2016 Region F Water Plan

Volume II Appendices

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2016 Region F Water Plan

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Volume II – APPENDICES

Appendix A

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Appendix B

WAM Analyses for Region F Water Availability

SUBJECT: Region F Run-Of-River Methodology

DATE: July 6, 2015

PROJECT: SAN11472

The annual supply for the run-of-river water rights were determined using the TCEQ WAMs, Run 3. Run-of-river supplies are reported individually for municipal water rights and irrigation and/or industrial rights greater than 10,000 acre-feet /year. Smaller non-municipal water rights are aggregated by county. In Region F there are four municipal run-of-river water rights with reliable supply.

- San Angelo, Concho River 214 ac-ft/yr
- City of Menard, San Saba River 139 ac-ft/yr
- Paint Rock, Concho River 37 ac-ft/yr
- Robert Lee, Colorado River 5 ac-ft/yr

Other run-of-river municipal water rights have no reliable supply under priority analyses. Each of these cities with reliable supply, with the exception of Menard, have other sources of water to help meet water needs. Menard has on-channel storage to enhance reliable supplies during times of low flow. Also, each of these cities has recommended strategies in the Region F Water Plan to meet projected shortages.

The other run-of-river water rights are aggregated irrigation or industrial water rights. The reliable supply from these rights are estimated using the minimum annual diversion reported by the WAM analysis. This is considered a reasonable approach to reliable supplies for these water rights given the monthly time-step of the WAM and the uncertainty of the diversions. Some of these rights include storage and may also be supplemented with other sources of water, such as groundwater. There is no direct connection between the aggregated water demand by county and an individual water right. Therefore, evaluating water reliability as if such direct relationship existed is not practical.

MEMORANDUM

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SUBJECT: Documentation of Colorado WAM Analyses for Region F Water Availability

DATE: September 9, 2014

PROJECT: SAN11472

This memorandum documents the datasets and processes used in the Water Availability Model (WAM) analyses for Region F. The first section of the memorandum pertains to firm yields calculated under the TCEQ WAM Run 3. The second section of this memorandum details the modifications of WAM as part of the subordination strategy. The first section of the memorandum identifies the base Colorado WAM dataset implemented for the analyses and the second section documents modifications to the base dataset, including the process implemented for determining safe yields.

1.0 TCEQ WAM Run 3

Consistent with TWDB rules and guidelines, existing water supplies in Region F were determined using a version of the TCEQ WAM Run 3 with revised SV/SA records for 2010 and 2060 to calculate the firm yield. These changes were approved by the Deputy EA of the TWDB on December 6, 2012. This model was received and downloaded from TCEQ on May 21, 2014. Freese and Nichols Inc. performed model runs on July 2, 2014.

2.0 Subordination

The subordination strategy in Region F adopts the cutoff model originally developed by Region K, with a few variations. The modifications made to WAM as well as the ways in which it differs from the version developed by Region K are outlined below. This model was also received and downloaded from TCEQ on May 21, 2014 and all of the analysis was performed by Freese and Nichols, Inc. in August, 2014.

Base Dataset

The cutoff model from TCEQ (*Cutoff.DAT*) was used as the base dataset for the safe yield analyses. The cutoff model is a modified version of the Colorado WAM in which water rights at and downstream of Lake Buchanan are subordinated to upstream water rights. The subordination was accomplished by subtracting a value of 10000000 from the priority dates of subordinating water rights. For example, a water right with an original priority date of 19580521 would have a priority date of 9580521 after subtracting 10000000. After the priority date adjustment, water rights upstream of Lake Buchanan become senior to downstream water rights but maintain their priorities relative to one another. The FLO, EVA, and FAD (*C32.FLO*, *C32.EVA*, and *C32.FAD*) files from TCEQ implemented a 73-year hydrologic period-of-analysis from 1940-2013. The base cutoff model from TCEQ is located in the following folder:
< T:\Task 3 Water Availability\Region F Extended WAM\Cutoff Model from TCEQ>.

Record of Modifications

Two datasets (*C3-Cutoff-FN2010-SUBORD-SafeYields.DAT* and *C3-Cutoff-FN2070-SUBORD-SafeYields.DAT*) were developed for the 2010 and 2070 safe yield analyses based on modifications to the cutoff model from TCEQ. The modifications are summarized below and described in greater detail in the remainder of this section. The modified DAT file with safe yields for 2010 conditions of reservoir sedimentation is located here: < T:\Task 3 Water Availability\Region F Extended WAM\Base\2010 Extended Cutoff WAM - SUBORD – SafeYields>. The modified DAT file with safe yields for 2070 conditions of reservoir sedimentation is located here: < T:\Task 3 Water Availability\Region F Extended WAM\Base\2070 Extended Cutoff WAM - SUBORD – SafeYields>. Modifications to the base dataset are marked with "FNI change" in the updated DAT files.

Summary of modifications:
1) General modifications
2) Updated reservoir sedimentation conditions
3) Priority date modification for additional water rights
4) Subordination of senior downstream reservoirs
5) Safe yield analyses

General Modifications
Several modifications were made to the base dataset to correct for mistakes or improve the modeling setup, summarized as follows.

- Control points added above Twin Buttes
- 7K diversion at Thomas changed to type 1 (no refill) with backup at Spence
- Nasworthy moved from control point C20240 to C20260 to agree with evaporation input file
- Twin Buttes moved from control point C20260 to C20330
- Backup used instead of system right at Twin Buttes
- Changed from system operations to diversion from Nasworty with backup from Twin Buttes
- Diversion at Nasworthy changed from type 2 to type 3, backup added
- Diversion at Twin Buttes changed from type 2 to type 1
- "Evap with wrong sign messages" associated with variable storage at different priority dates at Ballinger/Moonen corrected by changing the code so that shortages are backed up by storage at a priority date where storage isn't an issue
- Group ID added to WR 61401570002
- Storage for STHTEX changed from 203000 to 202988 for multiple WS records
- Group ID added to WR 61405471005SBU
- Group ID column spacing fixed for WR FILLBAYCITY1
- Group ID column spacing fixed for WR BUC-PUTBACK-LBJ
- Group ID column spacing fixed for WR TRA-PUTBACK-AUS
- Original code for subordinating Buchanan to O.H. Ivie was commented out (not necessary in cutoff model)

Updated Reservoir Sedimentation Conditions
The SV/SA and WS records for 15 reservoirs in the upper basin were updated for 2010 and 2070 conditions of reservoir sedimentation. The SV/SA records were updated using Microsoft Excel spreadsheets located in the following folder: <T:\Task 3 Water Availability\Sedimentation>. The spreadsheets modify the original SV/SA records based on sedimentation rate data and a specified length of time. After making new tabs for "Year 2010" and "Year 2070" and updating the "Condition" end date in each tab, the "Goal Seek" function (DATA → What-If Analysis → Goal Seek) can be used to compute updated SV/SA records. Within

the “Goal Seek” function, the “Error” cell is set to a value of 0 by changing the “Test Delta Area” cell. The *LAKE MOONEN ACE.xlsx* spreadsheet was used for Lake Ballinger.
The WS record storage capacity at the top of the conservation pool was updated using the maximum storage capacities from the updated SV records. The WS records for E.V. Spence Reservoir were not updated for either 2010 or 2070 reservoir sedimentation conditions because the authorized conservation storage capacity is less than the available storage capacity after sedimentation for both 2010 and 2070 conditions. The WS record storage capacities at the top of the conservation pools for O.C. Fisher Reservoir, several water rights at Lake Ballinger, and several water rights at Lake Winters are likewise less than the SV record amounts as a result of limited authorized storage volumes.

The WS record storage capacity at the top of the inactive pool was updated at 3 reservoirs by subtracting the difference between the original and updated conservation storage capacities at the top of the conservation pool from the original conservation storage capacity at the top of the inactive pool, with a minimum value of 0. For example, at Oak Creek Reservoir, the original and updated (2070 conditions) conservation storage capacities at the top of the conservation pool were 39,360 and 25,416 acre-feet, respectively, corresponding to a difference of 13,944 acre-feet. The original conservation storage capacity at the top of the inactive pool was 9,360 acre-feet. The updated conservation storage capacity at the top of the inactive pool is 0 acre-feet because 9,360 minus 13,944 is less than zero.

The SV/SA and WS records from Colorado WAM Run 8 were implemented for Lake Clyde for both the 2010 and 2070 updates. A 2013 TWDB survey of Lake Brownwood was used to update the SV/SA and WS records for 2010 conditions.

The original SV/SA records from the TCEQ cutoff model.

```
**J.B. Thomas Dam - Lake J.B. Thomas
SVTHOMAS       0    2000    7500   16400   31556   45000   75500  102000  135500  154000  203600  244000
SA             0     500    1110    1725    2420    2910    3910    4795    5850    6400    7820    8900
**Morgan Creek Dam - Lake Colorado City
SVCOLOCI       0     575    1000    2400    4000    5300    6300    9300   11600   16500   22500   31805
SA             0     108     160     268     375     450     507     680     810    1050    1350    1612
**Champion Creek Dam - Champion Creek
SVCHAMPI       0    1000    4000    6000    8500   10050   15500   20000   25000   30050   37000   42501
SA             0     200     360     480     580     640     800     920    1060    1220    1420    1560
**Robert Lee Dam - E. V. Spence
SVSPENCE       0    4000   11000   25000   70000  120000  185000  271000  333000  380000  445000  488761
SA             0     475    1025    2125    3800    5500    7500    9550   10775   12200   13900   14950
**Twin Buttes Dam - Twin Buttes
SVTWINBU       0    1000    3750   12300   49000   65300   84760  112000  130500  143300  158000  186201
SA             0     170     670    1050    2850    3580    4575    5870    6750    7400    8050    9080
**Nasworthy Dam - Lake Nasworthy - 1953 Survey
SVNASWOR       0     120     390     435    1580    2325    4170    6370    8210    9170   12390   13990
SA             0      72     143     160     350     460     706    1063    1210    1326    1596    1725
**San Angelo Dam - O.C. Fisher
SVOCFISH       0     255    2800    6034   11689   20494   36417   64517   82518   90237  103817  119201
SA             0     110     452     626     978    1564    2371    3248    3863    4218    4829    5440
**Elm Creek Dam - Lake Winters
SVELMCRK       0       2      42     234     680    1426    2404    3610    5152    7158    8374    9822
SA             0       1      19      77     146     227     262     341     430     573     643     805
**Oak Creek Dam - Oak Creek
SVOAKCRK       0    1450    2500    3950    5800    8300   14300   20500   29000   34250   39360   44280
SA             0     210     305     410     550     710    1085    1435    1890    2170    2375    2590
**Ballinger Municipal Lake Dam - Ballinger Municipal Lake
SVBALLIN       0     100     250     585    1200    2355    2950    3620    4500    4920    5450    6051
SA             0      20      40      77     149     277     325     380     455     480     520     560
**Simon Freese Dam - O.H. Ivie
SVOHIVIE       0    3062   14156   27438   38235  114886  147309  236764  361630  438584  526018  554341
SA             0     281     964    1918    2404    5819    7156   10674   14393   16425   18546   19149
**L. Clyde-Upper Pecan Bayou WS SCS Site 7 Dam - Lake Clyde
SVLCLYDE       0     200     523 789.257    1140    1665   21902922.157    3720    4720    5720    7690
SA             0      40      95     125     155     200     250     300     350     403     450     530
**Hords Creek Dam - Hords Creek Lake
```

```
SVHORDSC       0     194     401     776    1306    1935    2649    3533    4631    5989    7662    8641
SA             0      42      68     119     146     166     198     246     303     376     464     510
**Coleman Dam - Lake Coleman
SVCOLEMA       0     500     100    1800    3450    5300    9200   14500   18800   23600   33700   40001
SA             0      48     100     225     393     520     718     900    1175    1405    1730    2000
**Lake Brownwood Dam - Lake Brownwood - 1959 Survey, Dead Storage = 21,963
SVBROWNW       0     190     985    2675    5536   10378   18353   30524   47419   69620   98666  135964
SA             0      73     218     381     630    1084    1731    2553    3376    4413    5778    7298
**Brady Dam - Brady Creek
SVBRADYC       0     960    2060    2900    5200    6690    8650   10960   16910   20700   24740   30431
SA             0     160     285     360     575     710     860    1015    1370    1560    1765    2020
```

Updated SV/SA records for 2010 reservoir sedimentation conditions.

```
**Lake Thomas. Area-Capacity Relationship for Year 2010
SVTHOMAS       0     331    2488    7768   17269   31097   46130   67756   93855  124792  160198  199487
SA             0     206     538    1281    1896    2706    3253    3992    4725    5571    6219    7261
**Lake Colorado City. Area-Capacity Relationship for Year 2010
SVCOLOCI       0     105     678    2054    4329    7165    7526   11692   16922   23348   23774
SA             0      42     187     363     547     713     732     934    1158    1412    1430
**Lake Champion Creek. Area-Capacity Relationship for Year 2010
SVCHAMPI       0      96     664    1771    4761    9783   13151   17147   21791   27156   33427   37700
SA             0      34     110     208     395     613     734     864     993    1153    1355    1493
**Lake E.V. Spence. Area-Capacity Relationship for Year 2010 - Authorized Storage is 488,761
SVSPENCE       0      39    1900    8487   21541   46679   81499  134401  198939  281974  394270  514468
SA             0      31     422    1069    1885    3181    4534    6224    8192   10148   12309   14612
**Lake Twin Buttes. Area-Capacity Relationship for Year 2010
SVTWINBU       0    1766    4579    9220   17161   28963   55774   75155  100260  118586  132333  174144
SA             0     469     649     949    1349    2049    3379    4374    5669    6549    7199    8879
**Lake Nasworthy. Area-Capacity Relationship for Year 2010
SVNASWOR       0      71     439     981    1923    3261    5007    6031    7133    8307    9554    9820
SA             0      54     198     356     575     766     981    1066    1138    1209    1285    1371
**Lake O.C. Fisher. Area-Capacity Relationship for Year 2010
SVOCFISH       0    1091    2510    4949    9095   15669   24650   35957   49553   65782   86031  100516
SA             0     211     357     619    1040    1590    2003    2520    2919    3573    4527    5130
**Lake Winters (Elm Creek). Area-Capacity Relationship for Year 2010
SVELMCRK       0     159     507    1155    2035    3143    4586    6494    7661
SA             0      52     121     202     237     316     405     548     618
**Lake Oak Creek. Area-Capacity Relationship for Year 2010
SVOAKCRK      51     286     897    1933    4549    9723   12799   15199   17924   22695   28321   32556
SA            20     105     205     320     555     930    1120    1280    1445    1735    2015    2220
**Lake Ballinger/Moonen. Area-Capacity Relationship for Year 2010
SVBALLIN       0       1       9      39     307     768    1510    2550    3972    5948
SA             0       1       4      12      80     151     221     300     412     577
**Lake O.H. Ivie. Area-Capacity Relationship for Year 2010
SVOHIVIE       0     851    4162   11493   26008   47463   80228  128028  196512  287350  402579  515742
SA             0     231     611    1368    2214    3254    4968    7127    9946   12834   16034   18758
**L. Clyde-Upper Pecan Bayou WS SCS Site 7 Dam - Lake Clyde. From Colorado WAM Run 8.
SVLCLYDE       0     179     428     657     966    1461    1962    2678    3469    4466    5466    5494
SA             0      27      78     109     141     189     242     296     348     403     450     452
**Lake Hords CReek Lake. Area-Capacity Relationship for Year 2010
SVHORDSC       0      29      98     279     645    1129    1695    2388    3276    4396    5807    7564
SA             0       8      26      69     108     133     150     196     249     315     393     485
**Lake Coleman. Area-Capacity Relationship for Year 2010
SVCOLEMA       0     217     803    1820    3353    5704    8731   12577   17610   23997   31800   37931
SA             0      72     127     234     387     538     683     870    1135    1421    1687    1808
** Lk Brownwood 2013 TWDB Survey
**Elev      1362    1372    1382    1392    1397    1401    1405    1409    1413    1417    1421    1425
SVBROWNW       0     280    1882    8625   16226   24481   35269   48628   64573   83600  105919  131530
SA             0      78     289    1219    1812    2403    2975    3685    4345    5168    5991    6814
**Lake Brady Creek. Area-Capacity Relationship for Year 2010
SVBRADYC       0     781    1606    3137    5736    7558    9761   12364   15411   18933   22948   28457
SA             0     104     229     389     654     804     959    1124    1314    1504    1709    1964
```

Updated SV/SA records for 2070 reservoir sedimentation conditions.

```
**Lake Thomas. Area-Capacity Relationship for Year 2070
SVTHOMAS       0      84    1640    6318   15217   28443   42975   63999   89497  119831  154636  193323
SA             0     105     437    1180    1795    2605    3152    3891    4624    5470    6118    7160
**Lake Colorado City. Area-Capacity Relationship for Year 2070
SVCOLOCI       0     217    1110    2701    2924    5707    9555   14599   14942
SA             0      87     271     437     456     658     882    1136    1154
**Lake Champion Creek. Area-Capacity Relationship for Year 2070
SVCHAMPI       0      87     693    2965    7269   10279   13916   18201   23208   29121   33178
SA             0      38     136     323     541     662     792     921    1081    1283    1421
```

```
**Lake E.V. Spence. Area-Capacity Relationship for Year 2070
SVSPENCE       0     597    5692   17252   40731   74057  125300  188344  269886  380522  499227
SA             0     256     903    1719    3015    4368    6058    8026    9982   12143   14446
**Lake Twin Buttes. Area-Capacity Relationship for Year 2070
SVTWINBU       0     539    2087    5211   11381   21413   45694   87650  118459  158954
SA             0     216     396     696    1096    1796    3126    5416    6946    8626
**Lake Nasworthy. Area-Capacity Relationship for Year 2070
SVNASWOR       0      15     183     952    1972    3382    5206    7356    8793
SA             0      29     135     412     604     809    1003    1146    1308
**Lake O.C. Fisher. Area-Capacity Relationship for Year 2070
SVOCFISH       0     579    2789    7427   14472   23842   35502   49795   68108   81431
SA             0     232     653    1203    1616    2133    2532    3186    4140    4743
**Lake Winters (Elm Creek). Area-Capacity Relationship for Year 2070
SVELMCRK       0     138     576    1246    2143    3377    3377    5075    6137
SA             0      69     150     185     264     353     353     496     566
**Lake Oak Creek. Area-Capacity Relationship for Year 2070
SVOAKCRK       0      79     589    2527    8003   10013   16532   25416
SA             0      60     200     460     925    1085    1540    2025
**Lake Ballinger/Moonen. Area-Capacity Relationship for Year 2070
SVBALLIN       0       8     215     645    1356    2366    3757    5703
SA             0       4      72     143     213     292     404     569
**Lake O.H. Ivie. Area-Capacity Relationship for Year 2070
SVOHIVIE       0    2992   18007   58936  136861  245133  401848
SA             0     776    2453    5122    8978   12750   17115
**L. Clyde-Upper Pecan Bayou WS SCS Site 7 Dam - Lake Clyde. From Colorado WAM Run 8.
SVLCLYDE       0     179     428     657     966    1461    1962    2678    3469    4466    5466    5494
SA             0      27      78     109     141     189     242     296     348     403     450     452
**Lake Hords CReek Lake. Area-Capacity Relationship for Year 2070
SVHORDSC       0      78     339     718    1180    1768    2552    3568    4875    6527
SA             0      43      82     107     124     170     223     289     367     459
**Lake Coleman. Area-Capacity Relationship for Year 2070
SVCOLEMA       0      19     289     989    2259    4843    7756   12442   18961   25944   35072
SA             0      19      74     181     334     508     661     929    1253    1533    1755
**Lake Brownwood. Area-Capacity Relationship for Year 2070
SVBROWNW       0       0   14851   41617   65346   69894   79637   84855   95884  101644  113709
SA             0       0    1919    3514    4448    4648    5104    5333    5684    5837    6228
**Lake Brady Creek. Area-Capacity Relationship for Year 2070
SVBRADYC       0     119     313    1189    1915    4234    5916   10442   13348   20605   25946
SA             0      48     108     248     333     598     748    1068    1258    1653    1908
```

Priority Date Modification for Additional Water Rights

A value of 10000000 was subtracted from the priority dates for all water rights at and upstream of Junction (G40090) and Brady Creek Reservoir (E20090) using the Hoffpauir Priority Date Modification Tool. The Priority Date Modification Tool, developed by Richard Hoffpauir, consists of an executable program named “Priority” which reads an input PIN file. Control points are listed on CP records in the PIN file along with values to be added or subtracted from the priority dates. The priority dates are modified at the specified control points and all upstream control points. The “Priority” executable program and PIN file used to modify the datasets is located in the following folder: <T:\Task 3 Water Availability\Region F Extended WAM\Base\HoffpauirPriorityDateModificationTool>.

Subordination of Senior Downstream Reservoirs

In order to simulate water allocation among the upper basin reservoirs in upstream-to-downstream priority order, senior downstream reservoirs were subordinated to junior upstream reservoirs. Specifically, two water rights at O. H. Ivie Reservoir were subordinated to a junior water right at Lake Ballinger/Moonen and three water rights at Lake Brownwood were subordinated to junior water rights at Hords Creek Reservoir, Lake Coleman, and Lake Clyde when storage in Brownwood exceeded 50% of the maximum conservation storage capacity. When storage in Brownwood was less than 50% of the maximum storage capacity, the water rights at Brownwood were not subordinated to the upstream water rights.

The setup for subordinating the water rights at O. H. Ivie Reservoir and Lake Brownwood to upstream junior water rights is based on a technique described on pp. 149 & 367 of the Water Rights Analysis Package (WRAP) Modeling System Reference Manual in which several WRAP features are combined to model a subordination agreement. The control point availability limit option on the PX record is utilized at the upstream junior water rights to enable depletions without regard to senior downstream reservoirs and all downstream control points. Backup rights which have access to storage at the senior downstream reservoirs are used to back up excess stream flow depletions resulting from implementation of the control point availability limit option. In order to prevent the downstream senior rights from inappropriately refilling reservoir storage as a result of depletions made by the backup rights in previous time steps, depletions for the downstream senior rights are limited to depletions made in an initial simulation. The initial simulation is identical to the original arrangement of records without subordinations. Copies of the original upstream junior water rights are included in the initial simulation.

Records from the 2010 scenario DAT file are reproduced below to document the methodology that was implemented in detail. The records utilized for modeling the subordinations in the 2010 scenario DAT file are identical to the records utilized in the 2070 scenario DAT file apart from changes associated with reservoir sedimentation conditions or the safe yield analyses. Records added or modified to model the subordinations are marked with “FNI change – SUBORD” in the updated DAT files.

Subordination of Water Rights at O. H. Ivie Reservoir
Water rights 11403676301 and 11403676302 at O. H. Ivie Reservoir were subordinated to junior water right 61401072302 at Lake Ballinger/Moonen.

The updated records for the water right at Lake Ballinger are reproduced below. Water right 61401072302 is modified by the addition of a PX record. PX record DUAL option 2 is used to activate the water right only during the second simulation. PX record XCP option 2 is used to allow the water right to exclude control point D20050 (the location of the water rights at O. H. Ivie Reservoir) and all downstream control points in determining flow availability. The flow availability is limited to the flow depletion of the senior water rights at D20050. Water right 61401072302a is a copy of water right 61401072302 followed by a PX record. PX record DUAL option 1 activates the water right only during the initial simulation. A copy of water right 61401072302 must be included in the initial simulation to properly implement PX record depletion limits for the water rights at O. H. Ivie Reservoir, described in the next paragraph.

```
**  FNI change - SUBORD - Original records implemented in initial simulation and control point
**                        availability limit option implemented in second simulation for
**                        subordination of O.H. Ivie to Ballinger/Moonen
WRD40040     0.0     MUN 9800407                              61401072302a
WSBALLIN    5948
PX     1
WRD40040     0.0     MUN 9800407                              61401072302     6140107261072302
WSBALLIN    5948
PX     2               2  D20050
```

The updated records for the water rights at O. H. Ivie Reservoir are reproduced below. Water right BKUP-61401072302 is added as a backup for excess stream flow depletions made by water right 61401072302 as a result of the implementation of the downstream control point availability limit option. The backup right makes depletions from reservoir storage in O. H. Ivie Reservoir. The backup right is activated only during the second simulation using PX record DUAL option 2. Because the backup water right has access to reservoir storage in O. H. Ivie Reservoir, drawdowns in reservoir storage made by the backup water right may be inappropriately refilled by the senior water rights at O. H. Ivie Reservoir in future time steps, resulting in impacts to third-party water rights. In order to prevent impacts to third-party water rights, the depletions for senior water rights 11403676301 and 11403676302 at O. H. Ivie Reservoir are limited to the depletions made in an initial simulation using PX record DUAL option 3. The initial simulation reproduces the results of the original records prior to implementation of the subordinations (this is the reason a copy of the original records for water right 61401072302 were included in the initial simulation, as described in the previous paragraph).

```
**  FNI change - SUBORD - Dual pass option is activated to constrain flow depletions for
**                        subordination of O.H. Ivie to Ballinger/Moonen
WRD20050   32121     MUN 9780221                               11403676301     1140367613676301
WSOHIVIE  515742
PX     3
**  FNI change - SUBORD - Dual pass option is activated to constrain flow depletions for
**                        subordination of O.H. Ivie to Ballinger/Moonen
WRD20050    3119  IN3676 9780221                               11403676302     1140367613676302
WSOHIVIE  515742
PX     3
**  FNI change - SUBORD - Backup right for subordination of O.H. Ivie to Ballinger/Moonen
WRD20050                99999999                               BKUP-6140107230211403676
WSOHIVIE  515742
BU             61401072302
PX     2
```

Subordination of Water Rights at Lake Brownwood

Water rights 61402454301, 61402454302, and 61402454303 at Lake Brownwood were subordinated to water right 61401705301 at Hords Creek Reservoir, water rights 61401702301 and 61401702302 at Lake Coleman, and water rights 61401660301 and 61401660002 at Lake Clyde when storage in Lake Brownwood was greater than or equal to 50% of the maximum conservation storage capacity.

The updated records for the instream flow right and water right at Hords Creek Reservoir are reproduced below. The modifications to the water right are the same as those made for water right 61401072302 at Lake Ballinger/Moonen, described above. An instream flow right was added to prevent the senior water rights at Lake Brownwood from being subordinated to the junior right at Hords Creek Reservoir when reservoir storage in Lake Brownwood was less than 50% of the maximum conservation storage capacity. The instream flow right sets a target in the second simulation equal to the available regulated flow at Hords Creek Reservoir if storage in Lake Brownwood in the previous month is less than 50% of the maximum conservation storage capacity. With this setup, the water rights at Lake Brownwood are effectively not subordinated to the water right at Hords Creek Reservoir when storage is less than 50% because the water right at Hords Creek Reservoir has zero available stream flow to deplete.

```
**  FNI change - SUBORD - Add IF requirement to pass all water if Brownwood is below 50%.
IFF30370                 9460323              -7    Hords bypass
TO     2     1.0                         F30370
PX     2
**  FNI change - SUBORD - Original records implemented in initial simulation and control point
**                        availability limit option implemented in second simulation for
**                        subordination of Brownwood to Hords Creek
WRF30370     370     MUN 9460323   1   1                       61401705301a
WSHORDSC    7564
PX     1
WRF30370     370     MUN 9460323   1   1                       61401705301     6140170561705301
WSHORDSC    7564
PX     2               2  F30130
```

The drought index records for evaluating storage conditions in Lake Brownwood are reproduced below. The drought index multiplier for the instream flow right at Hords Creek Reservoir is set to 1 when storage in Lake Brownwood is less than 50% and 0 when storage is greater than 50%. The storage volume corresponding to 50% capacity on the IS record varies between the 2010 and 2070 scenarios as a result of reservoir sedimentation in Lake Brownwood.

```
**  FNI change - SUBORD - Brownwood is not subordinated if below 50%.
DI     7       1  BROWNW
IS     4       0   65765 65765.1  131530
IP     4     100     100       0       0
```

The updated records for the instream flow right and water rights at Lake Coleman are reproduced below. The records are identical in format to the records implemented at Hords Creek Reservoir, described above.

```
**  FNI change - SUBORD - Add IF requirement to pass all water if Brownwood is below 50%.
IFF30420                 9580825              -7  Coleman bypass
TO     2     1.0                         F30420
PX     2
**  FNI change - SUBORD - Original records implemented in initial simulation and control point
**                        availability limit option implemented in second simulation for
**                        subordination of Brownwood to Coleman
WRF30420    1475     MUN 9580825   1   1                        61401702301a
WSCOLEMA   37931
PX     1
WRF30420    1475     MUN 9580825   1   1                        61401702301     6140170261702301
WSCOLEMA   37931
PX     2               2  F30130
**  FNI change - SUBORD - Original records implemented in initial simulation and control point
**                        availability limit option implemented in second simulation for
**                        subordination of Brownwood to Coleman
WRF30420    1475  IN1702 9580825   1   1                        61401702302a
WSCOLEMA   37931
PX     1
WRF30420    1475  IN1702 9580825   1   1                        61401702302     6140170261702302
WSCOLEMA   37931
PX     2               2  F30130
```

The updated records for the instream flow right and water rights at Lake Clyde are reproduced below. The records are identical in format to the records implemented at Hords Creek Reservoir, described above.

```
**  FNI change - SUBORD - Add IF requirement to pass all water if Brownwood is below 50%
IFF31130                 9650202              -7    Clyde bypass
TO     2     1.0                         F31130
PX     2
**  FNI change - SUBORD - Original records implemented in initial simulation and control point
**                        availability limit option implemented in second simulation for
**                        subordination of Brownwood to Clyde
WRF31130     150     MUN 9650202                                61401660301a
WSLCLYDE    5494
PX     1
WRF31130     150     MUN 9650202                                61401660301     6140166061660301
WSLCLYDE    5494
PX     2               2  F30130
**  FNI change - SUBORD - Original records implemented in initial simulation and control point
**                        availability limit option implemented in second simulation for
**                        subordination of Brownwood to Clyde
WRF31130       0     MUN 9850906   1   2       0                61401660002a
WSLCLYDE    5494
PX     1
WRF31130       0     MUN 9850906   1   2       0                61401660002     6140166061660002
WSLCLYDE    5494
PX     2               2  F30130
```

The updated records for the water rights at Lake Brownwood are reproduced below. The records are identical in format to the records implemented at O. H. Ivie Reservoir, described above.

```
**  FNI change - SUBORD - Dual pass option is activated to constrain flow depletions for
**                         subordination of Brownwood to Hords Creek, Coleman, and Clyde
WRF30130   14089     MUN 9250929   1   4  BROWNR  F20360        61402454301     6140245462454301
WSBROWNW  131530                           17530
PX     3
WRF30130    4407  IN2454 9250929   1   2       0  F20360        61402454302     6140245462454302
WSBROWNW  131530                           17530
PX     3
WRF30130    7673   IRR-F 9250929   1   2       0  F20360        61402454303     6140245462454303
WSBROWNW  131530                           17530
PX     3
**  FNI change - SUBORD - Backup right for subordination of Brownwood to Hords Creek
WRF30130                99999999                                BKUP-6140170530161402454
WSBROWNW  131530
BU              61401705301
PX     2
** FNI change - SUBORD - Backup rights for subordination of Brownwood to Coleman
WRF30130                99999999                                BKUP-6140170230161402454
WSBROWNW  131530
BU              61401702301
PX     2
WRF30130                99999999                                BKUP-6140170230261402454
WSBROWNW  131530
BU              61401702302
PX     2
** FNI change - SUBORD - Backup rights for subordination of Brownwood to Clyde
WRF30130                99999999                                BKUP-6140166030161402454
WSBROWNW  131530
BU              61401660301
PX     2
WRF30130                99999999                                BKUP-6140166000261402454
WSBROWNW  131530
BU              61401660002
PX     2
```

Third-party Impacts

In order to ensure that third-party water rights not be impacted by the subordinations, JO record variable DUALD option 3 was implemented. This makes PX record DUAL option 3 the default option for all water rights such that depletions are limited to the depletions made in the initial simulation. As described earlier, the initial simulation reproduces the results of the original records prior to implementation of the subordinations.

Safe Yield Analyses

The term “safe yield” refers to the annual rate at which water may be diverted from a reservoir such that the minimum observed reservoir storage volume through the simulation period-of-analysis is just above the annual diversion rate. The safe yields were evaluated for 16 reservoirs and 1 run-of-river right in the Upper Colorado River Basin for 2010 and 2070 conditions of reservoir sedimentation.

The safe yields were determined one reservoir at a time in upstream-to-downstream order, as listed in Table 1. For each reservoir, the diversion amounts for water rights at the reservoir were iteratively reduced until the minimum observed storage in the reservoir through the period-of-analysis was just above (within 100 acre-feet) the total diversion at the reservoir. The safe yield diversion amounts at the upstream reservoir were kept in place while repeating the iterative process for the next downstream reservoir. For reservoirs with multiple water rights with the same priority date, the diversion amounts at each water right were reduced simultaneously while maintaining the same relative ratios as the original authorized diversion amounts. For reservoirs with multiple water rights with varying priority dates, the diversion amount was reduced for the most junior water right first and then for the next most junior water right, and on in this pattern until the safe yield was found. Records updated in the safe yield analyses are marked with "FNI change – SAFE YIELD" in the updated DAT files.

The *ReadWrapOut6f.xlsx*, *C3-Cutoff-FN2010-SUBORD-SafeYields_extract.xlsx*, and *C3-Cutoff-FN2070-SUBORD-SafeYields_extract.xlsx* spreadsheets were used to evaluate reservoir storage after each iteration of the safe yield analyses. The spreadsheets can be found with the updated DAT files in the locations provided previously.

Water right 61401570001 at Junction is a run-of-river water right with no reservoir storage. The safe yield for this water right was evaluated as the minimum annual diversion observed through the period-of-analysis. The safe yield was evaluated last after setting the safe yield diversion amounts for all other water rights.

Table 1. Results of Safe Yield Analyses for 2010 and 2070 Reservoir Sedimentation Conditions

Reservoir Name	Reservoir Identifier	Water Right Identifier	Priority Date	Use Type	Authorized Diversion (ac-ft/yr)	Safe Yield (ac-ft/yr)	
						2010 Scenario	2070 Scenario
Thomas	**THOMAS**			**Total**	**30,000**	**4,881**	**4,780**
		61401002301A	9460805	MUN	22,050	3,588	3,513
		61401002301B	9460805	IN1002	950	155	151
		61401002002	9460805	MUN	7,000	1,139	1,115
Champion	**CHAMPI**			**Total**	**6,750**	**1,500**	**1,380**
		61401009301	9570408	MUN	2,700	600	552
		61401009302	9570408	IN1009	4,050	900	828
Colorado City	**COLOCI**			**Total**	**5,500**	**2,300**	**1,940**
		61401009303A	9481122	MUN	2,750	1,150	970
		61401009303B	9481122	IN1009	2,750	1,150	970
Spence	**SPENCE**			**Total**	**34,573**	**24,620**	**24,450**
		61401008301	9640817	MUN	31,573	22,484	22,328
		61401008302	9640817	IN1008	2,000	1,424	1,414
		61401008303	9640817	MIN	1,000	712	707
Oak Creek	**OAKCRK**			**Total**	**10,000**	**1,600**	**960**
		61401031301	9490427	IN1031	4,000	640	384
		61401031302	9490427	MUN	5,328	852	511
		61401031303	9490427	MUN	672	108	65
Ballinger	**BALLIN**			**Total**	**1,685**	**785**	**750**
		31401130301	9570225	MUN	60	0	0
		61401072301	9461004	MUN	1,000	160	125
		61401075301	9300207	IRR-D	36	36	36
		61401129302	9290306	MUN	49	49	49
		61401073301	9250406	IRR-D	40	40	40
		61401129301	9140611	MUN	450	450	450
		61401074301	9131103	IRR-D	50	50	50

Reservoir Name	Reservoir Identifier	Water Right Identifier	Priority Date	Use Type	Authorized Diversion (ac-ft/yr)	Safe Yield (ac-ft/yr) 2010 Scenario	Safe Yield (ac-ft/yr) 2070 Scenario
Elm Creek	**ELMCRK**			**Total**	**1,360**	**195**	**170**
		61401095304	9830207	MUN	200	0	0
		61401095302	9570605	MUN	600	0	0
		61401095301	9441218	MUN	560	195	170
Twin Buttes	**TWINBU**			**Total**	**29,000**	**2,600**	**2,150**
		61401318002	9590506	MUN	4,000	359	297
		61401318001	9590506	IRR-C	25,000	2,241	1,853
Nasworthy	**NASWOR**			**Total**	**25,000**	**288**	**200**
		6141319002	9290311	MUN	17,000	196	136
		61401309003	9290311	IND	7,000	81	56
		61401319001C	9290311	IRR-C	1,000	12	8
O. C. Fisher	**OCFISH**			**Total**	**80,400**	**1,640**	**1,030**
		61401190001	9490527	MUN	80,400	1,640	1,030
O. H. Ivie	**OHIVIE**			**Total**	**113,000**	**35,240**	**29,140**
		11403676301	9780221	MUN	103,000	32,121	26,561
		11403676302	9780221	IN3676	10,000	3,119	2,579
Brady Creek	**BRADYC**			**Total**	**3,500**	**1,930**	**1,700**
		61401849001	9590902	MUN	3,000	1,654	1,457
		61401849002	9590902	IND	500	276	243
Hords Creek	**HORDSC**			**Total**	**2,240**	**370**	**300**
		61401705301	9460323	MUN	2,240	370	300
Coleman	**COLEMA**			**Total**	**9,000**	**2,950**	**2,740**
		6140172301	9580825	MUN	4,500	1,475	1,370
		61401702302	9580825	IN1702	4,500	1,475	1,370
Clyde	**LCLYDE**			**Total**	**1,200**	**150**	**150**
		6141660002	9850906	MUN	200	0	0
		61401660301	9650202	MUN	1,000	150	150
Brownwood	**BROWNW**			**Total**	**29,712**	**26,169**	**23,600**
		61402454301	9250929	MUN	15,996	14,089	12,705
		61402454302	9250929	IN2454	5,004	4,407	3,975
		61402454303	9250929	IRR-F	8,712	7,673	6,920
Junction	**N/A**			**Total**	**1,000**	**412**	**412**
		61401570001	9310517	MUN	1,000	412	412

MEMORANDUM

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SUBJECT: Documentation of for Region F Water Availability in the Rio Grande Basin

DATE: March 31 ,2014

PROJECT: SAN11472

This memorandum documents the analyses for the reservoir availability and run of river supplies in the Rio Grande River Basin in Region F. The surface water supplies are based on the hydrology developed for the TCEQ Water Availability Model (WAM). Any deviation from these flows was approved in the letter from the TWDB dated December 6, 2012 "Request for Modifications to Water Availability Models for Planning Purposes." In the letter it authorizes the following methodology for supply for Lake Balmorhea:

- The use of minimum annual supplies from the spring that feeds Lake Balmorhea in order to develop yield for the Lake.

1.0 TCEQ WAM Run 3

Consistent with TWDB rules and guidelines, existing water supplies in Region F were determined using the TCEQ WAM Run 3 to calculate the firm yield. The model version used for the 2016 Region F supplies was April 14, 2004. This version is consistent with supply evaluations under the current version of the TCEQ WAM Run 3 since 1) the hydrology of the Rio Grande WAM has not been extended and 2) no new water rights have been granted in the Region F portion of the Rio Grande Basin. The following sections describe the process used to determine the availability for each source.

1.1 Lake Balmorhea

The yield from Lake Balmorhea is assumed to be the minimum annual supply from the springs that feed the reservoir. This was calculated using the Rio Grande RG3.FAD file for spring flows. The minimum year occurred in 1983 and total spring flow was 21,844 acre-feet per year. The data is included in Table 1.

Table 1: Rio Grande Run 3 FAD Flow

-Values in Acre-Feet-

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1940	2,506	2,397	2,502	2,264	2,418	2,286	2,304	2,432	2,184	2,526	2,468	2,516	**28,803**
1941	2,496	2,251	2,286	2,234	2,645	2,625	2,757	2,791	3,497	4,769	4,489	4,186	**37,026**
1942	3,619	2,939	3,074	2,840	2,814	2,721	2,740	2,647	3,184	3,134	2,905	2,761	**35,378**
1943	2,712	2,407	2,625	2,573	2,656	2,566	2,818	2,751	2,456	2,524	2,337	2,297	**30,722**
1944	2,416	2,223	2,347	2,174	2,322	2,221	2,362	2,530	3,455	3,477	2,920	2,705	**31,152**
1945	2,564	2,316	2,609	2,459	2,522	2,405	3,836	3,429	2,856	2,629	2,425	2,449	**32,499**
1946	2,398	2,256	2,528	2,537	2,571	2,339	2,400	2,477	2,504	3,244	2,843	2,921	**31,018**
1947	2,708	2,306	2,380	2,358	2,474	2,313	2,356	2,300	2,120	2,196	2,100	2,217	**27,828**
1948	2,284	2,039	2,178	2,147	2,282	2,140	2,167	2,185	2,093	2,084	2,019	2,032	**25,650**
1949	2,003	1,793	2,124	2,086	2,165	2,194	2,295	2,248	2,115	2,120	1,992	2,133	**25,268**
1950	2,156	1,947	2,109	2,086	2,156	2,086	2,187	2,320	2,288	2,250	2,093	2,138	**25,816**
1951	2,055	1,884	2,086	2,019	2,124	2,109	2,225	2,160	2,106	2,172	2,106	2,086	**25,132**
1952	2,086	1,905	2,120	2,086	2,098	2,111	2,685	2,508	2,255	2,267	2,035	2,103	**26,259**
1953	2,086	1,884	2,086	2,047	2,086	2,037	2,111	2,178	2,146	2,086	2,001	2,071	**24,819**
1954	2,001	1,801	2,039	1,999	2,165	2,124	2,268	2,403	2,535	2,398	2,203	2,223	**26,159**
1955	2,223	2,089	2,277	2,102	2,127	2,133	2,290	2,297	2,100	2,396	2,089	2,149	**26,272**
1956	2,138	1,997	2,160	2,091	2,178	2,066	2,340	2,264	2,109	2,147	2,035	1,981	**25,506**
1957	1,878	1,784	2,017	2,017	2,048	2,077	2,068	2,095	1,967	1,994	1,979	2,044	**23,968**
1958	1,992	1,848	2,124	1,992	2,071	2,140	2,167	2,203	2,385	2,605	2,302	2,295	**26,124**
1959	2,196	1,891	2,176	2,084	2,167	2,077	2,214	2,281	2,156	2,169	2,082	2,154	**25,647**
1960	2,086	2,041	2,111	1,925	1,983	2,008	2,308	2,526	2,692	2,842	2,661	2,656	**27,839**
1961	2,643	2,496	2,806	2,230	2,158	2,026	2,214	2,306	2,252	2,255	2,154	2,111	**27,651**
1962	2,086	1,848	2,138	2,255	2,234	2,174	2,295	2,295	2,154	2,225	2,124	2,156	**25,984**
1963	2,140	1,955	2,156	2,086	2,086	2,118	2,115	2,044	1,952	2,017	1,979	2,156	**24,804**
1964	2,181	2,071	2,131	1,952	2,080	2,019	2,156	2,156	2,086	2,104	2,066	2,037	**25,039**
1965	2,140	1,975	2,225	2,129	2,122	1,923	1,840	1,990	1,905	1,905	1,783	1,871	**23,808**
1966	1,829	1,586	1,905	1,804	1,822	1,642	1,771	1,933	2,497	2,156	2,019	2,097	**23,061**
1967	2,107	1,834	1,954	1,810	1,975	1,884	2,069	2,200	1,938	2,051	1,996	2,133	**23,951**
1968	1,804	1,770	1,634	1,642	1,759	1,849	2,441	2,577	2,625	2,191	2,201	2,239	**24,732**
1969	2,169	1,865	2,052	1,857	1,787	2,006	2,032	1,968	1,888	1,933	1,966	2,278	**23,801**
1970	1,960	1,884	1,752	1,730	1,794	1,622	1,590	1,836	1,952	1,989	2,084	2,042	**22,235**
1971	2,098	1,727	1,857	1,787	1,836	1,831	1,833	1,892	1,958	2,065	1,925	1,912	**22,721**
1972	2,130	1,718	1,836	1,783	1,850	1,918	1,926	2,274	2,376	2,065	2,059	2,135	**24,070**
1973	2,167	1,790	1,985	1,952	1,996	1,979	2,011	2,323	2,106	1,947	2,059	2,796	**25,111**
1974	1,218	1,854	1,951	1,817	1,899	1,835	1,905	1,992	2,012	5,772	4,146	2,796	**29,197**
1975	4,063	3,154	2,504	2,356	2,399	2,288	2,013	2,121	2,154	1,947	2,128	2,021	**29,148**

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1976	2,713	1,952	1,878	1,851	1,947	1,750	2,167	2,121	2,019	2,434	2,003	2,241	**25,076**
1977	1,944	2,230	2,295	2,053	1,947	1,750	1,878	1,854	1,750	2,017	1,997	1,909	**23,624**
1978	1,909	1,593	1,808	1,854	1,914	1,788	1,808	1,982	2,086	3,269	2,557	2,504	**25,072**
1979	2,320	1,911	1,808	2,187	2,712	2,154	1,835	1,878	1,884	1,801	2,524	1,822	**24,836**
1980	2,153	2,017	2,079	1,925	1,947	1,834	1,852	1,989	2,113	2,378	1,938	1,822	**24,047**
1981	2,016	2,032	2,100	1,918	2,093	1,528	2,003	2,414	3,964	2,361	2,205	2,392	**27,026**
1982	2,134	1,956	2,142	1,905	1,947	1,864	1,881	1,877	1,841	1,968	1,800	1,752	**23,067**
1983	2,745	2,141	1,794	1,763	1,777	1,676	1,705	1,676	1,635	1,620	1,608	1,704	**21,844**
1984	1,899	1,906	2,013	1,871	1,899	2,234	2,682	2,323	2,214	2,253	1,905	1,808	**25,007**
1985	1,645	1,666	1,989	2,049	2,246	2,356	1,776	1,864	1,901	2,065	1,911	1,905	**23,373**
1986	2,107	1,930	1,975	1,911	1,895	1,757	1,885	2,002	2,226	2,668	2,219	2,437	**25,012**
1987	2,610	2,246	2,539	2,451	2,046	3,007	1,946	1,952	1,871	1,885	2,389	1,893	**26,835**
1988	1,836	2,221	2,354	1,817	2,404	2,253	1,887	1,852	1,815	1,885	2,210	2,245	**24,779**
1989	1,886	1,705	2,272	2,003	1,857	2,000	1,956	1,859	2,170	1,842	2,131	2,228	**23,909**
1990	1,838	2,025	1,842	1,970	1,844	1,939	1,821	2,369	2,466	2,647	2,562	2,310	**25,633**
1991	2,221	2,086	2,232	1,938	2,013	2,014	1,973	4,660	2,770	3,225	2,206	2,308	**29,646**
1992	2,484	2,204	2,979	2,495	2,582	2,387	2,278	2,151	2,211	2,082	2,148	2,056	**28,057**
1993	2,025	2,086	2,019	2,004	2,037	2,097	1,930	2,084	1,998	2,383	2,265	1,903	**24,831**
1994	2,284	1,753	2,166	1,866	2,361	1,840	2,173	1,878	2,151	1,866	2,170	2,212	**24,720**
1995	1,957	1,793	1,797	1,849	1,954	1,894	2,009	1,957	1,852	2,064	2,240	2,199	**23,565**
1996	1,800	1,725	2,132	2,061	2,132	2,063	2,042	2,132	2,268	2,036	2,154	2,225	**24,770**
1997	2,199	1,709	1,893	1,821	1,849	1,789	2,116	2,123	1,777	1,859	1,771	1,824	**22,730**
1998	1,851	1,649	1,936	1,833	1,916	1,802	1,880	1,842	1,766	1,879	1,813	1,885	**22,052**
1999	1,904	1,727	1,922	1,824	1,886	1,779	1,970	2,050	1,834	1,815	1,800	1,815	**22,326**
2000	1,827	1,747	1,885	1,861	1,918	1,824	1,941	1,882	1,856	1,935	1,804	1,815	**22,295**

1.2 Red Bluff Reservoir

The firm yield for Red Bluff reservoir was calculated using a Microsoft Excel based mass balance (Operate) model. The inflows and evaporation rate from the TCEQ WAM Run 3 were used for the yield analysis. The demand pattern was based on an irrigation pattern with use only during the spring and summer (March-September). The area-capacity relationship for 2000 and 2060 was used in calculating the yields. Table 2 through Table 4 include the inflow, evaporation rate, and area capacity for Red Bluff Reservoir. The 2000 yield calculated based on these assumptions was 41,725 acre-feet per year, decreasing to 38,570 acre-feet per year.

1.3 Run of River Diversions

The run of river supplies were calculated using the TCEQ WAM Run3. The firm supply was determined as the minimum annual diversion from the river. Based on this the only run of river supplies were in Pecos County for irrigation purposes. The annual supply was calculated to be 4,444 acre-feet per year.

Table 2: Inflow to Red Bluff Reservoir

-Values in Acre-Feet-

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1940	2,698	4,384	2,460	105	4,180	2,698	0	2,981	4,198	18,361	7,086	8,041
1941	9,499	7,534	8,585	585	306,080	14,887	16,335	16,620	9,179	6,184	85,720	50,898
1942	39,437	5,560	3,980	4,102	37,122	6,235	3,650	2,356	80,817	17,833	55,034	2,865
1943	4,457	6,188	2,522	2,185	3,532	3,413	3,120	0	10,462	12,959	14,149	13,758
1944	16,872	12,577	5,653	1,333	192	930	0	4,152	14,760	9,697	11,918	12,453
1945	14,092	11,089	1,664	1,994	1,354	0	9,628	1,725	3,192	10,011	7,522	8,673
1946	7,932	8,617	6,275	0	2,224	3,572	0	7,183	13,328	15,166	14,111	7,434
1947	13,391	8,359	4,965	0	7,678	4,620	0	2,049	5,182	4,136	4,713	4,970
1948	4,816	4,561	3,433	0	7,854	32,349	2,175	3,553	4,357	5,845	4,912	4,226
1949	6,940	6,224	3,179	0	8,138	10,549	0	4,631	50,722	12,626	12,615	11,566
1950	13,299	6,578	1,030	0	8,293	3,201	26,295	428	15,631	29,398	16,580	11,375
1951	10,115	6,224	6,734	5	0	4,392	0	4,239	5,539	4,138	4,203	5,114
1952	3,538	2,613	215	502	2,264	1,268	8,012	5	1,744	3,884	2,350	3,006
1953	4,989	4,156	1,805	0	757	0	0	0	0	14,954	2,502	2,657
1954	3,001	2,144	0	14,217	2,089	873	0	9,283	0	125,803	174	1,328
1955	1,816	1,051	0	0	0	0	0	0	10,837	62,855	4,012	5,314
1956	2,927	2,268	0	0	190	0	0	0	0	1,795	1,587	2,786
1957	4,673	0	3,130	2,144	2,749	2,041	211	10,078	0	10,297	4,664	4,624
1958	4,043	3,414	2,431	0	26,037	1,755	0	20,080	27,529	13,035	10,137	7,887
1959	7,202	4,783	0	0	10,101	165	0	0	0	3,751	5,318	4,299
1960	4,597	1,823	1,381	0	0	1,757	56,531	1,442	0	12,088	8,055	14,499
1961	12,729	12,308	2,803	2,625	719	0	0	0	176	4,554	4,246	5,394
1962	6,611	6,365	632	183	3,288	1,997	0	0	0	3,772	7,898	8,223
1963	7,809	3,867	1,212	2,841	0	3,948	0	4,414	9,376	1,397	3,659	5,433
1964	7,348	4,771	2,700	918	0	0	0	0	5,914	815	1,489	2,333
1965	997	1,072	0	0	16,431	26,140	1,695	0	7,973	11	2,982	847
1966	930	792	0	2,205	0	7,945	0	182,742	0	6	4	1,796
1967	113	1	0	0	2,036	1,056	0	0	0	0	1,799	2,202
1968	2,987	3,010	0	0	3,705	0	3,254	23	0	2,560	2,601	2,991
1969	4,522	2,859	0	2,815	1,670	0	0	0	9,829	75,335	8,205	5,478
1970	9,658	5,979	6,975	1,883	0	301	0	0	3,108	5,856	5,359	6,584
1971	7,352	4,231	2,975	0	0	0	0	17,836	4,855	6,232	3,795	5,619
1972	3,835	2,462	0	0	0	0	0	4,442	36,734	3,408	4,353	5,207
1973	3,718	3,520	1,859	224	48,284	434	3,124	0	591	5,592	4,512	4,386
1974	3,737	2,338	0	0	0	0	0	289	94,255	43,692	10,888	7,822
1975	7,287	3,549	1,691	2,390	0	0	0	0	0	1,859	3,879	3,992
1976	1,066	2,959	0	0	0	0	0	0	5,736	602	2,492	2,404
1977	4,207	3,226	0	2,593	0	0	0	0	0	1,626	1,511	2,015
1978	1,607	1,794	0	0	0	9,406	0	0	75,842	3,495	8,874	3,320
1979	4,125	4,705	2,608	2,314	0	2,304	3,256	279	0	0	4,666	5,866
1980	5,918	4,911	543	0	646	0	3	0	38,955	6,173	5,549	6,279
1981	5,810	3,315	3,381	5,274	0	0	0	3,640	1,915	3,458	3,657	4,791

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1982	4,232	2,687	1,958	0	1,728	0	0	1,302	4,117	2,028	4,279	4,586
1983	6,320	4,751	2,007	0	0	0	0	0	0	6,958	5,884	5,060
1984	4,144	2,606	0	0	566	5,545	0	55,263	26	5,610	4,984	5,465
1985	8,590	10,956	503	0	293	0	0	0	2,449	9,128	5,524	5,099
1986	4,673	2,957	0	557	0	105,169	10,855	0	0	5,517	24,872	20,361
1987	17,192	15,258	15,901	4,164	10,431	33,435	648	0	0	0	1,845	4,715
1988	4,103	4,129	441	189	2,812	8	949	0	2,178	1,478	2,227	2,880
1989	4,550	4,036	0	350	2,207	0	0	741	1,490	2,047	3,570	3,138
1990	5,614	3,398	0	2,294	430	0	421	5,102	7,450	5,809	7,176	4,805
1991	4,867	3,664	738	0	0	0	2,014	0	26,643	12,630	13,807	35,385
1992	4,026	6,448	1,600	299	14,718	28,120	5,270	0	816	9,171	3,643	4,242
1993	5,321	4,399	0	0	0	0	2,353	0	0	9,705	4,478	3,956
1994	3,857	4,261	1,066	0	2,261	0	0	0	321	14,426	4,869	3,845
1995	5,342	4,186	2,884	0	0	0	8,057	0	3,774	12,951	6,113	6,183
1996	4,798	3,633	854	1,637	153	2,158	1,683	2,365	7,007	3,235	12,522	5,030
1997	4,101	3,032	0	0	0	1,440	732	803	385	11,158	27,149	7,076
1998	6,386	4,716	1,034	0	0	121	0	0	1,073	6,761	14,876	3,721
1999	3,091	2,678	1,640	0	0	16,696	8,569	0	471	6,463	4,239	3,360
2000	4,004	3,653	4,296	0	0	0	3,021	0	0	13,354	10,638	5,331

Table 3: Net Evaporation Rate for Red Bluff Reservoir

-Values in Feet-

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1940	0.108	0.267	0.496	0.558	0.586	0.544	0.915	0.601	0.843	0.274	0.182	0.23
1941	0.122	0.154	0.257	0.362	0.058	0.428	0.576	0.714	0.113	0.146	0.269	0.211
1942	0.192	0.283	0.453	0.458	0.712	0.874	0.892	0.475	0.604	0.431	0.459	0.16
1943	0.262	0.338	0.498	0.557	0.712	0.688	0.629	1.095	0.687	0.525	0.302	0.068
1944	0.109	0.149	0.514	0.724	0.828	0.816	0.87	0.639	0.239	0.418	0.205	0.082
1945	0.153	0.329	0.43	0.616	0.848	0.99	0.527	0.868	0.731	0.125	0.426	0.286
1946	0.026	0.3	0.501	0.612	0.772	0.798	0.887	0.937	0.513	0.353	0.392	0.165
1947	0.201	0.245	0.332	0.564	0.506	0.932	1.03	0.792	0.876	0.609	0.276	0.182
1948	0.183	0.213	0.507	0.707	0.719	0.89	0.773	0.965	0.81	0.427	0.508	0.335
1949	-0.081	0.272	0.517	0.307	0.605	0.809	0.792	0.642	0.453	0.411	0.47	0.325
1950	0.29	0.247	0.589	0.56	0.68	0.809	0.567	0.91	0.37	0.606	0.515	0.432
1951	0.395	0.267	0.344	0.587	0.58	0.785	1.002	0.969	0.735	0.648	0.407	0.408
1952	0.353	0.361	0.544	0.487	0.732	0.64	0.653	1.028	0.745	0.582	0.261	0.252
1953	0.445	0.26	0.507	0.692	0.883	1.069	0.924	0.868	0.756	0.273	0.32	0.232
1954	0.236	0.368	0.503	0.406	0.395	0.692	0.777	0.476	0.628	0.274	0.304	0.249
1955	0.091	0.274	0.501	0.681	0.565	0.674	0.477	0.589	0.384	0.292	0.331	0.286
1956	0.211	0.243	0.566	0.581	0.62	0.788	0.786	0.707	0.599	0.486	0.331	0.263
1957	0.271	0.161	0.483	0.595	0.518	0.786	0.815	0.685	0.541	0.107	0.092	0.243
1958	0.005	0.05	0.103	0.4	0.38	0.456	0.465	0.535	0.056	0.032	0.178	0.159
1959	0.164	0.184	0.397	0.41	0.349	0.434	0.373	0.579	0.505	0.14	0.142	0.086
1960	0.104	0.148	0.371	0.497	0.525	0.668	0.11	0.314	0.483	0.098	0.196	-0.049
1961	0.029	0.149	0.357	0.595	0.522	0.336	0.388	0.565	0.449	0.272	0.055	0.094
1962	0.119	0.351	0.429	0.549	0.789	0.7	0.481	0.832	0.244	0.318	0.241	0.107
1963	0.159	0.262	0.528	0.668	0.489	0.687	0.801	0.441	0.397	0.401	0.25	0.133
1964	0.278	0.249	0.36	0.677	0.634	0.728	0.881	0.736	0.359	0.378	0.287	0.258
1965	0.246	0.187	0.398	0.627	0.488	0.582	0.83	0.491	0.458	0.409	0.293	0.097
1966	0.101	0.204	0.442	0.491	0.516	0.467	0.869	0.17	0.304	0.32	0.277	0.228
1967	0.255	0.276	0.462	0.615	0.673	0.541	0.613	0.597	0.332	0.453	0.246	0.109
1968	0.032	0.099	0.207	0.51	0.502	0.779	0.453	0.309	0.381	0.321	0.008	0.187
1969	0.253	0.201	0.232	0.439	0.429	0.516	0.557	0.631	0.249	0.014	0.113	0.085
1970	0.168	0.124	0.186	0.44	0.496	0.459	0.486	0.526	0.122	0.226	0.342	0.246
1971	0.249	0.283	0.546	0.567	0.591	0.6	0.573	0.013	0.096	0.188	0.245	0.094
1972	0.193	0.262	0.431	0.598	0.33	0.305	0.274	0.141	0.208	0.134	0.154	0.226
1973	0.052	0.014	0.199	0.413	0.448	0.489	0.22	0.549	0.252	0.325	0.294	0.285
1974	0.152	0.303	0.439	0.593	0.492	0.711	0.598	0.111	-0.23	-0.103	0.073	0.107
1975	0.14	0.127	0.341	0.511	0.391	0.636	0.251	0.474	0.25	0.417	0.284	0.16
1976	0.243	0.353	0.516	0.479	0.442	0.655	0.37	0.558	0.174	0.204	0.097	0.144
1977	0.093	0.281	0.419	0.467	0.514	0.56	0.654	0.584	0.569	0.265	0.303	0.346
1978	0.11	0.147	0.465	0.637	0.604	0.517	0.714	0.437	-0.176	0.205	-0.039	0.145
1979	0.057	0.079	0.326	0.505	0.461	0.463	0.546	0.3	0.433	0.499	0.321	0.168
1980	0.169	0.246	0.5	0.517	0.518	0.743	0.773	0.495	-0.127	0.311	0.061	0.174
1981	0.081	0.188	0.314	0.189	0.376	0.549	0.319	0.205	0.202	0.14	0.317	0.339

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1982	0.173	0.221	0.434	0.486	0.312	0.523	0.529	0.586	0.493	0.402	0.143	-0.038
1983	0.096	0.218	0.448	0.454	0.599	0.701	0.803	0.691	0.543	0.177	0.276	0.195
1984	0.219	0.393	0.456	0.556	0.387	0.152	0.582	0.31	0.297	0.102	0.148	0.024
1985	0.115	0.208	0.277	0.462	0.492	0.427	0.504	0.549	0.118	0.055	0.189	0.002
1986	0.253	0.233	0.339	0.515	0.403	-0.096	0.499	0.346	0.126	0.089	0.059	-0.144
1987	0.158	0.124	0.292	0.332	0.199	0.254	0.56	0.199	0.343	0.303	0.177	0.16
1988	0.227	0.149	0.332	0.429	0.394	0.604	0.197	0.277	0.319	0.388	0.376	0.223
1989	0.233	0.101	0.387	0.524	0.665	0.665	0.698	0.347	0.312	0.454	0.373	0.297
1990	0.189	0.156	0.307	0.376	0.505	0.721	0.197	0.122	0.003	0.196	0.1	0.183
1991	0.092	0.252	0.543	0.646	0.756	0.852	0.31	0.495	0.005	0.589	0.284	0.049
1992	0.084	0.1	0.436	0.478	-0.034	0.481	0.536	0.488	0.514	0.425	0.171	0.209
1993	0.068	0.185	0.41	0.628	0.732	0.807	0.531	0.851	0.629	0.516	0.294	0.232
1994	0.196	0.285	0.425	0.625	0.396	0.71	0.891	0.931	0.57	0.41	0.331	0.234
1995	0.002	0.004	0.439	0.543	0.495	0.63	0.838	0.635	0.138	0.391	0.293	0.22
1996	0.309	0.315	0.502	0.654	0.834	0.544	0.545	0.329	0.342	0.521	0.379	0.439
1997	0.266	0.098	0.446	0.373	0.432	0.56	0.675	0.528	0.45	0.408	0.27	0.148
1998	0.244	0.327	0.468	0.701	0.732	0.999	0.759	0.536	0.542	0.3	0.273	0.2
1999	0.405	0.326	0.269	0.376	0.37	0.34	0.333	0.499	0.346	0.157	0.323	0.268
2000	0.273	0.211	0.465	0.586	0.696	0.414	0.708	0.639	0.588	0.2	0.175	0.223

Table 4: Elevation Area Capacity Relationship for Red Bluff Reservoir

2000			2060		
Elevation (ft)	Area (Ac)	Capacity (Ac-ft)	Elevation (ft)	Area (Ac)	Capacity (Ac-ft)
2755	0	0	2755	0	0
2792	1,040	19,240	2792	325	6,007
2794	1,270	21,550	2794	555	6,886
2795	1,385	22,878	2795	670	7,498
2796	1,500	24,320	2796	785	8,225
2797	1,615	25,878	2797	900	9,067
2798	1,730	27,550	2798	1,015	10,025
2799	1,845	29,338	2799	1,130	11,097
2800	1,959	31,240	2800	1,244	12,283
2801	2,124	33,281	2801	1,409	13,610
2802	2,289	35,488	2802	1,574	15,101
2803	2,454	37,859	2803	1,739	16,757
2804	2,619	40,396	2804	1,904	18,578
2805	2,784	43,097	2805	2,069	20,564
2806	2,949	45,964	2806	2,234	22,716
2807	3,114	48,995	2807	2,399	25,032
2808	3,279	52,192	2808	2,564	27,513
2809	3,444	55,553	2809	2,729	30,159
2810	3,613	59,082	2810	2,898	32,972
2811	3,778	62,777	2811	3,063	35,952
2812	3,944	66,638	2812	3,229	39,098
2813	4,109	70,665	2813	3,394	42,409
2814	4,275	74,857	2814	3,560	45,886
2815	4,440	79,214	2815	3,725	49,528
2816	4,606	83,737	2816	3,891	53,336
2817	4,771	88,426	2817	4,056	57,309
2818	4,937	93,280	2818	4,222	61,448
2819	5,102	98,299	2819	4,387	65,752
2820	5,288	103,494	2820	4,573	70,232
2821	5,507	108,892	2821	4,792	74,914
2822	5,726	114,508	2822	5,011	79,815
2823	5,945	120,344	2823	5,230	84,935
2824	6,164	126,398	2824	5,449	90,274
2825	6,383	132,672	2825	5,668	95,832
2826	6,602	139,164	2826	5,887	101,610
2827	6,821	145,876	2827	6,106	107,606

2000			2060		
Elevation (ft)	**Area (Ac)**	**Capacity (Ac-ft)**	**Elevation (ft)**	**Area (Ac)**	**Capacity (Ac-ft)**
2828	7,040	152,806	2828	6,325	113,821
2829	7,259	159,956	2829	6,544	120,255
2830	7,478	167,324	2830	6,763	126,908
2831	7,758	174,942	2831	7,043	133,811
2832	8,038	182,840	2832	7,323	140,994
2833	8,318	191,018	2833	7,603	148,456
2834	8,598	199,476	2834	7,883	156,199
2835	8,878	208,214	2835	8,163	164,222
2836	9,158	217,232	2836	8,443	172,524
2837	9,438	226,530	2837	8,723	181,107
2838	9,718	236,108	2838	9,003	189,970
2839	9,998	245,966	2839	9,283	199,112
2840	10,279	256,105	2840	9,564	208,536
2841	10,656	266,572	2841	9,941	218,288
2841.7	10,920	274,124	2841.7	10,205	225,339
2842	11,033	277,417	2842	10,318	228,417

Appendix C

Water Management Strategy Evaluation

Appendix C

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INTRODUCTION

In accordance with TWDB rules and guidelines, the Region F Water Planning Group has adopted a standard procedure for identifying and evaluating potentially feasible water management strategies. This procedure classifies the strategies using the TWDB's standard categories developed for regional water planning. These strategy categories include:

- Improved conservation
- Reuse
- Expanded use of existing supplies
- Development of new water supplies
- Desalination
- Developing regional water supply facilities or providing regional management of water supply facilities
- Voluntary transfer of water within the region using, but not limited to, regional water banks, sales, leases, options, subordination agreements and financing agreements; and
- Emergency transfer of water

The methodology for selecting potentially feasible strategies for each water user group (WUG) is in Chapter 5A. After the potentially feasible water management strategies were selected, each strategy was evaluated in accordance with Chapter 31 of the Texas Administrative Code, Sections 357.34 and 357.35. These statutes dictate that each strategy be evaluated based on:

- Quantity, reliability, and cost
- Environmental factors
- Impacts to agricultural and natural resources including impacts of moving water from rural and agricultural areas
- Impacts on key parameters of water quality
- Impacts on other water resources including other water management strategies
- Other factors as deemed relevant by the RWPG

This Appendix documents each potentially feasible strategy's description and evaluation in accordance to the rules as outlined above. Water management strategies were developed for water user groups to meet projected needs in the context of their current supply sources, previous supply studies and available supply within the region. Much of the water supply in Region F is from groundwater, and several of the identified needs could be met by development of new groundwater supplies. Where site-specific data was available, this information was used. When specific well fields could not be identified, assumptions regarding well capacity, depth of well and associated costs were developed based on county and aquifer. In most cases new surface water supplies are not feasible because of the lack of unappropriated water in the region.

Some strategy evaluations were performed as a group. These strategies include:

- Municipal conservation
- Irrigation conservation

- Mining reuse/recycling
- Subordination of downstream water rights
- Purchase water strategies that require no infrastructure
- New or expanded water treatment plants that are not directly associated with a new supply
- Brush control
- Weather modification

The remaining water management strategies were evaluated individually. This appendix is organized by major strategy category. Cost tables are included in Appendix D. The technical analyses for all potentially feasible strategies are summarized in a matrix in Appendix E.

IMPROVED CONSERVATION

WMS Name: **Municipal Conservation**

WMS Type:	Conservation
Strategy Yield: Potential Municipal Demand Reductions of:	5,451 acre-feet per year
Strategy Capital Cost:	$1.5 million in 2020
Unit Cost:	$406 per ac-ft in 2020

Strategy Description

Water conservation is a demand management strategy that pro-actively decreases future water needs. Conservation facilitates more efficient use of existing water supplies and may delay the need to develop new water supplies. An expected level of conservation is included in the demand projections from the Texas Water Development Board (TWDB) due to the natural replacement of inefficient plumbing fixtures with low flow fixtures, as mandated under the Plumbing Code. The TWDB also considers expected reductions in municipal water use due to energy efficiency requirements for dish washers and clothes washers. Additional conservation savings can potentially be achieved in the region through the implementation of conservation best management practices (BMPs). These additional conservation measures were considered for all named municipal water user groups in Region F. These conservation measures were considered for County-Other WUGs only if their per capita use was greater than 140. Based on this criterion, seven County-Other WUGs were evaluated for municipal conservation. Region F recognizes that it has no authority to implement, enforce, or regulate water conservation practices. These water conservation practices are intended to be guidelines. Water conservation strategies determined and implemented by the individual water user group superseded the recommendations in this plan and are considered to meet regulatory requirements for consistency with this plan.

Each public water supplier is required to update and submit a Water Conservation Plan (WCP) to the Texas Commission on Environmental Quality (TCEQ) every five years. Per Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.2 of the Texas Administrative Code, some conservation strategies are required to be included as part of this plan. Required strategies include a program for universal metering, measures to determine and control water loss, a program of continuing public education, and a non-promotional water rate structure. If a public water supplier serves over 5,000 people, they are additionally required to have a conservation oriented rate structure and a program of leak detection, repair, and water loss accounting for the water transmission, delivery, and distribution system.

Screening of BMPs

To assess the appropriateness of conservation BMPs for Region F, 68 potential strategies were identified and a screening level evaluation was conducted. The screening evaluation was performed both for entities with populations less than 20,000 and entities with populations greater than 20,000. If an entity's population crossed the 20,000 person threshold, the larger city strategies and assumptions were applied to the appropriate decades. The evaluation considered six criteria:

- Cost
- Potential Water Savings
- Time to Implement
- Public Acceptance
- Technical Feasibility
- Staff Resources

Each criterion was scored from 1 to 5 with 5 being the most favorable. Scores for all the criteria were then added to create a composite score. The strategies were then ranked and selected based on their composite score. These strategies were selected for purposes of estimating savings and costs for planning purposes only. Region F supports all of the 68 BMPs an individual water user group may choose to employ and all are considered to meet regulatory requirements for consistency with this plan.

Selected Strategies for Entities under 20,000
Based on the screening level evaluation and requirements from the TCEQ, the following strategies were selected for consideration for entities in Region F with less than 20,000 people:

- Education and Outreach
- Water Audits and Leak Repair
- Rate Structure
- Water Waste Ordinance

Selected Strategies for Entities over 20,000
Based on the screening level evaluation and requirements from the TCEQ, the following strategies were selected for consideration for entities in Region F with more than 20,000 people:

- Education and Outreach
- Water Audits and Leak Repair
- Rate Structure
- Water Waste Ordinance
- Landscape Ordinance
- Time of Day Watering Limit

These strategies were evaluated individually for each water user as appropriate (greater than or less than 20,000) and the water savings and costs are aggregated for the selected strategies with the exception of the water audit and leak repair strategy. This strategy was considered separately for each water user because the quantity of savings and associated cost was quite variable. For smaller cities, a robust leak detection and repair program may not be cost effective, especially if the savings are small. This strategy is discussed separately in this Appendix.

For the purposes of strategy evaluation, each household was assumed to have an average of three people. The following assumptions were used in the evaluation of the selected municipal conservation measure.

Education and Outreach
Local officials would offer water conservation education to schools and civic associations, include information in water bills, and provide pamphlets and other materials as appropriate. It was assumed that the education and outreach programs would be needed throughout the planning period in order to maintain the level of water savings.

Potential Savings Assumptions

- Education and Outreach has an assumed water savings of 5,000 gallons per household per year with 50% adoption rate (assumes that 50% of the customers respond to this measure by reducing water use).

Costs Assumptions

- Education and Outreach has a $2.75 per person per year with a maximum cost of $15,000 for entities <20,000.
- Education and Outreach costs $1.80 per person per year for entities >20,000.

Rate Structure
Local officials would implement an increasing block rate structure where the unit cost of water increases

as consumption increases. Increasing block rate structures discourage the inefficient use or waste of water. Many cities already have a non-promotional rate structure. This strategy assumes that the entity adopts a higher level of a non-promotional rate structure.

Potential Savings Assumptions

- Increasing block rates is projected to save 6,000 gallons per household per year with a 10% adoption rate (assumes that 10% of the customers respond to this measure by reducing water use).

Costs Assumptions

- It is likely the entity would do any rate structure modifications themselves and incur no additional costs.

Water Waste Ordinance

Local officials would implement an ordinance prohibiting water waste such as watering of sidewalks and driveways or runoff into public streets.

Potential Savings Assumptions

- The assumed savings are 3,000 gallons per household per year with a 75% adoption rate.

Costs Assumptions

- Annual enforcement costs $2,500 per year for entities <20,000.
- Annual enforcement costs $10,000 per year for entities >20,000.

Landscape Ordinance (Entities greater than 20,000)

Local officials would implement an ordinance that would promote residential plantings that conserve water for all new construction. This strategy is assumed to be implemented by 2030.

Potential Savings Assumptions

- Landscape ordinances would only apply to only new construction.
- Would include both residential and commercial properties.
- Assumed to save 1,000 gallons per increased number of households per year with 100% adoption rate.

Costs Assumptions

- Annual enforcement cost of $10,000 per year for entities >20,000.

Time of Day Watering Limit Landscape Ordinance (Entities greater than 20,000)

Local officials would implement an ordinance prohibiting outdoor watering during the hottest part of the day when most of that water is lost (wasted) through evaporation. Many ordinances limit outdoor watering to between 6 p.m. and 10 a.m. on a year round basis.

Potential Savings Assumptions

- Savings of 1,000 gallons per household per year.
- 75 percent of the population would realize these savings (the other 25 percent is either not irrigating or already abide by this practice).

Costs Assumptions

- Annual enforcement cost of $10,000 per year for entities >20,000.

Quantity, Reliability and Cost

Region F as a whole is expected to save around 3,700 acre-feet per year in 2020, increasing to nearly 5,500 acre-feet of savings by 2070. Individual entities are shown to save between 3 and 1,236 acre-feet by 2070. The larger cities show greater quantities of savings due to a larger number of people and additional BMPs.

As a percentage, entities are shown to save between 1 and 8 percent of their projected municipal demand. Table C- 1 shows the potential savings from the enhanced conservation measures described above over the next 50 years.

Table C- 1
Estimated Savings from Municipal Conservation (acre-feet per year)

Water User Group	2020	2030	2040	2050	2060	2070
Andrews	82	99	136	157	183	213
Ballinger	21	22	22	22	22	22
Bangs	9	9	9	9	9	9
Big Lake	18	21	22	23	24	24
Big Spring	181	191	193	193	193	193
Borden County-Other	4	4	4	4	4	4
Brady	32	33	33	33	33	33
Bronte	5	5	5	5	5	5
Brookesmith SUD	44	45	45	45	45	45
Brownwood	126	129	129	129	129	129
Coahoma	5	5	5	5	5	5
Coleman	26	27	27	27	27	27
Coleman County SUD	19	19	19	19	19	19
Colorado City	28	31	32	32	32	33
Concho Rural WSC	33	35	37	38	40	41
Crockett County WCID	21	23	23	24	24	24
Crane	20	21	23	24	25	26
Early	16	16	16	16	16	16
Ector County UD	83	94	102	135	149	162
Eden	16	16	16	16	16	16
El Dorado	11	11	11	11	11	11
Fort Stockton	50	53	57	60	63	66
Greater Gardendale WSC	16	19	21	23	26	28
Iraan	7	8	8	9	9	10
Junction	14	15	15	15	15	15
Kermit	32	32	32	33	33	33
Loraine	3	4	4	4	4	4
Madera Valley WSC	11	12	12	13	13	14
Mason	12	12	12	12	12	12
McCulloch County-Other	3	3	3	3	3	3
McCamey	11	12	13	13	13	14
Menard	8	8	8	8	8	8
Mertzon	5	5	5	5	5	5
Midland	813	879	973	1,062	1,150	1,236
Midland County-Other	145	164	183	202	220	239
Miles	5	6	6	6	6	6
Mitchell County-Other	26	27	28	28	29	29
Millersview-Doole WSC	24	25	25	26	26	27
Monahans	41	43	45	47	48	48
Odessa	716	825	924	1,026	1,128	1,231
Pecos	53	56	59	62	63	64
Pecos WCID	19	20	22	23	24	25
Reeves County-Other	19	20	21	22	23	23

Water User Group	2020	2030	2040	2050	2060	2070
Rankin	5	5	5	5	6	6
Richland SUD	13	14	14	14	14	14
Robert Lee	6	6	6	6	6	6
San Angelo	656	753	793	842	894	949
Snyder	75	86	93	100	104	134
Santa Anna	6	6	6	6	6	6
Sonora	18	20	20	20	21	21
Stanton	15	17	18	19	20	20
Sterling City	5	5	5	5	5	5
Ward County-Other	22	23	24	25	25	26
Winkler County-Other	6	10	12	15	18	20
Wink	6	6	7	7	8	8
Winters	14	15	15	15	15	15
Zephyr WSC	25	26	26	26	26	26
Total	**3,707**	**4,098**	**4,430**	**4,774**	**5,098**	**5,451**

The reliability of this supply is considered to be medium because of the uncertainty involved in the potential for savings and the degree to which public participation is needed to realize savings. Site specific data regarding residential, commercial, industrial, and other types of use would give a better estimate of the reliable supply from this strategy.

The cost for this strategy is over $1.5 million in 2020 increasing to slightly over $2 million by 2070. The average unit cost across the region is approximately $406 per acre foot in 2020 and $382 per acre foot in 2070. The unit cost varies considerably between water user groups depending on the population size. The table below shows the projected cost of implementing the selected conservation strategies. Generally, conservation programs are funded through a city's annual operating budget and are not capitalized. However, in some cases, an entity may choose to capitalize a portion or all of their program. These kinds of costs are difficult to estimate for each individual entity due to the wide variety of factors at play. However, all capital expenditures for conservation are considered consistent with the Region F Plan.

Table C- 2
Cost per Acre-Foot of Municipal Conservation Savings

Water User Group	2020	2030	2040	2050	2060	2070
Andrews	$533	$531	$503	$472	$446	$423
Ballinger	$621	$618	$618	$618	$618	$618
Bangs	$776	$769	$769	$769	$769	$769
Big Lake	$638	$624	$617	$611	$608	$605
Big Spring	$399	$444	$443	$444	$444	$444
Borden County-Other	$1,196	$1,183	$1,183	$1,183	$1,183	$1,183
Brady	$555	$532	$531	$525	$524	$523
Bronte	$959	$959	$959	$959	$959	$959
Brookesmith SUD	$398	$389	$389	$388	$388	$388
Brownwood	$448	$520	$522	$522	$522	$522
Coahoma	$1,027	$1,005	$996	$996	$996	$996
Coleman	$597	$595	$595	$595	$595	$595
Coleman County SUD	$636	$632	$632	$632	$632	$632
Colorado City	$593	$562	$551	$546	$540	$535
Concho Rural WSC	$523	$494	$473	$455	$440	$427
Crockett County WCID	$620	$611	$609	$608	$607	$607

Water User Group	2020	2030	2040	2050	2060	2070
Crane	$628	$619	$612	$607	$603	$600
Early	$661	$657	$657	$657	$657	$657
Ector County UD	$533	$529	$542	$506	$486	$470
Eden	$658	$656	$656	$656	$656	$656
El Dorado	$736	$736	$736	$736	$736	$736
Fort Stockton	$352	$328	$307	$290	$276	$265
Greater Gardendale WSC	$656	$637	$622	$609	$600	$591
Iraan	$842	$818	$798	$782	$769	$758
Junction	$676	$674	$674	$674	$674	$674
Kermit	$552	$545	$539	$533	$528	$524
Loraine	$1,231	$1,209	$1,194	$1,184	$1,177	$1,172
Madera Valley WSC	$728	$713	$702	$696	$691	$687
Mason	$719	$719	$719	$719	$719	$719
McCulloch County-Other	$1,286	$1,254	$1,251	$1,243	$1,240	$1,239
McCamey	$723	$706	$699	$693	$689	$686
Menard	$813	$813	$813	$813	$813	$813
Mertzon	$1,058	$1,052	$1,052	$1,052	$1,052	$1,052
Midland	$313	$320	$315	$313	$311	$309
Midland County-Other	$398	$390	$384	$378	$374	$371
Miles	$977	$911	$911	$911	$911	$911
Mitchell County-Other	$597	$594	$592	$591	$590	$589
Millersview-Doole WSC	$607	$603	$601	$599	$597	$596
Monahans	$428	$404	$388	$376	$368	$362
Odessa	$316	$319	$316	$313	$311	$309
Pecos	$332	$310	$294	$284	$277	$272
Pecos WCID	$635	$626	$618	$611	$606	$602
Reeves County-Other	$634	$626	$619	$615	$613	$611
Rankin	$1,036	$996	$979	$963	$954	$948
Richland SUD	$692	$684	$683	$683	$681	$679
Robert Lee	$938	$938	$938	$938	$938	$938
San Angelo	$319	$323	$324	$321	$319	$317
Snyder	$536	$532	$529	$532	$549	$509
Santa Anna	$909	$900	$900	$900	$900	$900
Sonora	$640	$630	$627	$625	$623	$623
Stanton	$664	$649	$640	$633	$628	$625
Sterling City	$986	$969	$963	$963	$963	$963
Ward County-Other	$617	$611	$607	$603	$601	$599
Winkler County-Other	$892	$759	$703	$665	$644	$629
Wink	$932	$894	$868	$843	$825	$811
Winters	$676	$672	$672	$672	$672	$672
Zephyr WSC	$602	$600	$600	$600	$600	$600
Total	**$406**	**$407**	**$400**	**$394**	**$388**	**$382**

Environmental Factors
There are no identified environmental issues associated with this strategy. This strategy may have a positive impact on the environment by reducing the quantity of water needed to meet future demands.

Agricultural and Rural Impacts
Due to the limited availability of water, any municipal water user group may be competing with

agricultural users for water. Reducing the demand on limited resources could have positive impacts on water availability for agriculture.

Impacts to Natural Resources and Key Parameters of Water Quality

No impacts to natural resources or key parameters of water quality were identified for this strategy since it reduces demands and does not actually develop new supplies.

Impacts on Other Water Resources and Management Strategies

This may reduce the demand for water from other water management strategies. It may also reduce available supplies for reuse strategies. However, if much of the water saved is associated with outdoor water use, this impact would be negligible.

Other Issues Affecting Feasibility

This strategy is based on generic procedures and may not accurately reflect the actual costs or water savings that can be achieved by an individual water user group. Site specific data will be required for a better assessment for the potential for conservation in Region F. Technical and financial assistance by the State may be required to implement this strategy.

WMS Name:	**Water Audits & Leak Repairs**
WMS Type:	Conservation
Strategy Yield: Potential Municipal Demand Reductions of:	693 ac-ft
Strategy Capital Cost:	$517,160 in 2020
Strategy Unit Cost:	$841 per ac-ft in 2020

Strategy Description

Water losses in distribution systems can account for significant portions of water use in some cases. Water losses tend to be higher in systems with fewer users per mile of pipeline. Identifying and repairing leaks in water distribution and transmission lines can help reduce demands by reducing water waste throughout the system. As part of this strategy, local officials would perform a system wide water audit and create a program of leak detection and repair, including infrastructure replacement and repair as necessary. It was assumed that the leak detection and repair program is an ongoing activity to maintain the level of water loss reductions assumed below.

Potential Savings Assumptions

- If TWDB water loss data was available for the entity, it was utilized.
- This strategy was considered for all cities with greater than or equal to 15% losses.
- This strategy was considered for all Water Supply Corporations (WSCs) or Special Utility Districts (SUDs) with greater than or equal to 25% losses.
- It was assumed that 20% of an entity's losses could be recovered through a water audit and leak repair program.
- If no water loss data was available, this strategy was considered for an entity with a gpcd over 140. A constant 5% savings rate was assumed until an entity's gpcd was equal to 140.

Exceptions

- Midland – The TWDB did not have any recent water loss data for Midland. However, a recent study done for the City of Midland, shows that their water losses do not exceed 15%. Therefore, no savings from water audits and leak repairs were considered for Midland.

Costs Assumptions

- Water Audits and Leak Repairs has $5,000 base cost plus $10 per person for entities <20,000 with a maximum possible cost of $200,000.
- Water Audits and Leak Repairs costs $10 per person for entities >20,000.

Quantity, Reliability and Cost

The estimated quantity of supply for this strategy is uncertain due to lack of detailed data. Savings range from 9 to 186 acre-feet for individual entities under 20,000 throughout the planning period. No entities over 20,000 met the required loss thresholds to be considered for this strategy. Across Region F, it is estimated that nearly 600 acre-feet of supply could be obtained through a water audits and leak repairs program in 2020. This increases to around 700 acre-feet of savings by 2070. Table C- 3 shows the estimated savings by water user group.

The reliability of this supply is considered to be low due to uncertainty associated with estimated savings and the extent to which this strategy relies on individual utilities to adopt a water audits and leak repairs program, which can be costly and time intensive, especially for smaller users.

Due to the relatively high costs of implementing this strategy, especially for smaller or rural water user groups, this strategy may not be feasible. The estimated cost is shown in Table C- 4.

Table C- 3
Water Audits and Leak Repairs Savings (acre-feet per year)

Water User Group	2020	2030	2040	2050	2060	2070
Ballinger	37	37	36	36	36	36
Big Lake	29	32	33	35	36	37
Borden County-Other	9	9	9	9	9	9
Bronte	12	12	11	11	11	11
Coahoma	9	9	9	9	9	9
El Dorado	25	24	24	24	24	24
Junction	31	31	31	30	30	30
Madera Valley WSC	69	73	76	78	80	82
Mason	26	26	26	25	25	25
McCamey	39	41	42	44	45	45
Menard	17	17	17	16	16	16
Mitchell County-Other	42	43	43	43	43	44
Pecos	157	165	173	178	183	186
Rankin	14	15	15	16	16	16
Sonora	77	82	83	85	86	86
Ward County-Other	37	39	39	40	41	42
Winkler County-Other	11	16	20	25	28	32
Total	**641**	**671**	**687**	**704**	**718**	**730**

Table C- 4
Water Audits and Leak Repairs Cost Per Acre-Foot

Water User Group	Capital Cost	Cost Per Acre-Foot					
		2020	2030	2040	2050	2060	2070
Ballinger	$2,669,400	$1,164	$1,195	$1,225	$1,229	$1,231	$1,231
Big Lake	$2,708,800	$1,320	$1,336	$1,343	$1,337	$1,335	$1,332
Borden County-Other	$701,400	$1,302	$1,316	$1,331	$1,331	$1,338	$1,338
Bronte	$900,000	$1,283	$1,304	$1,325	$1,336	$1,336	$1,336
Coahoma	$848,000	$1,498	$1,515	$1,516	$1,524	$1,524	$1,524
El Dorado	$1,471,200	$991	$1,006	$1,019	$1,024	$1,026	$1,026
Junction	$1,891,700	$999	$1,018	$1,035	$1,044	$1,045	$1,045
Madera Valley WSC	$1,673,300	$365	$367	$366	$365	$363	$363
Mason	$1,568,400	$991	$1,006	$1,018	$1,025	$1,025	$1,025
McCamey	$1,698,600	$664	$664	$665	$661	$660	$658
Menard	$1,183,200	$1,144	$1,171	$1,192	$1,195	$1,195	$1,195
Mitchell County-Other	$3,361,800	$1,267	$1,290	$1,308	$1,319	$1,321	$1,319
Pecos	$6,834,400	$647	$657	$659	$658	$658	$658
Rankin	$876,900	$979	$967	$966	$956	$948	$945
Sonora	$2,486,600	$495	$496	$499	$500	$500	$500
Ward County-Other	$2,946,700	$1,197	$1,223	$1,245	$1,243	$1,243	$1,241
Winkler County-Other	$1,787,400	$1,594	$1,452	$1,388	$1,344	$1,317	$1,301
Total	**$35,607,800**	**$848**	**$853**	**$860**	**$862**	**$862**	**$861**

Environmental Factors

Environmental issues associated with this strategy are expected to be minimal since it is only the repair of infrastructure currently in place. This strategy may have a positive impact on the environment by reducing the quantity of water needed to meet future demands

Agricultural and Rural Impacts

Due to the limited availability of water, any municipal water user group may be competing with agricultural users for water. Reducing the demand on limited resources could have positive impacts on water availability for agriculture.

Impacts to Natural Resources and Key Parameters of Water Quality

Impacts to natural resources of key parameters of water quality are expected to be minimal since it only involves the repair of existing infrastructure and no new facilities.

Impacts on Other Water Resources and Management Strategies

This may reduce the demand for water from other water management strategies.

Other Issues Affecting Feasibility

This strategy is based on generic procedures and may not accurately reflect the actual costs or water savings that can be achieved by an individual water user group. Site specific data will be required for a better assessment for the potential for conservation in Region F. Due to high costs, many smaller and rural water user groups may find this strategy to be unfeasible. Technical and financial assistance by the State may be required to implement this strategy.

WMS Name:		**Irrigation Conservation**
WMS Type:		**Conservation**
Strategy Yield:	Potential Demand Reductions of:	28,000 - 73,000 ac-ft
Strategy Capital Cost:		$47.8 million
Strategy Annual Unit Cost (During Amortization):		$21.81 per ac-ft
Strategy Annual Unit Cost (After Amortization):		$0 in 2070

Strategy Description

Irrigation conservation is a strategy that proactively causes a decrease in future water needs by increasing the efficiency of current irrigation practices throughout the region. The adoption of irrigation conservation will help preserve the existing water resources for continued agriculture use and provide for other demands. Irrigation efficiency increases can be achieved by implementing a combination of strategies that lead to irrigation demand reductions. These may include but are not limited to:

- Changes in irrigation equipment
- Crop type changes and crop variety changes
- Conversion from irrigated to dry land farming
- Water loss reduction in irrigation canals

Region F recognizes that it has no authority to implement, enforce, or regulate irrigation conservation practices. These water conservation practices are intended to be guidelines. Water conservation strategies determined and implemented by the individual water user group superseded the recommendations in this plan and are considered to meet regulatory requirements for consistency with this plan.

Changes in irrigation equipment

Region F recommends improvements in the efficiency of irrigation equipment as an effective water conservation strategy for irrigation within Region F. This strategy replaces less efficient irrigation systems with new equipment types with higher efficiency ratings. These can include

- Furrow irrigation (FF) – 60 percent
- Surge flow (SF) – 75 percent
- Mid-elevation sprinkler application (MESA) – 78 percent
- Low-elevation sprinkler application (LESA) – 88 percent
- Low Energy Precision Application (LEPA) – 95 percent
- Subsurface Drip Irrigation (DRIP) – 97 percent

Any changes from a less efficient irrigation technology to a more efficient irrigation technology will save water and help the water user group reach a higher water use efficiency overall.

Crop type changes and crop variety changes

Certain crops are more water intensive than others. Shifting higher water use crops to lower water use crops could generate substantial water savings. Similarly, shifting long season to short season varieties is another water savings strategy. However, lower yields are typically associated with short season varieties (assuming the same irrigation technology).

Conversion from irrigated to dryland farming
Reducing the amount of irrigated acreage in Region F will reduce the amount of water applied to crops in the area. While converting from an irrigated to dryland cropping system may be a viable economic alternative for many Region F producers, only a limited number of dryland crops may be able to be produced profitably in the area. Region F also has an extensive dryland farming community. Further conversion may be limited.

Water loss reduction in irrigation canals
Many irrigation canals in Region F are open and unlined. This allows water to be lost both to evaporation and seepage into the ground. By lining these canals, seepage can be reduced and a larger portion of the water can go towards the beneficial use of crop irrigation. Converting these canals to a pipe system would save larger amounts of water by eliminating seepage and evaporation losses. However, the cost of doing this is likely prohibitive.

Assumptions
Depending on the method employed to achieve irrigation conservation, the composition of crops grown, sources of water, and method of delivery, will impact the potential savings and costs of this strategy. Since Region F does not have data on county-specific irrigation equipment employed by crop type, a general approach to irrigation conservation savings was taken. For planning purposes, a 5% increase in irrigation efficiency was assumed in decades 2020, 2030 and 2040. The efficiency level was held constant for decades 2050, 2060, and 2070. A maximum efficiency level of 85% was assumed. For planning purposes, it was assumed that on average, irrigation conservation would have a capital cost of $650 per acre-foot saved. This is based on the Water Conservation Implementation Task Force Water Conservation Best Management Practices cost per acre for irrigation equipment changes indexed to September 2013 dollars.

Quantity, Reliability and Cost
This strategy is estimated to save around 28,000 acre-feet of supply in 2020 and 73,500 acre-feet in 2070. Savings by county are presented in Table C- 5.

The reliability of this supply is considered to be medium due to lack of data and uncertainty involved in estimating the amount of supply that can be saved and the extent to which this strategy relies on the behavior of each individual irrigator.

The region wide capital cost and annual cost per acre-foot and per thousand gallons are shown in Table C-6. The annual cost per acre-foot was estimated at $21.81. This will vary greatly depending on the individual circumstances and irrigation conservation strategy employed by each individual irrigator.

Table C- 5
Irrigation Conservation Savings (acre-feet per year)

County Name	2020	2030	2040	2050	2060	2070
ANDREWS	1,895	3,758	3,726	3,726	3,726	3,726
BORDEN	200	399	399	399	399	399
BROWN	472	752	750	750	750	750
COKE	48	96	115	115	115	115
COLEMAN	39	77	77	77	77	77
CONCHO	487	969	1,062	1,062	1,062	1,062
CRANE	0	0	0	0	0	0
CROCKETT	24	47	69	69	69	69
ECTOR	72	142	210	210	210	210
GLASSCOCK	2,268	2,250	2,232	2,232	2,232	2,232
HOWARD	336	665	722	722	722	722
IRION	73	144	210	210	210	210
KIMBLE	147	283	326	326	326	326
LOVING	0	0	0	0	0	0
MCCULLOCH	179	354	524	524	524	524
MARTIN	1,816	3,567	5,254	5,254	5,254	5,254
MASON	415	817	1,208	1,208	1,208	1,208
MENARD	127	252	377	377	377	377
MIDLAND	1,664	3,302	4,913	4,913	4,913	4,913
MITCHELL	230	229	228	228	228	228
PECOS	6,301	12,602	18,903	18,903	18,903	18,903
REAGAN	957	1,881	2,773	2,773	2,773	2,773
REEVES	4,568	9,058	13,469	13,469	13,469	13,469
RUNNELS	200	399	477	477	477	477
SCHLEICHER	71	83	81	81	81	81
SCURRY	365	706	885	885	885	885
STERLING	49	94	135	135	135	135
SUTTON	90	177	260	260	260	260
TOM GREEN	4,679	9,335	11,175	11,175	11,175	11,175
UPTON	474	934	1,380	1,380	1,380	1,380
WARD	281	554	821	821	821	821
WINKLER	246	491	737	737	737	737
Total	**28,771**	**54,417**	**73,499**	**73,499**	**73,499**	**73,499**

Table C- 6
Irrigation Conservation Costs

	2020	2030	2040	2050	2060	2070
Region F Capital Cost	$18,701,189	$16,682,536	$12,439,616	$0	$0	$0
Annual Cost per acre-foot	$21.81	$21.81	$13.29	$5.68	$0.00	$0
Annual Cost per 1,000 gal	$0.07	$0.07	$0.04	$0.02	$0.00	$0

Environmental Factors

Most of the areas in Region F with significant irrigation needs rely on groundwater for irrigation. In areas where conserved groundwater finds expression as springs or base flow, conservation will have a positive impact. However, in most cases irrigation demand exceeds available supply even with implementation of advanced irrigation technologies. This strategy is expected to have a minimal impact on the environment, either positive or negative.

Agricultural and Rural Impacts

Irrigated agriculture is vital to the economy and culture of Region F. Implementation of water-conserving irrigation practices may be necessary to retain the economic viability of many areas that show significant water supply needs throughout the planning period. Water conservation measures identified as part of this strategy could have positive or negative economic impacts to agricultural communities, depending on the selected BMPs. However, the BMPs selected by the individual producer would have to be economically feasible or the producer would not implement the BMP. No agricultural acreage is expected to be taken out of production with this strategy. Some producers may choose to change crop types or convert to dry land farming, but total acreage is not expected to decrease. For purposes of this analysis, it is assumed that up to 3 percent of the total irrigated acreage is converted to dryland farming in counties with an irrigation water shortage.

Impacts to Natural Resources and Key Parameters of Water Quality

In areas where conserved water can be used to enhance the environment (increase spring flow, base flow or streamflow), irrigation conservation will positively impact natural resources and water quality. However, in areas where the demand already exceeds available supply, impacts will be minimal to none.

Impacts on Other Water Resources and Management Strategies

None identified.

Other Issues Affecting Feasibility

The most significant issue associated with the implementation of this strategy is the lack of a clear sponsor for the strategy. Although the TWDB and other state and federal agencies may sponsor many irrigation programs, for most irrigation conservation measures, the actual implementation is the responsibility of the individual irrigators. Because this strategy relies largely on individual behavior, it is difficult to quantify the actual savings that can be achieved.

The economic viability of irrigation conservation is critical to its implementation. Changing crop prices can impact the ability of a producer to implement conservation practices while maintaining profitability.

Another significant factor is the lack of detailed data on both irrigation equipment in use and the quantity of water used for individual crops. The conservation calculations included in this analysis were hampered by the lack of current data for these two items.

WMS Name:	**Steam Electric Power Conservation (Alternative Cooling Technologies)**
WMS Type:	Conservation
Strategy Yield:	4,660 ac-ft in 2020
Strategy Capital Cost:	$89.75 million in 2020
Strategy Annual Cost (During Amortization):	$9.7 million in 2020 $1,126 per acre-foot in 2020
Strategy Annual Cost (After Amortization):	$13.4 million in 2070 $662 per acre-foot in 2070

Strategy Description

By 2070 the region has water needs for Steam Electric Power Generation of over 25,000 acre-feet after subordination. These shortages are generally the result of increased demands that cannot be met with existing supplies, particularly in Ector County. Some of these needs are proposed to be met by the City of Odessa, but there is still a considerable large quantity of projected steam electric water demands that currently does not have an identified source.

The projections for growth in steam electric power water use in Region F are based on state-wide projections for new generation capacity and do not necessarily reflect site-specific water needs[1]. The expected growth in water demand reflects the expected need for additional electrical generation capacity in Texas, and that additional capacity can be met through a variety of approaches. In Region F, the projected growth in water demand exceeds the water supply currently available to existing generation facilities. Because growth in demand is not site-specific, strategies may include movement of demand to other locations as well as new supply development.

The use of alternative cooling technologies that generate the same amount of electricity but use less water is a form of water conservation. An analysis of alternative cooling technologies is included in this plan. However, the actual strategies are largely a business decision on the part of the power industry.

Region F considers alternative cooling technologies on new power generation projects a likely method for developing new generation capacity within Region F. This technology, which uses air for cooling instead of water, can be utilized on any steam cycle based power generation project, for an incremental cost. This cost, calculated on a dollar per installed megawatt basis, would be above the cost of conventional cooling.

Quantity, Reliability and Cost

This strategy was considered for steam electric power needs in Coke, Ector, Mitchell and Ward counties. For the purposes of this plan, costs have been developed for replacing water demand with the equivalent generation capacity using air-cooled condensers (ACC).

For each county, the generation capacity associated with the water shortage was determined and based on estimated power needs that were used to develop the water projections. It was assumed that new generation capacity would be added in each decade in 500 MW blocks (except in Coke and Mitchell Counties where 150 MW blocks are assumed) at a cost of $112.10 per kW, which is the cost of retrofitting existing power generation facilities with an air-cooled condenser. This cost was selected as representative of the incremental difference between a conventional water-cooled facility and one that uses alternative cooling technology. Actual electric generating capacities will be determined on a facility basis.

Table C- 7
Costs of Alternative Cooling Technology to Meet Steam Electric Needs in Coke County

	2020	2030	2040	2050	2060	2070
Steam-Electric Needs (acft)	247	289	339	401	477	528
Equivalent Needs (GWh)	145	178	222	280	355	393
MW Capacity Needed (MW)	24	30	37	47	59	66
Incremental Capacity Installed (MW)	150	150	0	0	150	0
Cumulative Capacity Installed (MW)	150	300	300	300	450	450
Incremental Cost of ACT (million $)	$16.83	$16.83	$0.00	$0.00	$16.83	$0.00
Total Capital Cost (million $)	$16.83	$33.66	$33.66	$33.66	$50.49	$50.49
Amount of Water Saved (acft/yr)	247	289	339	401	477	528
Annual Cost of Water ($ per 1,000 gallons)	$22.74	$38.87	$20.37	$6.43	$17.18	$15.52

Table C- 8
Costs of Alternative Cooling Technology to Meet Steam Electric Needs in Ector County

	2020	2030	2040	2050	2060	2070
Steam-Electric Needs (acft)	3,286	4,263	6,165	8,604	11,597	15,033
Equivalent Needs (GWh)	1931	2620	4043	6017	8622	11177
MW Capacity Needed (MW)	322	437	674	1003	1437	1863
Incremental Capacity Installed (MW)	500	0	500	500	0	500
Cumulative Capacity Installed (MW)	500	500	1000	1500	1500	2000
Incremental Cost of ACT (million $)	$56.09	$0.00	$56.09	$56.09	$0.00	$56.09
Total Capital Cost (million $)	$56.09	$56.09	$112.18	$168.27	$168.27	$224.36
Amount of Water Saved (acft/yr)	3,286	4,263	6,165	8,604	11,597	15,033
Annual Cost of Water ($ per 1,000 gallons)	$5.69	$4.38	$3.73	$4.85	$2.36	$2.10

Table C- 9
Costs of Alternative Cooling Technology to Meet Steam Electric Needs in Mitchell County

	2020	2030	2040	2050	2060	2070
Steam-Electric Needs (acft)	1,127	1,030	933	837	740	674
Equivalent Needs (GWh)	662	633	612	585	550	501
MW Capacity Needed (MW)	110	106	102	98	92	84
Incremental Capacity Installed (MW)	150	0	0	0	0	0
Cumulative Capacity Installed (MW)	150	150	150	150	150	150
Incremental Cost of ACT (million $)	$16.83	$0.00	$0.00	$0.00	$0.00	$0.00
Total Capital Cost (million $)	$16.83	$16.83	$16.83	$16.83	$16.83	$16.83
Amount of Water Saved (acft/yr)	1,127	1,030	933	837	740	674
Annual Cost of Water ($ per 1,000 gallons)	$4.98	$5.45	$1.38	$1.54	$1.74	$1.91

Table C- 10
Cost of Alternative Cooling Technology to Meet Steam Electric Needs in Ward County (Alt WMS)

	2020	2030	2040	2050	2060	2070
Steam-Electric Needs (acft)	1,079	1,718	2,496	3,445	4,603	5,569
Equivalent Needs (GWh)	634	1056	1637	2409	3422	4140
MW Capacity Needed (MW)	106	176	273	402	570	690
Incremental Capacity Installed (MW)	500	0	0	0	500	0
Cumulative Capacity Installed (MW)	500	500	500	500	1000	1000
Incremental Cost of ACT (million $)	$56.09	$0.00	$0.00	$0.00	$56.09	$0.00
Total Capital Cost (million $)	$56.09	$56.09	$56.09	$56.09	$112.18	$112.18
Annual Cost of Water ($ per acft)	$5,644	$3,545	$561	$406	$1,627	$1,345
Annual Cost of Water ($ per 1,000 gallons)	$17.32	$10.88	$1.72	$1.25	$4.99	$4.13

Table C- 11
Estimated Savings and Cost from Recommended Steam Electric Conservation Strategies

	2020	2030	2040	2050	2060	2070
Savings (ac-ft./yr)	8,660	9,582	11,437	13,842	16,814	20,235
Capital Cost	$89,750,000	$106,580,000	$162,670,000	$218,760,000	$235,590,000	$291,680,000
Annual Cost	$9,750,000	$11,580,000	$10,160,000	$14,860,000	$11,990,000	$13,390,000

Environmental Factors
Environmental impacts are largely positive because no additional water supply is required to implement the technology. Other impacts will need to be addressed when specific sites for new generation facilities have been determined.

Agricultural and Rural Impacts
There are no agricultural or rural issues associated with this project.

Impacts to Natural Resources and Key Parameters of Water Quality
There are no expected impacts to natural resources or key parameters of water quality from this strategy. Implementation may improve existing water resources that are currently used for power cooling if less water from these sources is needed.

Impacts on Other Water Resources and Management Strategies
No other water management strategies are impacted by this project.

Other Issues Affecting Feasibility
The implementation of this strategy is dependent upon a distribution of state-wide generation needs that may not represent the actual needs for generation within Region F. Location of new generation facilities within Region F is largely an economic issue that will be made by the power industry. Other technologies or strategies may be more attractive for meeting the need for new generation capacity.

WMS Name:	**Mining Conservation (Recycling)**
WMS Type:	Conservation
Strategy Yield:	7,791 ac-ft in 2020
Strategy Capital Cost:	$84.3 million in 2020
Strategy Annual Cost (During Amortization):	$21million in 2020 $261 per acre-foot in 2020
Strategy Annual Cost (After Amortization):	$0 in 2040-2070 $0 per acre-foot in 2040-2070

Strategy Description

Mining conservation or recycling is a demand management strategy that decreases future water needs by treating and reusing water used in mining operations. Mining conservation and recycling is possible for both oil and gas mining as well as sand and gravel mining. Mining recycling and conservation was considered for all mining operations in Region F.

The majority of mining demand in Region F is driven by the oil and gas boom in the Permian Basin which underlies most of Region F. Therefore, much of this discussion is focused on recycling by the oil and gas industry in the Permian Basin.

According to the September 2012 *Oil & Gas Water Use in Texas: Update to the 2011 Mining Water Use Report* done by the Bureau of Economic Geology[2], very little water was reused/recycled as of 2011 in the Permian Basin, compared to other areas in the state. However, significantly more brackish water is used in the region.

Play / Region	Type	Current (2011) %
Permian Far West	Recycled/reused	0%
	Brackish	80%
	Fresh	**20%**
Permian Midland	Recycled/reused	2%
	Brackish	30%
	Fresh	**68%**
Anadarko Basin	Recycled/reused	20%
	Brackish	30%
	Fresh	**50%**
Barnett Shale	Recycled/reused	5%
	Brackish	3%
	Fresh	**92%**
Eagle Ford Shale	Recycled/reused	0%
	Brackish	20%
	Fresh	**80%**
East Texas Basin	Recycled/reused	5%
	Brackish	0%
	Fresh	**95%**

The amount of water than can be reused/recycled is dependent on the amount of flowback. Flowback refers to the water based solution that flows back to the surface during and after the completion of the hydraulic fracturing. The fluid contains clays, chemical additives, dissolved metal ions and total dissolved solids (TDS)[14]. The volume of flowback varies across plays but is generally between 20-40% in the Permian Basin. For planning purposes, it is assumed that 20% of water used for mining purposes will be available through flowback and can be reused/recycled.

The flowback water is of low quality and requires treatment or must be blended with fresh water. The process used to recycle/reuse water can employ either conventional treatment or advanced treatment technologies. Conventional treatment technologies include flocculation, coagulation, sedimentation, filtration and lime softening. Advanced treatment technologies include reverse osmosis membranes, thermal distillation, evaporation, and/or crystallization processes and often use more energy than conventional treatment. It is assumed that 30% of the flowback water will be lost during the treatment process.

As competition for water grows, and water resources become more scarce, individual mining operators may find it more attractive to implement a reuse/recycling strategy. Reusing/recycling flow back water may also reduce brine disposal costs for the operator to help offset the cost of treatment and transportation. Ultimately, the decision to implement this strategy will be based on the economics of each individual well field. If brackish water is readily available and not in demand by other users, it may be more attractive to use brackish supplies. For planning purposes, it is assumed that the mining industry will adopt this strategy 50% of the time.

Region F recognizes that it has no authority to implement, enforce, or regulate water conservation practices. These water conservation practices are intended to be guidelines. Any water management strategies that reduce the demand for mining water are considered to meet regulatory requirements for consistency with this plan.

Quantity, Reliability and Cost

The estimated quantity available from this strategy is nearly 7,800 acre-feet in 2020 and around 2,600 acre-feet in 2070 when demands have decreased significantly. Estimated savings by county are shown in the table below. The actual quantity of water available from this strategy will vary. Since this strategy is largely dependent on each individual operator and economic factors specific to each mining operation, it is difficult to estimate the actual quantity of water that could be made available through this strategy.

The reliability of this supply is considered to be low because of the uncertainty involved in the potential for savings and the degree to which participation of mining companies is needed to realize savings.

Table C- 12
Mining Conservation (Recycling) Supplies (acre feet per year)

Mining Conservation (Recycling) Supplies						
County	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Andrews	277	260	222	176	135	104
Borden	48	65	55	35	17	8
Brown	66	66	67	67	66	66
Coke	34	34	30	26	23	20
Coleman	8	7	7	6	5	5
Concho	34	33	30	26	22	20
Crane	43	59	60	48	37	28
Crockett	121	129	88	48	14	4
Ector	138	151	135	110	89	75
Glasscock	240	217	167	118	77	56
Howard	174	192	136	80	33	14
Irion	223	235	170	104	50	24
Kimble	1	1	1	1	1	1
Loving	55	74	65	53	42	33
Martin	247	210	158	101	54	29
Mason	72	66	50	40	32	26
McCulloch	625	584	465	394	339	294
Menard	76	75	67	58	50	44
Midland	273	239	184	124	74	52
Mitchell	42	52	44	35	26	20
Pecos	48	75	75	60	47	37
Reagan	295	238	172	98	37	14
Reeves	107	184	178	145	114	90
Runnels	19	19	17	15	13	11
Schleicher	43	51	39	27	17	10
Scurry	20	32	34	25	17	12
Sterling	55	67	57	37	19	10
Sutton	31	50	53	40	27	18

Mining Conservation (Recycling) Supplies						
County	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Tom Green	74	76	78	78	79	81
Upton	297	254	201	135	81	56
Ward	56	67	59	45	32	23
Winkler	55	82	69	53	37	26
Total	**3,897**	**3,944**	**3,233**	**2,408**	**1,706**	**1,311**

The costs associated with this strategy vary based on the amount of flowback, the geographic location of the flowback, the amount of treatment required and transportation distances required. For the purposes of this plan, a $20,000 per acre-foot capital investment for the maximum amount of water saved over the planning period was assumed. This investment was amortized over 20 years. However, individual operators may plan to invest the capital with no debt service and would likely implement capital improvements at the level needed for each decade. The costs in Table C- 13 assume a single capital investment beginning in 2020. A 20 cent per barrel ($1,550 per acre-foot) annual savings from not having to dispose of the brine was assumed for the decades with capital cost. If an operator continued to employ this strategy in the later decades, they may realize a net savings over treating and disposing of the brine. However, for planning purposes, the annual cost was assumed to be $0 after the capital investment is paid off.

Table C- 13
Mining Conservation (Recycling) Costs

County	Capital Cost	Annual Cost Per Acre-Foot					
		2020	**2030**	**2040**	**2050**	**2060**	**2070**
Andrews	$5,540,000	$124	$233	$0	$0	$0	$0
Borden	$1,300,000	$716	$124	$0	$0	$0	$0
Brown	$1,340,000	$149	$149	$0	$0	$0	$0
Coke	$680,000	$124	$124	$0	$0	$0	$0
Coleman	$160,000	$124	$363	$0	$0	$0	$0
Concho	$680,000	$124	$174	$0	$0	$0	$0
Crane	$1,200,000	$785	$152	$0	$0	$0	$0
Crockett	$2,580,000	$234	$124	$0	$0	$0	$0
Ector	$3,020,000	$281	$124	$0	$0	$0	$0
Glasscock	$4,800,000	$124	$301	$0	$0	$0	$0
Howard	$3,840,000	$297	$124	$0	$0	$0	$0
Irion	$4,700,000	$214	$124	$0	$0	$0	$0
Kimble	$20,000	$124	$124	$0	$0	$0	$0
Loving	$1,480,000	$702	$124	$0	$0	$0	$0
Martin	$4,940,000	$124	$418	$0	$0	$0	$0
Mason	$1,440,000	$124	$276	$0	$0	$0	$0
McCulloch	$12,500,000	$124	$241	$0	$0	$0	$0
Menard	$1,520,000	$124	$146	$0	$0	$0	$0
Midland	$5,460,000	$124	$362	$0	$0	$0	$0
Mitchell	$1,040,000	$522	$124	$0	$0	$0	$0
Pecos	$1,500,000	$1,065	$124	$0	$0	$0	$0
Reagan	$5,900,000	$124	$524	$0	$0	$0	$0
Reeves	$3,680,000	$1,328	$124	$0	$0	$0	$0
Runnels	$380,000	$124	$124	$0	$0	$0	$0
Schleicher	$1,020,000	$435	$124	$0	$0	$0	$0
Scurry	$680,000	$1,295	$228	$0	$0	$0	$0

County	Capital Cost	Annual Cost Per Acre-Foot					
		2020	2030	2040	2050	2060	2070
Sterling	$1,340,000	$489	$124	$0	$0	$0	$0
Sutton	$1,060,000	$1,311	$224	$0	$0	$0	$0
Tom Green	$1,620,000	$282	$234	$0	$0	$0	$0
Upton	$5,940,000	$124	$407	$0	$0	$0	$0
Ward	$1,340,000	$452	$124	$0	$0	$0	$0
Winkler	$1,640,000	$945	$124	$0	$0	$0	$0
Total	**$84,340,000**	**$261**	**$239**	**$0**	**$0**	**$0**	**$0**

Environmental Factors

There are no identified environmental issues associated with this strategy. This strategy may have a positive impact on the environment by reducing the quantity of water needed to meet future demands and reducing the waste disposal of flowback water.

Agricultural and Rural Impacts

Due to the limited availability of water, any mining operation may be competing with agricultural and rural users for water. Reducing the demand on limited resources could have positive impacts on water availability for agriculture and rural users.

Impacts to Natural Resources and Key Parameters of Water Quality

No impacts to natural resources or key parameters of water quality were identified for this strategy since it reduces demands and does not develop new supplies. Positive impacts due to reduced waste water discharges, which were likely disposed of through deep well injection, are possible.

Impacts on Other Water Resources and Management Strategies

This may reduce the demand for water from other water management strategies.

Other Issues Affecting Feasibility

Because this strategy relies largely on the behavior of each individual mining company, it is difficult to quantify the expected level of savings. This strategy is based on generic procedures and may not accurately reflect the actual costs or water savings that can be achieved by an individual mining operator. Site specific data will be required for a better assessment for the potential for mining conservation (recycling/reuse) in Region F.

SUBORDINATION OF DOWNSTREAM WATER RIGHTS

WMS Name:	**Subordination of Downstream Water Rights**
WMS Type:	Subordination
Strategy Yield:	50,880 – 46,580 ac-ft
Strategy Capital Cost:	$0
Strategy Annual Cost (During Amortization):	$0
Strategy Annual Cost (After Amortization):	$0

Strategy Description

The TWDB requires the use of the TCEQ Water Availability Models (WAM) for regional water planning. Most of the water rights in Region F are in the Colorado River Basin. Chapter 3 discusses the use of the WAM models for water supply estimates and the impacts to the available supplies in the Upper Colorado River Basin. The Colorado WAM assumes that senior lower basin water rights would continuously make priority calls on Region F water rights. This assumption is not in line with the historical operation of the Colorado River Basin and likely underestimates the amount of surface water supplies available in Region F.

Although the Colorado WAM does not give an accurate assessment of water supplies based on the way the basin has historically been operated, TWDB requires the regional water planning groups to use the WAM to determine supplies. Therefore several sources in Region F have no supply by definition, even though in practice their supply may be greater than indicated by the WAM. According to the WAM, the Cities of Ballinger, Brady, Coleman, Junction, and Winters and their customers have no water supply. The Morgan Creek power plant has no supply to generate power. The Cities of Big Spring, Bronte, Coahoma, Midland, Miles, Odessa, Robert Lee, San Angelo, Snyder and Stanton do not have sufficient water to meet current demands. Overall, the Colorado WAM shows shortages that are the result of modeling assumptions and regional water planning rules rather than the historical operation of the Colorado Basin. This would indicate Region F needs to immediately spend significant funds on new water supplies, when in reality the magnitude of the indicated water shortages are not justified. Conversely, the WAM model shows more water in Region K (Lower Colorado Basin) than may actually be available.

One way for the planning process to reserve water supplies for these communities and their customers is to assume that downstream senior water rights do not make priority calls on major Region F municipal water rights, a process referred to as subordination. This assumption is similar to the methodology used to evaluate water supplies in previous water plans.

Because this strategy impacts water supplies outside of Region F, coordination with the Lower Colorado Regional Water Planning Group (Region K) was conducted. For the development of the 2006 regional water plans, a joint modeling effort was conducted with Region K and an agreement was reached for planning purposes. In subsequent planning cycles, Region K developed its own version of this subordination strategy, called the "cutoff model" that modified the priority dates for all water rights above Lakes Ivie and Brownwood. Region F has adopted the premise of the Region K's cutoff model with only minor variations for purposes of the subordination strategy in this plan. The Region F model makes two major assumptions: 1) water rights in the Lower Colorado Basin (Region K) do not make priority calls on the upper basin, and 2) these upper basin water rights do not make calls on each other. Figure C- 1 shows the divide between the upper and lower basin and depict which reservoirs were included in the subordination modeling. The hydrology developed by TCEQ through December 2013 was used for the subordination modeling.

The Region F model differs from the Region K model by including the City of Junction's run-of-river rights and Brady Lake in the upper basin. Other refinements to the subordination modeling include modifications for the Pecan Bayou. As discussed above, the assumption that upper basin water rights do not make calls on each other is consistent with general operations in the basin, but it may not be appropriate for determining water supplies during drought in the Pecan Bayou watershed. To better reflect reality, an assumption was made that the upstream reservoirs hold inflows that would have been passed to Lake Brownwood under strict priority analysis if Lake Brownwood is above 50 percent of the conservation capacity. This scenario provides additional supplies in the upper watershed while allowing Lake Brownwood to make priority calls at certain times during drought.

Two reservoirs providing water to the Brazos G planning region were included in the subordination analysis. Lake Clyde is located in Callahan County and provides water to the City of Clyde. Oak Creek Reservoir is located in Region F and supplies a small amount of water to water user groups within the region. Oak Creek Reservoir is owned and operated by the City of Sweetwater, which is in the Brazos G Region. Both Clyde and Sweetwater have other sources of water in addition to the supplies in the Colorado Basin.

The subordination strategy modeling was conducted for regional water planning purposes only. By adopting this strategy, the Region F Water Planning Group does not imply that the water rights holders have agreed to relinquish the ability to make priority calls on junior water rights. The Region F Water Planning Group does not have the authority to create or enforce subordination agreements. Such agreements must be developed by the water rights holders themselves. Region F recommends and supports ongoing discussions on water rights issues in the Colorado Basin that may eventually lead to formal agreements that reserve water for Region F water rights.

For three water suppliers, additional infrastructure was identified to fully utilize the subordinated supplies. These entities include the Cities of Odessa, Junction and Big Spring. Big Spring requires expansion of its water treatment facilities to meet its future demands. Odessa is implementing advanced treatment of the subordinated supplies to improve water quality, and Junction requires infrastructure improvements to its intake for quantity and quality concerns. Each of these improvements is discussed under Expanded Use of Existing Water Supplies in this appendix. The associated costs are shown in Appendix D.

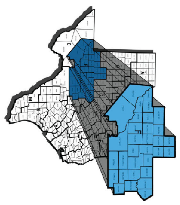
Quantity, Reliability and Cost

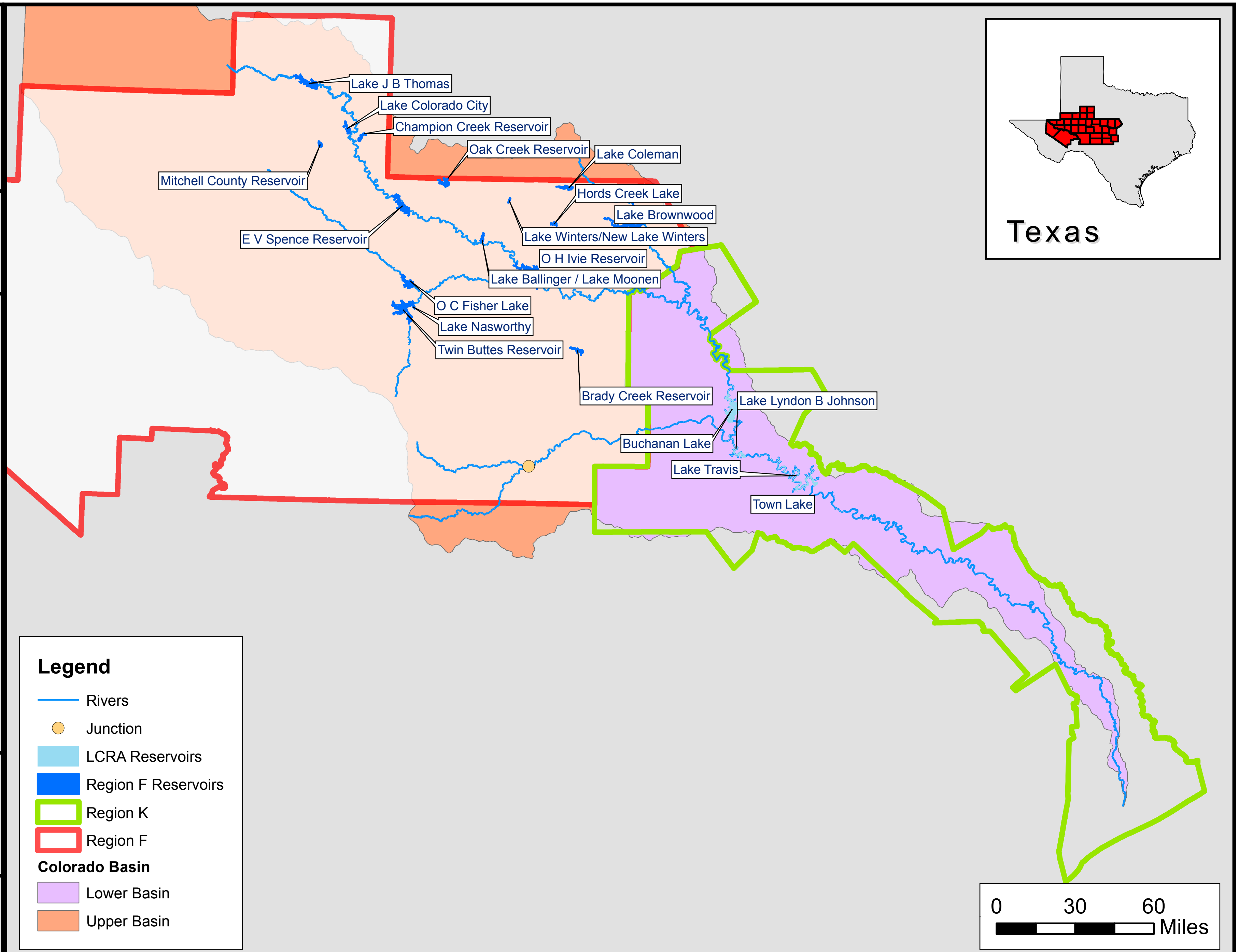
Over 50,000 acre-feet of additional supply is available through this strategy in 2020 and over 46,000 acre-feet in 2070. Figure C- 2 compares overall Region F surface water supplies with and without the subordination strategy over the planning period. Table C- 14 compares the 2010 and 2070 Region F water supply sources with and without subordination.

A list of the water user groups that could potentially benefit from subordination and the amount assumed for planning are shown in Table C- 15. The reduction in supplies shown for Midland is associated with a reduced safe yield of Lake Ivie with the subordination assumptions. These reductions also impact the subordination supplies to San Angelo. The contracts for water for both of these cities is based on a percentage of the safe yield of Lake Ivie.

The reliability of this strategy is considered to be medium based on the uncertainty of implementing this strategy and the current ongoing drought, which could impact supplies. The subordination strategy defined for the Region F Water Plan is for planning purposes. If an entity chooses to enter into a subordination agreement with a senior downstream water right holder, the details of the agreement (including costs, if any) will be between the participating parties. Therefore strategy costs will not be determined for the subordination strategy. For planning purposes, capital and annual costs for the subordination strategy are assumed to be $0.

Coordinate System: NAD 1983 StatePlane Texas North Central FIPS 4202 Feet





Subordination Strategy

Region F

DRAFTED	DESIGNED	SCALE	DATE	FILE	FN JOB NO
JLA	JLA	1:3,801,600	MARCH, 2015	Figure 5C-1.mxd	SAN11472

FIGURE C-1

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Table C- 14
Region F Surface Water Supplies with and without Subordination

Reservoir	2020 Supply WAM Run 3	2020 Supply Subordination	2070 Supply WAM Run 3	2070 Supply Subordination	Comments
Lake Colorado City	0	2,240	0	1,940	
Champion Creek Reservoir	0	1,480	0	1,380	
Colorado City/Champion System	*0*	*3,720*	*0*	*3,320*	
Oak Creek Reservoir	0	1,493	0	960	
Lake Ballinger	0	779	0	750	
Lake Winters	0	191	0	170	
Twin Buttes Reservoir/Lake Nasworthy	0	2,797	0	2,342	
O.C. Fisher Reservoir	0	1,538	0	1,030	
San Angelo System	*0*	*4,335*	*0*	*3,372*	
Hords Creek Reservoir	0	358	0	300	
Lake Coleman	0	2,915	0	2,740	
Coleman System	*0*	*3,273*	*0*	*3,040*	
Lake Clyde	0	150		150	
Brady Creek Reservoir	0	1,892	0	1,700	
Lake Thomas	0	4,864	0	4,779	
Spence Reservoir (CRMWD system)	0	23,116	0	22,982	
Spence Reservoir (Non-system)	0	1,475	0	1,467	6% of safe yield
Spence Reservoir Total	*0*	*24,591*	*0*	*24,449*	
Ivie Reservoir (CRMWD system)	18,152	17,242	15,583	14,681	
Ivie Reservoir (Non-system)	17,878	16,981	15,347	14,459	49.62% of safe yield
Ivie Reservoir Total	*36,030*	*34,223*	*30,930*	*29,140*	
CRMWD Total (Thomas, Spence & Ivie)	*36,030*	*63,678*	*30,930*	*58,368*	
Lake Brownwood	18,760	25,741	*18,060*	23,600	
City of Junction	0	412	*0*	412	
TOTAL	***54,790***	***105,664***	***48,990***	***95,842***	

Figure C- 2
Comparison of Region F Surface Water Supplies with and without Subordination

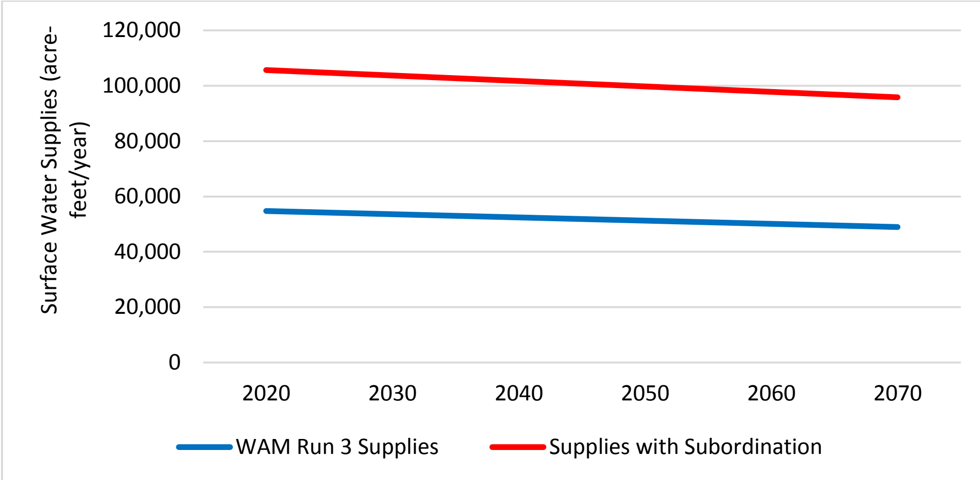


Table C- 15
Subordination Supplies by WUG in Region F

WUG Name	Additional Supplies Made Available through the Subordination Strategy					
	2020	2030	2040	2050	2060	2070
Bronte	400	400	400	400	400	400
Robert Lee	6	6	6	6	6	6
Coke County Mining	38	36	34	32	30	28
Coleman	2,102	2,061	2,024	1,985	1,938	1,891
Coleman County SUD	214	211	206	202	202	203
Coleman County Irrigation	743	743	743	743	743	743
Odessa	11,671	7,523	10,146	13,053	16,214	19,491
Ector County Irrigation	189	110	134	156	178	196
Big Spring	3,677	2,190	2,682	3,115	3,523	3,885
Howard County Mining	1,000	1,000	1,000	982	320	43
Junction	412	412	412	412	412	412
Stanton	253	160	202	249	292	330
Brady	1,892	1,854	1,816	1,778	1,740	1,700
Millersview-Doole WSC	517	302	369	236	267	294
Midland [a]	8,527	(299)	(298)	(297)	(297)	(296)
Mitchell County Steam Electric Power	1,480	1,460	1,440	1,420	1,400	1,380
Ballinger	752	675	693	563	558	554
Miles	112	124	121	119	119	119
Winters	186	182	178	174	170	165
Runnels County Manufacturing	11	10	10	11	11	11
Snyder	1,268	807	1,030	1,280	1,544	1,812
San Angelo	3,271	3,090	2,909	2,737	2,561	2,389
Tom Green Co. Manufacturing (San Angelo Sales)	428	404	396	378	361	343
BCWID (non-allocated)	6,981	6,693	6,405	6,117	5,829	5,540
CRMWD (non –allocated)	5,527	20,834	17,318	13,566	10,225	6,444
Total	**51,251**	**50,582**	**49,970**	**49,011**	**48,340**	**47,677**

[a]Due to assumptions concerning the priority date of Lake Ivie in the TCEQ WAM and the subordination model, Lake Ivie has less yield under subordination since it must pass water to other Region F water right holders. Thus, in certain cases, the yield from the subordination strategy is negative.

Environmental Factors

The WAM models assume a perfect application of the prior appropriations doctrine. A significant assumption in the model is that junior water rights routinely bypass water to meet the demands of downstream senior water rights and fill senior reservoir storage. If a downstream senior reservoir is less than full, all junior upstream rights are assumed to cease diverting and storing water until that reservoir is full, even if that reservoir does not need to be filled for that water right to meet its diversion targets. Currently in the Region F portion of the Colorado Basin, water rights divert and store inflows until downstream senior water rights make a priority call on upstream junior water rights. Many other assumptions are made in the Colorado WAM model that may be contrary to historical operation of the Colorado Basin in Region F.

Because many of the assumptions in the Colorado WAM are contrary to the actual operation of the upper portion of the basin, the model does not give a realistic assessment of streamflows in Region F. In the WAM a substantial amount of water is passed downstream to senior water rights that would not be passed based on historical operation. The subordination analysis better represents the actual operation of the basin. Therefore a comparison of flows with and without subordination is meaningless as an assessment of impacts on streamflow in the upper basin.

Environmental impacts should be based on an assessment of the actual conditions, not a simulation of a theoretical legal framework such as the WAM. Impacts should also be assessed for a change in actions. The subordination modeling approaches the actual operation of the upper basin. There is no change in operation or distinct action taken under this strategy. The actual impacts of implementing this strategy could occur during extreme drought when a downstream senior water right may elect to make a priority call on upstream junior water rights. Flows from priority releases could be used beneficially for environmental purposes in the intervening stream reaches before the water is diverted by the senior water right. Priority calls are largely based on the decision of individual water rights holders, making it difficult to quantify impacts. However, the potential environmental impacts are considered to be low because this strategy, as modeled, assumes that operations in the basin continue as currently implemented. Existing species and habitats are established for current conditions, which will not change under this strategy.

Agricultural and Rural Impacts

The water user groups impacted the most by the Colorado WAM are small rural towns such as Ballinger, Winters and Coleman, and the rural water supply corporations supplied by these towns. These towns have developed surface water supplies because groundwater supplies of sufficient quality and quantity are not available or have water quality concerns. This strategy reserves water for these rural communities, which provides a positive impact.

Three Region F reservoirs included in the subordination strategy are permitted to provide a significant amount of water for irrigation: the Twin Buttes Reservoir/Lake Nasworthy system and Lake Brownwood. Twin Buttes Reservoir uses a pool accounting system to divide water between the City of San Angelo and irrigation users. As long as water is in the irrigation pool, water is available for irrigation. Due to drought, no water has been in the irrigation pool since 1998. The total authorized diversion for the Twin Buttes/Nasworthy system is 54,000 acre-feet per year. The two reservoirs have no firm or safe yield in the Colorado WAM. With the subordination analysis the current safe yield of the Twin Buttes/Nasworthy system is 4,528 acre-feet per year. Historical use of this reservoir system has been much higher. Therefore, even with subordination there is not sufficient water to meet both the needs of the City of San Angelo and irrigation demands. Subordination has no impact on irrigation users of Twin Buttes/Lake Nasworthy.

The reliable supply from Lake Brownwood does increase with subordination but the entire supply is not currently used. Subordination does not have an impact on rural or agricultural users of Lake Brownwood. It may have a positive impact with greater supplies. However, the occurrence of drought conditions more severe than those encountered during the historical modeling period could impact supplies available from this source.

Impacts to Natural Resources and Key Parameters of Water Quality

The subordination modeling approaches the actual operation of the upper basin. There is no change in operation or distinct action taken under this strategy. Therefore impacts to natural resources and water quality are expected to be minimal.

Impacts on Other Water Resources and Management Strategies

All other strategies for this plan are based on water supplies with the subordination strategy in place. The amount of water needed from some of these strategies may be higher without the subordination strategy and/or the timing for implementation may need to be sooner. Other strategies may be indirectly impacted. Changes to the assumptions made in the subordination strategy may have a significant impact on the amount of water needed from these strategies.

Other Issues Affecting Feasibility

Water supply in the Colorado Basin involves many complex legal and technical issues, as well as a variety of perspectives on these issues. There is also a long history associated with water supply development in the Colorado Basin. It is likely that a substantial study evaluating multiple subordination scenarios will be required before a full assessment of the feasibility of this strategy can be made. Legal opinions regarding the implementation of subordination agreements under Texas water law will be a large part of assessing the feasibility of the strategy.

Before assigning costs for this strategy a definitive assessment of the impacts on senior water right holders and the benefits to junior water rights holders must be determined. This assessment should take into account the existing agreements and the historical development of water supply in the basin. The analysis presented in this plan is not sufficient to make that determination.

REUSE

Wholesale Water Provider:	**San Angelo**
WMS Name:	**Reuse**
WMS Type:	Direct Reuse
Strategy Yield:	7,000 acre-feet per year
Strategy Capital Cost:	$150,000,000
Strategy Annual Cost (During Amortization):	$2,826 per acre-foot $8.67 per thousand gallons
Strategy Annual Cost (After Amortization):	$1,033 per acre-foot $3.17 per thousand gallons

Strategy Description

The City of San Angelo currently contracts its treated effluent to the local irrigation district in exchange for Twin Buttes water from the irrigation pool. However, due to drought, no water has been in the irrigation pool since 1998. The City recently initiated a reuse study to investigate alternative uses for its treated effluent. The results of this study are not available at this time.

Potential reuse strategies include:

- In-city landscape irrigation (parks, cemeteries, golf courses, Angelo State University, air base, etc.)
- Manufacturing purposes
- Steam electric power generation
- Blending with other sources of water for indirect reuse
- Treatment for direct municipal use

The study has not yet been completed, and thus it is not known whether the reuse will be implemented directly or indirectly. For planning purposes it was assumed that this project will incorporate direct reuse for municipal use. The City currently contracts approximately 8,300 acre-feet for irrigation purposes. This project assumes those contracts decrease to 0 acre-feet and the City begins treating the 8,300 acre-feet of effluent for best possible direct use. This type of reuse will require a permit modification. The waste stream from the reverse osmosis (RO) treatment process is assumed to be disposed through deep well injection.

Quantity, Reliability and Cost

Due to losses associated with RO for direct reuse, this strategy is expected to yield 7,000 acre-feet of supply. This supply would be very reliable. Capital costs are estimated at $150 million.

Environmental Factors

The environmental impacts of direct reuse differs depending on the method of disposal for the RO reject stream. The conceptual design for the project uses deep well injection for disposal. A properly designed and maintained facility should have minimal environmental impact.

Agricultural and Rural Impacts

Implementation of this strategy will result in no reuse water being available to the Tom Green County Water Control and Improvement District (WCID) by diverting the treated effluent currently sold to irrigation. The WCID uses the treated effluent to help irrigate 10,000 acres of agricultural lands. The reuse supply and surface water from Twin Buttes and O.C. Fisher reservoirs, when available, are used by the

WCID. During drought there has been little to no water available directly from the reservoirs. This strategy will have high impacts to irrigated agriculture in Tom Green County.

Impacts to Natural Resources and Key Parameters of Water Quality

A properly designed and maintained deep injection well facility should have minimal impacts on natural resources and no impacts on water quality. The highly treated wastewater could improve overall water quality of San Angelo's treated water that currently utilizes water from the Upper Colorado River Basin.

Impacts on Other Water Resources and Management Strategies

Implementation of this reuse strategy will make less water available for irrigation by diverting the treated effluent currently used for irrigation.

Other strategies for the City of San Angelo may be affected.

Other Issues Affecting Feasibility

Although direct reuse for potable consumption is technically feasible, there may be public resistance to the direct reuse of water. However, acceptance for this type of project is growing. Adequate monitoring and oversight will be required to protect public health and safety. To date, TCEQ has not granted a long-term permit for a direct potable reuse project that utilizes a high percentage of the entity's total water supply. This project would provide about 30 percent of San Angelo's total treated water on an average annual basis. Further study and coordination with TCEQ will be needed to ensure that the treated wastewater percentage of the total water supply on an instantaneous basis is not too high, especially during the winter months when demands tend to be lower.

Water User Group:	**Bangs**
WMS Name:	**Reuse**
WMS Type:	Type 1 Direct Non-Potable Reuse
Strategy Yield:	25 acre-feet per year
Strategy Capital Cost:	$422,000
Strategy Annual Cost (During Amortization):	$1,560 per acre-foot $4.79 per 1,000 gallons
Strategy Annual Cost (After Amortization):	$160 per acre-foot $0.49 per 1,000 gallons

Strategy Description

Direct non-potable reuse (Type 1) has been identified as a feasible solution for the City of Bangs. The City plans on using reuse for irrigation of public parks. This evaluation is based on a generalized direct non-potable reuse strategy developed for the Region F plan. This strategy assumes that the current WWTP will need to construct the necessary improvements in order to bring a portion of the plant's effluent to Type 1 standards. If the plant's effluent already meets Type 1 standards than the cost will be significantly reduced. The strategy also assumes that along with the WWTP improvements, two miles of transmission pipeline will need to be constructed in order to convey the reuse water from the plant to the public parks. If this strategy is pursued, additional site-specific studies will be required to determine actual quantities of water available, costs, and potential impacts.

Quantity, Reliability and Cost

For the City of Bangs, it is estimated that reuse could provide as much as 22,300 gallons per day of additional irrigation supply, or 25 acre-feet per year. Currently Bangs purchases all of its water from the BCWID#1. By reusing the water generated by the City of Bangs Wastewater Treatment Facility, the City will not need to rely as heavily on external water supplies. This strategy would supply an extremely reliable water source for irrigation purposes. The capital cost for this strategy is estimated at $422,000. This cost could be significantly less if no wastewater treatment plant improvements are needed.

Environmental Factors

The City of Bangs currently discharges its wastewater into an unnamed tributary that ultimately flows into the Colorado River. It is assumed that the waste stream from the treatment facility will be combined with unused treated effluent and discharged in a similar manner. The potential impacts of this discharge on the receiving stream will need to be evaluated prior to implementation of this strategy. If the impacts are unacceptable, an alternative method of disposal may be required. Alternative disposal methods may significantly increase the cost of the project.

Reuse would result in a reduction in the quantity of water discharged by the City. An analysis of the environmental impacts on the receiving stream will be required in the permitting process. However, because of the relatively small amount of flow reduction associated with this reuse project, the impact is not expected to be significant.

Agricultural and Rural Impacts

None Identified

Impacts to Natural Resources and Key Parameters of Water Quality

Reuse would result in a reduction in the quantity of water that is ultimately introduced to the Colorado River. This minimal reduction in water supply is not expected to significantly impact downstream WUGs that rely on the Colorado River for their own water needs.

Impacts on Other Water Resources and Management Strategies

None Identified.

Other Issues Affecting Feasibility

None.

Water User Group:	**Bronte**
WMS Name:	**Reuse**
WMS Type:	Direct Potable Reuse
Strategy Yield:	94 acre-feet per year
Strategy Capital Cost:	$3,159,000
Strategy Annual Cost (During Amortization):	$4,213 per acre-foot $12.93 per thousand gallons
Strategy Annual Cost (After Amortization):	$1,397per acre-foot $4.29 per thousand gallons

Strategy Description

Direct potable reuse has been identified as a potentially feasible solution for the City of Bronte. The City currently uses land application for disposal of treated effluent. This evaluation is based on a generalized direct reuse strategy developed for the Region F plan. This strategy assumes that a portion of the wastewater stream will be sent through membrane filtration and reverse osmosis (RO). The treated water will then be blended with raw water prior to treatment at the City's existing water treatment plant. It is assumed that the waste stream from the reuse facility will be combined with unused treated effluent and discharged into a local stream or use existing land application facilities. If this strategy is pursued, additional site-specific studies will be required to determine actual quantities of water available, costs and potential impacts.

Quantity, Reliability and Cost

For the City of Bronte, it is estimated that reuse could provide as much as 94 acre-feet per year. This supply would thus be very reliable. The estimated capital costs are $3,159,000.

Environmental Factors

The City of Bronte currently uses land application to dispose of treated effluent. This strategy assumes that the waste stream from the treatment facility will be blended with unused treated effluent and disposed of in a similar fashion. The potential impacts of land application may need to be evaluated prior to implementation of this strategy. If the impacts are unacceptable, an alternative method of disposal may be required. Alternative disposal methods may significantly increase the cost of the project.

Agricultural and Rural Impacts

The City of Bronte is a rural community. Like other water supply strategies, the high cost of this strategy may have an adverse impact on the limited financial resources of the City and the surrounding rural community.

Impacts to Natural Resources and Key Parameters of Water Quality

None identified.

Impacts on Other Water Resources and Management Strategies

None Identified.

Other Issues Affecting Feasibility

Although direct potable reuse is technically feasible, there may still be public resistance to the direct reuse of water for municipal purposes. Adequate monitoring and oversight will be needed to protect human health and safety. The cost of this project may put a significant financial strain on the City of Bronte and the surrounding community. The infrastructure associated with reuse requires ongoing use of water from this source to make the project cost-effective.

Water User Group: **Brownwood**

WMS Name: **Reuse**

WMS Type: Direct Potable Reuse

Strategy Yield: 841 acre-feet per year

Strategy Capital Cost: $8,500,000

Strategy Annual Cost (During Amortization): $ 1,541per acre-foot; $ 4.73 per thousand gallons

Strategy Annual Cost (After Amortization): $ 696 per acre-foot; $ 2.14 per thousand gallons

Strategy Description

Direct potable reuse is currently being considered by the City of Brownwood. The City has already done significant amounts of planning and has applied for and been awarded funding from the TWDB. However, as the result of recent rains, the City has decided to wait on implementing this strategy and declined the funding from the TWDB. This strategy is considered a future option for water supply for Brownwood. The water treatment plant still needs to be fully designed, constructed, tested and permitted. The evaluation here is based on a generalized direct potable reuse strategy developed for the Region F plan. Site specific evaluations will be conducted as a part of the permitting process.

Quantity, Reliability and Cost

For the City of Brownwood, it is estimated that a 1.5 MGD direct potable reuse plant could provide as much 841 acre-feet per year. Currently Brownwood purchases all of its water from the BCWID#1. By reusing the water generated by the City's Wastewater Treatment Facility, the City will not need to rely as heavily on external water supplies. This strategy would supply an extremely reliable water source for additional drinking water. Capital costs for this strategy are estimated at $8.5 million dollars.

Environmental Factors

The City of Brownwood currently discharges its wastewater into Willis Creek which ultimately flows into the Colorado River Basin. It is assumed that the waste stream from the treatment facility will be combined with unused treated effluent and discharged in a similar manner. The potential impacts of this discharge on the receiving stream will need to be evaluated prior to implementation of this strategy. If the impacts are unacceptable, an alternative method of disposal may be required. Alternative disposal methods may significantly increase the cost of the project. Reuse would result in a reduction in the quantity of water discharged by the City.

Agricultural and Rural Impacts

None Identified.

Impacts to Natural Resources and Key Parameters of Water Quality

Pending the water quality of the discharge stream to Willis Creek, this strategy could increase the levels of TDS and other key water quality parameters to the stream. This would be evaluated during permitting for the project.

Impacts on Other Water Resources and Management Strategies

None Identified.

Other Issues Affecting Feasibility

Direct potable reuse plants may face public opposition. They can also be difficult to permit and operate.

Water User Group:	**Crockett County Mining**
WMS Name:	**Direct Non-Potable Reuse sales from Crocket County WCID #1**
WMS Type:	Direct Non-Potable Reuse (Type II)
Strategy Yield:	75 acre-feet per year
Strategy Capital Cost:	$0
Strategy Annual Cost (During Amortization):	$1.00 per thousand gallons
Strategy Annual Cost (After Amortization):	$1.00 per thousand gallons

Strategy Description
Crockett County WCID #1 plans to sell about 75 acre-feet per year of treated wastewater effluent to the oil and gas industry. For planning purposes, it was assumed that the mining industry would not invest capital in permanent infrastructure such as a pipeline. Instead it was assumed that the purchaser would transport the water via truck from the wastewater plant to the specific well field.

Quantity, Reliability and Cost
The estimated quantity of supply available from Crockett County WCID #1 for reuse sales to mining is 75 acre-feet per year. This supply is considered to be very reliable. For planning purposes, it was assumed that the mining industry would not invest in permanent infrastructure for this small amount of supply but instead would transport the water via truck. While, this would incur some annual costs for the mining operator, it is difficult to develop a meaningful cost estimate because of the uncertainty regarding the way in which this strategy would actually be implemented. It is assumed the mining operator will incur all of the annual costs. For planning purposes, only the sales cost of the water is estimated at $1.00 per thousand gallons.

Environmental Factors
This strategy assumes that 75 additional acre-feet of supply will be used for mining. This may reduce mining's demand on other water sources and decrease the environmental impacts of those uses.

Agricultural and Rural Impacts
None identified.

Impacts to Natural Resources and Key Parameters of Water Quality
No impacts to natural resources or water quality are expected.

Impacts on Other Water Resources and Management Strategies
To the extent that this supply reduces the demand on other water resources previously used to meet mining demands, this strategy may reduce competition for water from those sources.

Other Issues Affecting Feasibility
This strategy is dependent on an independent mining operator determining this is the most economically feasible solution to their water shortages. The need for this strategy may vary depending on the oil and gas market.

Water User Group: **Eden**

WMS Name: **Reuse**

WMS Type: Direct Non-Potable Reuse (Type 1)

Strategy Yield: 50 acre-feet per year

Strategy Capital Cost: $485,700

Strategy Annual Cost (During Amortization): $902 per acre-foot
$2.77 per thousand gallons

Strategy Annual Cost (After Amortization): $89 per acre-foot
$0.27 per thousand gallons

Strategy Description

Direct non-potable reuse (Type 1) has been identified as a feasible solution for the City of Eden. The City plans on using the reuse for the irrigation of public parks and golf courses. This evaluation is based on a generalized direct non-potable reuse strategy developed for the Region F plan. This strategy assumes that the current WWTP will need to construct the necessary improvements in order to bring a portion of the plant's effluent to Type 1 standards. If the plant's effluent already meets Type 1 standards, then the cost will be significantly reduced. The strategy also assumes that along with the WWTP improvements, two miles of transmission pipeline will need to be constructed in order to convey the reuse water from the plant to the golf courses and parks. If this strategy is pursued, additional site-specific studies will be required to determine actual quantities of water available, costs and potential impacts.

Quantity, Reliability and Cost

For the City of Eden, it is estimated that reuse could provide as much as 44,600 gallons per day of additional irrigation supply, or 50 acre-feet per year. This supply would be very reliable. It is estimated to require about $485,700 of capital investment.

Environmental Factors

The City of Eden currently discharges its wastewater into Harden Branch which ultimately flows into the San Saba River. It is assumed that the waste stream from the treatment facility will be combined with unused treated effluent and discharged in a similar manner. The potential impacts of this discharge on the receiving stream will need to be evaluated prior to implementation of this strategy. If the impacts are unacceptable, an alternative method of disposal may be required. Alternative disposal methods may significantly increase the cost of the project. Reuse would result in a reduction in the quantity of water discharged by the City. However, because of the relatively small amount of flow reduction associated with this reuse project, the impact is not expected to be significant.

Agricultural and Rural Impacts

None identified.

Impacts to Natural Resources and Key Parameters of Water Quality

This strategy is not expected to significantly impact natural resources or key parameters of water quality due to the small volume involved in this strategy.

Impacts on Other Water Resources and Management Strategies

None identified.

Other Issues Affecting Feasibility

None identified.

Water User Group: **Menard**

WMS Name: **Reuse**

WMS Type: Direct Non-Potable Reuse (Type II)

Strategy Yield: 67 acre-feet per year

Strategy Capital Cost: $1,288,800

Strategy Annual Cost (During Amortization): $1,775 per acre-foot; $5.45 per 1,000 gallons

Strategy Annual Cost (After Amortization): $165 per acre-foot; $0.51 per 1,000 gallons

Strategy Description

Direct non-potable reuse (Type 1) has been identified as a feasible solution for the City of Menard. The City plans on using the reuse for the irrigation of city farms. This evaluation is based on a generalized direct non-potable reuse strategy developed for the Region F plan. This strategy assumes that the current WWTP will need to construct the necessary improvements in order to bring a portion of the plant's effluent to Type 1 standards. If the plant's effluent already meets Type 1 standards, then the cost will be significantly reduced. The strategy also assumes that along with the WWTP improvements, two miles of transmission pipeline will need to be constructed in order to convey the reuse water from the plant to the city farms. If this strategy is pursued, additional site-specific studies will be required to determine actual quantities of water available, costs and potential impacts.

Quantity, Reliability and Cost

For the City of Menard, it is estimated that reuse could provide as much as 67 acre-feet per year of additional irrigation supply, or 0.12 MGD. Currently the water users in Menard obtain their water from wells located along the banks of the San Saba River that produce water from the San Saba Alluvium. Reduced flows in the river due to drought, therefore, have a severe impact on the availability of water. Reuse will introduce a much more reliable water source for the irrigation of the city farms.

Environmental Factors

The City of Menard currently discharges its wastewater into the San Saba River. It is assumed that the waste stream from the treatment facility will be combined with unused treated effluent and discharged in a similar manner. The potential impacts of this discharge on the receiving stream will need to be evaluated prior to implementation of this strategy. If the impacts are unacceptable, an alternative method of disposal may be required. Alternative disposal methods may significantly increase the cost of the project.

Reuse would result in a reduction in the quantity of water discharged by the City. However, because of the relatively small amount of flow reduction associated with this reuse project, the impact is not expected to be significant.

Agricultural and Rural Impacts

The City of Menard obtains water from wells located along the banks of the San Saba River that produce water from the San Saba Alluvium. To the extent that implementing this strategy reduces the amount of water extracted from these wells to service Menard's needs, it may improve the reliability of this water source for agricultural and rural users. Also, the water will be used for agricultural purposes, providing a positive impact to agriculture.

Impacts to Natural Resources and Key Parameters of Water Quality

It is assumed that the quality of the treated effluent to the San Saba River will not change significantly. Therefore, minimal impacts to the San Saba's overall water quality are expected.

Impacts on Other Water Resources and Management Strategies

None identified.

Other Issues Affecting Feasibility

None identified.

Water User Group:	**Midland, Andrews and Martin Counties Mining**
WMS Name:	**Direct Reuse**
WMS Type:	Direct Non-Potable Reuse (Type I)
Strategy Yield:	4,500 acre-feet per year
Strategy Capital Cost:	$49,373,000
Strategy Annual Cost (During Amortization):	$1,103 per acre-foot $3.39 per thousand gallons
Strategy Annual Cost (After Amortization):	$185 per acre-foot $0.57 per thousand gallons

Strategy Description

Midland County Mining shows no shortage, but mining companies have expressed interest in purchasing wastewater effluent from the City of Midland for mining purposes. It is uncertain whether this water would be used in Midland County or adjacent areas. For purposes of this plan, the use of the reuse water is assumed to occur in Midland, Andrews and Martin Counties. This strategy includes improvements to the City's wastewater treatment plant and the construction of a 37 mile transmission system to move the water to Andrews and Martin Counties.

Quantity, Reliability and Cost

This strategy assumes that up to 9 MGD of treated wastewater from the City of Midland would be sold directly to mining companies. The total average annual supply from this strategy is assumed to be 4,500 acre-feet per year. The capital cost is estimated at $49 million, with a unit cost of $3.39 per thousand gallons. The reliability of this source is considered to be very high.

Table C-16

County	Quantity (ac-ft. /yr.)	Cost	Cost per ac-ft.
Andrews	2,500	$28,197,000	$1,141
Martin	1,500	$17,827,000	$1,187
Midland	500	$3,349,000	$664
Total	4,500	$49,373,000	$1,103

Environmental Factors

It is assumed that the pipeline will be routed to minimize impacts to the environment. Disruptions of the environment for pipeline construction are expected to be temporary and minimal.

Agricultural and Rural Impacts

No agricultural and rural impacts are expected.

Impacts to Natural Resources and Key Parameters of Water Quality

The City of Midland currently discharges their wastewater via land application. Therefore, diversion of the wastewater for reuse by the mining industry is not expected to have any impacts on the water quality of a receiving stream.

Impacts on Other Water Resources and Management Strategies

Other water resources that mining may have pursued instead of reuse may become available for other purposes.

Other Issues Affecting Feasibility

The mining industry and the City of Midland ultimately have to reach a mutually agreeable contract for this strategy to be implemented. As of the writing of this plan, a contract has not been signed. Contract negotiations are outside the scope of the Region F Plan.

Water User Group:	**Mitchell County Mining**
WMS Name:	**Reuse sales from Colorado City**
WMS Type:	Direct Non-Potable Reuse (Type II)
Strategy Yield:	250 acre-feet per year
Strategy Capital Cost:	$932,000
Strategy Annual Cost (During Amortization):	$368 per acre-foot $1.13 per thousand gallons
Strategy Annual Cost (After Amortization):	$56 per acre-foot $0.17 per thousand gallons

Strategy Description
Colorado City plans to begin selling an additional 250 acre-feet per year to the oil and gas industry (mining) or possibly outdoor irrigation. This evaluation is based on a generalized direct non-potable reuse strategy developed for the Region F Plan that assumes all of the water is sold to mining. This strategy assumes that the current WWTP will need no improvements in order to bring a portion of the plant's effluent to Type II standards. If the plant's effluent does not already meet Type II standards, then the cost will be greater than shown in this plan. The strategy assumes two miles of transmission pipeline will need to be constructed in order to convey the reuse water from the plant to the mining industry. If this strategy is pursued, additional site-specific studies will be required to determine actual quantities of water available, costs and potential impacts.

Quantity, Reliability and Cost
This strategy is based on an additional reuse supply of 250 acre-feet per year of Type II non-potable reuse supply for sales to mining. This supply is considered to be very reliable. The cost of this strategy is estimated at $932,000 but may be different depending on site specific situations.

Environmental Factors
This strategy assumes that 250 additional acre-feet of supply will be used for mining. This may reduce mining's demand on other water sources and decrease the environmental impacts of those uses.

Agricultural and Rural Impacts
None identified.

Impacts to Natural Resources and Key Parameters of Water Quality
Reuse would result in a reduction in the quantity of water discharged by the City. It is not expected to adversely impact natural resources or key parameters of water quality.

Impacts on Other Water Resources and Management Strategies
To the extent that this supply reduces the demand on other water resources previously used to meet mining demands, this strategy may reduce competition for water from those sources.

Other Issues Affecting Feasibility
None identified.

Water User Group:	**Sonora**
WMS Name:	**Reuse**
WMS Type:	Direct Non-Potable Reuse (Type 1)
Strategy Yield:	62 acre-feet per year
Strategy Capital Cost:	$495,800
Strategy Annual Cost (During Amortization):	$748 per acre-foot $2.30 per thousand gallons
Strategy Annual Cost (After Amortization):	$79 per acre-foot $0.24 per thousand gallons

Strategy Description

Direct non-potable reuse (Type 1) has been identified as a feasible solution for the City of Sonora. The City plans on using the reuse for the irrigation of industrial and municipal parks. This evaluation is based on a generalized direct non-potable reuse strategy developed for the Region F Plan. This strategy assumes that the current WWTP will need to construct the necessary improvements in order to bring a portion of the plant's effluent to Type 1 standards. If the plant's effluent already meets Type 1 standards, then the cost will be significantly reduced. The strategy also assumes that along with the WWTP improvements, two miles of transmission pipeline will need to be constructed in order to convey the reuse water from the plant to the end users. If this strategy is pursued, additional site-specific studies will be required to determine actual quantities of water available, costs, and potential impacts.

Quantity, Reliability and Cost

For the City of Sonora, it is estimated that reuse could provide as much as 55,300 gallons per day of additional irrigation supply, or 62 acre-feet per year. This supply would be very reliable.

Environmental Factors

The City of Sonora currently discharges its wastewater to Dry Devil's River. It is assumed that the waste stream from the treatment facility will be combined with unused treated effluent and discharged in a similar manner. The potential impacts of this discharge on the receiving stream will need to be evaluated prior to implementation of this strategy. If the impacts are unacceptable, an alternative method of disposal may be required. Alternative disposal methods may significantly increase the cost of the project. Reuse would result in a reduction in the quantity of water discharged by the City. An analysis of the environmental impacts on the receiving stream may be required in the permitting process. However, because of the relatively small amount of flow reduction associated with this reuse project, the impact is not expected to be significant.

Agricultural and Rural Impacts

The City of Sonora obtains water from the Edwards-Trinity Plateau aquifer. By reducing the amount of water extracted from this aquifer to service Sonora's needs, it may improve the reliability of these wells as a water source for the other WUGs in the county such as Irrigation and Livestock.

Impacts to Natural Resources and Key Parameters of Water Quality

Reuse will result in a slight reduction in the quantity of water that is discharged by the City and thus into the Rio Grande Basin. This small change is not expected to have adverse impacts on natural resources or key parameters of water quality.

Impacts on Other Water Resources and Management Strategies
None identified.

Other Issues Affecting Feasibility
None identified.

Water User Group:	**Winters**
WMS Name:	**Reuse**
WMS Type:	Direct Potable Reuse
Strategy Yield:	83 acre-feet per year
Strategy Capital Cost:	$3,354,000
Strategy Annual Cost (During Amortization):	$5,091 per acre foot $15.62 per thousand gallons
Strategy Annual Cost (After Amortization):	$1,685 per acre foot $5.17 per thousand gallons

Strategy Description

Reuse has been identified as a feasible strategy for the City of Winters. The City currently holds a wastewater discharge permit for 0.49 MGD. Treated effluent is also authorized for irrigation. This strategy assumes that a portion of the wastewater stream will be sent through membrane filtration and reverse osmosis (RO). The treated water will then be blended with raw water prior to treatment at the City's existing water treatment plant. It is assumed that the waste stream from the reuse facility will be combined with the remaining treated effluent and discharged into a local stream or disposed of using land application. If this strategy is pursued, additional site-specific studies will be required to determine actual quantities of water available, costs, and potential impacts.

Quantity, Reliability and Cost

For the City of Winters, it is estimated that reuse could provide as much as 83 acre-feet per year. This supply would be very reliable. However, the cost of this strategy may be prohibitive.

Environmental Factors

The City of Winters currently discharges to a receiving stream and irrigates with its treated wastewater. This strategy assumes that reject from advanced treatment will be blended with the treated effluent that is not reused and disposed of in a similar manner. The potential impacts of this discharge on the receiving stream will need to be evaluated prior to implementation of this strategy. If the impacts are unacceptable, an alternative method of disposal may be required. Alternative disposal methods may significantly increase the cost of the project.

Agricultural and Rural Impacts

This strategy may reduce the amount of reuse water currently used for irrigation.

The City of Winters supplies a large portion of the drinking water for rural Runnels County. Since the proposed project will make the City's water supply more reliable, it should have a positive impact on rural interests in the area

The City of Winters is a rural community. Like other water supply strategies, the cost of this strategy may have an adverse impact on the community's limited financial resources and the surrounding rural area, potentially offsetting the positive impacts of a more reliable water supply.

Impacts to Natural Resources and Key Parameters of Water Quality

Depending on the ultimate disposal method, this strategy may increase TDS levels of its effluent discharges.

Impacts on Other Water Resources and Management Strategies

Other strategies for Winters.

Other Issues Affecting Feasibility

Although direct reuse for potable consumption is technically feasible, there may be public resistance to the concept of direct reuse water. Adequate monitoring and oversight will be required to protect public health and safety.

The infrastructure associated with reuse requires ongoing use of water from this source to make the project cost-effective. Reuse water should not be used on an as-needed basis.

EXPANDED USE OF EXISTING WATER SUPPLIES

Wholesale Water Provider:	**Colorado River Municipal Water District**
WMS Name:	**Ward County Well Field Expansion and Development of Winkler County Well Field**
WMS Type:	Expanded Use of Existing Water Supplies
Strategy Yield:	11,200 acre-feet/year
Strategy Capital Cost:	$139.9 million
Strategy Annual Cost (During Amortization):	$1,265 per acre-foot $3.88 per thousand gallons
Strategy Annual Cost (After Amortization):	$219 per acre-foot $0.67 per thousand gallons

Strategy Description

CRMWD currently owns and operates a well field in Ward County in the Pecos Valley aquifer. CRMWD also owns the groundwater rights to an undeveloped well field in southern Winkler County. This well field will produce water from the Pecos Valley aquifer. For the purposes of this plan, it was assumed that the Ward County Well Field Expansion and the development of the Winkler County Well Field will happen concurrently as a single strategy.

This strategy assumes that 6 MGD will be developed from the Winkler County Well Field and then pumped to the Ward County Well Field for transmission to CRMWD customers using a new 36-inch pipeline and new 12 MGD pump station. An additional 4 MGD will be developed from the existing Ward County Well Field. The water will use the same existing transmission lines from the current Ward County Well Field to Odessa. The pumping capacity of this system will be upgraded. This will require one new 50 MGD pump station and one 20 MGD pump station expansion. An additional shared pipeline and 20 MGD pump station expansion would also be developed from Odessa to the terminal storage reservoir.

Quantity, Reliability and Cost

It is estimated that this strategy could provide 11,200 acre-feet per year. Water from these sources is considered to be very reliable. The capital cost for this strategy is estimated at $139.9 million. Annual costs during debt service are estimated at $1,265 per acre-foot. This drops to $219 per acre-foot once the infrastructure is paid off.

Environmental Factors

Winkler County has no flowing water. Therefore, development of this source has very little potential of impacting springflow, baseflow in rivers, or habitats. Based on the available data, it is unlikely that pumping limits will be needed to prevent impacts on aquatic or terrestrial ecosystems. It is not anticipated that groundwater development will cause subsidence.

The Ward County Well Field already exists and has enough supply to support an expansion by CRMWD without causing any major environmental impacts.

Agricultural and Rural Impacts

The Region F water supply analysis shows sufficient water supply in both Winkler and Ward Counties to meet local agricultural and municipal needs and support well field development/expansion by CRMWD. Therefore, this strategy should have minimal effects on agriculture and rural areas. The right of way for the small portion of additional transmission lines may temporarily affect a small amount of agricultural acreage during construction.

Impacts to Natural Resources and Key Parameters of Water Quality
None identified.

Impacts on Other Water Resources and Management Strategies
The Region F water supply analysis shows sufficient water supply in Winkler and Ward Counties to meet local needs and support well field development/expansion by CRMWD. Impacts to strategies are expected to be minimal.

Wholesale Water Provider:	**Colorado River Municipal Water District**
WMS Name:	**Aquifer Storage and Recovery (ASR) of Existing Surface Water Supplies in Ward County Well Field**
WMS Type:	Aquifer Storage and Recovery
Strategy Yield:	5,000 acre-feet per year
Strategy Capital Cost:	$10,184,000
Strategy Annual Cost (During Amortization):	$651 per acre-foot $2.00 per thousand gallons
Strategy Annual Cost (After Amortization):	$480 per acre-foot $1.47 per thousand gallons

Strategy Description

CRMWD owns and operates several water supply reservoirs and groundwater well fields. During periods of above normal inflow in the Colorado River Basin, surface water that is not utilized to meet demands could be treated and stored in CRMWD's existing groundwater well field. This would reduce evaporative losses that would have occurred at the lakes, resulting in increased water supplies available to CRMWD.

This strategy assumes that in years with excess surface water, up to 10-15 MGD of water would be treated at the Odessa Water Treatment Plant and pumped to the Ward County Well Field for storage in the Pecos Valley aquifer. This would likely be done during the winter months, when demands are lower and system has excess capacity. Operation in this manner will require no expansion to the existing water treatment plant in Odessa. An additional pump station and piping to facilitate getting an additional 5 MGD to and from the Odessa Water Treatment plan were included. The existing transmission pipeline and wells would be used to transport, store, and recover the treated surface water.

Quantity, Reliability and Cost

It is assumed that on a decadal basis, the average annual amount of water available through ASR is 5,000 acre-feet. The reliability is moderate since during drought, there will be less water available from surface water sources. The cost is estimated at $10.18 million.

Environmental Factors

The environmental concerns are low. This strategy proposes to use existing infrastructure so there would be no additional impacts to the environment. The increased use of surface water could result in lower reservoir levels, but this strategy is proposed to be used during periods with above normal inflows.

Agricultural and Rural Impacts

There are no known impacts to agricultural and rural areas. The water savings associated with reduced evaporation will provide additional water to rural water users.

Impacts to Natural Resources and Key Parameters of Water Quality

This strategy will provide the highest use of the limited water supplies in the Colorado River Basin and allow CRMWD to manage its resources to minimize impacts associated with drought. It should have minimal impacts to key water quality parameters.

Impacts on Other Water Resources and Management Strategies

This strategy does limit the ability to utilize the pipeline for groundwater from the Ward County Well Field. However, there are two pipelines from the well field to Odessa, which allow water to travel in both directions if needed.

Other Issues Affecting Feasibility

Further study is needed to confirm that ASR is feasible at the Ward County Well Field.

Wholesale Water Provider:	**Upper Colorado River Authority (UCRA)**
WMS Name:	**Purchase Water from San Angelo and Expand Transmission System**
WMS Type:	Expanded Use of Existing Supplies
Strategy Yield:	500 acre-feet per year
Strategy Capital Cost:	$32,233,000
Strategy Annual Cost (During Amortization):	$6,116 per acre-foot $18.77 per thousand gallons
Strategy Annual Cost (After Amortization):	$722 per acre-foot $2.22 per thousand gallons

Strategy Description

This strategy involves a contract amendment to increase the amount of water that San Angelo will treat for UCRA in return for water from O.C. Fisher. The cost for additional supply from San Angelo will need to be negotiated at the time of the contractual changes and will reflect San Angelo's wholesale water rates at that time. Currently, these costs are unknown and therefore not included in the plan. This strategy also includes additional infrastructure to move the treated water to rural customers in Tom Green County. A study was recently completed for UCRA that looked at the infrastructure needs to serve customers to the northwest and south of San Angelo. Based on this study, the capital costs for this strategy are estimated at $32.2 million.

Quantity, Reliability and Cost

The quantity of supply from this strategy represents a contract increase from San Angelo of 500 acre-feet. However, the transmission system could also be used to transport existing supplies. The reliability of the strategy is considered high due to the diversity in San Angelo's sources of supply. The cost of this strategy is estimated at $32.2 million and does not include the price to purchase the water from San Angelo. The purchase price will need to be negotiated between San Angelo and UCRA. The unit costs for this strategy are high because the quantity only represents the increased supplies from San Angelo. However, the infrastructure is sized such that it can also transport other existing supplies.

Environmental Factors

The disruption to the environment from pipeline construction is expected to be temporary and minimal.

Agricultural and Rural Impacts

This strategy supplies rural users in Tom Green County and is expected to have a positive impact on their water supply security.

Impacts to Natural Resources and Key Parameters of Water Quality

No impacts to natural resources and key parameters of water quality have been identified.

Impacts on Other Water Resources and Management Strategies

This strategy would increase the demands on San Angelo's other water supplies and strategies.

Other Issues Affecting Feasibility

Details and cost of a contract increase will need to be negotiated between UCRA and San Angelo.

Water User Group: **Ballinger**

WMS Name: **Purchase Water Right from Clyde (Fort Phantom Hill Reservoir)**

WMS Type: Regional WMS

Strategy Yield: 990 acre-feet per year in 2020

Strategy Capital Cost: $48,053,000

Strategy Annual Cost (During Amortization): $4,946 per acre-foot
$15.18 per thousand gallons

Strategy Annual Cost (After Amortization): $885 per acre-foot
$2.72 per thousand gallons

Strategy Description

Fort Phantom Hill Reservoir is located in Jones County in Region G. In 2013, the City of Clyde purchased a 2,500 acre-foot water right in Fort Phantom Hill Reservoir from an abandoned steam electric power generation facility. The City of Clyde amended the water right to expand its use for municipal supply and also secured an interbasin transfer to select counties including Runnels County where Ballinger is located. The City of Clyde does not currently receive any supply from the reservoir. Ballinger is currently in negotiations with the City of Clyde to purchase between 1,000 and 1,750 acre-feet of this water right. These negotiations are ongoing at the writing of this plan and an exact sale amount or purchase price is unknown. For planning purposes, it was assumed that Ballinger will obtain 1,500 acre-feet of the water right in Fort Phantom Hill Reservoir and that a new pipeline will be built from the reservoir to Ballinger. Ballinger is also considering partnering with other rural entities in the region to build a regional system and sell a portion of this supply. However, this may change as this strategy is further developed and defined. This will affect the costs and impacts described in this evaluation.

Quantity, Reliability and Cost

Many watersheds throughout the State are over-appropriated, i.e. not all water rights can be fully met at all times. Thus, the yields from a water right are often less than the amount shown in the water right. This is also the case for Fort Phantom Hill Reservoir. If Ballinger were to purchase the full 1,750 acre-feet of water right, that would translate into 1,155 acre-feet of safe yield in 2020. If Ballinger were to purchase only 1,000 acre-feet of the right, the yield would be 660 acre-feet in 2020. In both cases, the yield declines over the planning period due to sedimentation in the reservoir. For planning purposes, it is assumed that Ballinger purchases 1,500 acre-feet of the water right. This results in 990 acre-feet of supply in 2020 and 816 acre-feet of supply in 2070 as shown in Table C- 16.

Table C- 16
Supply Quantity

	2020	2030	2040	2050	2060	2070
Water Right Purchase Amount	1,500	1,500	1,500	1,500	1,500	1,500
WMS Quantity (Safe Yield)	990	955	920	886	851	816

The supply amount shown from this strategy is based on a safe yield analysis and is considered to be reliable.

The cost for this strategy assumes a new pipeline from the reservoir to Ballinger would be required. Ballinger is actively pursuing the most cost effective delivery option for the water. The results of their analysis may change this assumption and could greatly impact the costs used for the purposes of this plan. The results of the study by the City of Ballinger are considered to be consistent with this plan.

Environmental Factors

Since this supply is from an existing reservoir and water right, the environmental impacts are expected to be minimal. The disruption from the construction of the pipeline is expected to be minor and temporary.

Agricultural and Rural Impacts

Ballinger is a rural community. Having a sustainable water supply source will improve the vitality of this rural community and potentially other rural communities in Runnels County if a regional system is ultimately pursued.

Impacts to Natural Resources and Key Parameters of Water Quality

Since this strategy provides water from an existing reservoir and water right, no impacts to natural resources or water quality are expected.

Impacts on Other Water Resources and Management Strategies

This strategy utilizes water from Fort Phantom Hill Reservoir which is operated, maintained, and used by the City of Abilene. The use of this water by Ballinger could impact Abilene and their strategies.

Other Issues Affecting Feasibility

This strategy is dependent upon agreements between multiple parties that are outside the scope of regional water planning. The economic viability of this strategy will depend on the results of these agreements.

Water User Group: **Big Spring**

WMS Name: **Water Treatment Plant Expansion**

WMS Type: Expanded Use of Existing Supplies

Strategy Yield: 3,000 acre-feet

Strategy Capital Cost: $16,345,000

Strategy Annual Cost (During Amortization): $1,368,000

Strategy Annual Cost (After Amortization): $585,000

Strategy Description

The City of Big Spring currently supplies water to Coahoma and some manufacturers in Howard County. Given the current projected demand levels of these entities, the City of Big Spring will exceed their water treatment plant capacity starting in 2020. The City also plans to provide additional water to Howard County-Other and Howard County-Manufacturing. To provide water to all of these entities over the planning period, a 5.5 MGD expansion in 2020 of the current 12 MGD facility was considered. The actual size and timing of the expansion will depend on actual demands and contract negotiations with individual entities that look to Big Spring to supply them treated water.

Quantity, Reliability and Cost

The supply related to this strategy originates from the subordination of CRMWD supplies and must be treated for Big Spring to use as municipal supply. This strategy assumes a 5.5 MGD expansion of Big Spring's current 12 MGD facility. The reliability of the supply treated by this strategy is considered to be high due CRMWD's multiple sources. The cost of this strategy is estimated to be $16.3 million.

Environmental Factors

Environmental impacts of expanding the existing water treatment plant are expected to be minimal.

Agricultural and Rural Impacts

None identified.

Impacts to Natural Resources and Key Parameters of Water Quality

None identified.

Impacts on Other Water Resources and Management Strategies

This strategy makes more treated water available to potential future customers of Big Spring in Howard County.

Other Issues Affecting Feasibility

None.

Water User Group:	**Brady**
WMS Name:	**Advanced Groundwater Treatment**
WMS Type:	Expanded Use of Existing Supplies
Strategy Yield:	617 acre-feet (1,200 acre-feet full supply without MAG limits)
Strategy Capital Cost:	$20,398,000
Strategy Annual Cost (During Amortization):	$3,013 per acre-foot ($1,549 per acre-foot with full supply) $9.25 per thousand gallons ($4.75 per thousand gallons with full supply)
Strategy Annual Cost (After Amortization):	$246 per acre-foot ($127 per acre-foot with full supply) $0.76 per thousand gallons ($0.39 per thousand gallons with full supply)

Strategy Description

The City of Brady obtains water from groundwater wells in the Hickory aquifer and surface water from Brady Creek Reservoir. However, drought has severely impacted Brady Creek Reservoir and the City is unable to use supply from this source at this time. Without surface water supplies to blend the Hickory supplies with, the City is unable to meet the TCEQ standards for radon and gross alpha particles. To address these water quality issues, the City of Brady plans to pursue the development of an advanced treatment facility so that their groundwater source can be used when surface water supplies are not available for blending. For planning purposes, it was assumed that this would be an ion exchange facility and that the project would treat about half of Brady's historical groundwater use. This water would then be blended with the rest of their supplies to improve the overall drinking water quality and come into compliance with Maximum Contaminant Level (MCL) set by the TCEQ. The treatment plant was sized to treat 1,200 acre-feet of supply, which is the amount the City intends to treat. However, MAG limitations in McCulloch County limit the amount that can be shown in the Region F Water Plan. This artificially inflates the true anticipated unit cost.

Quantity, Reliability and Cost

This strategy during times of drought is estimated to provide slightly over 1,200 acre-feet per year of supply to Brady by advanced treatment of groundwater to meet their overall water quality and TCEQ regulations. This supply would be used in conjunction with surface water supplies from Brady Creek Reservoir when they are available. In some years, the full 1,200 acre-feet may be used from this source. In other years, little or no groundwater may be used. On average, over an entire decade, this strategy will provide around 600 acre-feet per year. This supply is considered to be reliable. Project costs were provided by the City of Brady and are estimated at just over $20 million.

Environmental Factors

Construction of the treatment facility should have minimal environmental impact.

Agricultural and Rural Impacts

This strategy is expected to have no impacts on agricultural or rural users.

Impacts to Natural Resources and Key Parameters of Water Quality

Depending on the disposal method, this strategy may impact the quality of effluent discharge. However, this impact is expected to be minimal since the contaminants are already present in the water supply and thus, wastewater today.

Impacts on Other Water Resources and Management Strategies

None.

Water User Group:	**Bronte**
WMS Name:	**Water Treatment Plant Expansion**
WMS Type:	Expanded Use of Existing Supplies
Strategy Yield:	504 acre-feet
Strategy Capital Cost:	$6,768,000
Strategy Annual Cost (During Amortization):	$566,000
Strategy Annual Cost (After Amortization):	$242,000

Strategy Description
The City of Bronte currently supplies treated water to Robert Lee in Coke County. Given the current projected demand levels of these entities, the City of Bronte will exceed their water treatment plant capacity starting in 2020. To provide water to all of these entities over the planning period, a 1 MGD expansion in 2020 of the current facility was considered.

Quantity, Reliability and Cost
The supply related to this strategy originates from other strategies being considered for Bronte but must be included for Bronte to utilize these sources as municipal supply for their residents and the residents of Robert Lee. This strategy assumes a 1 MGD expansion of Bronte's current facility. The reliability of the supply treated by this strategy is considered under Bronte's other strategies. The cost of this strategy is estimated at $6.8 million.

Environmental Factors
Environmental impacts of expanding the existing water treatment plant are expected to be minimal.

Agricultural and Rural Impacts
None identified.

Impacts to Natural Resources and Key Parameters of Water Quality
None identified.

Impacts on Other Water Resources and Management Strategies
This strategy makes more treated water available to Robert Lee, reducing their need to pursue their own treatment facilities or other supplies independently.

Other Issues Affecting Feasibility
None.

Water User Group: **Bronte**

WMS Name: **Rehabilitation of Oak Creek Pipeline**

WMS Type:	Expanded Use of Existing Supplies
Strategy Yield:	104 acre-feet per year
Strategy Capital Cost:	$1,499,000
Strategy Annual Cost (During Amortization):	$1,370/acre-feet ($4.21/1,000 gallons)
Strategy Annual Cost (After Amortization):	$164.42/acre-feet ($0.50/1,000 gallons)

Strategy Description

The City of Bronte has a 13-mile, 8-inch and 10-inch pipeline to Oak Creek Reservoir. This pipeline is approximately 60 years old and in need of rehabilitation. All but approximately five miles of the pipeline has been replaced or rehabilitated. The remaining five miles of pipe need to be replaced. The proposed strategy includes a new 50,000 gallon raw water ground storage tank and 5 miles of 10-inch pipeline.

Quantity, Reliability and Cost

The additional yield from this strategy represents the use of additional supplies (groundwater and sales from Sweetwater) that were previously constrained by the pipeline's capacity. This source is considered to be of moderate reliability because of the impact of the drought on Oak Creek's reliable supply.

Environmental Factors

Environmental impacts are expected to be minimal because this is a rehabilitation of an existing project.

Agricultural and Rural Impacts

No impacts are expected.

Impacts to Natural Resources and Key Parameters of Water Quality

None identified.

Impacts on Other Water Resources and Management Strategies

None identified.

Other Issues Affecting Feasibility

The most significant factor affecting rehabilitation of the pipeline is funding. The City will have to further analyze the cost versus benefit of rehabilitating the pipeline.

Water User Group:	**Mason**
WMS Name:	**Additional Treatment**
WMS Type:	Expanded Use of Existing Supplies
Strategy Yield:	703 acre-feet
Strategy Capital Cost:	$838,000
Strategy Annual Cost (During Amortization):	$240 per acre-foot $0.74 per thousand gallons
Strategy Annual Cost (After Amortization):	$141 per acre-foot $0.43 per thousand gallons

Strategy Description

To address water quality concerns associated with gross alpha particles, the City of Mason plans to pursue the development of an ion exchange facility. For planning purposes, it was assumed that this project would treat half of Mason's supply. This water would then be blended with the rest of their supplies to improve the overall drinking water quality and come into compliance with Maximum Contaminant Level (MCL) set by the TCEQ.

Quantity, Reliability and Cost

This strategy is estimated to treat 350 acre-feet of supply but provide over 700 acre-feet per year of supply to Mason by blending to increase their overall water quality and meet TCEQ regulations. This supply is considered to be reliable. The project is estimated to cost just over $800,000.

Environmental Factors

Construction of the treatment facility should have minimal environmental impact. For a town of Mason's size it is likely that they would contract with a company to change the media filters and dispose of the waste created by the used filters. These filters would be disposed of in a properly designed waste facility and should have minimal environmental impacts.

Agricultural and Rural Impacts

This strategy is expected to have no impacts on agricultural or rural users.

Impacts to Natural Resources and Key Parameters of Water Quality

None identified.

Impacts on Other Water Resources and Management Strategies

None.

Water User Group:	**Odessa**
WMS Name:	**RO Treatment of Existing Supplies**
WMS Type:	Expanded Use of Existing Supplies
Strategy Yield:	7,500 acre-feet
Strategy Capital Cost:	$62,309,000
Strategy Annual Cost (During Amortization):	$8,084,000 per year
Strategy Annual Cost (After Amortization):	$2,870,000 per year

Strategy Description

To address water quality concerns associated with existing high TDS levels in CRMWD's surface water system, the City of Odessa is planning to pursue the development of an advanced treatment (RO) facility. For planning purposes, it was assumed that this project would produce 7,500 acre-feet per year of finished water based on a peaking factor of 1.5. This water would then be blended with the rest of their supplies to improve the overall drinking water quality.

Quantity, Reliability and Cost

This strategy would increase the quality and accessibility of the subordination supplies Odessa obtains from CRMWD. The reliability of this supply is considered medium as discussed in further detail under the subordination strategy. The project is sized to produce 10 MGD of finished water at peak capacity and requires $62,309,000 of capital investment. The conceptual design for this project uses deep well injection for brine disposal, however disposal to a brine lake may be feasible. If this is the case, the cost of the project would be less.

Environmental Factors

The conceptual design for this project uses deep well injection for brine disposal. A properly designed and maintained facility should have minimal environmental impact. Construction of the treatment facility should have minimal environmental impact as well.

Agricultural and Rural Impacts

This strategy is expected to have no impacts on agricultural or rural users.

Impacts to Natural Resources and Key Parameters of Water Quality

The current conceptual design for this project uses deep well injection to dispose of the brine waste stream. If this were to change and the brine was released to a stream, impacts to the receiving water body would need to be evaluated.

Impacts on Other Water Resources and Management Strategies

None.

Water User Group:	**Junction**
WMS Name:	**Dredging River Intake**
WMS Type:	Expanded Use of Existing Supplies
Strategy Yield:	412 acre-feet per year
Strategy Capital Cost:	$4,268,000
Strategy Annual Cost (During Amortization):	$357,000
Strategy Annual Cost (After Amortization):	$0

Strategy Description

The City of Junction currently utilizes run-of-river supplies from the S. Llano River. Without subordination, this source has no supply. Under subordination, it is shown to have 412 acre-feet of supply. This strategy would dredge the City of Junction’s intake, increasing the accessibility and reliability of the subordination supply.

Quantity, Reliability and Cost

The supply associated with this strategy of 412 acre-feet is already made available through the subordination strategy. The river dredging is necessary for the City of Junction to be able to fully access this water. The cost of this strategy is estimated at $4.2 million dollars.

Environmental Factors

Environmental issues associated with dredging mainly center around the disposal of the dredged material. In some cases, it may be possible to find a beneficial use for the waste material such as sales to a sand or gravel operation. However, if this is not possible, a proper disposal location will need to be found. The City is currently evaluating its options. Finding a suitable disposal location can be a challenge and may increase the cost if one cannot be found near the dredging site.

Agricultural and Rural Impacts

None identified.

Impacts to Natural Resources and Key Parameters of Water Quality

This strategy assumes that the dredged material is relatively clean and not contaminated. If contamination is found, the impacts of dredging on water quality will need to be evaluated.

Impacts on Other Water Resources and Management Strategies

This strategy is expected to have minimal impacts on other water resources and management strategies.

Other Issues Affecting Feasibility

Finding a suitable location for disposal of the dredged material is a significant hurdle and may make this strategy economically infeasible if the material must be hauled a long distance. Even if a nearby disposal location can be found, this strategy may prove to be too expensive for a small entity such as Junction.

Water User Group: **Multiple**

WMS Name: **Purchase from Provider (Voluntary Transfer)**

WMS Type: Expanded Use of Existing Water Supplies

Strategy Yield: 6,640 acre-feet in 2020

Strategy Capital Cost: $35,351,500

Strategy Description

The purchase from provider strategy is part of a generalized strategy in Region F that facilitates the sale of water from one entity to another. This could be through the sale of a water right or through the sales of raw or treated water via contract. In some cases, this strategy may require infrastructure to transport the water from the seller to the buyer. In other cases, there is existing infrastructure in place and only a contract is needed.

Quantity, Reliability and Cost

The quantity of water and capital costs associated with this strategy are shown below in Table C- 17. For entities that purchase water from irrigation, this strategy assumes only a groundwater right purchase for purposes of not exceeding the MAG. In reality, individual users will likely continue to use the groundwater under the right of capture.

The reliability of this strategy is considered medium since the purchasing entity is reliant on the provider for their water supplies.

Table C- 17
Quantity and Cost

County	Purchaser	Provider	Capital Cost	2020	2030	2040	2050	2060	2070
Coke	County-Other	Irrigation	$11,000	22	20	18	18	18	18
Ector	County-Other	Odessa (CRMWD)	$0	0	0	0	221	520	809
Ector	SEP	Odessa (CRMWD)	$0	4,000	4,000	4,000	4,000	4,000	4,000
Howard	County-Other	Big Spring (CRMWD)	$1,833,000	449	485	480	478	475	475
Howard	Manufacturing	Big Spring (CRMWD)	$0	614	773	895	998	1,191	1,396
Howard	Mining	CRMWD (Brackish)	$0	238	240	242	0	0	0
Martin	Manufacturing	Irrigation	$14,500	25	26	25	26	28	29
McCulloch	Manufacturing	Brady	$142,000	201	217	230	241	261	284
McCulloch	County-Other	Millersview-Doole WSC	$347,000	35	35	35	35	35	35
Runnels	Winters	Abilene	$696,000	100	100	100	100	100	100
Midland	Midland	CRMWD	$0	0	4,000	4,000	4,000	4,000	4,000
Scurry	County-Other	Irrigation	$75,000	150	150	150	150	150	150
Tom Green	UCRA	San Angelo	$32,233,000	500	500	500	500	500	500
Tom Green	County-Other	UCRA	$0	306	323	379	428	474	518
WMS Total			**$35,351,500**	**6,640**	**10,869**	**11,054**	**11,195**	**11,752**	**12,314**

Environmental Factors

In some instances, no new infrastructure is required to facilitate the sale of the water. In these cases, no environmental impacts are expected. Any impacts associated with new supplies developed by the provider are discussed under those individual strategies. In cases where a new infrastructure is required, the impacts from construction are expected to be temporary and minimal. Pipeline routes are assumed to be selected such that environmental impacts are minimized.

Agricultural and Rural Impacts
Many of these sales are to rural areas of a county, such as County-Other. In these cases, having a sustainable water supply will increase the vitality of the rural area. In instances where the transfer is from irrigators to municipal or manufacturing users, the impacts may be the opposite. However, irrigators may find this option financially attractive. This strategy assumes that all sales are voluntary.

Impacts to Natural Resources and Key Parameters of Water Quality
Since this does not involve the development of any new sources of water, no impacts to natural resources and key parameters of water quality are expected.

Impacts on Other Water Resources and Management Strategies
None identified.

Other Issues Affecting Feasibility
This strategy assumes that mutually agreeable contractual terms can be reached by the involved parties. This kind of contract negotiation is outside of the scope of regional planning but the results will greatly impact the feasibility of this strategy.

Water User Group:	**Midland**
WMS Name:	**Additional T-Bar Ranch Supplies with Treatment**
WMS Type:	Expanded Use of Existing Water Supplies
Strategy Yield:	10,000 acre-feet per year
Strategy Capital Cost:	$52,199,000
Strategy Annual Cost (During Amortization):	$869 per acre-foot $2.67 per thousand gallons
Strategy Annual Cost (After Amortization):	$432 per acre-foot $1.33 per thousand gallons

Strategy Description

Water from the T-Bar Ranch is provided to Midland through the Midland Fresh Water District. Some of the water has elevated arsenic levels. This water is currently blended with water from the Clearwater Well Field to meet drinking water standards. The well field capacity and limitations associated with the blend ratio limits the annual average supply from this source to 10 MGD. The transmission capacity of the pipeline to Midland is 38 MGD. This strategy would fully develop the T-Bar Well Field to provide a peak capacity of 38 MGD. It would require approximately 25 additional wells, two new pump stations, and treatment for arsenic. It is assumed that the treatment facilities would be located at the well field, but the final location would be determined during design. The arsenic waste stream will require special considerations for disposal. For the purposes of this strategy, deep well injection was assumed, though the actual disposal method will be determined during design.

Quantity, Reliability and Cost

This strategy is estimated to supply an additional 10,000 acre-feet per year by adding ion exchange treatment, eliminating the blending requirement to meet safe drinking water standards for arsenic that currently limit the use of the T-Bar Well Field supplies. The reliability of this supply is considered to be high over the planning period, since there is available supply from storage in the Pecos Valley aquifer in Winkler County. The cost of this strategy is estimated at $52.2 million. During debt service, the cost per thousand gallons is estimated to be $2.67. This cost reduces to $1.33 per thousand gallons once the infrastructure loans are paid off.

Environmental Factors

There is adequate supply in the Pecos Valley aquifer in Winkler County to support the additional use of the proposed well field. Since the proposed well field is located in a geological trough, pumping of groundwater should have minimal impacts on the aquifer outside of the well field.

The conceptual design for this project uses deep well injection for waste disposal. A properly designed and maintained facility should have minimal environmental impact. However, if a different disposal method was selected, the environmental impacts of that method would need to be evaluated. Construction of the treatment facility should have minimal environmental impact as well. This strategy utilizes pipeline infrastructure that is already in place and will result in no additional environmental impacts.

Agricultural and Rural Impacts
This strategy should have minimal effects on agriculture since the water rights are already owned by the City and there is little agriculture in the area.

Impacts to Natural Resources and Key Parameters of Water Quality
The current conceptual design for this project uses deep well injection to dispose of the waste stream. A properly designed and maintained facility should have no significant impacts on natural resources and water quality. If another disposal method was selected, the impacts of this waste stream would need to be reevaluated.

Impacts on Other Water Resources and Management Strategies
Full development of the T-Bar Ranch at peak flows may limit the ability to transport additional groundwater for Midland Co. Other *(Development of Groundwater in Winkler County)*.

Water User Group:	**Robert Lee**
WMS Name:	**New Water Treatment Plant**
WMS Type:	Expanded Use of Existing Water Supplies
Strategy Yield:	500 acre-feet per year
Strategy Capital Cost:	$7,065,000
Strategy Annual Cost (During Amortization):	$1,666 per acre-foot $5.11 per thousand gallons
Strategy Annual Cost (After Amortization):	$484 per acre-foot $1.49 per thousand gallons

Strategy Description
Currently, due to the prolonged drought, the City of Robert Lee has not been able to utilize their current surface water treatment plant. If the Spence and Mountain Creek Reservoirs once again become a dependable surface water source, the City could reopen the plant. Bringing the plant online and up to operational standards would require considerable repairs and infrastructure expansion. This strategy is necessary for Robert Lee to utilize supplies form the subordination strategy.

Quantity, Reliability and Cost
This strategy is not estimated to yield any additional supply during the drought of record, given this source was unreliable during the current drought. The reliability of this supply is considered to be low. The cost of this strategy is estimated at $7 million.

Environmental Factors
Robert Lee previously operated a plant from these sources so no additional environmental impacts are expected from reopening the plant.

Agricultural and Rural Impacts
This strategy should have minimal effects on agriculture since the water has traditionally been used as municipal supply for Robert Lee.

Impacts to Natural Resources and Key Parameters of Water Quality
None identified.

Impacts on Other Water Resources and Management Strategies
None identified.

Other Issues Affecting Feasibility
This strategy is a very expensive option for an unreliable supply during drought. Robert Lee is a small, rural community and this project may cause an economic burden on the community. This strategy is included in this plan as an alternate strategy.

DEVELOPMENT OF NEW SURFACE WATER SUPPLIES

Wholesale Water Provider:	**San Angelo**
WMS Name:	**Red Arroyo Off-Channel Reservoir**
WMS Type:	New Surface Water Supply
Strategy Yield:	1400 acre-feet per year
Strategy Capital Cost:	$23,475,000
Strategy Annual Cost (During Amortization):	$1791 per acre-foot $5.50 per thousand gallons
Strategy Annual Cost (After Amortization):	$389 per acre-foot $1.19 per thousand gallons

Strategy Description

In this strategy, the City of San Angelo in conjunction with Upper Colorado River Authority (UCRA) would construct a stormwater storage basin near the confluence of Red Arroyo and South Concho River in Tom Green County. The primary purpose of the storage basin would be to catch and treat stormwater runoff from the Red Arroyo River for subsequent downstream utilization or delivery of the stored water to the Lone Wolf Water Treatment Plant about half a mile northwest of the proposed basin.

A feasibility study for this project was conducted by Jacobs Engineering Group in 2013. Based on their recommendations, the conceptual design for the project includes a channel weir, inflow pipes to carry the water by gravity to the basin, an off-channel reservoir with a capacity of 1,839 acre-feet, an emergency spillway, and a pump system to directly draw the stored water from the basin to the water treatment plant.

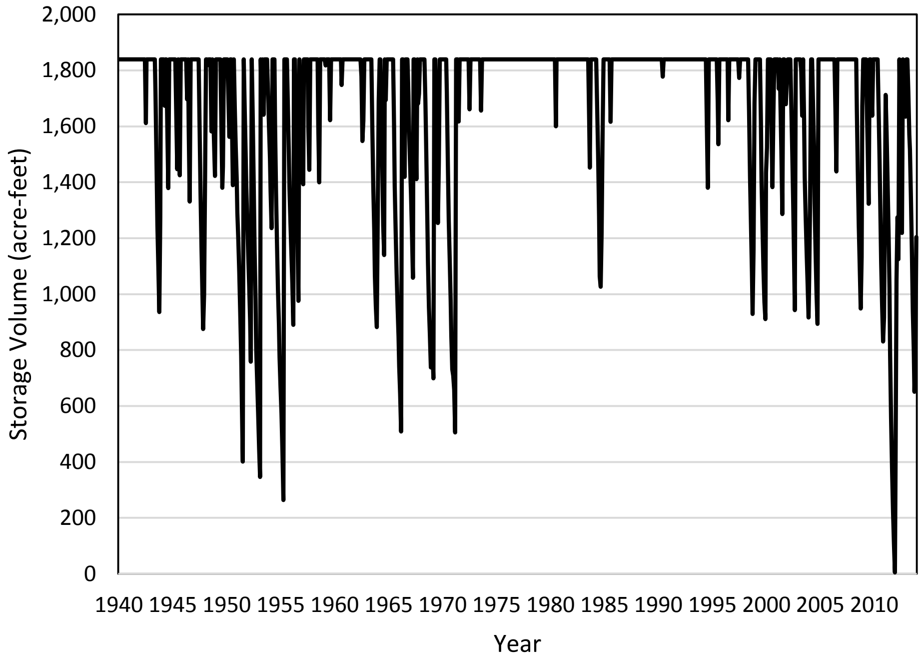
The drainage area of the Red Arroyo watershed is 15 square miles and there is little unappropriated water available. If constructed, the reservoir would most likely need to be permitted under an existing City of San Angelo water right or with a subordination agreement with senior water right holders, or both. The reliable supply from this project could be augmented by scalping from the larger South Concho River when flow is available there, or by operating as additional capacity for Ben Ficklin Reservoir, owned by San Angelo. The extra infrastructure that would be required to implement these alternatives is not included in the cost estimate.

Quantity, Reliability and Cost

The firm yield for any configuration relying solely on inflows from the Red Arroyo River is zero, regardless of storage capacity or priority date. However, if the water right is assigned a 1916 priority date, the same priority as Ben Ficklin Reservoir, and is allowed to deplete additional water from the South Concho River when available, then a firm supply of 1,400 acre-feet per year is achievable with a 1,839 acre-foot reservoir. A storage trace of the reservoir modeled with these assumptions is shown in the figure below.

UCRA has been monitoring flows in the Red Arroyo over the past five years and found that even under drought conditions, the watershed produces 5,000 acre-feet per year or more of stormwater flow. The latest SWMM model, applied to the watershed in the Jacobs study, projected upwards of 10,000 acre-feet of water in a normal rainfall year. Some of this flow may be associated with increased urbanization in the greater San Angelo area, which has resulted in increased runoff. Further study is needed of this strategy to determine if this is a viable water source for San Angelo and UCRA.

Figure C-3
Storage Trace of the Stormwater Storage Basin Modeled with a Diversion of 1400 ac-ft/yr, a 1916 Priority, and Scalping from the South Conchos River



The total capital cost is $16.15 million, additional costs for professional services, contingencies, mitigation, land acquisition, and interest during construction add $7.33 million for a total project cost of $23.48 million. The annual cost for the full project is $2.51 million, which for a total annual supply of 1,400 acre-feet of water is $5.50/thousand gallons prior to amortization.

Environmental Factors

The yield and cost of the project are subject to change if any environmental flows are required for the Red Arroyo River or this part of the South Conchos River.The UCRA will likely need to identify potential wetland locations along the Red Arroyo.

Agricultural and Rural Impacts

Impacts to agricultural and rural users are expected to be minimal since this source is not currently utilized by either user group.

Impacts to Natural Resources and Key Parameters of Water Quality

Although the off –channel reservoir's impact on natural resources and water quality would be minimal, additional study would be needed to confirm that.

Impacts on Other Water Resources and Management Strategies

There is not enough unappropriated water in the Red Arroyo for a new water right. One possibility for implementation of this project would be to make diversions based on existing more senior water rights and to allow depletions from South Conchos River when flow is available there. An agreement with senior water rights holders would be necessary to implement this project, and the cost and feasibility may change significantly based upon a more detailed analysis.

Other Issues Affecting Feasibility

Groundwater was discovered during the drilling of boreholes on the site. This may cause structural issues with the proposed impoundment. This triggered an ongoing study to evaluate the impacts of groundwater on the site. The results of the study were not available at the time of the writing of this plan.

The analyses presented in this plan were developed for screening purposes only. Additional studies would be required if this strategy is pursued.

DEVELOPMENT OF NEW GROUNDWATER SUPPLIES

Wholesale Water Provider:	**Brown County Water Improvement District #1 (BCWID)**
WMS Name:	**Develop Groundwater Supplies from Brown County**
WMS Type:	Development of New Groundwater
Strategy Yield:	1,680 acre-feet
Strategy Capital Cost:	$8,436,000
Strategy Annual Cost (During Amortization):	$580 per acre-foot $1.78 per thousand gallons
Strategy Annual Cost (After Amortization):	$160 per acre-foot $0.49 per thousand gallons

Strategy Description

BCWID previously drilled a test well in the Ellenburger San Saba aquifer but found the quality to be too poor for municipal use without additional treatment. If water of adequate quality was located, this source could potentially be used. However, to avoid potential additional treatment requirements, BCWID is now pursuing development of the Trinity aquifer in Brown County. Under the Modeled Available Groundwater (MAG), there is no availability from this aquifer for strategy development. However, that does not mean water is not available from this source. Furthermore, there is no groundwater conservation district in Brown County to enforce the MAG or hinder BCWID from pursuing this source.

Therefore, this strategy evaluates the development of 1,680 acre-feet of supply per year from the Trinity aquifer in Brown County assuming the MAG value changes. The conceptual design for this strategy includes seventeen 150 gpm wells and 3 miles of 16-inch transmission pipeline.

Quantity, Reliability and Cost

The quantity expected to be obtained from this source is 1,680 acre-feet per year. The reliability of the source is considered medium due to the lack of specific information pertaining to the well field. The cost of this strategy is estimated at $8.4 million. This equates to $1.78 per thousand gallons during debt service.

Environmental Factors

The well fields would be located so as to minimize any potential environmental impacts. As such, the environmental impacts are expected to be minimal.

Agricultural and Rural Impacts

Development of groundwater may divert water that was previously used for agricultural and rural purposes. However, this strategy assumes that the groundwater rights are obtained on a willing buyer – willing seller basis which would minimize the impacts to agriculture.

Impacts to Natural Resources and Key Parameters of Water Quality

The impacts to natural resources are expected to be minimal. No impacts to water quality are expected.

Impacts on Other Water Resources and Management Strategies

To the extent that this water source lessens the demand on Lake Brownwood, additional water from Lake Brownwood may be available for other use.

Other Issues Affecting Feasibility

Additional study will be needed once a more specific location for this strategy has been selected.

Wholesale Water Provider:	**Colorado River Municipal Water District**
WMS Name:	**Develop Additional Groundwater Supplies from Western Region F Counties**
WMS Type:	Development of New Groundwater
Strategy Yield:	30,000 acre-feet
Strategy Capital Cost:	$62.7 million
Strategy Annual Cost (During Amortization):	$403 per acre-foot $1.24 per thousand gallons
Strategy Annual Cost (After Amortization):	$228 per acre-foot $0.70 per thousand gallons

Strategy Description

The Colorado Municipal Water District (CRMWD) plans to pursue new groundwater development. The exact location of the wells is not yet known. For the purposes of this plan, this project will seek to develop 30,000 acre-feet of supply from Pecos, Reeves, Ward, and Winkler Counties. This project is for new groundwater supplies and does not include water rights currently held by CRMWD. Region F considers development from any single or combination of these sources to be consistent with the plan. This strategy only involves the development of the groundwater. The transmission of this groundwater to CRMWD's system is discussed in a separate strategy, *Transmission of Additional Groundwater Supplies from Western Region F Counties*. Some portions of this groundwater may be brackish and need additional treatment. This treated water may be stored using aquifer storage and recovery (ASR). Treatment and ASR are discussed as separate strategies.

Quantity, Reliability and Cost

In total, this strategy will provide 30,000 acre-feet of supply per year. Since the location of the well field is not yet known, a combination of aquifers and counties was assumed as outlined in

Table C- 18. The reliability of this strategy is considered to be high due to the large number of sources being employed. Additional study will be required once an exact location and source have been determined. For planning purposes, the strategy includes the purchase of the groundwater rights as well as the costs to drill 70 800-gpm wells, and associated well field piping. The capital cost for this project is estimated at $62.7 million. This equates to a cost per thousand gallons of $1.24 during debt service and $0.70 after debt service for groundwater production only. The transmission and any potentially necessary treatment of this water are handled as standalone strategies.

Table C- 18
Groundwater Supplies from Western Region F Counties

County	Aquifer	CRMWD Supply (ac-ft.)
Pecos	EDWARDS-TRINITY-PLATEAU AQUIFER	5,000
	RUSTLER AQUIFER	3,500
	PECOS VALLEY-EDWARDS-TRINITY PLATEAU AQUIFER	5,000
Reeves	PECOS VALLEY-EDWARDS-TRINITY PLATEAU AQUIFER	5,000
	RUSTLER AQUIFER	1,500
Ward	PECOS VALLEY AQUIFER	4,000
	RUSTLER AQUIFER	500
Winkler	PECOS VALLEY-EDWARDS-TRINITY PLATEAU AQUIFER	5,000
	RUSTLER AQUIFER	500
Total Supply		30,000

Environmental Factors
The well fields would be located so as to minimize any potential environmental impacts. As such, the environmental impacts are expected to be minimal.

Agricultural and Rural Impacts
Development of groundwater may divert water that was previously used for agricultural and rural purposes. However, this strategy assumes that the groundwater rights are obtained on a willing buyer – willing seller basis which would minimize the impacts to agriculture.

Impacts to Natural Resources and Key Parameters of Water Quality
The strategy proposes to utilize a sustainable level of groundwater that does not exceed the Modeled Available Groundwater (MAG). The impacts to natural resources are expected to be minimal. No impacts to water quality are expected. The impacts of transmission and treatment of this water are discussed in their respective strategies.

Impacts on Other Water Resources and Management Strategies
This strategy could impact the Expanded Ward County and Winkler County Well Fields but it is assumed that the new wells would be located so as not to impact these well fields. Development of additional groundwater will ease the dependence on CRMWD's surface water system which is currently experiencing a new drought of record and may have even less reliable supply than is estimated in this plan.

Other Issues Affecting Feasibility
Additional study will be needed once a more specific location for this strategy has been selected.

Wholesale Water Provider:	**Colorado River Municipal Water District**
WMS Name:	**Transmission of Additional Groundwater Supplies from Western Region F Counties**
WMS Type:	Transmission of Newly Developed Groundwater
Strategy Yield:	30,000 acre-feet
Strategy Capital Cost:	$226.7 million
Strategy Annual Cost (During Amortization):	$796 per acre-foot $2.44 per thousand gallons
Strategy Annual Cost (After Amortization):	$164 per acre-foot $0.50 per thousand gallons

Strategy Description

This strategy involves the development of a pipeline to transport the 30,000 acre-feet of groundwater supply developed by CRMWD in Western Region F Counties. Since the exact location of the development of these supplies is still unknown, for planning purposes it was assumed that 90 miles of new transmission system would be needed.

Quantity, Reliability and Cost

The supply for this strategy originates from the CRMWD strategy *Additional Groundwater Supplies from Western Region F Counties*. This strategy enables the 30,000 acre-feet of supply to be used through transmission to the rest of the CRMWD system. The reliability of this strategy is considered to be high. The capital cost of this strategy includes the construction of 90 miles of 48-inch pipeline, 4 new pump stations, and 10 MG of storage. The total capital cost is estimated at $226.7 million. For 30,000 acre-feet of supply, the incremental cost to transport the water is estimated at $2.44 per thousand gallons.

Environmental Factors

The right of way for the transmission line may temporarily affect the environment during construction. Additional study and mitigation may be required before construction of the transmission pipeline. The pipeline may be routed to avoid environmentally sensitive areas.

Agricultural and Rural Impacts

The right of way for the transmission line may temporarily affect a small amount of agricultural acreage during construction. The acreage is estimated at 218 acres for planning purposes.

Impacts to Natural Resources and Key Parameters of Water Quality

Other natural resources may be temporarily impacted during construction of the pipeline. These impacts are expected to be minimal and the mitigation of impacts will be addressed through further study once the exact pipeline route has been selected.

Impacts on Other Water Resources and Management Strategies

Since this strategy only involves transmission, no impacts on water resources or management strategies are anticipated.

Other Issues Affecting Feasibility

Once a more defined pipeline route is identified, additional study will be required to determine its feasibility and potential impacts.

Wholesale Water Provider:	**Colorado River Municipal Water District**
WMS Name:	**Aquifer Storage and Recovery (ASR) of Brackish Groundwater**
WMS Type:	Aquifer Storage and Recovery
Strategy Yield:	11,200 acre-feet
Strategy Capital Cost:	$17.4 million
Strategy Annual Cost (During Amortization):	$189 per acre-foot $0.58 per 1,000 gallons
Strategy Annual Cost (After Amortization):	$59 per acre-foot $0.18 per 1,000 gallons

Strategy Description

This strategy is one component of several strategies that are needed to develop, treat, store, recover and transport brackish groundwater from far West Texas to CRMWD's service area. This component is associated with the storage of treated brackish groundwater by ASR. It assumes that brackish groundwater that is not needed for immediate demands would be desalinated and stored in the Pecos Valley aquifer at the existing Ward County North Well Field. Alternatively, if the new well field has properties suitable for ASR, the water may be stored locally. This strategy only includes 50 injection wells required for the ASR, not any potential transmission that may or may not be required. It is assumed that the pumping wells associated with the new groundwater development strategy or existing well fields would be used to recover the stored water. Advanced treatment of the brackish water would be needed prior to injection. This treatment is discussed under *Desalination of Brackish Groundwater Supplies.* The transmission of the stored water to CRMWD's service area is discussed under the *Transmission of Additional Groundwater Supplies from Western Region F Counties* strategy.

Quantity, Reliability and Cost

Treated brackish groundwater would be injected into the Pecos Valley aquifer at a CRMWD well field site during winter months at approximately the same rate the groundwater can be withdrawn from the aquifer. When determining the location for the ASR wells, it is important to locate the wells in a relatively confined portion of the aquifer to reduce the chances of unauthorized withdrawals. Assuming that the water would be withdrawn within the following few months, a return of approximately 95 percent could be anticipated.

Environmental Factors

Utilization of the existing wells for ASR will likely result in minimal environmental impacts.

Agricultural and Rural Impacts

The supplies in this strategy are derived from brackish sources which are not readily usable for agricultural and rural purposes. Therefore the impacts on agricultural and rural users are expected to be minimal.

Impacts to Natural Resources and Key Parameters of Water Quality

The supplies in this strategy are from brackish sources that would otherwise go unused. Therefore their impact on natural resources and water quality is expected to be minimal. To the extent that the use of this water reduces the demand on surface water supplies in Region F, this strategy may help to improve surface water quality.

Impacts on Other Water Resources and Management Strategies

If the Ward County Well Field is used for ASR, this would impact its ability to be used for ASR of surface water supplies discussed in *Aquifer Storage and Recovery ASR of Existing Surface Water Supplies in Ward County Well Field*. If ASR is implemented at the new well field, it would likely be used during the winter months when demands for the wells are lower. Operation in this manner will optimize their existing infrastructure and will likely result in minimal impacts on other water resources and management strategies. This strategy may reduce demands on CRMWD surface water sources.

Other Issues Affecting Feasibility

The suitability of the Pecos Valley aquifer in this area for ASR has not been firmly established. Further studies will be required to evaluate aquifer characteristics. Injection of water into the subsurface will likely require a Class V permit from TCEQ.

Wholesale Water Provider:	**San Angelo**
WMS Name:	**Develop Hickory Aquifer Supplies in McCulloch County**
WMS Type:	New Groundwater Source
Strategy Yield:	4,000 ac-ft/yr (7,953 ac-ft/yr including new supplies plus current supplies that are MAG limited)
Strategy Capital Cost:	$27,104,000
Strategy Annual Cost (During Amortization):	$1,016/ac-ft ($3.12/1,000 gal)
Strategy Annual Cost (After Amortization):	$468/ac-ft ($1.44/1,000 gal)

Strategy Description

The City recently completed the first phase of its Hickory Well Field project. This project included 15 wells and can provide up to 6,700 acre-feet per year according to their agreement with the Hickory Underground Water District. Starting in 2026, the City can increase this supply by 3,300 acre-feet to a total capacity of 10,000 acre-feet. The project will reach its ultimate capacity of 12,000 acre-feet by 2036. The City has the infrastructure in place to pump up to 8,000 acre-feet as soon as their permit allows. However, due to MAG limitations in McCulloch County only about 4,000 acre-feet can be shown as existing supplies. The 7,953 acre-feet supply amount shown from this strategy includes both the water made available through infrastructure upgrades as well as existing supplies unable to be shown due to MAG limitations. In order to reach ultimate capacity of 12,000 acre-feet, the City will need to add additional wells, increase their radium treatment capacity, and upgrade some pump stations along the pipeline route. These infrastructure upgrades were sized only to provide the additional 4,000 acre-feet the City will need to reach their ultimate capacity. The wells would produce water from approximately 3,000 feet below the surface. This water would be transported to San Angelo through the existing McCulloch Well Field pipeline. This strategy includes 4000 feet of 10-inch diameter well field piping that will be constructed to connect the wells to existing well field infrastructure. It is assumed that San Angelo's existing treatment facilities are sufficient to treat the full authorized amount of Hickory aquifer supplies.

Quantity, Reliability and Cost

The quantity and reliability of water from this source is expected to be approximately 500 gpm. The Hickory aquifer is a viable source but elevated radionuclide concentrations will require advanced treatment. The supply from this strategy, which includes existing supplies as well as upgrades to ultimate capacity, is estimated at 7,953 acre-feet in 2070. The reliability of the supply is considered to be medium to high. There is plenty of water in storage, but water quality issues and competing demands may limit the availability. This strategy is estimated to cost $27.1 million.

Environmental Factors

The proposed wells will produce water from the down-dip portion of the Hickory aquifer. Because of the 3,000 feet of overburden, there is no connection with the land surface and as a result, there would be no impact on springs or surface water sources. Subsidence would also not be a factor due to the depth of the source and the competency of the overburden. Groundwater development from this source is expected to cause minimal environmental impacts.

Agricultural and Rural Impacts

This source is currently used for agricultural, industrial and municipal purposes. This strategy may reduce the amount of water currently available to other users in the area. San Angelo has the necessary water rights to produce the quantities included in this strategy.

Impacts to Natural Resources and Key Parameters of Water Quality

The water quality in the Hickory aquifer is variable. The upper portion of the aquifer contains iron in excess of the State's secondary drinking water standards. Also, much of the water from the Hickory aquifer exceeds drinking water standards for radionuclides. Additional advanced treatment may be required to meet standards, significantly increasing the cost of this strategy. San Angelo has an existing treatment facility for this supply.

No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies

No impacts to other water resources or management strategies are identified.

Other Issues Affecting Feasibility

The most significant factor affecting the feasibility of this project is the limitations of the MAG for the Hickory aquifer in McCulloch County. As currently adopted, there is no available water for this strategy. Hickory UGCD has acknowledged that San Angelo has the rights to develop this source and intends to modify the MAG values, but these changes cannot be incorporated into the current 2016 Regional Water Plan.

Wholesale Water Provider: **San Angelo**

WMS Name: **Develop Edwards Trinity Plateau Aquifer Supplies in Schleicher County**

WMS Type: New Groundwater Source

Strategy Yield: 4,500 ac-ft/yr

Strategy Capital Cost: $51,891,000

Strategy Annual Cost (During Amortization): $1,140/ac-ft ($3.50/1,000 gal)

Strategy Annual Cost (After Amortization): $175/ac-ft ($0.54/1,000 gal)

Strategy Description

The Edwards-Trinity Plateau aquifer in Schleicher County has been identified as a potential source for municipal, industrial and agricultural purposes. For the purpose of this plan, groundwater development in Schleicher County is not a recommended strategy. However, this strategy was evaluated as a potential alternative strategy if the exportation of water outside of Schleicher County was agreed upon. This source is currently used for agricultural purposes and may require advanced treatment for municipal use. To provide approximately 4,500 acre-feet per year, 26 new wells would need to be drilled. These wells would produce water from approximately 487 feet below the surface.

This strategy assumes that the wells will be spaced 2,000 feet apart and connected by three 52,000 feet of well field piping, with diameters of 6-, 12-, and 14-inches.

This project also includes a transmission pipeline that will transport the water from the well field to existing infrastructure located in the City of San Angelo. It is assumed that the water produced from the new well field will be blended with the existing water supply or treated at the City's water treatment plant. Desalination of new groundwater is evaluated as a separate strategy. The transmission pipeline is assumed to be a 30-mile pipeline with a diameter of 24 inches.

Quantity, Reliability and Cost

The quantity and reliability of water from this source is expected to be approximately 170 gpm. Historical municipal and agricultural use indicates that the Edwards-Trinity Plateau aquifer may be a viable source but high TDS will require advanced treatment. For this plan, the 26 new wells are assumed to supply an additional 4,500 acre-feet per year. The reliability of the supply is considered to be medium because of the potential competing demands.

Environmental Factors

The aquifer is a proven groundwater source for municipal, industrial, and agricultural purposes. However, the long-term water quality is unknown. Groundwater development from this source should be evaluated for potential impacts on springflows and base flows of area rivers. It is unlikely that this strategy would cause subsidence.

Agricultural and Rural Impacts

Springflows from the Edwards-Trinity Plateau supply much of the base flow of the South Concho and other flowing streams in the area. Many of these streams are used extensively for irrigation. Wells provide water for ranching, domestic and municipal supplies throughout the area. Studies will be required to evaluate potential impacts on the area.

Impacts to Natural Resources and Key Parameters of Water Quality

The water quality in the Edwards-Trinity Plateau aquifer ranges from fresh to slightly saline in the outcrop areas, and brine water in subsurface portions. Water levels have remained relatively stable because recharge has generally kept pace with the relatively low amounts of pumping over the extent of the aquifer.

No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies

Other strategies that use the Edwards-Trinity aquifer in Schleicher County may be impacted.

Other Issues Affecting Feasibility

No other issues were identified.

Wholesale Water Provider:	**San Angelo**
WMS Name:	**Develop Capitan Reef Complex Aquifer Supplies in Pecos County**
WMS Type:	New Groundwater Source
Strategy Yield:	11,100 ac-ft/yr
Strategy Capital Cost:	$289,092,000
Strategy Annual Cost (During Amortization):	$3,360/ac-ft ($10.31/1,000 gal)
Strategy Annual Cost (After Amortization):	$427/ac-ft ($1.31/1,000 gal)

Strategy Description

The Capitan Reef Complex aquifer in Pecos County has been identified as a potential source for municipal, industrial and agricultural purposes. This source is currently not used in Pecos County, and therefore, the water quantity and quality data are limited. It is likely that water from the Capitan Reef Complex will require advanced treatment for municipal use. To provide approximately 11,100 acre-feet per year, 12 new wells would need to be drilled. These wells would produce water from approximately 3,000 feet below the surface.

This strategy assumes that the wells would be spaced 1 mile (5,280 feet) apart along the southern length of the Capitan Reef Complex aquifer in Pecos County. The wells will be connected by 58,080 feet of 36-inch diameter well field piping.

This project also includes a transmission pipeline that will transport the water from the well field to existing infrastructure located in the City of San Angelo. The transmission pipeline is assumed to be a 180-mile pipeline with a diameter of 36 inches.

Advanced treatment of this water is evaluated as a separate strategy.

Quantity, Reliability and Cost

The quantity and reliability of water from this source is expected to be approximately 1,000 gpm. Historical well data indicates that the Capitan Reef Complex aquifer may be a viable source but high TDS will require advanced treatment. For this plan, the 12 new wells are assumed to supply an additional 11,100 acre-feet per year. The reliability of the supply is considered to be medium because of aquifer and water quality properties. The cost of this strategy is high at $389 million due to deep wells and long transmission distances.

Environmental Factors

The aquifer is an unproven groundwater source in this area and the long-term water quality is unknown. Groundwater development from this source should be evaluated for potential impacts on springflows and base flows of area rivers. It is unlikely that this strategy would cause subsidence.

Agricultural and Rural Impacts

While the Capitan Reef Complex aquifer supplies the base flow of springs in Reeves County to the west, it is uncertain whether this aquifer is interconnected to local area rivers that provide rural and agricultural water. Studies will be required to evaluate potential impacts on the area.

Impacts to Natural Resources and Key Parameters of Water Quality

The water quality in the Capitan Reef Complex aquifer is generally poor, yielding small to large quantities of slightly saline to saline groundwater. Most of the groundwater pumped from the aquifer is used for oil reservoir flooding.

No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies

Other strategies for water from Pecos County may be impacted. This includes Pecos County groundwater development strategies identified for CRMWD.

Other Issues Affecting Feasibility

The most significant challenge for this strategy is whether or not the strategy is economically feasible. The necessary infrastructure to move water from Pecos County to Tom Green County where it will need advanced treatment will be expensive. This may be too great of a financial burden for the City of San Angelo. This strategy is not recommended for this planning cycle. However, it was analyzed as an alternative strategy to be considered for future use should the opportunity present itself.

Wholesale Water Provider:	**San Angelo**
WMS Name:	**Develop Pecos Valley/Edwards-Trinity Plateau Aquifer Supplies in Pecos County**
WMS Type:	New Groundwater Source
Strategy Yield:	12,000 ac-ft/yr
Strategy Capital Cost:	$262,762,000
Strategy Annual Cost (During Amortization):	$2,109/ac-ft ($6.47/1,000 gal)
Strategy Annual Cost (After Amortization):	$277/ac-ft ($0.85/1,000 gal)

Strategy Description

In compliance with the guidance and rules for regional water planning, the TWDB requires the use of the Modeled Available Groundwater (MAG) in regional water planning. The MAG for the City's current well field in the Hickory aquifer is severely limiting and causes the supplies from San Angelo's well field to be artificially shorted. In order to meet the City's water demands, the City of San Angelo is considering the possibility of obtaining new water supplies outside of Tom Green County.

The Pecos Valley and/or Pecos Valley-Edwards-Trinity aquifer in Pecos County has been identified as a potential source for municipal, industrial and agricultural purposes. This source is currently used for agricultural and industrial purposes and may require advanced treatment for municipal use. To provide approximately 12,000 acre-feet per year, seven new wells would need to be drilled. These wells would produce water from approximately 200 feet below the surface.

This strategy assumes that the wells will be spaced 2,000 feet apart and be connected by 10,000 feet of 36-inch diameter well field piping.

This project also includes a transmission pipeline that will transport the water from the well field to existing infrastructure located in the City of San Angelo. It is assumed that the water produced from the new well field will be blended with the existing water supply. The transmission pipeline is assumed to be a 135-mile pipeline with a diameter of 36 inches. Three pump stations will be needed to convey the water to San Angelo.

This strategy does not include treatment, but depending upon the water quality of the well field, some or all of the water may need advanced treatment. Potential advanced treatment is included in a separate strategy for San Angelo, *Desalination of Brackish Groundwater*.

Quantity, Reliability and Cost

The quantity and reliability of water from this source is expected to be approximately 1,800 gpm. In parts of the aquifer there are elevated levels of chloride and sulfate, resulting from previous oil field activities, which would require advanced treatment. If treatment is needed, the treated water supply would be about 9,000 acre-feet per year. For this plan, the seven new wells are assumed to supply 12,000 acre-feet per year. The reliability of the supply is considered to be medium because of potential water quality properties.

The capital cost of this strategy is $262.7 million. Unit costs during amortization are $6.47 per 1,000 gallons. Following repayment of debt, the unit costs decrease to $0.85 per 1,000 gallons, assuming no treatment is needed. Costs of treatment are evaluated in a separate strategy. This strategy is relatively expensive due to the long transmission pipeline and transport costs.

Environmental Factors

The aquifer is a proven groundwater source for industrial, agricultural and municipal purposes. However, the long-term water quality is unknown. Groundwater development from this source should be evaluated for potential impacts on springflows and base flows of area rivers. Depending upon the well field location and connectivity to surface water, there may be possible impacts on the Pecos River from this strategy. It is unlikely that this strategy would cause subsidence.

Agricultural and Rural Impacts

This source is currently used for agricultural purposes. The area of potential interest is currently being used mainly for livestock and ranching. It is possible that large scale production from this aquifer could impact irrigation supplies in the Belding Farms area. This strategy could reduce the amount of water currently available to other users in the area.

Impacts to Natural Resources and Key Parameters of Water Quality

The water quality in Pecos Valley and Edwards-Trinity aquifers is highly variable. This is due to there being several structural basins, the largest of which are the Pecos Trough in the west and Monument Draw Trough in the east. Water is generally better in the Monument Draw Trough. The aquifer is characterized by high levels of chloride and sulfate in excess of secondary drinking standards in some areas. In addition, naturally occurring arsenic and radionuclides occur in excess of primary drinking water standards. Water levels of the aquifer continue to decline due to increased municipal and industrial pumping.

No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies

Other strategies for water from Pecos County may be impacted. This includes Pecos County groundwater development strategies identified for CRMWD and the City of Odessa.

Other Issues Affecting Feasibility

The most significant challenge for this strategy is whether or not the strategy is economically feasible. The necessary infrastructure to move water from Pecos County to Tom Green County where it may need advanced treatment will be expensive. This may be too great of a financial burden for the City of San Angelo. This strategy is not recommended for this planning cycle. However, it was analyzed as a potential strategy to be considered for future use should the opportunity present itself.

Water User Group:	**City of Andrews**
WMS Name:	**Develop Ogallala Aquifer Supplies**
WMS Type:	New Groundwater Source
Strategy Yield:	4,300 ac-ft/yr
Strategy Capital Cost:	$18.67 million
Strategy Annual Cost (During Amortization):	$487 per acre-foot $1.50 per thousand gallons
Strategy Annual Cost (After Amortization):	$124 per acre-foot $0.38 per thousand gallons

Strategy Description

To provide additional supply, the City of Andrews plans to develop additional groundwater in three phases. The first phase involves an expansion of their existing Florey Well Field. The second phase involves developing new lands near the existing Florey Well Field. The third and final phase is to develop groundwater located south of town and construct a new pipeline.

Phase I of this project assumes five new wells in the vicinity of their existing infrastructure at the Florey Well Field. A 20-inch transmission line will be built to connect the existing Florey Well Field to the City's other existing well field on University Lands. The existing infrastructure from the University Lands Well Field to the City of Andrews will be used for transmission to the City. Phase I is anticipated to come online by 2020 and provide 1,680 acre-feet per year.

Phase II of this project assumes eight new wells located on undeveloped lands already leased by the City and adjoining to the Florey Well Field. Four miles of collection piping will be needed to connect this to the infrastructure built in Phase I. This phase is expected to be online in 2030 and provide 1,680 acre-feet per year.

Phase III involves developing groundwater from a different location south of town. The City has drilled 16 test wells in this area and discovered the wells are slower producing than those located near the Florey Well Field. Phase III assumes 10 new wells and an 8-mile, 20-inch diameter pipeline to town. This portion is expected to be online in 2040 and provide approximately 940 acre-feet per year.

The City recently completed a new water treatment plant to treat naturally occurring fluoride and arsenic levels found in local groundwater. It was assumed that this plant could handle any potential water quality issues that may arise. Therefore, no treatment plant was included in the evaluation and cost estimate of this strategy. If a new treatment plant is determined to be needed, the cost of this strategy will increase.

Quantity, Reliability and Cost

The quantity and reliability of water from this source is expected to be good given the test wells and studies already performed by the City of Andrews. For this plan, the 23 new wells are assumed to supply an additional 4,300 acre-feet per year by the time Phase III is fully implemented.

The total cost of the project will be approximately $18.67 million. This equates to $487 per acre-foot ($1.50 per 1,000 gallons) of treated water during debt service. After the infrastructure is fully paid for, the cost drops to $124 per acre-foot ($0.38 per 1,000 gallons) of treated water.

Environmental Factors

The aquifer is a proven groundwater source for municipal, industrial, and agricultural purposes. However, the long-term water quality is unknown. Throughout much of the aquifer, groundwater withdrawals exceed the amount of recharge, and water levels have declined fairly consistently through time. However, the City has an agreement with other users in the area to minimize the impacts of drawdown near their well field. Groundwater development from this source is expected to cause minimal environmental impacts.

Agricultural and Rural Impacts

This source is currently used for agricultural purposes. This strategy would reduce the amount of water currently available to agricultural users. It is assumed that the transfer of water rights will be between a willing buyer and willing seller, and there would be minimal impacts to agricultural users.

Impacts to Natural Resources and Key Parameters of Water Quality

There are no identified impacts to natural resources.

Impacts on Other Water Resources and Management Strategies

This strategy may impact other groundwater strategies in Andrews County due to competition for available supplies.

Other Issues Affecting Feasibility

The most significant challenge for this strategy is the planning constraints of the Modeled Available Groundwater volume amount for the County of Andrews from the Ogallala aquifer. Due to these limitations, the supply available from the Ogallala aquifer is less than proposed for this strategy. As such, this strategy cannot be recommended in the plan at the quantities shown. However, since Andrews County does not have a GCD to enforce ground restrictions, such as MAG limits, the City could pursue this strategy independently, but it could not receive State funding to construct it.

Water User Group:	**Andrews County-Other**
WMS Name:	**Develop Edwards-Trinity Plateau Aquifer Supplies**
WMS Type:	New Groundwater Source
Strategy Yield:	500 ac-ft/yr
Strategy Capital Cost:	$3,515,000
Strategy Annual Cost (During Amortization):	$696 per acre-foot $2.14 per thousand gallons
Strategy Annual Cost (After Amortization):	$108 per acre-foot $0.33 per thousand gallons

Strategy Description

The Edwards-Trinity Plateau aquifer has been identified as a potential source for municipal, industrial and agricultural purposes. Along the southern county border, there may lie groundwater supplies suitable for development. It is unclear if this formation is truly from the Edwards-Trinity Plateau or if it is fed by leakage from the overlaying Ogallala aquifer. This potential source is only located in the southern part of Andrews County. Further study would be needed to determine if this was a feasible strategy for the specific user depending on their location within the county and local hydrogeologic conditions. This strategy assumes that 38 new wells would need to be drilled to provide approximately 500 acre-feet per year. These wells would produce water from approximately 200 feet below the surface.

Quantity, Reliability and Cost

The quantity and reliability of water from this source is expected to be approximately 20 gpm. Historical municipal and agricultural use indicates that the Edwards-Trinity Plateau outcrops may be a viable source but high TDS may require advanced treatment for municipal use. For this plan, the 38 new wells are assumed to supply an additional 500 acre-feet per year. Since there is not a specific sponsor for this strategy, it is assumed that the water would be treated at the Point of Use if needed and the infrastructure costs for treatment are not included in the costs for this strategy. The reliability of the supply is considered to be medium, based on the aquifer characteristics and water quality. The capital costs are estimated at $3.5 million.

Environmental Factors

The aquifer is currently not used for municipal purposes in Andrews County. Wastewater discharges from this source may contain elevated TDS if the water is not treated. This strategy is not expected to have other environmental impacts. It is unlikely that this strategy would cause subsidence.

Agricultural and Rural Impacts

Since this source is not currently being used to any extent in Andrews County, the strategy should not have any impacts to agricultural users. It would provide additional water to rural users.

Impacts to Natural Resources and Key Parameters of Water Quality

The water quality in the Edwards-Trinity Plateau aquifer can be variable, with water quality ranging from fresh to slightly saline in the outcrop areas, and brine water in subsurface portions. Water levels have remained relatively stable because recharge has generally kept pace with the relatively low amounts of pumping over the extent of the aquifer. No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies

No other water management strategies will be impacted.

Other Issues Affecting Feasibility

The most significant challenge for this strategy is locating areas with sufficient well production where the water quality is good. In addition, this project requires financing for the new facilities.

Water User Group:	**Andrews County Livestock**
WMS Name:	**Develop Edwards-Trinity Plateau Aquifer Supplies**
WMS Type:	New Groundwater Source
Strategy Yield:	150 ac-ft/yr
Strategy Capital Cost:	$238,000
Strategy Annual Cost (During Amortization):	$193 per acre-foot $0.59 per thousand gallons
Strategy Annual Cost (After Amortization):	$60 per acre-foot $0.18 per thousand gallons

Strategy Description

The Edwards-Trinity Plateau aquifer has been identified as a potential source of water for livestock in Andrews County. Water from this source ranges from fresh to slightly saline in the outcrop areas, and brine water in subsurface portions. Along the southern border of the county, there may lie undeveloped brackish groundwater supplies suitable for agricultural use. It is unclear whether supply is truly from the Edwards-Trinity Plateau or if it is fed by leakage from the overlaying Ogallala aquifer. This source is only located in the southern part of Andrews County. Further study would be needed to determine if this is a feasible strategy for the user depending on their location within the county and local hydrogeologic conditions. This strategy assumes that five new wells would need to be drilled to provide approximately 150 acre-feet per year. These wells would produce water from approximately 200 feet below the surface.

Quantity, Reliability and Cost

The quantity and reliability of water from this source is expected to be approximately 20 gpm. For this plan, the five new wells are assumed to supply an additional 150 acre-feet per year. The reliability of the supply is considered to be low to medium, based on the unproven use of this source.

The total cost of the project will be approximately $238,000. This equates to $193 per acre-foot ($0.59 per 1,000 gallons) of treated water during debt service. After the infrastructure is fully paid for, the cost drops to $60 per acre-foot ($0.18 per 1,000 gallons) of treated water.

Environmental Factors

Environmental impacts from this strategy are expected to be low. Groundwater development from this source should be evaluated for potential impacts on springflows and base flows of area rivers. It is unlikely that this strategy would cause subsidence.

Agricultural and Rural Impacts

This source is currently not used in Andrews County. This strategy should not impact current rural users. It should provide additional water for agricultural purposes.

Impacts to Natural Resources and Key Parameters of Water Quality

Water quality in the Edwards-Trinity Plateau aquifer ranges from fresh to slightly saline in the outcrop areas, and brine water in subsurface portions. Water levels have remained relatively stable because recharge has generally kept pace with the relatively low amounts of pumping over the extent of the aquifer.

No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies

This strategy could potentially impact the development of groundwater from the Edwards-Trinity Plateau aquifer for rural County-Other in Andrews County if located in the same vicinity. However, the combined supplies from these strategies do not exceed the MAG value, indicating there is sufficient supplies for both strategies.

Other Issues Affecting Feasibility

An adequate drinking water supply is an essential component of livestock production. The most significant challenge for this strategy is locating areas with sufficient well production. Generally livestock can tolerate higher salinity levels than municipal use; however, long-term use could negatively impact overall livestock performance. This might potentially offset the positive impacts of a more reliable water supply.

Water User Group:	**Andrews County Livestock**
WMS Name:	**Develop Pecos Valley Aquifer Supplies**
WMS Type:	New Groundwater Source
Strategy Yield:	50 ac-ft/yr
Strategy Capital Cost:	$68,000
Strategy Annual Cost (During Amortization):	$160 per acre-foot $0.49 per thousand gallons
Strategy Annual Cost (After Amortization):	$40 per acre-foot $0.12 per thousand gallons

Strategy Description

The Pecos Valley aquifer has been identified as a potential source of water for livestock in Andrews County. Water from this source is highly variable, and typically hard. However, along the eastern border of Andrews County lies groundwater suitable for agricultural purposes. This strategy assumes that one new well would need to be drilled to provide approximately 50 acre-feet per year. These wells would produce water from approximately 230 feet below the surface.

Quantity, Reliability and Cost

The quantity and reliability of water from this source is expected to be approximately 40 gpm. Historical use indicates that the Pecos Valley aquifer may contain high levels of chloride and sulfate, resulting from previous oil field activities. It is uncertain whether these constituents are present in the portion of the aquifer that lies within Andrews County. For this plan, the one new well is assumed to supply an additional 50 acre-feet per year. The reliability of the supply is considered to be medium because of aquifer and water quality properties.

The total cost of the project will be approximately $68,000. This equates to $160 per acre-foot ($0.49 per 1,000 gallons) of treated water during debt service. After the infrastructure is fully paid for, the cost drops to $40 per acre-foot ($0.12 per 1,000 gallons) of treated water.

Environmental Factors

Environmental impacts are expected to be low.

Agricultural and Rural Impacts

This source is currently not for agricultural or rural purposes. This strategy would marginally reduce the amount of water available to other users. There are no agricultural or rural issues associated with this strategy. It would provide additional water for agricultural purposes.

Impacts to Natural Resources and Key Parameters of Water Quality

The water quality in the Pecos Valley aquifer in Andrews County is unknown. In other areas, the aquifer is characterized by high levels of chloride and sulfate in excess of secondary drinking standards. Further study is needed on the water quality in Andrews County. Use of this source is not expected to impact key parameters of water quality.

No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies

No other water management strategies use water supplies from the Pecos Valley aquifer in Andrews County, therefore no other strategies will be impacted.

Other Issues Affecting Feasibility

An adequate drinking water supply is an essential component of livestock production. The most significant challenge for this strategy is locating areas with sufficient well production. Generally livestock can tolerate higher salinity levels than municipal use; however, long-term use could negatively impact overall livestock performance. This might potentially offset the positive impacts of a more reliable water supply.

Water User Group:	**Bronte**
WMS Name:	**New Water Wells Located Southeast of Bronte**
WMS Type:	New Groundwater Source (Other Aquifer)
Strategy Yield:	200 acre-feet/year
Strategy Capital Cost:	$7,468,000
Strategy Annual Cost (During Amortization):	$4,860/acre-feet ($14.91/1,000 gallons)
Strategy Annual Cost (After Amortization):	$1,735/acre-feet ($5.32/1,000 gallons)

Strategy Description

The City of Bronte is evaluating potential alluvium groundwater located southeast of the City. This source is currently used for agricultural purposes and may require advanced treatment for municipal use. To provide approximately 200 acre-feet per year, three new wells would need to be drilled. These wells would produce water from an unclassified aquifer approximately 200 feet below the surface.

Quantity, Reliability and Cost

The quantity and reliability of water from this source is not well known. Historical agricultural use indicates that the alluvium may be a viable source but high sulfides will require advanced treatment. For this plan, the three new wells are assumed to supply an additional 200 acre-feet per year. The reliability of the supply is considered to be medium because of the potential competing demands.

The total cost of the project will be approximately $7.5 million. This equates to $4,860 per acre-foot of treated water during debt service. After the infrastructure is fully paid for, the cost drops to $1,735 per acre-foot of treated water.

Environmental Factors

The aquifer is a proven groundwater source for agricultural purposes. However, the long-term water quality is unknown. At this time, it is assumed that the discharge from the advanced treatment facility can be discharged to the City's wastewater treatment plant or land applied. If these options are not available to Bronte, then additional facilities will be needed for the treatment plant discharge. Environmental issues associated with the treatment facility would be addressed during permitting.

Agricultural and Rural Impacts

This source is currently used for agricultural purposes. This strategy would reduce the amount of water currently available to agricultural users. It is assumed that the transfer of water rights would be between a willing buyer and willing seller, and there would be minimal impacts to agricultural users.

Impacts to Natural Resources and Key Parameters of Water Quality

None identified.

Impacts on Other Water Resources and Management Strategies

Other strategies for the City of Bronte may be impacted.

Other issues affecting feasibility

Because the long-term reliability and quality of this supply is unknown, the City may need to develop other alternatives to meet long-term needs. Funding construction of these new wells will be a significant strain on the financial resources of the City.

Water User Group: **Bronte**

WMS Name: **New Water Wells Located at Oak Creek Reservoir**

WMS Type: New Groundwater Source (Other Aquifer)

Strategy Yield: 150 acre-feet/year

Strategy Capital Cost: $2,576,000

Strategy Annual Cost (During Amortization): $1780 per acre-foot
$5.46 per thousand gallons

Strategy Annual Cost (After Amortization): $340 per acre-foot
$1.04 per thousand gallons

Strategy Description

The City of Bronte is considering developing new groundwater wells near Oak Creek Reservoir and developing a distribution system to potentially serve up to 300 homes. The most likely location for these wells would be near the City's existing wells near Oak Creek Reservoir. These wells produce water from an unclassified aquifer approximately 275 to 300 feet below the surface.

For the purposes of this strategy, it is assumed that three new wells and approximately three miles of 6-inch transmission pipeline would be needed. Additional distribution pipelines will likely be needed to serve the local community. This is considered part of the service distribution system and is not included in this strategy.

Quantity, Reliability and Cost

It is assumed for this strategy that each well will provide an additional 50 acre-feet per year. This brings the total strategy yield up to 150 acre-feet per year. The prolonged drought has put an extreme strain upon the region, making the reliability of this strategy extremely low. The City is preparing to drill test wells in the area to further determine the quantity and quality of water that is potentially available. Capital costs are estimated at $2.57 million.

Environmental Factors

There are no significant environmental issues associated with this strategy. Water quality is adequate for municipal use. Also, it is unlikely that water production for local residents will result in subsidence.

Agricultural and Rural Impacts

None identified.

Impacts to Natural Resources and Key Parameters of Water Quality

None identified.

Impacts on Other Water Resources and Management Strategies

Long-term supply for the City of Bronte from existing wells may be impacted as more demand is placed on the aquifer.

Other Issues Affecting Feasibility

Since the reliability of this supply is unknown, the City should consider other alternatives to meet long-term needs as well. Funding construction of these new wells will be a significant strain on the financial resources of the City and/or local residents around the lake.

Water User Group:	**Bronte, Robert Lee**
WMS Name:	**New Water Wells Located in Nolan County**
WMS Type:	New Groundwater Source (Edwards-Trinity Aquifer)
Strategy Yield:	78 acre-feet/year
Strategy Capital Cost:	$7,350,000
Strategy Annual Cost (During Amortization):	$8,885 per acre-foot ($3,465 per ac-ft if full supply can be developed) $27.27 per thousand gallons ($10.63 per thousand gallons if full supply can be developed)
Strategy Annual Cost (After Amortization):	$1,000 per acre-foot ($390 per ac-ft if full supply can be developed) $3.07 per thousand gallons ($1.20 per thousand gallons if full supply can be developed)

Strategy Description

The Cities of Bronte and Robert Lee are considering developing new groundwater wells in south central Nolan County, which is in Region G. These wells produce water from the Edwards Trinity aquifer. For the purposes of this strategy, it is assumed that two new wells and approximately 22 miles of 8-inch transmission pipeline would be needed.

Quantity, Reliability and Cost

Bronte and Robert Lee estimate this strategy will provide 200 acre-feet per year. This is how the infrastructure was sized. However, the Modeled Available Groundwater (MAG) in Nolan County in Region G limits this supply to only 78 acre-feet per year. It is possible that not all users will utilize all the supply allocated to them from this source in the Region G plan. In this case, additional water may be available for Bronte. The reliability of this strategy is considered to be medium since it is dependent on other entities' use to meet the MAG. Capital costs are estimated at $7.35 million. If Bronte and Robert Lee are able to get the full 200 acre-feet of supply, instead of only 78 acre-feet of supply, the unit cost during debt service will be reduced from $27.27 per thousand gallons to $10.63 per thousand gallons.

Environmental Factors

There are no significant environmental issues associated with this strategy. Water quality is adequate for municipal use.

Agricultural and Rural Impacts

None identified.

Impacts to Natural Resources and Key Parameters of Water Quality

None identified.

Impacts on Other Water Resources and Management Strategies

This strategy may be able to provide more than 78 acre-feet per year if other users of Edwards Trinity supply in Nolan County do not use their full allocation of the MAG.

Other Issues Affecting Feasibility

Since the reliability of this supply is unknown, the City should consider other alternatives to meet long-term needs as well. Funding construction of these new wells will be a significant strain on the financial resources of the City.

Water User Group:	**Coke County Mining**
WMS Name:	**Develop Additional Edwards-Trinity Plateau Aquifer Supplies**
WMS Type:	New Groundwater Source
Strategy Yield:	250 ac-ft/yr
Strategy Capital Cost:	$678,000
Strategy Annual Cost (During Amortization):	$295/ac-ft ($0.91/1,000 gal)
Strategy Annual Cost (After Amortization):	$67/ac-ft ($0.21/1,000 gal)

Strategy Description

The Edwards-Trinity Plateau aquifer has been identified as a potential source of water for mining in Coke County. This strategy assumes that five new wells would be drilled to provide approximately 250 acre-feet per year. These wells are assumed to produce water from approximately 350 feet below the surface.

A peaking factor of 2 was assumed for the wells and piping in order to capture the peak annual supply.

Quantity, Reliability and Cost

It is assumed that for this strategy, each well will provide an additional 50 acre-feet per year for mining purposes in Coke County. This brings the total strategy yield up to 250 acre-feet per year. The reliability of the supply is considered to be low to medium, based on the unproven use of this source. Test wells were recently drilled in the county in which one was found to be productive, and produce an adequate water supply.

The total cost of the project will be approximately $678,000. This equates to $295 per acre-foot ($0.91 per 1,000 gallons) of water during debt service. After the infrastructure is fully paid for, the cost drops to $67 per acre-foot ($0.21 per 1,000 gallons) of treated water.

Environmental Factors

Environmental impacts from this strategy are expected to be low. Groundwater development from this source should be evaluated for potential impacts on springflows and base flows of area rivers. It is unlikely that this strategy would cause subsidence.

Agricultural and Rural Impacts

None identified.

Impacts to Natural Resources and Key Parameters of Water Quality

The water quality in this area tends to be poor, but should be more than adequate for mining purposes.

No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies

None identified.

Other Issues Affecting Feasibility

The most significant challenge for this strategy is locating areas with sufficient well production.

Water User Group:	**Coleman County Mining**
WMS Name:	**Develop Hickory Aquifer Supplies**
WMS Type:	New Groundwater Source
Strategy Yield:	65 ac-ft/yr
Strategy Capital Cost:	$814,000
Strategy Annual Cost (During Amortization):	$1,200/ac-ft ($3.68/1,000 gal)
Strategy Annual Cost (After Amortization):	$154/ac-ft ($0.47/1,000 gal)

Strategy Description

The Hickory aquifer has been identified as a potential source of water for mining in Coleman County. This strategy assumes that one new well would be drilled to provide approximately 65 acre-feet per year. This well is assumed to produce water from approximately 2,000 feet below the surface.

A peaking factor of 2 was assumed for the wells and piping in order to capture the peak annual supply.

Quantity, Reliability and Cost

It is assumed that the well will produce approximately 65 additional acre-feet of water per year. The reliability of this source is assumed to be low to medium based on the unproven use of this source in the county.

The total cost of the project will be approximately $814,000. This equates to $1,200 per acre-foot ($3.68 per 1,000 gallons) of water during debt service. After the infrastructure is fully paid for, the cost drops to $154 per acre-foot ($0.47 per 1,000 gallons) of treated water.

Environmental Factors

Environmental impacts from this strategy are expected to be low, assuming the flowback water from mining is properly disposed of.

Agricultural and Rural Impacts

This source is currently not used for agricultural or rural purposes within the county. This strategy would marginally reduce the amount of water available to other users. There are no agricultural or rural issues associated with this strategy.

Impacts to Natural Resources and Key Parameters of Water Quality

The water quality from the Hickory aquifer tends to be relatively poor. The water quality in the area should prove adequate for the purposes of the mining industry though.

No impacts to natural resources were identified.

Impacts on Other Water Resources and Management Strategies

None identified.

Other Issues Affecting Feasibility

The most significant issues associated with this strategy will be finding areas that produce sufficient well production.

Water User Group:	**Concho County Mining**
WMS Name:	**Develop Additional Hickory Aquifer Supplies**
WMS Type:	New Groundwater Source
Strategy Yield:	200 ac-ft/yr
Strategy Capital Cost:	$1,626,000
Strategy Annual Cost (During Amortization):	$800/ac-ft ($2.46/1,000 gal)
Strategy Annual Cost (After Amortization):	$120/ac-ft ($0.37/1,000 gal)

Strategy Description

The Hickory aquifer has been identified as a potential source of water for mining in Concho County. This strategy assumes that two new wells would be drilled to provide approximately 200 acre-feet per year. These wells are assumed to produce water from approximately 2,000 feet below the surface.

A peaking factor of 2 was assumed for the wells and piping in order to capture the peak annual supply.

Quantity, Reliability and Cost

It is assumed that each well will produce approximately 100 acre-feet of water per year. This brings the total quantity of the strategy yield to 200 acre-feet per year. The reliability of this source is assumed to be medium to high based on the proven use of this source in the county.

The total cost of the project will be approximately $1.6 million. This equates to $800 per acre-foot ($2.46 per 1,000 gallons) of treated water during debt service. After the infrastructure is fully paid for, the cost drops to $120 per acre-foot ($0.37 per 1,000 gallons) of treated water.

Environmental Factors

Environmental impacts from this strategy are expected to be low, assuming flowback water from mining is properly disposed.

Agricultural and Rural Impacts

Currently this water source is also being used to supply the City of Eden. This strategy would marginally reduce the amount of water available to the other users.

Impacts to Natural Resources and Key Parameters of Water Quality

The water quality from the Hickory aquifer tends to be relatively poor. The water quality in the area should prove adequate for the purposes of the mining industry.

No impacts to natural resources were identified.

Impacts on Other Water Resources and Management Strategies

None identified.

Other Issues Affecting Feasibility

The most significant issues associated with this strategy will be finding areas that produce sufficient well production near its intended use (mining).

Water User Group:	**Colorado City**
WMS Name:	**Develop Dockum Aquifer Supplies**
WMS Type:	New Groundwater Source
Strategy Yield:	2,240 ac-ft/yr
Strategy Capital Cost:	$6,124,000
Strategy Annual Cost (During Amortization):	$333/ac-ft ($1.02/1,000 gal)
Strategy Annual Cost (After Amortization):	$104/ac-ft ($0.32/1,000 gal)

Strategy Description

In compliance with the guidance and rules for regional water planning, the TWDB requires the use of Modeled Available Groundwater (MAG) in regional water planning. The MAG for the City's current well field in the Dockum aquifer is severely limiting. In order to meet the City's water demands, Colorado City is considering an alternative water management strategy. This strategy is not recommended for this planning cycle due to the supply volume exceeding the current MAG in the Dockum aquifer.

Colorado City currently obtains its water supply from several well fields in the Dockum aquifer. Since 2011, the City has been in need of an additional supply of water in order to keep up with the growing water demands. The City has recently drilled two wells, one in each of the well fields, and plans on completing the project when further funding is made available. This source is currently used for municipal and agricultural purposes and has been identified as a potential supply to meet the City's needs. This strategy assumes that 14 new wells would need to be drilled to provide approximately 2,240 acre-feet per year. These wells would produce water approximately 167 feet below surface. It is assumed that the water quality of the new wells would be equivalent to the quality the City currently receives and that no additional treatment will be needed.

This strategy assumes a peaking factor of 2 for all wells and infrastructure to capture the peak annual supply.

Piping infrastructure is currently in place to transport water from the first field 9 miles east of town to the existing standpipe. A 3.5-mile pipeline 8-inches in diameter will connect water from the second field to the current pipeline running from the first field to the standpipe. The well pumps will be used to convey the water through the pipeline.

In addition, 3,500 feet of well field piping at 6 inches in diameter, and 3,500 feet of collection lines at 8 inches in diameter will be needed to connect the wells to the pipelines, both new and existing.

Colorado City is also considering the purchase of an existing utility company whose assets consist of one to two elevated water towers. The overall system cost of $2,500,000 would include the system as well as necessary upgrades, and would support approximately 1,120 acre-feet per year.

Quantity, Reliability and Cost

The quantity and reliability of water from this source is expected to be 150 gpm. Historical municipal and agricultural use indicates that the Dockum aquifer may be a viable source. For this plan, the new wells are assumed to supply an additional 2,240 acre-feet per year. The reliability of the supply is considered to be medium because of aquifer and water quality properties.

The total cost of the project will be approximately $6 million. This equates to $333 per acre-foot ($1.02 per 1,000 gallons) of treated water during debt service. After the infrastructure is fully paid for, the cost drops to $104 per acre-foot ($0.32 per 1,000 gallons) of treated water.

Environmental Factors

The aquifer is a proven groundwater source for municipal, industrial, and agricultural purposes. However, the long-term water quality is unknown. Groundwater development from this source should be evaluated for potential impacts on springflows and base flows of area rivers. It is unlikely that this strategy would cause subsidence.

Agricultural and Rural Impacts

This source is currently used for agricultural purposes. It is assumed that the transfer of water rights will be between a willing buyer and willing seller, and there would be minimal impacts to agricultural users.

Impacts to Natural Resources and Key Parameters of Water Quality

The water quality in the Dockum aquifer is generally variable, with freshwater in outcrop areas and brine in the subsurface portions. The water tends to be very hard. Advanced treatment may be required for municipal use.

No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies

Other strategies for Colorado City may be impacted.

Other Issues Affecting Feasibility

The most significant challenge for this strategy is locating areas with sufficient well production, and ample funding. This strategy is not recommended; however, it was analyzed as an alternative strategy to be considered for future use should the DFC and MAG change in future planning cycles.

Water User Group:	**Concho Rural Water Corporation**
WMS Name:	**Develop Lipan Aquifer Supplies**
WMS Type:	New Groundwater Source
Strategy Yield:	200 ac-ft/yr
Strategy Capital Cost:	$448,000
Strategy Annual Cost (During Amortization):	$285/ac-ft ($0.87/1,000 gal)
Strategy Annual Cost (After Amortization):	$100/ac-ft ($0.31/1,000 gal)

Strategy Description

The Lipan aquifer and associated Quaternary Leona Formation has been identified as a potential source for municipal, industrial and agricultural purposes in Tom Green County. Water from this source is highly variable and typically hard. This strategy assumes that four new wells would need to be drilled to provide approximately 200 acre-feet per year. These wells would produce water from approximately 125 feet below the surface.

This quantity of supply is not shown as currently available under the MAG limitations for the Lipan aquifer in Tom Green County. This strategy is included in the plan as alternate should the MAG change.

The cost of this strategy also includes new wells and well field collection lines. It is assumed that the additional supply can be transported using existing infrastructure. Electricity needed to transport the additional supply through the existing transmission system are not included in this estimate.

Quantity, Reliability and Cost

The quantity and reliability of water from this source is expected to be approximately 50 gpm. Historical municipal and agricultural use indicates that the Lipan aquifer may be a viable source. For this plan, the four new wells are assumed to supply an additional 200 acre-feet per year. The reliability of the supply is considered to be medium because of aquifer and water quality properties.

Environmental Factors

The aquifer is a proven groundwater source. However, the long-term water quality is unknown. Groundwater development from this source should be evaluated for potential impacts on springflows and base flows of area rivers. It is unlikely that this strategy would cause subsidence.

Agricultural and Rural Impacts

This source is currently used for municipal and agricultural purposes. This strategy could reduce the amount of water currently available to other users in the area. There are no other agricultural and rural issues associated with this strategy.

Impacts to Natural Resources and Key Parameters of Water Quality

The water in the Lipan aquifer is highly variable ranging from fresh to slightly saline, containing between 350-3,000 TDS and is very hard. Water in underlying parts of the rock formations tends to have a TDS level in excess of 3,000 milligrams per liter. Due to drought and heavy irrigation pumping, water levels have decreased significantly in some areas and are currently being pumped at a reduced rate.

No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies
No impacts are expected.

Other Issues Affecting Feasibility
The most significant issues associated with this project are financing for the new facilities.

Water User Group: **Howard County Livestock**

WMS Name: **Develop Dockum Aquifer Supplies**

WMS Type: New Groundwater Source

Strategy Yield: 150 ac-ft/yr

Strategy Capital Cost: $512,000

Strategy Annual Cost (During Amortization): $367 per acre-foot; $1.13 per thousand gallons

Strategy Annual Cost (After Amortization): $80 per acre-foot; $0.25 per thousand gallons

Strategy Description

The Dockum aquifer has been identified as a potential source of water for livestock in Howard County. Water quality from this source is generally poor, with freshwater in outcrop areas and brine water in subsurface portions. Along the eastern section of the county, lie undeveloped slightly brackish groundwater supplies suitable for agricultural use. This strategy assumes that ten new wells would need to be drilled to provide approximately 150 acre-feet per year. These wells would produce water from approximately 290 feet below the surface.

Quantity, Reliability and Cost

The quantity and reliability of water from this source is expected to be approximately 10 gpm. For this plan, the ten new wells are assumed to supply an additional 150 acre-feet per year. The reliability of the supply is considered to be medium because of aquifer and water quality properties.

Environmental Factors

There are no environmental impacts expected from this strategy.

Agricultural and Rural Impacts

This source is currently used for agricultural purposes. This strategy would marginally reduce the amount of water currently available to agricultural users. There are no other agricultural or rural issues associated with this strategy.

Impacts to Natural Resources and Key Parameters of Water Quality

The water quality in the Dockum aquifer is generally poor, with freshwater in outcrop areas and brine in the subsurface portions. The water tends to be very hard. This strategy is not expected to impact key parameters of water quality.

No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies

No other water management strategies will be impacted.

Other Issues Affecting Feasibility

An adequate drinking water supply is an essential component of livestock production. The most significant challenge for this strategy is locating areas with sufficient well production. Generally livestock can tolerate high salinity levels; however, long-term use could negatively impact overall livestock performance. This might potentially offset the positive impacts of a more reliable water supply.

Water User Group:	**Howard County Mining**
WMS Name:	**Develop Additional Ogallala Aquifer Supplies**
WMS Type:	New Groundwater Source
Strategy Yield:	31 ac-ft/yr
Strategy Capital Cost:	$127,000
Strategy Annual Cost (During Amortization):	$419 per acre-foot $1.29 per thousand gallons
Strategy Annual Cost (After Amortization):	$67 per acre-foot $0.21 per thousand gallons

Strategy Description

The Ogallala aquifer has been identified as a potential source of water for mining in Howard County. This strategy assumes that one new well would be drilled to provide approximately 31 acre-feet per year. This well is assumed to produce water from approximately 300 feet below the surface.

A peaking factor of 2 was assumed for the well and piping in order to capture the peak annual supply.

Quantity, Reliability and Cost

It is assumed that the well will produce approximately 31 additional acre-feet of water per year. The reliability of the supply is considered to be low to medium because of the potential competing demands.

The total cost of the project will be approximately $127,000. This equates to $419 per acre-foot ($1.29 per 1,000 gallons) of treated water during debt service. After the infrastructure is fully paid for, the cost drops to $67 per acre-foot ($0.21 per 1,000 gallons) of treated water.

Environmental Factors

The aquifer is a proven groundwater source for municipal, industrial, and agricultural purposes. However, the long-term water quality is unknown. Throughout much of the aquifer, groundwater withdrawals exceed the amount of recharge, and water levels have declined fairly consistently through time. Groundwater development from this source is expected to cause minimal environmental impacts, but further study may be needed to confirm whether there would be any impacts to area streams.

Agricultural and Rural Impacts

Currently this water source is also being used to supply many other WUGS within the county including Irrigation, Livestock, Manufacturing and County-Other but there is some supply available under the MAG, but it is small. It is assumed that any potential transfers of water will be between a willing buyer and willing seller, and there would be minimal impacts to agricultural users.

Impacts to Natural Resources and Key Parameters of Water Quality

The water quality in the Ogallala aquifer varies from fresh water in the north with TDS less than 400 milligrams per liter, to high TDS in the south in excess of standard drinking water parameters. The water quality in the area should prove adequate for the purposes of the mining industry.

There are no identified impacts to natural resources.

Impacts on Other Water Resources and Management Strategies

This strategy may impact other groundwater strategies in Howard County due to competition for available supplies.

Other Issues Affecting Feasibility

None identified.

Water User Group: **Howard County Mining**

WMS Name: **Develop Additional Dockum Aquifer Supplies**

WMS Type: New Groundwater Source

Strategy Yield: 274 ac-ft/yr

Strategy Capital Cost: $989,000

Strategy Annual Cost
(During Amortization): $383/ac-ft ($1.18/1,000 gal)

Strategy Annual Cost
(After Amortization): $82/ac-ft ($0.25/1,000 gal)

Strategy Description

The Dockum aquifer has been identified as a potential source of water for mining in Howard County. This strategy assumes that six new wells would be drilled to provide approximately 274 acre-feet per year. These wells are assumed to produce water from approximately 300 feet below the surface. A peaking factor of 2 was assumed for the wells and piping in order to capture the peak annual supply.

Quantity, Reliability and Cost

It is assumed that each well will produce approximately 46 additional acre-feet of water per year. This brings the total quantity of the strategy yield to 274 acre-feet per year. The reliability of the supply is considered to be low to medium because of the potential competing demands.

The total cost of the project will be approximately $1 million. This equates to $383 per acre-foot ($1.18 per 1,000 gallons) of treated water during debt service. After the infrastructure is fully paid for, the cost drops to $82 per acre-foot ($0.25 per 1,000 gallons) of treated water.

Environmental Factors

Groundwater development from this source is expected to cause minimal environmental impacts, but further study may be needed to confirm whether there would be any impacts to area streams.

Agricultural and Rural Impacts

This source is currently used for agricultural purposes. This strategy could marginally reduce the amount of water currently available to agricultural users but the supplies do not exceed the MAG. There are no other agricultural or rural issues associated with this strategy.

Impacts to Natural Resources and Key Parameters of Water Quality

The water quality in the Dockum aquifer is generally poor, with freshwater in outcrop areas and brine in the subsurface portions. The water tends to be very hard. Care should be taken regarding discharges of this water to area streams.

No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies

This strategy may impact other groundwater strategies in Howard County due to competition for available supplies. Howard County Livestock also has a recommended strategy that involves development of the Dockum aquifer for water supply.

Other Issues Affecting Feasibility

None identified.

Water User Group:	**Junction**
WMS Name:	**Develop Edwards-Trinity Plateau Aquifer Supplies**
WMS Type:	New Groundwater Source
Strategy Yield:	220 ac-ft/yr
Strategy Capital Cost:	$3,555,000
Strategy Annual Cost (During Amortization):	$1,655 per acre-foot $5.08 per thousand gallons
Strategy Annual Cost (After Amortization):	$305 per acre-foot $0.93 per thousand gallons

Strategy Description

The City of Junction is evaluating a groundwater source in the Edwards-Trinity Plateau aquifer to back up its current supplies. Water from this source is not widely used because of low well yields and poor water quality. This source is currently used for manufacturing. This strategy assumes that nine new wells would be drilled to provide approximately 220 acre-feet per year. These wells are assumed to produce water from approximately 190 feet below the surface with elevated TDS levels. It is assumed that this water is blended with surface water. However, if it is determined that the water qualities of the two sources are incompatible, the groundwater may require advanced treatment. Costs for advanced treatment are not included.

This strategy assumes that the new wells will be drilled within three miles of the City's existing infrastructure. This project includes 1,800 feet of 6-inch diameter well field collection piping and three miles of 6-inch transmission piping to connect to existing infrastructure. A peaking factor of 2 was assumed for the wells and piping to allow conjunctive use of these two sources.

Quantity, Reliability and Cost

The quantity and reliability of water from this source is expected to be approximately 40 gpm. Historical municipal and agricultural use indicates that the Edwards-Trinity Plateau may be a viable source but may contain high TDS. For this plan, the nine new wells are assumed to supply an additional 220 acre-feet per year. The reliability of the supply is considered to be medium because of water quantity and quality issues.

Environmental Factors

The blending of slightly brackish water with Junction's existing supplies may increase the TDS levels of treated wastewater from the City. It is expected the increase will not exceed current discharge limits. No other environmental impacts are identified.

Agricultural and Rural Impacts

Wells provide water for ranching, domestic and municipal supplies throughout the area. This strategy assumes sufficient groundwater rights would be obtained on a willing buyer-willing seller basis, which should mitigate potential impacts to agricultural and rural water users.

Impacts to Natural Resources and Key Parameters of Water Quality

Water quality in the Edwards-Trinity Plateau aquifer ranges from fresh to slightly saline in the outcrop areas, and brine water in subsurface portions. Water levels have remained relatively stable because recharge has generally kept pace with the relatively low amounts of pumping over the extent of the aquifer.

No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies

None identified.

Other Issues Affecting Feasibility

A significant challenge for this strategy is locating areas with sufficient well production where the water quality is good.

Water User Group:	**Irion County Mining**
WMS Name:	**Develop Dockum Aquifer Supplies**
WMS Type:	New Groundwater Source
Strategy Yield:	150 ac-ft/yr
Strategy Capital Cost:	$782,000
Strategy Annual Cost (During Amortization):	$520 per acre foot $1.60 per thousand gallons
Strategy Annual Cost (After Amortization):	$87 per acre-foot $0.27 per thousand gallons

Strategy Description

The Dockum aquifer has been identified as a potential source of water for mining in Irion County. Water from this source is generally poor, with freshwater in outcrop areas and brine water in subsurface portions. It is assumed that this strategy would use water from the brackish formations of the Dockum aquifer, which preserves the higher water quality area for other uses. This strategy assumes that ten new wells would be drilled to provide approximately 150 acre-feet per year. These wells are assumed to produce water from approximately 550 feet below the surface.

A peaking factor of 2 was assumed for the wells and piping in order to capture the peak annual supply.

Quantity, Reliability and Cost

The quantity is small for the mining needs in the county and reliability of the supply is considered to be medium because of aquifer and water quality properties. Capital costs are estimated at $0.78 million.

Environmental Factors

No environmental impacts were identified.

Agricultural and Rural Impacts

Since the water is brackish and is currently not being used, no impacts to agricultural or rural water users were identified.

Impacts to Natural Resources and Key Parameters of Water Quality

The water quality in the Dockum aquifer is generally poor, with freshwater in outcrop areas and brine in the subsurface portions. The water tends to be very hard. Care should be taken regarding discharges of this water to area streams.

No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies

None identified.

Other Issues Affecting Feasibility

The most significant challenge for this strategy is locating areas with sufficient well production.

Water User Group:	**Irion County Mining**
WMS Name:	**Develop Edwards-Trinity Plateau Aquifer Supplies**
WMS Type:	New Groundwater Source
Strategy Yield:	500 ac-ft/yr
Strategy Capital Cost:	$2,057,000
Strategy Annual Cost (During Amortization):	$412 per acre-foot $1.26 per thousand gallons
Strategy Annual Cost (After Amortization):	$68 per acre-foot $0.21 per thousand gallons

Strategy Description

The Edwards-Trinity Plateau aquifer has been identified as a potential source of water for mining in Irion County. It is assumed that this strategy would use water from the brackish formations of the Edwards-Trinity Plateau aquifer, which preserves the higher water quality area for other uses. This strategy assumes that 32 new wells would be drilled to provide approximately 500 acre-feet per year. These wells are assumed to produce water from approximately 350 feet below the surface.

A peaking factor of 2 was assumed for the wells and piping in order to capture the peak annual supply.

Quantity, Reliability and Cost

Region F has identified subsurface areas of the Edwards-Trinity Plateau aquifer that hold large volumes of non-potable water suitable for mining use. According to §27.0511 of the Texas Water Code, the oil and gas industry is required by law to use non-potable supplies whenever possible for enhanced production. For this plan, the 32 new wells are assumed to supply an additional 500 acre-feet per year. The reliability of the supply is considered to be high based on the aquifer characteristics of containing large pools of non-potable water.

Environmental Factors

No environmental impacts identified assuming flowback water from mining is properly disposed. It is unlikely that this strategy would cause subsidence.

Agricultural and Rural Impacts

Brackish water is generally not used for agricultural and rural use. As such, this strategy should not impact agricultural or rural water users.

Impacts to Natural Resources and Key Parameters of Water Quality

The water quality in the Edwards-Trinity Plateau aquifer ranges from fresh to slightly saline in the outcrop areas, and brine water in subsurface portions. Elevated levels of fluoride in excess of primary drinking water standards occur within Irion County, but this should not have an impact on this strategy. Water levels have remained relatively stable because recharge has generally kept pace with the relatively low amounts of pumping over the extent of the aquifer. Care should be taken regarding discharges of brackish water to area streams to minimize potential impacts to key water quality parameters.

No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies

None identified.

Other Issues Affecting Feasibility
None identified.

Water User Group:	**Kimble County Manufacturing**
WMS Name:	**Develop Edwards-Trinity Plateau Aquifer Supplies**
WMS Type:	New Groundwater Source
Strategy Yield:	290 ac-ft/yr
Strategy Capital Cost:	$305,000
Strategy Annual Cost (During Amortization):	$140 per acre-foot $$0.43 per thousand gallons
Strategy Annual Cost (After Amortization):	$53 per acre-foot $0.16 per thousand gallons

Strategy Description

There are undeveloped groundwater supplies in the Edwards-Trinity Plateau aquifer in Kimble County. Water from this source is not widely used because of low well yields in most areas. Some areas have poor water quality as well. However, there appears to be some areas within the county that have sufficient well yields to meet manufacturing water needs. This strategy assumes that five new wells would be drilled to provide approximately 290 acre-feet per year. These wells would produce water approximately 190 feet below the surface.

Quantity, Reliability and Cost

This strategy could meet Kimble County manufacturing water needs for consumptive use, but not for recirculated water. This strategy assumes that up to 290 acre-feet of water per year could be produced from the Edwards-Trinity Plateau aquifer. Reliability would be moderate to high, depending on well capacity.

Environmental Factors

Many areas of good well production in the Edwards-Trinity Plateau aquifer are associated with surface water discharge from springs. Groundwater development from this source should be evaluated for potential impacts on springflows and base flows of area rivers. It is unlikely that this strategy would cause subsidence.

Agricultural and Rural Impacts

Wells provide water for ranching, industrial, domestic and municipal supplies throughout the area. This strategy assumes sufficient groundwater rights would be obtained on a willing buyer-willing seller basis, which should mitigate potential impacts to agricultural and rural water users.

Impacts to Natural Resources and Key Parameters of Water Quality

The water quality in the Edwards-Trinity Plateau aquifer ranges from fresh to slightly saline in the outcrop areas, and brine water in subsurface portions. Water levels have remained relatively stable because recharge has generally kept pace with the relatively low amounts of pumping over the extent of the aquifer. This strategy is not expected to impact key parameters of water quality.

No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies

This strategy may compete with other Kimble County strategies for limited supplies. However, the strategies were sized with respect to the MAG for the Edwards-Trinity Plateau aquifer, so there should be no impacts to other strategies.

Other Issues Affecting Feasibility

The most significant challenge for this strategy is locating areas with sufficient well production and low potential for impacts on springflows. There is also uncertainty regarding the amount of water actually needed to meet consumptive manufacturing needs in Kimble County. It is quite likely that the actual amount of water needed is overstated in the needs calculation because the surface water supplies are limited to consumptive use only in the WAM. The actual amount of surface water available for manufacturing use for recirculation is greater.

Water User Group:	**Martin County-Other**
WMS Name:	**Develop Dockum Aquifer Supplies**
WMS Type:	New Groundwater Source
Strategy Yield:	250 ac-ft/yr
Strategy Capital Cost:	$4,219,000
Strategy Annual Cost (During Amortization):	$1,636 per acre foot $5.02 per thousand gallons
Strategy Annual Cost (After Amortization):	$224 per acre-foot $0.69 per thousand gallons

Strategy Description

The Dockum aquifer has been identified as a potential source for municipal, industrial and agricultural purposes. Along the western county border lie undeveloped groundwater supplies suitable for small water supply systems. This strategy assumes that seven new wells would need to be drilled to provide approximately 250 acre-feet per year. These wells would produce water from approximately 1,700 feet below the surface

Quantity, Reliability and Cost

The quantity and reliability of water from this source is expected to be approximately 50 gpm. Historical municipal and agricultural use indicates that the Dockum aquifer may be a viable source but may require advanced treatment for municipal purposes. Since there is not a specific sponsor for this strategy, it is assumed that the water would be treated at the Point of Use if needed and the infrastructure costs for treatment are not included in the costs for this strategy. For this plan, the seven new wells are assumed to supply an additional 250 acre-feet per year. The reliability of the supply is considered to be medium because of aquifer and water quality properties. Capital costs are estimated at $4.2 million.

Environmental Factors

No environmental impacts were identified.

Agricultural and Rural Impacts

This source is currently not used In Martin County. There are no agricultural and rural issues associated with this strategy.

Impacts to Natural Resources and Key Parameters of Water Quality

The water quality in the Dockum aquifer is generally poor, with freshwater in outcrop areas and brine in the subsurface portions. The water tends to be very hard. Discharges of wastewater to area streams could impact local water quality, but the quantities would be small, so impacts are expected to be negligible.

No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies

No other water management strategies will be impacted.

Other Issues Affecting Feasibility

The most significant challenge for this strategy is locating areas with sufficient well production where the water quality is good. In addition, this project requires financing for the new facilities.

Water User Group:	**Martin County Livestock**
WMS Name:	**Develop Dockum Aquifer Supplies**
WMS Type:	New Groundwater Source
Strategy Yield:	40 ac-ft/yr
Strategy Capital Cost:	$339,000
Strategy Annual Cost (During Amortization):	$800 per acre-foot $2.45 per thousand gallons
Strategy Annual Cost (After Amortization):	$100 per acre-foot $0.31 per thousand gallons

Strategy Description
The Dockum aquifer has been identified as a potential source of water for livestock in Martin County. Water from this source is generally poor, with freshwater in outcrop areas and brine water in subsurface portions. Along the western county border lie undeveloped brackish groundwater supplies suitable for agricultural use. This strategy assumes that one new well would need to be drilled to provide approximately 40 acre-feet per year. This well would produce water from approximately 1,700 feet below the surface.

Quantity, Reliability and Cost
The quantity and reliability of water from this source is expected to be approximately 80 gpm. Historical municipal and agricultural use indicates that the Dockum may be a viable source but contains high TDS. For this plan, the one new well is assumed to supply an additional 40 acre-feet per year. The reliability of the supply is considered to be medium because of aquifer and water quality properties.

Environmental Factors
There are no known environmental impacts.

Agricultural and Rural Impacts
This source is currently not used In Martin County. There are no agricultural and rural issues associated with this strategy.

Impacts to Natural Resources and Key Parameters of Water Quality
This strategy is not expected to impact key parameters of water quality or natural resources in Martin County.

Impacts on Other Water Resources and Management Strategies
No other water management strategies will be impacted.

Other Issues Affecting Feasibility
An adequate drinking water supply is an essential component of livestock production. The most significant challenge for this strategy is locating areas with sufficient well production. Generally livestock can tolerate high salinity levels; however, long-term use could negatively impact overall livestock performance. This might potentially offset the positive impacts of a more reliable water supply.

Water User Group:	**Martin County Mining**
WMS Name:	**Develop Dockum Aquifer Supplies**
WMS Type:	New Groundwater Source
Strategy Yield:	210 ac-ft/yr
Strategy Capital Cost:	$677,000
Strategy Annual Cost (During Amortization):	$348 per acre-foot $1.07 per thousand gallons
Strategy Annual Cost (After Amortization):	$76 per acre-foot $0.23 per thousand gallons

Strategy Description
The Dockum aquifer has been identified as a potential source for municipal, industrial and agricultural purposes. Along the western county border lie undeveloped groundwater supplies suitable for mining use. Most of the water used for mining purposes in the county is for enhanced oil and gas production. It is assumed that this strategy would use water from the brackish formations of the Dockum aquifer, which preserves the higher water quality area for other uses. This strategy assumes that two new wells would need to be drilled to provide approximately 210 acre-feet per year. These wells would produce water approximately 1,700 feet below the surface.

Quantity, Reliability and Cost
The quantity and reliability of water from this source is expected to be approximately 80 gpm. Region F has identified subsurface areas of the Dockum aquifer that hold large volumes of non-potable water suitable for mining use. According to §27.0511 of the Texas Water Code, the oil and gas industry is required by law to use non-potable supplies whenever possible for enhanced production. For this plan, the two new wells are assumed to supply an additional 210 acre-feet per year. The reliability of the supply is considered to be high based on the aquifer characteristics of containing large pools of non-potable water.

Environmental Factors
No environmental impacts have been identified.

Agricultural and Rural Impacts
This brackish water supply source is not extensively used for other purposes. No agricultural and rural impacts have been identified at this time.

Impacts to Natural Resources and Key Parameters of Water Quality
This strategy is not expected to impact key parameters of water quality or natural resources in Martin County. However, care should be taken regarding discharges of brackish water to area streams to minimize potential impacts to key water quality parameters.

No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies
No other water management strategies will be impacted.

Other Issues Affecting Feasibility
Finding sufficient water near mining areas.

Water User Group:	**Martin County Mining**
WMS Name:	**Develop Edwards-Trinity Plateau Aquifer Supplies**
WMS Type:	New Groundwater Source
Strategy Yield:	1,500 ac-ft/yr
Strategy Capital Cost:	$2,356,000
Strategy Annual Cost (During Amortization):	$188 per acre-foot $0.58 per thousand gallons
Strategy Annual Cost (After Amortization):	$57 per acre-foot $0.17 per thousand gallons

Strategy Description

The Edwards-Trinity Plateau aquifer has been identified as a potential source of water for municipal, irrigation, livestock and mining supplies. Water from this source ranges from fresh to slightly saline in the outcrop areas, and brine water in subsurface portions. Along the southern border of Martin County may lie undeveloped brackish groundwater supplies suitable for mining use. It is unclear if this formation is truly from the Edwards-Trinity Plateau or if it is fed by leakage from the overlaying Ogallala aquifer. This source is only located in the southern portion of Martin County and may not always yield economically viable volumes of groundwater. Further study would be needed to determine if this was a feasible strategy for the specific user depending on their location within the county. This strategy assumes that 47 new wells would need to be drilled to provide approximately 1,500 acre-feet per year. These wells would produce water from approximately 220 feet below the surface.

Quantity, Reliability and Cost

The quantity and reliability of water from this source is expected to be approximately 20 gpm. Region F has identified subsurface areas of the Edwards-Trinity Plateau aquifer to hold large volumes of non-potable water suitable for mining use. According to §27.0511 of the Texas Water Code, the oil and gas industry is required by law to use non-potable supplies whenever possible for enhanced production. For this plan, the 47 new wells are assumed to supply an additional 1,500 acre-feet per year. The reliability of the supply is considered to be high based on the aquifer characteristics of containing large pools of non-potable water.

Environmental Factors

There are no known environmental impacts.

Agricultural and Rural Impacts

This brackish water supply source is not extensively used for other purposes. No agricultural and rural impacts have been identified at this time.

Impacts to Natural Resources and Key Parameters of Water Quality

This strategy is not expected to impact key parameters of water quality or natural resources in Martin County. However, care should be taken regarding discharges of brackish water to area streams to minimize potential impacts to key water quality parameters. No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies

No other water management strategies will be impacted.

Other Issues Affecting Feasibility

None identified.

Water User Group:	**McCulloch County Livestock**
WMS Name:	**Develop Edwards-Trinity Plateau Aquifer Supplies**
WMS Type:	New Groundwater Source
Strategy Yield:	30 ac-ft/yr
Strategy Capital Cost:	$62,000
Strategy Annual Cost (During Amortization):	$200 per acre-foot $0.61 per thousand gallons
Strategy Annual Cost (After Amortization):	$33 per acre-foot $0.10 per thousand gallons

Strategy Description

The Edwards-Trinity Plateau aquifer has been identified as a potential source of water for livestock in McCulloch County. Water from this source ranges from fresh to slightly saline in the outcrop areas, and brine water in subsurface portions. The aquifer extends across much of the county, offering a fresh to slightly saline supply suitable for agricultural use. This strategy assumes that one new well would need to be drilled to provide approximately 30 acre-feet per year. These wells would produce water from approximately 190 feet below the surface.

Quantity, Reliability and Cost

The quantity and reliability of water from this source is expected to be approximately 40 gpm. For this plan, the one new well is assumed to supply an additional 30 acre-feet per year. The reliability of the supply is considered to be high, based on the aquifers recharge abilities.

Environmental Factors

The aquifer is a proven groundwater source for municipal, industrial, and agricultural purposes. However, the long-term water quality is unknown. The small quantity of water for this strategy should not impact springflows or base flows of area rivers. It is unlikely that this strategy would cause subsidence.

Agricultural and Rural Impacts

This supply would supplement existing agricultural water supplies and have a positive impact on agricultural water use.

Impacts to Natural Resources and Key Parameters of Water Quality

The water quality in the Edwards-Trinity Plateau aquifer ranges from fresh to slightly saline in the outcrop areas, and brine water in subsurface portions. This strategy is not expected to impact key parameters of water quality or natural resources in McCulloch County.

No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies

No other water management strategies will be impacted.

Other Issues Affecting Feasibility

An adequate drinking water supply is an essential component of livestock production. The most significant challenge for this strategy is locating areas with sufficient well production. Generally livestock can tolerate high salinity levels; however, long-term use could negatively impact overall livestock performance. This might potentially offset the positive impacts of a more reliable water supply.

Water User Group:	**Menard**
WMS Name:	**Develop Hickory Aquifer Supplies**
WMS Type:	New Groundwater Source
Strategy Yield:	500 ac-ft/yr
Strategy Capital Cost:	$6,120,000
Strategy Annual Cost (During Amortization):	$1,366 per acre-foot $4.19 per thousand gallons
Strategy Annual Cost (After Amortization):	$342 per acre-foot $1.05 per thousand gallons

Strategy Description

The City of Menard has been actively seeking a groundwater source to add to its current supplies. Yields from the Edwards-Trinity Plateau aquifer tend to be low in Menard County and the City has been unsuccessful in locating an adequate supply from that source. An alternative is the Hickory aquifer, which underlies the City at a depth of approximately 3,600 ft. The City is planning to drill one well near its existing storage tank to provide approximately 500 acre-feet per year. This well would produce water from approximately 3,600 feet below the surface. In addition, one 8-inch diameter, 5-mile transmission line was included to connect the well to the City's existing infrastructure.

Quantity, Reliability and Cost

The quantity and reliability of water from this source is expected to be approximately 620 gpm. Historical agricultural use indicates that the Hickory aquifer may be a viable source but elevated radionuclide concentrations will require advanced treatment. For the purpose of this plan, this strategy assumes that water from the Hickory can meet primary drinking water standards if blended with the City's existing water supply. The one new well is assumed to supply an additional 500 acre-feet per year. The reliability of the supply is considered to be medium because of water quality issues. The costs for this strategy assume that the well will be located within 5 miles of existing infrastructure. Capital costs for this strategy are estimated at $6.1 million.

Environmental Factors

The proposed well will produce water from the down-dip portion of the Hickory aquifer. Because of the 3,000 feet of overburden, there is no connection with the land surface and as a result, there would be no impact on springs or surface water sources. Subsidence would also not be a factor due to the depth of the source and the competency of the overburden. Groundwater development from this source is expected to cause minimal environmental impacts, unless the water requires advanced treatment. If advanced treatment is required, impacts may be higher depending on the method used to dispose of the reject from the treatment process.

Agricultural and Rural Impacts

Currently, only a very small amount of water from the Hickory is used for irrigation in Menard County. Because of the relatively small amount of water from this strategy, there are no expected impacts on irrigated agriculture.

Impacts to Natural Resources and Key Parameters of Water Quality

In Menard County, the water quality of the Hickory aquifer tends to be poor. The upper portion of the aquifer contains iron in excess of the State's secondary drinking water standards. Also, much of the water from the Hickory aquifer exceeds drinking water standards for radionuclides. For this plan, this strategy assumes that water from the Hickory can meet primary drinking water standards if blended with the City's existing water supply. However, advanced treatment may be required to meet standards, significantly increasing the cost of this strategy.

Impacts on Other Water Resources and Management Strategies

Based on other users of the aquifer, such as the City of Brady, there should be sufficient supplies to meet the City's long-term water supply needs. No impacts to other strategies or water resources were identified.

Other Issues Affecting Feasibility

The most significant challenge for this strategy is locating areas with sufficient well production where the water quality is good. For the purposes of this plan, this strategy assumes that water from the Hickory can meet primary drinking water standards in regards to radionuclides if blended with the City's existing water supply.

Water User Group:	**Midland**
WMS Name:	**Development of Groundwater in Midland County (previously used for mining)**
WMS Type:	New Groundwater Source
Strategy Yield:	3,000 acre feet per year
Strategy Capital Cost:	$ 51,501,000
Strategy Annual Cost (During Amortization):	$2,086 per acre foot $6.40 per thousand gallons
Strategy Annual Cost (After Amortization):	$649 per acre-foot $1.99 per thousand gallons

Strategy Description

Midland is considering utilizing fresh and/or brackish groundwater supplies in Midland County that are currently being used for mining purposes. These supplies may become available after Midland completes its sale of wastewater to the mining industry and as the mining demands decrease in the county. Due to the uncertainty of this supply, these sources are considered as potential strategies for the City. The exact aquifer and location of this supply are unknown. For the purposes of this plan, it is assumed that advanced treatment would be required to use this source for municipal supply. If water of better quality was able to be developed, the cost of implementing this strategy would be significantly less.

Quantity, Reliability and Cost

The quantity available from this source is difficult to assess because the strategy is not well defined at this time and the source locations are unclear. For the purposes of this plan, it was assumed that 4,000 acre-feet of reuse water that Midland plans to sell to the mining industry could be replaced with the groundwater sources previously used to supply the mining demand. This strategy assumes the source would require advanced treatment for municipal use. After accounting for the 25 percent losses associated with the advanced treatment process, about 3,000 acre-feet of supply is assumed to be available to the City of Midland from this strategy. The reliability of this source is considered to be medium to low due to the speculative nature of this strategy at this time. Further study would be needed to determine the reliability and feasibility of this alternative. The capital costs from this strategy are estimated at $51.5 million.

Environmental Factors

It assumed that the pipelines would be located so as to minimize any potential environmental impacts. As such, the environmental impacts are expected to be minimal. The treatment plant is also expected to have minimal impacts. The conceptual design for this project uses deep well injection for disposal of the waste stream from the water treatment plant. A properly designed and maintained facility should have minimal impacts.

Agricultural and Rural Impacts

None identified.

Impacts to Natural Resources and Key Parameters of Water Quality

Since this water is already being used for the mining industry, it is assumed that no significant impacts on natural resources or water quality would occur from the continued use of this supply for a municipal use.

Impacts on Other Water Resources and Management Strategies
This strategy is only potentially feasible if Midland and the mining industry are able to successfully negotiate the sale of Midland's treated effluent, making the supply for this strategy available.

Other Issues Affecting Feasibility
The wells that the mining industry uses are likely to be spread out and may require significant amounts of well field piping to collect relatively small amounts of water. Further study of the specific source(s) would be needed to determine if this strategy is economically feasible.

Water User Group:	**Midland County-Other**
WMS Name:	**Development of Groundwater in Winkler County**
WMS Type:	New Groundwater Source
Strategy Yield:	1,000 acre feet per year
Strategy Capital Cost:	$62,699,000
Strategy Annual Cost (During Amortization):	$5,837per acre foot $17.91 per thousand gallons
Strategy Annual Cost (After Amortization):	$590per acre-foot $1.81 per thousand gallons

Strategy Description

Midland County Utility District is considering developing additional groundwater in conjunction with the Midland County Fresh Water District (FWD). In March 2015, the FWD entered into an agreement to purchase the land contingent upon the groundwater quality and quantity tests. This strategy would expand groundwater supplies from the Pecos Valley aquifer in Winkler County and would be transported by the existing Midland County Fresh Water District pipeline to the greater Midland area. This strategy is a recommended strategy for Midland County Utility District (County-Other).

Quantity, Reliability and Cost

At this time it is unclear how much water would be available through this strategy or how it will ultimately be transported. For planning purposes, the strategy was assumed to provide up to 1,000 acre-feet of additional water to County-Other in Midland County. It is assumed that three new wells would be drilled in Winkler County and connected to the T-Bar infrastructure, if agreements can be reached with the Midland County Freshwater Supply District No. 1 and the City of Midland to provide this capacity in the transmission line from the T-Bar Well Field. For this strategy, no treatment is included. This supply is considered reliable, but the use of the T-Bar infrastructure may limit the supplies when Midland is using the full capacity of the system. The capital cost of this strategy is $62 million, not including the purchase of the land which is considered complete for the purposes of this plan. Further development of supply from this land may be possible beyond the quantity shown in this plan. However, at this time, not enough information is available for inclusion in the plan.

Environmental Factors

The aquifer is a proven groundwater source for municipal, industrial, and agricultural purposes. However, the long-term water quality is unknown. It is unlikely that this strategy would cause subsidence.

Agricultural and Rural Impacts

Development of groundwater may divert water that was previously used for agricultural and rural purposes. However, this strategy involves groundwater rights that were obtained on a willing buyer – willing seller basis which minimizes the impacts to agriculture.

Impacts to Natural Resources and Key Parameters of Water Quality

The strategy proposes to utilize a sustainable level of groundwater that does not exceed the Modeled Available Groundwater (MAG). The impacts to natural resources are expected to be minimal. No impacts to water quality are expected.

Impacts on Other Water Resources and Management Strategies

This strategy could limit the ability to transport water from the expansion of the T-Bar Well Field during times of peak capacity.

Other Issues Affecting Feasibility

This strategy proposes to use the existing T-Bar ranch pipeline so capacity may be limited during certain times of the year. This assumes agreements can be reached between all entities involved including the Midland County Fresh Water District, the Midland County Utility District, and the City of Midland.

Water User Group:	**Odessa**
WMS Name:	**Develop Edwards-Trinity and Capitan Reef Complex Aquifer Supplies in Pecos County**
WMS Type:	New Groundwater Source
Strategy Yield:	28,000 ac-ft/yr
Strategy Capital Cost:	Phase 1 $377,471,000 Phase 2 $259,476,000
Strategy Annual Cost (During Amortization):	Phase 1 $3,615 per acre-foot Phase 1 $11.10 per thousand gallons Phase 2 $1,942 per acre-foot Phase 2 $5.96 per thousand gallons
Strategy Annual Cost (After Amortization):	Phase 1 $795 per acre-foot Phase 1 $2.44 per thousand gallons Phase 2 $650 per acre-foot Phase 2 $1.99 per thousand gallons

Strategy Description

The City of Odessa is considering developing a groundwater supply in Pecos County. This supply likely would be developed in the Edwards-Trinity and/or Capitan Reef Complex. Water quality of these formations is variable, with fresh water supplies adjacent to brackish water. Due to this uncertainty, it is assumed that the supplies from this strategy would require advanced treatment.

A study is currently being conducted on the feasibility of developing this water for Odessa. The proposed transmission system is sized for a peak capacity of 50 MGD. The City would develop this project in stages with an initial development of 10 MGD average annual supply, and increasing to the full capacity of the transmission system by 2070. Assuming a peaking factor of 1.5 for this source, the ultimate average annual supply from the well field would be about 37,300 acre-feet per year before treatment losses. To provide approximately this amount of water, 36 new wells would need to be drilled. These wells would produce water from approximately 2,000 to 3,000 feet below the surface.

This strategy assumes that well field piping will connect the water wells to a new 90–mile transmission line that would carry the water from Pecos County to the City of Odessa. The water treatment facility is assumed to be located near Odessa. Due to the large quantity of water to be developed, it is assumed that a new advanced water treatment facility would be built. The facility would be built in phases with Phase 1 sized for 20 MGD and a Phase 2 expansion of 30 MGD for a total ultimate capacity of 50 MGD.

Quantity, Reliability and Cost

The quantity and reliability of water from this source is expected to be approximately 1,000 gpm. Historical industrial and agricultural use indicates that the Edwards-Trinity and Capitan Reef Complex aquifers may be a viable source but high TDS will require advanced treatment. For this plan, the 36 new wells are assumed to supply an additional 37,300 acre-feet per year. Assuming a loss of 25 percent, the amount of reliable treated supply for municipal use is about 28,000 acre-feet per year. The reliability of the supply is considered to be medium because of the potential for competing demands and limitations of the aquifers. The total capital cost is estimated at $636,947,000.

Environmental Factors

The aquifer is a proven groundwater source for municipal, industrial, and agricultural purposes. However, the long-term water quality is unknown. Groundwater development from this source should be evaluated for potential impacts on springflows and base flows of area rivers. There are several springs in the Fort Stockton area that could potentially be impacted by large development of groundwater. It is unlikely that this strategy would cause subsidence.

Agricultural and Rural Impacts

Wells provide water for ranching, domestic and municipal supplies throughout the area. It is assumed that this project would acquire sufficient water rights to mitigate potential impacts to agricultural and rural areas. Studies may be required to evaluate potential impacts on the area.

Impacts to Natural Resources and Key Parameters of Water Quality

The water quality in the Edwards-Trinity Plateau aquifer ranges from fresh to slightly saline in the outcrop areas, and brine water in subsurface portions. The water quality in the Capitan Reef Complex aquifer is generally poor, yielding small to large quantities of slightly saline to saline groundwater. Water levels have remained relatively stable because recharge has generally kept pace with the relatively low amounts of pumping over the extent of the aquifer. No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies

Other strategies for Pecos County may be impacted. Also, CRMWD is considering developing additional groundwater in Pecos County. It is likely that only one strategy for groundwater from Pecos County to Odessa will be developed.

Other Issues Affecting Feasibility

The most significant challenge for this strategy is whether or not the strategy is economically feasible. The necessary infrastructure to pump and treat water from the Capitan Reef Complex aquifer will be a financial challenge. This strategy is not recommended for this planning cycle. However, it was analyzed as an alternative strategy to be considered for future planning periods should Odessa need additional supplies and CRMWD choose not to develop these supplies.

Water User Group:	**Odessa**
WMS Name:	**Develop Capitan Reef Complex Aquifer Supplies in Ward County**
WMS Type:	New Groundwater Source
Strategy Yield:	8,400 ac-ft/yr
Strategy Capital Cost:	$134,120,000
Strategy Annual Cost (During Amortization):	$1,801/ac-ft ($5.53/1,000 gal)
Strategy Annual Cost (After Amortization):	$465/ac-ft ($1.43/1,000 gal)

Strategy Description

The City of Odessa has purchased the water rights to the brackish groundwater beneath the CRMWD Ward County Well Field. Odessa is considering developing this source and supplementing the supplies produced by CRMWD. In compliance with the guidance and rules for regional water planning, the TWDB requires the use of the Modeled Available Groundwater (MAG) in regional water planning. The MAG for the Capitan Reef Complex aquifer in Ward County is severely limiting and causes the supplies from the City of Odessa's well field to be artificially shorted. This strategy is developed with the understanding that the MAG may be changed in the future to allow inclusion of this strategy in the regional water plan. Currently, Ward County does not have a GCD to enforce the MAG.

The Capitan Reef Complex aquifer in Ward County has been identified as a potential source for municipal, industrial and agricultural purposes. For the purpose of this plan, groundwater development in Ward County is not a recommended strategy due to current existing MAG limitations. However, this strategy was evaluated as a potential alternative strategy.

This strategy assumes that Odessa would pump up to 10 MGD of brackish water from the Capitan Reef Complex and treat the water on-site. It is assumed that 25% of the groundwater would be discharged as brine waste, resulting in a net supply of 8,400 acre-feet per year. The brine discharge would be injected into a deep saline formation. The treated water would then be transported using the existing infrastructure developed by CRMWD.

To provide the 10 MGD of groundwater, 15 new wells would need to be drilled. These wells would produce water from approximately 4,500 feet below the surface.

This strategy assumes that the wells would be spaced about 1,500 to 3,000 feet apart along the Capitan Reef Complex aquifer within the existing well field area. The wells would be connected by up to three sections of continuous well field piping. The well field would also include a new 2 MG covered ground storage tank.

This project includes a reverse osmosis water treatment plant at the well field and five disposal wells.

Quantity, Reliability and Cost

The quantity and reliability of water from this source is expected to be approximately 475 gpm. Previous investigations indicate that the Capitan Reef Complex aquifer may be a viable source but high TDS will require advanced treatment. For this plan, the 15 new wells are assumed to supply an additional 8,400 acre-feet per year of treated water. The reliability of the supply is considered to be medium because of aquifer and water quality properties. The total capital cost is estimated at $134.1 million.

Environmental Factors

This strategy should have minimal impacts to the environment since the proposed wells are located within an existing well field and the transmission system is existing. The discharge of the brackish wastewater would be to a saline formation and would not impact its water quality. Care should be taken to ensure that the discharge wells are properly constructed such so that the brackish discharge would not impact fresh water zones.

Agricultural and Rural Impacts

This source is currently not used for agricultural or rural purposes, and likely would not be used for these purposes due to the depth of the aquifer and poor water quality. No impacts are expected.

Impacts to Natural Resources and Key Parameters of Water Quality

The water quality in the Capitan Reef Complex aquifer is generally poor, yielding small to large quantities of slightly saline to saline groundwater. Brackish groundwater often contains water with greater than 5,000 TDS. Very little to no water is currently used from the Capitan Reef in Ward County. Most of the groundwater pumped from the aquifer is from other areas of the formation and used for oil reservoir flooding. No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies

This strategy would impact the ability of CRMWD to transport additional water from the Ward County Well Field since this strategy proposes to use the same infrastructure. If constructed, it is likely that this strategy would be used conjunctively with the Ward County Expansion for CRMWD.

Other Issues Affecting Feasibility

The most significant challenge for this strategy is whether or not the strategy is economically feasible. The necessary infrastructure to pump and treat water from the Capitan Reef Complex aquifer will be a financial challenge. This strategy is not recommended for this planning cycle. However, it was analyzed as an alternative strategy to be considered for future planning periods should the desired future condition and MAG availability support it.

Water User Group:	**Pecos County Water Control Improvement District No. 1**
WMS Name:	**Develop Edwards-Trinity Plateau Aquifer Supplies**
WMS Type:	New Groundwater Source
Strategy Yield:	250 ac-ft/yr
Strategy Capital Cost:	$2,465,000
Strategy Annual Cost (During Amortization):	$988/ac-ft ($3.03/1,000 gal)
Strategy Annual Cost (After Amortization):	$164/ac-ft ($0.50/1,000 gal)

Strategy Description
Pecos County WCID #1 is evaluating a groundwater source in the Edwards-Trinity Plateau aquifer to back up its current supplies. This source has been identified as currently supplying water for municipal, industrial and agricultural uses. This strategy assumes that two new wells would be drilled west of the existing wells to provide approximately 250 acre-feet per year. These wells would produce water from approximately 598 feet below the surface.

This strategy also includes 500 feet of 6-inch diameter well field piping that will connect the wells to the current infrastructure. In addition, a 0.5 MGD elevated storage tank will be constructed at the local airport. No advanced treatment is included.

Quantity, Reliability and Cost
The quantity and reliability of water from this source is expected to be approximately 150 gpm. Historical municipal and agricultural use indicates that the Edwards-Trinity Plateau may be a viable source for municipal use, but may require advanced treatment. For this plan, the two new wells are assumed to supply an additional 250 acre-feet per year. The reliability of the supply is considered to be high, based on the aquifer characteristics of containing large pools of non-potable water. The total capital cost is estimated at $2.5 million. If the quality of water indicates advanced treatment is needed, costs would be higher.

Environmental Factors
The aquifer is a proven groundwater source for municipal, industrial and agricultural purposes. However, the long-term water quality is unknown. Groundwater development from this source should be evaluated for potential impacts on springflows and base flows of area rivers. It is unlikely that this strategy would cause subsidence.

Agricultural and Rural Impacts
Springflows from the Edwards-Trinity Plateau supply much of the base flow of flowing streams in the area. Diamond Y Springs is one of the largest springs in Pecos County. Many of these streams are used for irrigation. Wells provide water for ranching, domestic and municipal supplies throughout the area. It is assumed that the proposed level of additional groundwater development will not impact agricultural or rural users.

Impacts to Natural Resources and Key Parameters of Water Quality
The water quality in the Edwards-Trinity Plateau aquifer ranges from fresh to slightly saline in the outcrop areas, and brine water in subsurface portions. Water levels have remained relatively stable because

recharge has generally kept pace with the relatively low amounts of pumping over the extent of the aquifer. This strategy is not expected to impact key parameters of water quality.

No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies

No other water management strategies will be impacted.

Other Issues Affecting Feasibility

The economic viability of the project will depend upon the ability to locate groundwater of sufficient quality to blend with existing sources without advanced treatment.

Water User Group:	**Robert Lee**
WMS Name:	**Develop groundwater from the Edwards-Trinity Plateau Aquifer in Coke County**
WMS Type:	New Groundwater Source
Strategy Yield:	240 acre-feet per year
Strategy Capital Cost:	$5,800,000
Strategy Annual Cost (During Amortization):	$2,832 per acre-foot $8.69 per thousand gallons
Strategy Annual Cost (After Amortization):	$811 per acre-foot $2.49 per thousand gallons

Strategy Description

The City of Robert Lee recently drilled four test wells in the Edwards-Trinity Plateau aquifer in Coke County. One of these wells was found to be productive and produce water of adequate quality. The City is currently pursuing additional test wells in this area to establish a groundwater supply. These water rights are owned by UCRA. Robert Lee already has an agreement in place with UCRA to lease these rights should the test wells prove fruitful. For planning purposes, this strategy includes three new 100 gpm wells and a 15-mile pipeline to Robert Lee. Alternatively, the City could connect to Coke County WSC's system reducing the needed pipeline length to 10 miles.

Quantity, Reliability and Cost

It is assumed that each well will produce approximately 100 gpm. The reliability of this strategy is medium due to uncertainty in locating supplies of adequate quality and quantity. The total cost of the project will be approximately $5,800,000 if Robert Lee does not partner with Coke County WSC.

Environmental Factors

Environmental impacts from this strategy are expected to be low. Groundwater development from this source should be evaluated for potential impacts on springflows and base flows of area rivers. It is unlikely that this strategy would cause subsidence.

Agricultural and Rural Impacts

Robert Lee is a rural community. Increased water security provided by this strategy will have a positive impact on the vitality of this rural community.

Impacts to Natural Resources and Key Parameters of Water Quality

The water quality of this aquifer is uncertain, but Robert Lee is actively searching for well locations with good water quality. No significant impacts to water quality are expected from the implementation of this strategy.

No impacts to natural resources were identified.

Impacts on Other Water Resources and Management Strategies

None identified.

Other Issues Affecting Feasibility

The biggest issue affecting the feasibility of this strategy will be to find an area where the production of the well will be sufficient and provide water of adequate quality.

Water User Group:	**Robert Lee**
WMS Name:	**Develop groundwater from the Edwards-Trinity Plateau Aquifer in Tom Green County**
WMS Type:	New Groundwater Source
Strategy Yield:	160 acre-feet per year
Strategy Capital Cost:	$5,586,000
Strategy Annual Cost (During Amortization):	$3,895 per acre-foot $11.95 per thousand gallons
Strategy Annual Cost (After Amortization):	$976 per acre-foot $3.00 per thousand gallons

Strategy Description
The City of Robert Lee is currently investigating developing groundwater in far western Tom Green County in the Edwards-Trinity Plateau aquifer. For planning purposes, this strategy includes three new 100 gpm wells and a 15-mile pipeline to Robert Lee.

Quantity, Reliability and Cost
It is assumed that each well will produce approximately 100 gpm. The reliability of this strategy is medium due to uncertainty in locating supplies of adequate quality and quantity. The total cost of the project will be approximately $5,586,000.

Environmental Factors
Environmental impacts from this strategy are expected to be low. Groundwater development from this source should be evaluated for potential impacts on springflows and base flows of area rivers. It is unlikely that this strategy would cause subsidence.

Agricultural and Rural Impacts
Robert Lee is a rural community. Increased water security provided by this strategy will have a positive impact on the vitality of this rural community.

Impacts to Natural Resources and Key Parameters of Water Quality
The water quality of this aquifer is uncertain, but Robert Lee is actively searching for well locations with good water quality. No significant impacts to water quality are expected from the implementation of this strategy.

No impacts to natural resources were identified.

Impacts on Other Water Resources and Management Strategies
None identified.

Other issues affecting feasibility
The biggest issue affecting the feasibility of this strategy will be to find an area where the production of the well will be sufficient and provide water of adequate quality at a reasonable cost to the City.

Water User Group:	**Runnels County Mining**
WMS Name:	**Develop Other Undifferentiated Aquifer Supplies**
WMS Type:	New Groundwater Source
Strategy Yield:	76 ac-ft/yr
Strategy Capital Cost:	$140,000
Strategy Annual Cost (During Amortization):	$211/ac-ft ($0.65/1,000 gal)
Strategy Annual Cost (After Amortization):	$55/ac-ft ($0.17/1,000 gal)

Strategy Description

The other undifferentiated aquifer has been identified as a potential source of water for mining in Runnels County. This strategy assumes that two new wells would be drilled to provide approximately 76 acre-feet per year. These wells are assumed to produce water from approximately 550 feet below the surface.

A peaking factor of 2 was assumed for the wells and piping in order to capture the peak annual supply.

Quantity, Reliability and Cost

It is assumed that each well will produce approximately 38 additional acre-feet of water per year. This equates to a total strategy yield of 76 acre-feet per year. The reliability of the supply is considered to be low to medium because of the unproven use of the source in this county.

The total cost of the project will be approximately $140,000. This equates to $211 per acre-foot ($0.65 per 1,000 gallons) of treated water during debt service. After the infrastructure is fully paid for, the cost drops to $55 per acre-foot ($0.17 per 1,000 gallons) of treated water.

Environmental Factors

No environmental impacts identified. It is unlikely that this strategy would cause subsidence.

Agricultural and Rural Impacts

None identified.

Impacts to Natural Resources and Key Parameters of Water Quality

The water quality of this aquifer is uncertain, but this is not a factor for mining use.

No impacts to natural resources were identified.

Impacts on Other Water Resources and Management Strategies

None identified.

Other Issues Affecting Feasibility

The biggest issue affecting the feasibility of this strategy will be to find an area where the production of the well will be sufficient.

Water User Group: **Scurry County Mining**

WMS Name: **Develop Local Alluvium Aquifer Supplies**

WMS Type: New Groundwater Source

Strategy Yield: 80 ac-ft/yr

Strategy Capital Cost: $140,000

Strategy Annual Cost (During Amortization): $200/ac-ft ($0.61/1,000 gal)

Strategy Annual Cost (After Amortization): $53/ac-ft ($0.16/1,000 gal)

Strategy Description

The local alluvium aquifer has been identified as a potential source of water for mining in Scurry County. This strategy assumes that two new wells would be drilled to provide approximately 80 acre-feet per year. These wells are assumed to produce water from approximately 200 feet below the surface.

A peaking factor of 2 was assumed for the wells and piping in order to capture the peak annual supply.

Quantity, Reliability and Cost

It is assumed that each well will produce approximately 40 additional acre-feet of water per year. This equates to a total strategy yield of 80 acre-feet per year. The reliability of the supply is considered to be low to medium because of the unproven use of the source in this county.

The total cost of the project will be approximately $140,000. This equates to $200 per acre-foot ($0.61 per 1,000 gallons) of treated water during debt service. After the infrastructure is fully paid for, the cost drops to $53 per acre-foot ($0.16 per 1,000 gallons) of treated water.

Environmental Factors

Depending on the connection between the river alluvium and local streams, this strategy could impact streamflows. Reduced streamflows could have impacts to water quality and aquatic habitats.

Agricultural and Rural Impacts

This source is currently used for agricultural purposes. This strategy would marginally reduce the amount of water currently available to agricultural users. There are no other agricultural or rural issues associated with this strategy.

Impacts to Natural Resources and Key Parameters of Water Quality

The water quality in the local alluvium formations are generally poor, with freshwater in outcrop areas and brine in the subsurface portions. This is not an issue for mining purposes. No impacts to key parameters of water quality are expected to occur as a result of this strategy.

No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies

None identified.

Other Issues Affecting Feasibility

The biggest issue affecting the feasibility of this strategy will be to find an area where the production of the well will be sufficient.

Water User Group: **Scurry County Livestock**

WMS Name: **New Groundwater from the Local Alluvium Aquifer**

WMS Type: New Groundwater Source

Strategy Yield: 92 ac-ft/yr

Strategy Capital Cost: $143,000

Strategy Annual Cost
(During Amortization): $185/ac-ft ($0.57/1,000 gal)

Strategy Annual Cost
(After Amortization): $54/ac-ft ($0.17/1,000 gal)

Strategy Description

Scurry County is evaluating the local alluvium groundwater associated with the Dockum aquifer as a potential source of water for livestock. Water from this source is generally poor, with freshwater in outcrop areas and brine water in subsurface portions. Along the eastern section of the county, lie undeveloped brackish groundwater supplies suitable for agricultural use. This strategy assumes that three new wells would need to be drilled to provide approximately 92 acre-feet per year. These wells would produce water from approximately 200 feet below the surface.

Quantity, Reliability and Cost

The quantity and reliability of water from this source is not well known. Historical agricultural use indicates that the alluvium may be a viable source but may contain elevated TDS. For this plan, the three new wells are assumed to supply approximately 20 gpm. The reliability of the supply is considered to be medium because of aquifer and water quality properties.

Environmental Factors

Depending on the connection between the river alluvium and local streams, this strategy could impact streamflows. Reduced streamflows could have impacts to water quality and aquatic habitats.

Agricultural and Rural Impacts

This source is currently used for agricultural purposes. This strategy would marginally reduce the amount of water currently available to agricultural users. There are no other agricultural or rural issues associated with this strategy.

Impacts to Natural Resources and Key Parameters of Water Quality

The water quality in the Dockum aquifer and the associated alluvium formations are generally poor, with freshwater in outcrop areas and brine in the subsurface portions. No impacts to key parameters of water quality are expected to occur as a result of this strategy. No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies

None identified.

Other Issues Affecting Feasibility

An adequate drinking water supply is an essential component of livestock production. The most significant challenge for this strategy is locating areas with sufficient well production. Generally livestock can tolerate high salinity levels; however, long-term use could negatively impact overall livestock performance. This might potentially offset the positive impacts of a more reliable water supply.

Water User Group:	**Ward County Steam Electric Power**
WMS Name:	**Develop Pecos Valley Aquifer Supplies**
WMS Type:	New Groundwater Source
Strategy Yield:	5,600 ac-ft/yr
Strategy Capital Cost:	$2,682,000
Strategy Annual Cost (During Amortization):	$89/ac-ft ($0.27/1,000 gal)
Strategy Annual Cost (After Amortization):	$49/ac-ft ($0.15/1,000 gal)

Strategy Description

The Pecos Valley aquifer has been identified as a potential source of water for municipal, industrial and agricultural purposes in Ward County. Water from this source is highly variable and typically hard. Groundwater supplies found suitable for industrial use lie within central Ward County. This strategy assumes that six new wells would need to be drilled to provide approximately 5,600 acre-feet per year. These wells would produce water approximately 162 feet below the surface.

Due to seasonal peak uses of energy, this strategy assumed a peaking factor of 2 in order to accurately capture a reliable average annual supply.

Quantity, Reliability and Cost

The quantity and reliability of water from this source is expected to be approximately 1,280 gpm. Historical steam electric power use indicates that the Pecos Valley aquifer may be a viable source. For this plan, the six new wells are assumed to supply an additional 5,600 acre-feet per year. The reliability of the supply is considered to be high, based on the large volume of accessible water for industrial use.

Environmental Factors

The aquifer is a proven groundwater source for multiple purposes. However, the long-term water quality is unknown. Groundwater development from this source should be evaluated for potential impacts on springflows and base flows of area rivers. It is unlikely that this strategy would cause subsidence.

Agricultural and Rural Impacts

More than 80 percent of groundwater from this source is being used for irrigation, with the remaining amount being used for municipal, industrial and power generation. This strategy could marginally reduce the amount of water currently available to other water users. There are no other agricultural or rural issues associated with this strategy.

Impacts to Natural Resources and Key Parameters of Water Quality

The water quality in the Pecos Valley aquifer is highly variable. This is due to several structural basins, the largest of which are the Pecos Trough in the west and Monument Draw Trough in the east. Water is generally better in the Monument Draw Trough. The aquifer is characterized by high levels of chloride and sulfate in excess of secondary drinking standards. In addition, naturally occurring arsenic and radionuclides occur in excess of primary drinking water standards. Water levels of the aquifer continue to decline due to increased municipal and industrial pumping.

No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies

This strategy respects the MAG values in Ward County, such that there is sufficient supplies for all recommended strategies.

Other Issues Affecting Feasibility

The most significant challenge for this strategy is locating areas with sufficient well production where the water quality is good. In addition, the projection for growth in steam electric power causes the water demand to exceed the current water supply available to existing generation facilities.

Water User Group:	**Winkler County Other**
WMS Name:	**Develop Pecos Valley Aquifer Supplies**
WMS Type:	New Groundwater Source
Strategy Yield:	500 ac-ft/yr
Strategy Capital Cost:	$1,908,000
Strategy Annual Cost (During Amortization):	$452/ac-ft ($1.39/1,000 gal)
Strategy Annual Cost (After Amortization):	$133/ac-ft ($0.41/1,000 gal)

Strategy Description

The Pecos Valley aquifer has been identified as a potential source of water for Winkler County-Other. The water quality in the Pecos Valley is highly variable. It is possible that the water may require advanced treatment to meet drinking water standards. The cost for advanced treatment is not included in this strategy. This strategy assumes that three new wells would be drilled to provide approximately 500 acre-feet per year. These wells are assumed to produce water from approximately 500 feet below the surface.

A peaking factor of 2 was assumed for the wells and piping in order to capture the peak annual supply.

Quantity, Reliability and Cost

It is assumed that each well will produce approximately 167 additional acre-feet of water per year. This equates to a total strategy yield of 500 acre-feet per year. The reliability of the supply is considered to be low to medium because of the unproven use of the source in this county.

The total cost of the project will be approximately $1.9 million. This equates to $452 per acre-foot ($1.39 per 1,000 gallons) of treated water during debt service. After the infrastructure is fully paid for, the cost drops to $133 per acre-foot ($0.41 per 1,000 gallons) of treated water.

Environmental Factors

The aquifer is a proven groundwater source for municipal, industrial, and agricultural purposes. However, the long-term water quality is unknown. Groundwater development from this source should be evaluated for potential impacts on springflows and base flows of area rivers. It is unlikely that this strategy would cause subsidence.

Agricultural and Rural Impacts

There are no agricultural or rural issues associated with this strategy.

Impacts to Natural Resources and Key Parameters of Water Quality

The water quality in the Pecos Valley aquifer is highly variable. This is due to several structural basins, the largest of which are the Pecos Trough in the west and Monument Draw Trough in the east. Water is generally better in the Monument Draw Trough. The aquifer is characterized by high levels of chloride and sulfate in excess of secondary drinking standards. In addition, naturally occurring arsenic and radionuclides occur in excess of primary drinking water standards. Water levels of the aquifer continue to decline due to increased municipal and industrial pumping.

No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies

None identified.

Other Issues Affecting Feasibility

The most significant challenge for this strategy is locating areas with sufficient well production where the water quality is good.

DESALINATION

Wholesale Water Provider:	**Colorado River Municipal Water District**
WMS Name:	**Desalination of Brackish Groundwater Supplies**
WMS Type:	Treatment of New Groundwater
Strategy Yield:	11,200 acre-feet
Strategy Capital Cost:	$65.2 million
Strategy Annual Cost (During Amortization):	$986 per acre-foot $3.03 per thousand gallons
Strategy Annual Cost (After Amortization):	$500 per acre-foot $1.53 per thousand gallons

Strategy Description

This strategy assumes that half of the supply that is developed through CRMWD's strategy, *Develop Additional Groundwater Supplies from Western Region F Counties,* is brackish and will require additional advanced treatment to meet drinking water standards. For planning purposes, the advanced treatment plant is assumed to be located near the proposed well field or the existing Ward County Well Field if ASR is also used. This strategy is sized to treat 15,000 acre-feet of raw brackish supplies (approximately half of the supply estimated from the CRMWD strategy *Additional Groundwater Supplies from Western Region F Counties*). The advanced treatment processes associated with brackish water desalination result in around 25 percent losses, resulting in about 11,200 acre-feet of treated supply. This equates to 10 MGD finished water. For planning purposes, the brackish supplies are assumed to have a starting salinity of 3,000 TDS. A 16-inch diameter, 5-mile brine disposal pipeline was assumed. Six 1,000-gpm deep brine injection wells were also included. The treated water from this strategy may be stored via aquifer storage and recovery (ASR). The ASR component is discussed separately as a standalone strategy.

Quantity, Reliability and Cost

The treated supply made available through this strategy is estimated to be 11,200 acre-feet per year. It should be noted that this strategy involves a portion of the supply from *Additional Groundwater Supplies from Western Region F Counties* and is therefore not additive. Because of the uncertainty involved with development of this source for municipal water use, the reliability of this strategy is considered moderate. The capital cost for this strategy is estimated at $65.2 million. That is equal to $3.03 per thousand gallons during debt service for treatment of the brackish groundwater only. Development, transmission and potential ASR of this supply are evaluated separately as standalone strategies. After the infrastructure is fully paid for, the price for treatment drops to $1.53 per thousand gallons.

Environmental Factors

This strategy relies on brackish groundwater from formations which have no surface outflow in the vicinity of the proposed project. It is unlikely that pumping from these formations will result in any alteration of terrestrial habitats. The conceptual design for this project uses deep well injection for brine disposal. A properly designed and maintained facility should have minimal environmental impact. Construction of the treatment facility should have minimal environmental impact as well.

Agricultural and Rural Impacts

Since this strategy relies on brackish supplies that are not readily usable for agricultural or municipal users, competition for the water is expected to be minimal. Therefore agricultural and rural impacts are expected to be minimal.

Impacts to Natural Resources and Key Parameters of Water Quality
The current conceptual design for this project uses deep well injection to dispose of the brine waste stream. If this were to change and the brine was released to a stream, impacts to the receiving water body would need to be evaluated.

Impacts on Other Water Resources and Management Strategies
Since this strategy relies on brackish supplies that cannot be used without significant treatment, impacts to other strategies will be minimal.

Other Issues Affecting Feasibility
None.

Wholesale Water Provider:	**Colorado River Municipal Water District**
WMS Name:	**Desalination of Brackish Surface Water (CRMWD Diverted Water System)**
WMS Type:	Expanded Use of Existing Water Supplies
Strategy Yield:	3,360 acre-feet
Strategy Capital Cost:	$35 million
Strategy Annual Cost (During Amortization):	$1668 per acre-foot $5.12 per thousand gallons
Strategy Annual Cost (After Amortization):	$797 per acre-foot $2.45 per thousand gallons

Strategy Description

CRMWD currently owns and operates several chloride control reservoirs and associated diversion structures. This part of their system is known as the diverted water system. The firm yield from this system is 5,760 acre-feet per year. However, the quality of this water is poor and it is unable to be used as potable supply in its current state. CRMWD sells slightly over 1,000 acre-feet per year to the mining industry without treatment. For the purposes of this plan, it is assumed CRMWD will continue to sell this brackish supply to the mining industry. The remaining 4 MGD would be piped from their diverted water system balancing reservoir to the Big Spring Reclamation plant for advanced treatment. To treat this additional supply, a new water treatment plant would be needed. The advanced treatment processes associated with treating brackish supplies result in around 25 percent losses. This results in 3 MGD of potable supply. It is assumed for this strategy that the brine concentrate will be discharged to Beals Creek, which has diminished water quality.

Quantity, Reliability and Cost

The potable supply estimated from this project is 3,360 acre-feet per year (3MGD). This supply is based on the WAM Run 3 firm yield and is considered to be fairly reliable. However, a drought worse than the drought of record could reduce the supply available from this strategy. The capital cost of this strategy is estimated at about $35 million. Unit costs of this strategy are estimated to be $5.12 per thousand gallons during debt service and would drop to $2.45 per thousand gallons after debt service.

Environmental Factors

The waste stream from the treatment facility is proposed to be discharged into Beals Creek, which has diminished water quality in its existing state. This discharge is later captured by the diverted water system to help improve the water quality at Lake Spence. Therefore, these discharges are not expected to further impair the water quality of the receiving stream.

The right of way for the transmission line may temporarily affect the environment during construction. Additional study and mitigation may be required before construction of the transmission pipeline.

Agricultural and Rural Impacts

The current water quality of the diverted water system prevents the possibility of it being used for agricultural or rural areas. Therefore, no impacts to agricultural and rural areas are expected.

Impacts to Natural Resources and Key Parameters of Water Quality

The diverted water system was originally built to improve the water quality of CRMWD's other surface water sources by capturing naturally brackish water from watersheds with naturally occurring salt seeps. This helped improve the water quality of the other surface water sources. The proposed strategy would maintain this benefit and use otherwise unusable water supply.

Impacts on Other Water Resources and Management Strategies

No other impacts.

Other Issues Affecting Feasibility

Further study will be needed to determine the impacts on the recycling of the brine waste stream in the diverted water system.

Wholesale Water Provider: **San Angelo**

WMS Name: **Desalination of Brackish Groundwater Supplies**

WMS Type: Treatment of New Groundwater

Strategy Yield: 11,200 acre-feet

Strategy Capital Cost: $66,978,000

Strategy Annual Cost (During Amortization): $827 per acre-foot
$2.54 per thousand gallons

Strategy Annual Cost (After Amortization): $326 per acre-foot
$1.00 per thousand gallons

Strategy Description

This strategy assumes that supply from San Angelo's groundwater strategies in Schleicher and Pecos Counties is brackish and will require additional advanced treatment to meet drinking water standards. For planning purposes, the advanced treatment plant is assumed to be located near the proposed well field. This strategy is sized to treat 15 MGD acre-feet of raw brackish supplies. The advanced treatment processes associated with brackish water desalination result in around 25 percent losses, resulting in about 11,200 acre-feet of treated supply. This equates to 10 MGD finished water. For planning purposes, the brackish supplies are assumed to have a starting salinity of 5,000 TDS. Four 1,000-gpm deep brine injection wells were also included.

Quantity, Reliability and Cost

The treated supply made available through this strategy is estimated to be 11,200 acre-feet per year. It should be noted that this strategy involves supplies from other potentially feasible strategies for San Angelo and is therefore not additive. Because of the uncertainty involved with development of this source for municipal water use, the reliability of this strategy is considered moderate. The capital cost for this strategy is estimated at $67 million. That is equal to $2.54 per thousand gallons during debt service for treatment of the brackish groundwater only. After the infrastructure is fully paid for, the price for treatment drops to $1.00 per thousand gallons.

Environmental Factors

The conceptual design for this project uses deep well injection for brine disposal. A properly designed and maintained facility should have minimal environmental impact. Construction of the treatment facility should have minimal environmental impact as well.

Agricultural and Rural Impacts

Since this strategy relies on brackish supplies that are not readily usable for agricultural or municipal users, competition for the water is expected to be minimal. Therefore agricultural and rural impacts are expected to be minimal.

Impacts to Natural Resources and Key Parameters of Water Quality

The current conceptual design for this project uses deep well injection to dispose of the brine waste stream. If this were to change and the brine was released to a stream, impacts to the receiving water body would need to be evaluated.

Impacts on Other Water Resources and Management Strategies

Since this strategy relies on brackish supplies that cannot be used without significant treatment, impacts to other strategies will be minimal.

Other Issues Affecting Feasibility

None.

Wholesale Water Provider: **San Angelo**

WMS Name: **Desalination of Other Aquifer Supplies in Tom Green County**

WMS Type: New Groundwater Source

Strategy Yield: 3,750 ac-ft/yr

Strategy Capital Cost: $79,128,000

Strategy Annual Cost (During Amortization): $2,738/ac-ft ($8.40/1,000 gal)

Strategy Annual Cost (After Amortization): $972/ac-ft ($2.98/1,000 gal)

Strategy Description

The City of San Angelo and UCRA have identified several potential brackish groundwater sources north and west of the City. An initial investigation into one of these sources, the Whitehorse Formation, did not yield water of sufficient quality or quantity and has been dropped from consideration. A test of the Clear Fork Formation was more promising and merits additional investigation. The City plans to continue investigating sources of saline water for long-term future water supplies. For the purposes of this plan, a conceptual design was developed for 7 MGD capacity treatment facility starting in 2050, yielding an average supply of 3,750 acre-feet per year. The most likely location for desalination facility is on the northwest side of the City. The conceptual design for this strategy calls for disposal of brine reject through deep-well injection.

Quantity, Reliability and Cost

The quantity and reliability of water from this source is expected to be approximately 500 gpm. For this plan, the 15 new wells are assumed to supply an additional 3,750 acre-feet per year after treatment losses. Treatment losses are estimated at 25 percent. The reliability of the supply is considered to be medium because of aquifer and water quality properties. The cost of this strategy is estimated at $79.1 million.

Environmental Factors

This strategy relies on brackish groundwater for its sources. The conceptual design for the project uses deep well injection for brine disposal. A properly designed and maintained facility should have minimal environmental impact. Well field development and construction for the treatment facility should have minimal environmental impact as well.

Agricultural and Rural Impacts

One of the most productive agricultural areas in the region is located east of the City of San Angelo. Some of this area is irrigated with surface water from Twin Buttes Reservoir and the Concho River, resulting in direct competition for water during dry periods. One of the chief benefits of this strategy is that there is no competition for this source with other interests. At present, water from these formations is not used for any beneficial purpose.

Impacts to Natural Resources and Key Parameters of Water Quality

Brackish groundwater often contains water with greater than 5,000 TDS. Most of the groundwater pumped from the aquifer is used for oil reservoir flooding. No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies

No impacts to other water resources or management strategies have been identified.

Other Issues Affecting Feasibility

The most significant challenge for this strategy is the lack of data on water quality and quantity from these formations. It has been demonstrated that there is water in these formations and geophysical logs indicate favorable formation conditions. However, specific data on chemistry and quantity of water are not available at this time. Water chemistry could have a significant impact on the cost and feasibility of this project.

Water User Group:	**Concho Rural WSC**
WMS Name:	**Desalination of Other Aquifer Supplies in Tom Green County**
WMS Type:	New Groundwater Source
Strategy Yield:	150 ac-ft/yr
Strategy Capital Cost:	$5,131,000
Strategy Annual Cost (During Amortization):	$3,505/ac-ft ($10.76/1,000 gal)
Strategy Annual Cost (After Amortization):	$1,360/ac-ft ($4.17/1,000 gal)

Strategy Description

Concho Rural WSC is investigating the possibility of developing brackish sources of water for future water supplies. For the purposes of this plan, a conceptual design was developed for .27 MGD capacity treatment facility starting in 2020, yielding an average supply of 150 acre-feet per year. The conceptual design for this strategy calls for disposal of brine reject via evaporation ponds.

Quantity, Reliability and Cost

The quantity and reliability of water from this source is expected to be approximately 200 gpm. For this plan, the two new wells are assumed to supply an additional 200 acre-feet per year. The desalination process was estimated to result in 25 percent losses, yielding 150 acre-feet per year of treated supplies. The reliability of the supply is considered to be medium because of aquifer and water quality properties. The cost of this strategy is estimated at $5.1 million.

Environmental Factors

This strategy relies on brackish groundwater for its sources. These formations have no surface outflow in the vicinity of the proposed project. It is unlikely that pumping from these formations will result in any environmental impacts. The conceptual design for the project uses evaporation ponds for brine disposal. A properly designed and maintained facility should have minimal environmental impact. Well field development and construction for the treatment facility should have minimal environmental impact as well.

Agricultural and Rural Impacts

One of the chief benefits of this strategy is that there is no competition for this source with other interests. At present, water from these formations is not used for any beneficial purpose.

Impacts to Natural Resources and Key Parameters of Water Quality

Brackish groundwater often contains water with greater than 5,000 TDS. Most of the groundwater pumped from the aquifer is used for oil reservoir flooding. No impacts to natural resources have been identified.

Impacts on Other Water Resources and Management Strategies

No impacts to other water resources or management strategies have been identified.

Other Issues Affecting Feasibility

The most significant challenge for this strategy is the lack of data on water quality and quantity from these formations. It has been demonstrated that there is water in these formations and geophysical logs indicate favorable formation conditions. However, specific data on chemistry and quantity of water are not available at this time. Water chemistry could have a significant impact on the cost and feasibility of this project.

REGIONAL WATER SUPPLY STRATEGIES

WMS Name: **Brush Control**

WMS Type: **Regional Water Supply Strategies**

Strategy Description

Brush control has been identified as a potentially feasible water management strategy for Region F. It has the potential to create additional water supply that could be used for some of the unmet needs in the region as well as enhance the existing supply from the region's reservoirs.

Prior to settlement, most of Texas was grassland. Along with settlement came grazing animals which, for a number of reasons, created an environment that favored shrubs and trees (brush) rather than grasslands. Brush not only increases the costs of land management and decreases the livestock carrying capacity of the land, but certain species of brush can drastically reduce water yield in a watershed. For these reasons, an effort was bought forth to control this brush and convert land back to grasslands.

In 1985, the Texas Legislature authorized the Texas State Soil and Water Conservation Board (TSSWCB) to conduct a program for the "selective control, removal, or reduction of … brush species that consume water to a degree that is detrimental to water conservation." In 1999 the TSSWCB began the Brush Control Program. In 2011, the 82nd Legislature replaced the Brush Control Program with the Water Supply Enhancement Program (WSEP). The WSEP's purpose is to increase available surface and groundwater supplies through the selective control of brush species that are detrimental to water conservation. The WSEP considers priority watersheds across the State, the need for conservation within the territory of a proposed projection based on the State Water Plan, and if the Regional Water Planning Group has identified brush control as a strategy in the State Water Plan as part of their competitive grant, cost sharing program. Five species are eligible for funding from the WSEP:

- Juniper
- Mesquite
- Salt cedar
- Huisache*
- Carrizo cane*

*These are classified as other species of interest and are conditionally eligible.

Methods of Brush Control

A number of methods can be employed to control brush. They include mechanical, chemical, prescribed burning, bio-control, and range management. Mechanical brush control methods can range from selective cutting with a hand axe and chainsaw to large bulldozers. Moderate to heavy mesquite or cedar can be grubbed or plowed for $100 to $165/acre.[3]

Several herbicides are approved for chemical brush control. The herbicides may be applied from aircraft, from booms on tractor-pulled spray rigs, or from hand tanks. Some herbicides are also available in pellet form. The herbicides Triclopyr (Remedy®) and Clopyralid methyl (Reclaim®) are approved herbicides for ongoing TSSWCB brush programs. Arsenal is the herbicide typically used for removal of salt cedar. These chemicals were shown to achieve about 70 percent root kill in studies around the State and in adjacent states. Specific soil temperature and foliage conditions must be met in order for chemical brush control to be effective. Aerial spraying of brush, such as mesquite, costs the same regardless of the plant density or canopy cover, about $25 per acre.[2]

Prescribed burning is also used to control brush. Burning is conducted under prescribed conditions to specifically target desired effects. Prescribed burning is estimated at $15 per acre for the TSSWCB programs. There are some limitations however. Burning rarely affects moderate to heavy stands of mature mesquite. Burning only topkills the smooth-bark mesquite plants and they re-sprout profusely. In addition, for mesquite, fire only gives short-term suppression and it stimulates the development of heavier canopy cover than was present pre-burn. Fire is not usually an applicable tool in moderate to heavy cedar (juniper) because these stands suppress production of an adequate amount of grass for fire fuel. Fire can be excellent for controlling junipers over 4 feet tall, if done correctly. Prescribed burning is often not recommended for initial clearing of some heavy brush due to the concern that the fire could become too hot and sterilize the soil. Burning is often used for maintenance of brush removal that has been initially performed through some other method.

Bio-control of salt cedar is a relatively new technique to be used in Texas. It has been studied for nearly 20 years, and there have been pilot studies in the Lake Meredith watershed and most recently in the Colorado River Basin.[4] Research has shown that the Asian leaf beetle can consume substantial quantities of salt cedar in a relatively short time period, and generally does not consume other plants. Different subspecies of the Asian beetle appear to be sensitive to varying climatic conditions, and there is ongoing research on appropriate subspecies for Texas. It is recommended that this control method be integrated with chemical and mechanical removal to best control re-growth. The cost per acre is unknown.

Range or grazing management should follow any type of upland brush control. It allows the regrowth of desirable grasses, maintaining good groundcover that hinders establishment of woody plant seedlings. Continued maintenance of brush is necessary to ensure the benefits of brush control.

Brush control is a potential water management strategy that could possibly create additional water supply within Region F. Predicting the amount of water that would be made available by implementing a brush control program is difficult, but some estimates have been made. In order for a watershed to be eligible for cost-share funds from the WSEP, a feasibility study must demonstrate increases in projected post-treatment water yield as compared to the pre-treatment conditions. Feasibility studies have been conducted and published for the following watersheds in Region F[5]:

- Lake Brownwood
- North Concho River (O.C. Fisher Lake)
- O.H. Ivie Reservoir (Upper Colorado River and Concho River)
- E.V. Spence (Upper Colorado River)
- Lake J.B. Thomas (Upper Colorado River)
- Twin Buttes Reservoir (including Lake Nasworthy)

Feasibility studies within Region F that are in progress at the time of writing of this plan include:

- O.H. Ivie Reservoir lake basin (salt cedar specific)
- Upper Llano River, including South and North Llano Rivers and Junction City Lake

O. C. Fisher Project

In 1999, the Legislature authorized the North Concho River Pilot Brush Control Project for the purpose of enhancing the amount of water flowing from the North Concho River watershed into the O.C. Fisher Reservoir. The O.C. Fisher Reservoir is located in Tom Green County and serves as a water supply source for the City of San Angelo. The O.C. Fisher project is a follow-on to the North Concho River Project, further enhancing potential watershed yield by removal of water-loving exotic species. The Project area encompasses approximately 15,860 acres above the existing lake level that includes lake habitat, riverine habitat, intermittent riverine habitat and bottomland hardwoods. The majority of the study area is located on fee-owned government land that is operated by the U.S. Army Corps of Engineers. As of December 2011, 2,555 acres had been treated. The total water yield for the life of the project was estimated to be approximately 1,040 acre-feet. The feasibility study, published in 1999, estimated that the total control cost per acre ranged from $20 to $75. The current state cost per treated acre is averaged at $104.98.

Twin Buttes Reservoir/Lake Nasworthy Brush Control Projects

In September 2002, brush control projects were initiated to enhance the amount of water flowing into the Twin Buttes Reservoir/Lake Nasworthy complex. Twin Buttes Reservoir is used to maintain sufficient water levels in Lake Nasworthy, which serves as a water supply for the City of San Angelo. TSSWCB had allocated $11.3 million for brush control cost-share in this watershed. As of December 2011, over 229,739 acres had already been treated using state funds. TSSWCB estimates that this project could increase water yield by approximately 176,459 acre-feet over the life of the project. Scheduled follow-up treatment occurring between December 2011 and December 2014, included an additional 6,428 treated acres. The increase in water yield for these acres was estimated at 533 acre-feet. The feasibility study, published in 2000, estimated that the total control cost per acre ranged from $35.89 to $94.89. The current state cost per treated acre is averaged at $68.03.

Lake Brownwood Project

In March 2008, the TSSWCB funded efforts to treat mesquite and juniper in the Lake Brownwood watershed. The program is being administered by the Pecan Bayou Soil and Water Conservation District. Lake Brownwood provides municipal, industrial and agricultural water supply to Brown County and surrounding areas. As of the end of 2011, TSSWCB had allocated $671,835.15 to the project and treated 1,322.8 acres. TSSWCB estimates an increase in water yield of approximately 3,885 acre-feet over the life of the project. Scheduled follow-up treatment occurring between December 2011 and December 2014 included an additional 3,829 treated acres. The increase in water yield for these acres was estimated at 350 acre-feet of supply for 1,000 acres of brush treated. BCWID estimates an annual cost of about $300,000 per year.

Although many studies have illustrated the benefits of brush control, until recently it has been difficult to quantify the benefits in the context of regional water planning. This quantification is very important because in most areas where the program is being implemented, hydrologic records indicate long term declines in reservoir watershed yields (some as much as 80%). Region F has been in critical drought conditions during most of the time that the region’s brush removal programs have been in place, so the monitoring programs associated with these projects may not have shown significant gains due to the lack of rainfall events. Also, the benefits from brush control are long term; it takes time for aquifers to recharge and for watersheds to return to pre-brush conditions. This fact was recognized by the various scientists during the initial planning for the Texas Brush Control Program and the preparation of numerous feasibility studies. Measuring success and hydrologic responses to brush control projects is going to be a long-term process, even under ideal conditions. Until recently, the projects have been implemented under less than ideal conditions due to the record drought. While the relatively short period of time these programs have been in place may not be indicative of the long-term gains of the programs, evidence is beginning to manifest that should serve to offer some indications.

Considering the above facts as a point of reference, the measured hydrologic responses and ongoing research findings to date have been nothing short of spectacular. Some of the indications of water production successes observed to date are as follows:

- Following modest surface water inflows in November 2004, unprecedented base flows into Twin Buttes Reservoir essentially doubled reservoir capacity (to 47,500 acre-feet by mid-June) and is effectively mitigating summer evaporation losses from the reservoir. The Twin Buttes watershed has been the recent recipient of a major brush removal effort on targeted and high priority sub-basins.
- Base flows on Pecan Creek (a long dormant perennial tributary to Lake Nasworthy and the subject of a special brush control project) provided so much base flow to Lake Nasworthy that water had to be released downstream on several occasions during the winter and spring of 2004-2005. This condition has been unprecedented in recent history.
- Long dormant tributary springs throughout the region have begun to flow following brush removal. Most of these became active during the drought and without benefit of any rainfall.
- The East Fork of Grape Creek, which is a portion of a major tributary to O.C. Fisher Reservoir, has received extensive brush removal (approximately 70 percent of targeted brush in the sub-basin). This tributary has been measured to have produced hundreds of acre-feet of water in base flows since November 2004. A similarly sized adjacent watershed (West Fork of Grape Creek) that has not received brush removal produced no downstream water base flows. Hydrologic calculations of data from the East Fork indicate that this watershed is producing in excess of 1.0 acre inch of water per year in base flows. Prior to brush removal, the hydrologic characteristics of this watershed were similar to that of the West Fork. An August 2005 runoff event on both watersheds revealed a dramatic difference in the flood hydrographs from each stream. The untreated watershed produced a rapid short flow event, while the treated watershed produced a longer and sustained flow.
- For the first time since the mid-20th century, the North Concho River has experienced perennial base flows for an extended period of the year throughout the stream reach. As a result of this saturated stream condition, the watershed yield from an August 2005 storm runoff event was undoubtedly increased.
- Regional groundwater monitoring within the North Concho watershed during a time period lasting 48 months indicated a significant trend in increasing ground water levels. Much of this data had been collected during a period of record drought.
- Evapotranspiration data from paired watershed studies conducted by the Texas Institute for Applied Environmental Research (TIAER) at Tarleton State University for the Upper Colorado River Authority (UCRA) indicated a significant difference in water use between treated and untreated mesquite infested sites. On the treated sub-watersheds, perennial base flows were re-established and produced significant water yield on an annual basis. The untreated sub-watersheds produced virtually no water yield during the same time period.

Based on anecdotal accounts and observations, almost everyone in the area from participating landowners to water supply and elected officials are recognizing the water producing value of the program. It would appear from preliminary observations and findings that brush control as a water producing strategy is viable and should be incorporated into water supply planning. Recent monitoring efforts have produced a wealth of experimental data that makes accurate quantifications of the hydrological effects of brush control possible. The Water Supply Enhancement Program (WSEP) annually publishes statewide water yield estimate projections that originate from computer models that have been in published brush control feasibility studies. The annual report published by the Texas State Soil and Water Conservation Board (TSSWCB) documents the results from the program and includes the extent of the completed brush work within the watershed along with status reviews to determine the brush density of treated acreage. Also, since the program is based on voluntary participation by landowners, an analysis of the completed brush control work as to the extent within each sub-basin, location of each sub-basin in relationship to the overall watershed and anticipated water production from each sub-basin should be performed. The feasibility studies and models assume removal of all of the targeted brush, which will not often happen.

The TSSWCB uses a competitive grant process to rank the most feasible projects, and allocates the WSEP cost-share funds according to the project that balances the most critical water conservation need with the highest projected water yield. Once the funding has been allocated to a project, a geospatial analysis is performed to determine the acreage that has the highest potential to yield water within the watershed. The analysis will subdivide each Project area into four priority zones – high, medium, low, and not eligible. Available funding will only be obligated for those landowners who are in the high priority zone. The TSSWCB then works through Soil and Water Conservation Districts (SWCDs) to provide technical and financial assistance to landowners. Cost-share funding is based on the actual cost and is not to exceed the average cost established in the project's implementation plan. Payments are determined by acreage times the cost-share rate times the actual cost to implement.

Treating only the most productive areas results in a lower overall composite cost per acre-foot increase in water yield. A summary of each sub-basin within the Upper Colorado watershed by production and costs was published by the Upper Colorado River Authority (UCRA) in 2002 and is available for use in performing an analysis. This document showed that according to existing feasibility studies, treating the entire Upper Colorado River Basin (nine reservoir watersheds) would result in a composite cost of slightly over $70 per acre-foot of water produced. Treating only the most productive sub-basins, however, could produce a high percentage of the modeled water production and reduce the composite costs to less than $50 per acre-foot.

In order to be an effective and reliable long-term water production strategy, areas of brush once removed, must be maintained. Follow –up treatment is essential to the program and has been built into the TSSWCB landowner contracts. During the 10-year contract period landowners must perform any needed follow-up treatment. The landowners will be subjected to periodic reviews by their local SWCD or the TSSWCB to determine compliance. If a landowner is found out of compliance they will not be eligible for another WSEP contract for a period of ten years. It is important to note that any follow-up brush control is entirely the landowners' financial responsibility and they cannot receive any additional state funds for this follow-up brush control.

The program budget for the Water Supply Enhancement Program for 2014 was $2,135,413 for the State of Texas. Near-term funding for brush control would be at similar levels statewide, with some portion of that budget going to Region F. Costs would be shared with project sponsors, including reservoir owners and land owners.

Quantity, Reliability and Cost

The quantity of supply expected from this strategy is relatively small and is shown in Table C- 19 below. There are no capital costs associated with this strategy, only annual operating costs. The supply from this strategy is considered to be of medium reliability since brush must be continually treated to continue to provide additional supplies.

Table C- 19
Brush Control Quantities

Sponsor	Quantity (acre-feet per year)
Brown County WCID #1	350
San Angelo	1,000
UCRA	Included in Contract Increase from San Angelo

Environmental Factors
The Texas Parks and Wildlife Department (TPWD) lists the potential environmental impacts of brush control as alteration of terrestrial habitat, increased sediment runoff and erosion, impacts from chemical control measures, potential for increase groundwater recharge, impacts to aquatic and terrestrial communities and ecosystem process, and influence on energy and nutrient inputs and processing.[6] Region F suggests coordinating with TPWD and other state and federal agencies regarding any brush control program.

Agricultural and Rural Impacts
Invasive brush has altered the landscape of Region F and the rest of West Texas. Restoration of much of the landscape to natural grassland conditions will benefit the ranching economy of the region as well as enhance water supplies.

Impacts to Natural Resources and Key Parameters of Water Quality
Although invasive brush has impacted water supplies and altered the natural landscape of the region and reduced runoff, in some cases the brush has provided habitat for wildlife. In addition to the environmental benefits of this habitat, some of this habitat is suitable for deer and other game. Hunting is an important part of the economy of Region F. Therefore it may be desirable to leave portions of a watershed with brush to maintain habitat.

Impacts on Other Water Resources and Management Strategies
If the program is adequately implemented and maintained, brush control could supplement existing supplies and possibly delay or eliminate the need for new water supply projects.

Other Issues Affecting Feasibility
The most significant factor regarding the feasibility of this strategy is ongoing funding for brush control projects. Brush control is an ongoing process that must be constantly maintained for the project to be successful. Existing programs provide funding for the initial clearing of brush but any necessary follow-up brush control is typically the landowner's financial responsibility. Further clarification is needed as to whether the landowner will be able to receive any additional state funds for ongoing brush control maintenance. Without maintenance and monitoring, brush control will not be effective as either a range management or water management strategy.

Like other similar activities, brush control is dependent upon the ongoing cooperation and financial contributions of individual landowners. Therefore each program should be tailored to local conditions.

WMS Name: **Weather Modification**

WMS Type: **Regional Water Supply Strategies**

Strategy Yield: 6,730 acre-feet per year

Strategy Annual Cost: $7,474

Strategy Description

Weather modification is a water management strategy currently used in Texas to increase precipitation released from clouds over a specified area typically during the dry summer months. The most common form of weather modification or rainfall enhancement is cloud seeding. Early forms of weather modification began in Texas in the 1880s by firing cannons to induce convective cloud formation. Current cloud seeding techniques are used to enhance the natural process for the formation of precipitation in a select group of convective clouds.

Convective clouds, also known as cumulus clouds, are responsible for producing the bulk of rainfall during any given year in Texas.[7] The cloud seeding process increases the availability of ice crystals, which bond with moisture in the atmosphere to form raindrops. This is accomplished by injecting a target cloud with artificial crystals, such as silver iodide, and is known as glaciogenic seeding. Hygroscopic seeding, or injecting calcium chloride into target clouds, is often used in tandem with glaciogenic seeding. Specially equipped aircraft release the seeding crystals into clouds as flares that are rich in super cooled droplets. The silver iodide crystals form water droplets from available moisture in the air. Droplets then collide with droplets transforming the ice crystal into a raindrop.

Weather modification is most often utilized as a water management strategy during the dry summers in West Texas, with the season beginning in March and ending in October. The water produced by weather modification augments existing surface and groundwater supplies. It also reduces the reliance on other supplies for irrigation during times of normal and slightly below normal rainfall. However, not all of this water is available for water demands. Some of this precipitation is lost to evaporation, evapotranspiration, and local ponds. During drought years the amount of additional rainfall produced by weather modification may not be significant. However, during wet years, the amount of water produced by weather modification may be significant.

The amount of water made available to a specific entity from this strategy is difficult to quantify, yet there are regional benefits. Four major benefits associated with weather modification include:

- Improved rangeland and agriculture due to increased precipitation
- Greater runoff to streams and rivers due to higher soil moisture
- Groundwater recharge
- Hail suppression

In Region F, there are two ongoing weather modification programs: the West Texas Weather Modification Association (WTWMA) project and the Trans Pecos Weather Modification Association (TPWMA) program.

<u>West Texas Weather Modification Association (WTWMA) Project</u>

The WTWMA began weather modification efforts in 1995. The intent of the rainfall enhancement program was to increase groundwater recharge, springflow, and runoff resulting in increased agricultural productivity and reduction in groundwater withdrawals. A side effect of the rain enhancement operations also include hail suppression, but is not one of the main intents of the program. WTWMA has operated in eight counties covering an area of 6.6 million acres. The City of San Angelo, Crockett County Groundwater Conservation District (GCD), Glasscock County GCD, Irion County Water Conservation District (WCD), Plateau Underground Water Conservation and Supply District (UWC & SD), Santa Rita UWCD, Sterling County UWCD and Sutton County UWCD operated in the rainfall enhancement effort through 2013. The Glasscock County GCD did not participate in the program during the 2014 season. In 2014, a total of 111 clouds were seeded as part of the WTMA's rain enhancement efforts in 40 operational days. WTWMA estimated a 15 percent increase in rainfall in the target area because of their operations.[8] Table C- 20 shows a breakdown by county of the estimated increase in rainfall for the year 2014 from the annual report of the Texas Weather Modification Association.[9]

Table C- 20
Estimated Precipitation Increase for the Year 2014 due to WTWMA Activities

County	Inches (Increase)	Rain Gauge (season value)	% Increase
Sterling	1.16	10.59	11.0
Reagan	2.80	15.52	18.0
Irion	2.74	13.18	20.9
Tom Green	2.65	15.46	17.1
Crockett	1.19	13.01	9.1
Schleicher	2.35	15.38	15.3
Sutton	1.24	9.20	13.5
Total	14.13	92.34	
Average	2.02	14.13	15.0

Data are from the Texas Weather Modification Association.

<u>Trans Pecos Weather Modification Association (TPWMA) Program</u>

The TPWMA began operation in 2003. The TPWMA consists of the Ward County Irrigation District and other political entities from Culberson, Loving, Reeves, Ward and parts of Pecos County. The program's target area covers over 5.1 million acres along and to the west of the Pecos River from El Paso to Midland. The program is currently funded by local ranchers, farmers, and landowners, Loving County, the Ward County Irrigation District, and a grant from the Texas Department of Agriculture. In 2014, TPWMA had 18 seeding days and estimated a 6.8 percent increase in precipitation from cloud seeding.[10]

Table C- 21 shows a breakdown by county of the estimated increase in rainfall for the year 2014 from the annual report of the Texas Weather Modification Association.

Table C- 21
Estimated Precipitation Increase for the Year 2014 due to TPWMA Activities

County	Inches (Increase)	Rain Gauge (season value)	% Increase
Culberson	0.03	9.86	0.3
Reeves	0.29	4.08	7.1
Pecos	0.19	5.19	3.7
Ward	0.68	5.81	11.7
Loving	0.25	2.30	11.0
Total	1.44		
Average	0.29	5.45	6.8

Data are from the Texas Weather Modification Association.

Quantity, Reliability and Cost

Benefits of the weather modification programs are widespread and are difficult to quantify in the context of regional water planning. To precisely estimate the benefit of weather modification requires an estimate of how much precipitation would have occurred naturally without weather modification, and an estimate of how much of the increase in precipitation becomes directly available to a water user. The eight counties in the WTWMA target area were evaluated for their increase in precipitation and recharge potential over a 10-year period (Jennings and Green, 2014)[11]. Analysis from 2004 to 2013 performed by Ruiz-Columbiè (2014)[12] which compared seeded clouds with non-seeded clouds resulted in precipitation increases of 8 to 20 percent or up to 2 inches per year. Rain gauges within and outside the target area provided confirmatory results.

Statewide precipitation increases averaged 8 percent in 2014, including regions in the Panhandle and South Texas. In the last ten years, precipitation has increased statewide by 12 percent or 1.5 inches per year due to rain enhancement activities. However, it is difficult to quantify the benefits to individual water user groups. For purposes of this plan, weather modification is a recommended strategy for irrigated agriculture for counties that currently participate in an active program. It is assumed that the increase in rainfall will offset irrigation water use. To determine the water savings associated with this strategy, an estimate of the increase in rainfall over the growing season (7 months) is applied directly to the irrigated acreages. These savings are shown by county in Table C- 22.

Table C- 22
Water Savings due to Precipitation Enhancement per County

County	Irrigated Acreage (Acre)	Annual Increase (ft)	Water Savings (Ac-Ft/Yr)	Cost
Crockett	153	0.10	9	$6
Irion	829	0.23	110	$50
Pecos	28,566	0.02	264	$1,714
Reagan	10,793	0.23	1,469	$648
Reeves	16,997	0.02	240	$1,020
Schleicher	889	0.20	102	$53
Sterling	440	0.10	25	$26
Sutton	563	0.10	34	$34
Tom Green	38,386	0.22	4,945	$2,303
Ward	1,381	0.06	46	$83

The reliability of water supplies from precipitation enhancement is considered to be low for two reasons. First, it is uncertain how much water is made directly available per water user. Second, during drought conditions precipitation enhancement may not result in a significant increase in water supply. (The guidelines for regional water planning in TAC §357.5(a) specifies that regional water planning evaluate supplies from water management strategies during critical drought conditions.) Cloud formations suitable for seeding may not occur frequently during drought, so benefits during drought may be negligible. However, during the drought of 2011, the WTWMA target area averaged a precipitation increase of 1.12 inches per year, the lowest of 2004-2013. Among the counties, the increase in precipitation was between 0.77 inches per year and 1.54 inches per year, resulting in half of the counties receiving over 1 inch of rainfall from cloud seeding.

Cost-benefit analysis of the WTWMA region by Johnson (2014)[13] calculated the hypothetical benefits from an additional 1 inch of rainfall. The direct economic impact from precipitation enhancement is estimated to be up to $6 million for the region. For every $1 invested in the WTWMA, an expected $16 is returned. A rainfall increase of 1 inch is equivalent to 5.13 percent of the total annual rainfall of the WTWMA target area. Based on program data, an increase of 5 percent is below average and possibly feasible during drought years for some counties, therefore the benefits are highly likely. The cost of operating Texas weather modification programs are approximately 4 to 6 cents per acre. The WTWMA operates at 4 cents per acre.

Environmental Factors

Weather modification should have a positive impact on the environment due to the increased rainfall from storms. Possible benefits include improved wildlife habitat and landscapes. The chemicals used in weather modification should be sufficiently diluted to minimize any threat of contamination.

Agricultural and Rural Impacts

Weather modification has a positive impact on agriculture and ranching by increasing productivity. Dry land farm production, a common means of measuring the effects of rainfall enhancement, has increased in regions participating in rainfall enhancement. Another benefit of weather modification is hail suppression, which helps minimize damage from severe weather, but is not a primary goal of the TPWMA and WTWMA programs.

Dryland farming revenues can increase by $4.6 million for each additional one inch of rainfall created through weather modification (Johnson, 2014)[12]. Estimates for grazing land revenues and costs savings to irrigated acreage with one inch of rainfall are $1.1 million and $250,000, respectively.

Impacts to Natural Resources and Key Parameters of Water Quality

Aquifer recharge has been estimated to be 100,000 acre-feet per year for the WTWMA target area assuming 10 percent of precipitation increases reach local aquifers. Recharge costs are $1.50 per acre-foot. Recharge efforts are ideal in the winter months when evapotranspiration is lowest, however no programs are known to have successfully attempted such seeding. The potential for groundwater recharge from weather modification is growing, however research methodology and seasonal climatic effects exclude recharge strategies from regional water planning presently.

No impacts to key parameters of water quality were identified for this strategy.

Impacts on Other Water Resources and Management Strategies

This strategy may reduce the demand for water from other water management strategies. Downwind impacts of increased precipitation to areas outside target areas is also an additional benefit.

Other Issues Affecting Feasibility

The most significant issue facing existing weather modification programs is funding. In many cases these programs rely on the cooperation of several entities and the availability of outside funding to continue operations. State funding for weather modification has been absent since 2002. Many of the programs that chose to contract out their operations instead of purchasing equipment with state funding have been discontinued. In addition, there is some local opposition to precipitation enhancement. This opposition has been slowly decreasing due to the TWMA's continuing education outreach activities. Lastly, several weather modification programs have adjusted their target areas which limits continuous and reliable data for water planning regions.

Water User Group:	**San Angelo (Region F), Midland (Region F), and Abilene (Region G)**
WMS Name:	**West Texas Water Partnership (WTWP)**
WMS Type:	Regional WMS
Strategy Yield:	10,000 acre-feet (San Angelo and Midland supplies only)
Strategy Capital Cost:	$65,292,000
Strategy Annual Cost (During Amortization):	$1,256 per acre-foot $3.85 per thousand gallons
Strategy Annual Cost (After Amortization):	$710 per acre-foot $2.18 per thousand gallons

Strategy Description

The Cities of Midland, San Angelo and Abilene have formed the West Texas Water Partnership (the Partnership or WTWP) to evaluate long-term water supplies the Partnership could develop jointly. The Partnership is conducting a separate study to determine the most feasible water management strategies for these cities, but the results were not available at the writing of this plan. For planning purposes, it is assumed that the Partnership would provide 10,000 acre-feet per year from sources in Region G (City of Abilene). These sources in Region G include current supplies to the City of Abilene and future supplies from the proposed Cedar Ridge Reservoir.

Abilene receives supplies from O.H. Ivie Reservoir at the Hargesheimer WTP via a 36-inch pipeline as well as other surface water supplies through a network of raw water transmissions pipelines. The Ivie pipeline could be retrofitted to transmit supplies in reverse to O.H. Ivie Reservoir where the water would be diverted from the reservoir using existing CRMWD facilities. Alternatively, with construction of a second pipeline, supplies could be connected directly to the CRMWD's transmission pipeline from Ivie.

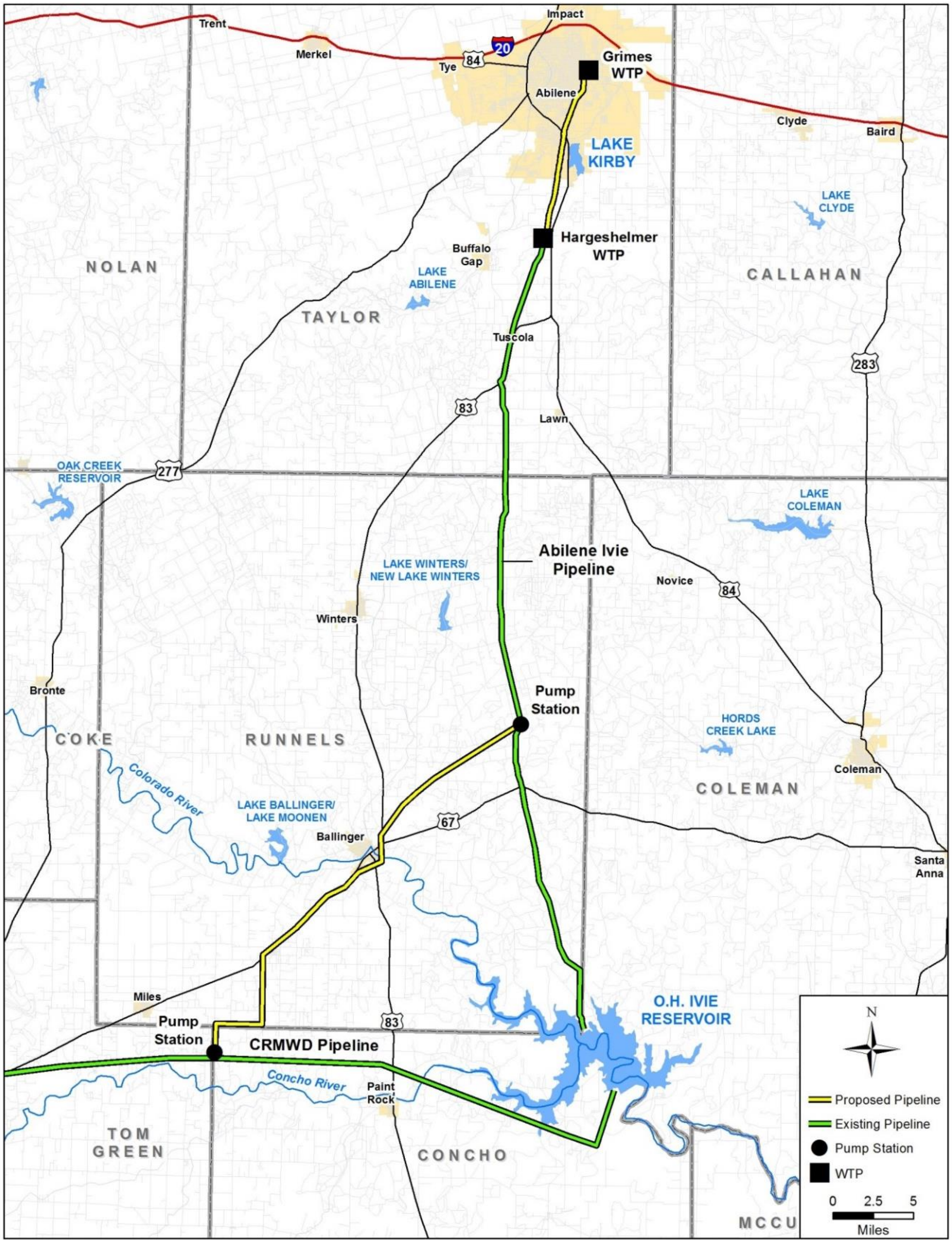
Raw water from Lake Fort Phantom Hill and Hubbard Creek Reservoir is delivered to the City's Northeast and Grimes WTPs. To convey supplies from the raw water transmission system serving the Northeast and Grimes WTPs to the Abilene Ivie pipeline will require additional infrastructure. The identified routing for this pipeline is to use railroad right-of-way between the Grimes WTP and Loop 322, and right-of-way owned by the City to the Hargesheimer WTP. Additionally, an 18-inch spur could be developed to connect the line to Lake Kirby for operational flexibility. This spur is not included in this strategy.

The facilities sized for delivery of 10,000 acre-feet per year will include a 760 HP pump station at Grimes WTP, and an 11-mile, 30-inch diameter pipeline. Additional improvements will be necessary at the Hargesheimer WTP to deliver supplies south in the existing Ivie pipeline towards O.H. Ivie Reservoir. These improvements include an 800,000 gallon storage reservoir at Hargesheimer, 1,000 HP pump station and some additional valving to manage pressures in the pipeline. Energy costs are based on delivery of 10,000 acre-feet per year between Grimes and Hargesheimer.

For delivery of supplies into the CRMWD transmission system, there may be a need to consider a direct connection rather than transference through O.H. Ivie Reservoir. The intake for the Abilene Ivie pipeline is in a deeper section of the lake compared to the CRMWD system intake and during very low reservoir levels supplies could be stranded and not readily available to the CRMWD system intake. It is therefore recommended to construct the alternative pipeline to connect the Abilene Ivie pipeline near Ballinger with the CRMWD pipeline near Miles. A 30-mile, 30-inch diameter pipeline would be sized to deliver

10,000 acre-feet per year along with a 340 HP pump station and 0.85 MG storage tank at the Abilene Ivie pipeline interconnect.

Figure C- 4
West Texas Water Partnership



Quantity, Reliability and Cost

For planning purposes, it is assumed that the Partnership would provide 10,000 acre-feet per year from sources in Region G (City of Abilene), transmitted back through Abilene's existing O.H. Ivie pipeline to a delivery point near San Angelo. Midland would receive 4,000 acre-feet per year, and the remaining 6,000 acre-feet would supply San Angelo.

Since this supply comes from multiple sources, it is considered very reliable.

The total project costs for the infrastructure improvements necessary to transmit water back through Abilene's Ivie pipeline and tie into existing CRMWD facilities are estimated to be $65,292,000, with a unit cost of $1,256 per acre-foot. Annual costs include a cost of water of $597 per acre-foot, which represents a blended cost to Abilene for providing combined supplies from Fort Phantom Hill Reservoir, Hubbard Creek Reservoir and the proposed Cedar Ridge Reservoir.

Environmental Factors

The portion of this supply from existing reservoirs and water rights will have minimal environmental impacts. The environmental impacts associated with the construction of the proposed Cedar Ridge Reservoir are discussed as part of a separate strategy in the Region G Plan. The disruption from the construction of the pipeline is expected to be minor and temporary.

Agricultural and Rural Impacts

Agricultural and rural impacts are expected to be minimal. Proposed sources of existing supply are not used for agricultural purposes. Construction of the pipeline may temporarily impact rural or agricultural lands but the pipeline routing will attempt to avoid impacts. Agricultural impacts associated with Cedar Ridge Reservoir are discussed in the Brazos G Water Plan.

Impacts to Natural Resources and Key Parameters of Water Quality

The portion of this supply from existing reservoirs and water rights will result in no significant impacts to natural resources or water quality. Impacts associated with the proposed Cedar Ridge Reservoir are discussed as part of a separate strategy in the Region G Plan.

Impacts on Other Water Resources and Management Strategies

This strategy utilizes water from the City of Abilene's sources and may impact their other strategies.

Other issues affecting feasibility

This strategy is dependent upon agreements between multiple parties that are outside the scope of regional water planning. Delivery to Midland proposes to use CRMWD existing infrastructure. The WTWP has not approached CRMWD with any plans to use CRMWD facilities and CRMWD facilities are already contractually committed. If and when the Partnership has developed a firmer concept strategy they should contact CRMWD to see if their option(s) are feasible and beneficial to both the WTWP and CRMWD. Discussions between the WTWP and CRMWD are outside the scope of regional water planning.

Water User Group:	**Bronte, Ballinger, Winters and Robert Lee**
WMS Name:	**Regional System from Lake Brownwood to Runnels and Coke Counties**
WMS Type:	Regional WMS
Strategy Yield:	2,802 acre-feet
Strategy Capital Cost:	$54,728,000
Strategy Annual Cost (During Amortization):	$ 2,421 per acre-foot $ 7.43 per thousand gallons
Strategy Annual Cost (After Amortization):	$ 786 per acre-foot $ 2.41 per thousand gallons

Strategy Description

Lake Brownwood is one of the few surface water sources in Region F with a firm yield under WAM Run 3 with uncommitted supply. However, it is still susceptible to drought and has suffered in recent years. A conceptual design for a regional system providing water to the Cities of Bronte, Ballinger, Winters and Robert Lee was developed to evaluate the potential for water supply from this source. It is unclear if Brown County WID #1 would be willing to sell water to these users and an agreement would have to be reached between all parties.

Quantity, Reliability and Cost

This strategy would provide a total of 2,802 acre-feet per year to multiple users. The division of supply is shown below in Table C- 23. This source is considered to be reliable. Capital costs are estimated at $52.4 million and are assumed to be split amongst the entities that would need to enter into a partnership to implement this strategy. The exact division of costs would be negotiated as part of the partnership to implement the proposed strategy.

Table C- 23
Supply to Each User (acre-feet per year)

Water User Group	Supply
Winters	729
Ballinger	1345
Bronte	280
Robert Lee	448
Total	2,802

Environmental Factors

The environmental issues associated with this strategy are expected to be minimal. It is assumed that the pipeline could be routed around sensitive environmental areas if needed.

Agricultural and Rural Impacts

Although Lake Brownwood is used for agricultural supplies, there are sufficient supplies under WAM Run 3 to meet irrigation demands as well as additional municipal demands. No impacts to agriculture are expected. Bronte is a rural community. Like other water supply strategies, the high cost of this strategy may have an adverse impact on the limited financial resources of the City and the surrounding rural area.

Impacts to Natural Resources and Key Parameters of Water Quality

None identified.

Impacts on Other Water Resources and Management Strategies

Other strategies for Bronte, Ballinger, Winters, and Robert Lee.

Other Issues Affecting Feasibility

The most significant issues affecting the feasibility of this project are sponsorship and financing. At this time it is unclear what entity would be responsible for implementing and obtaining financing for the project. The project is outside of the traditional service area of the Brown County WID, the owner of Lake Brownwood. Additionally, BCWID may not be willing to sell a portion of their supply to these communities. Implementation may require development of a new political subdivision to administer and finance the project. The cost of the project is significant and would be a significant financial strain on the area.

Water User Group:	**Bronte, Ballinger, Winters and Robert Lee**
WMS Name:	**Regional System from Lake Fort Phantom Hill to Runnels and Coke Counties**
WMS Type:	Regional WMS (Alternative)
Strategy Yield:	1,555 acre-feet
Strategy Capital Cost:	$53,591,000
Strategy Annual Cost (During Amortization):	$4,697 per acre-foot $14.42 per thousand gallons
Strategy Annual Cost (After Amortization):	$815 per acre-foot $2.50 per thousand gallons

Strategy Description

Fort Phantom Hill Reservoir is located in Jones County in Region G. In 2013, the City of Clyde purchased a 2,500 acre-foot water right in Fort Phantom Hill Reservoir from an abandoned steam electric power generation facility. The City of Clyde amended the water right to expand its use for municipal supply and also secured an interbasin transfer to select counties including Runnels and Coke Counties. The City of Clyde does not currently receive any supply from the reservoir. Ballinger is currently in negotiations with the City of Clyde to purchase between 1,000 and 1,750 acre-feet of this water right. These negotiations are ongoing at the writing of this plan and an exact sale amount or purchase price is unknown. For the purposes of this strategy, it is assumed that they would purchase the full 1,750 acre-feet of water right and then enter into an agreement to provide a portion of this supply to Bronte, Robert Lee, and Winters. This strategy includes the construction of a new intake on Lake Fort Phantom Hill and a new pipeline and associated infrastructure to connect to Winters, Ballinger, and Bronte. It was assumed that existing infrastructure from Bronte to Robert Lee could be used to convey supplies to Robert Lee.

Quantity, Reliability and Cost

Many watersheds throughout the State are over-appropriated, i.e. not all water rights can be fully met at all times. Thus, the yields from a water right are often less than the amount shown in the water right. This is also the case for Fort Phantom Hill Reservoir. If Ballinger were to purchase the full 1,750 acre-feet of water right, that would translate into 1,155 acre-feet of safe yield in 2020. The yield in the remaining decades is shown below in Table C- 24. The division of supply is shown below in Table C- 25. This source is considered to be reliable. Capital costs are estimated at $53.6 million and are assumed to be split amongst the entities that would need to enter into a partnership to implement this strategy. The exact division of costs would be negotiated as part of the partnership to implement the proposed strategy.

Table C- 24
Yield of Water Right at Full Purchase Amount

	2020	2030	2040	2050	2060	2070
Water Right Purchase Amount	1,750	1,750	1,750	1,750	1,750	1,750
Total WMS Quantity (Safe Yield)	1,155	1,114	1,074	1,033	993	952

Table C- 25
Potential Supply by User

Water User Group	Supply (%)	2020 (ac-ft)	2070 (ac-ft)
Winters	15.1%	175	143
Ballinger	43.3%	500	413
Bronte	30.3%	350	288
Robert Lee	11.3%	130	108
Total	100%	1,115	952

Environmental Factors

Since this supply is from an existing reservoir and water right, the environmental impacts are expected to be minimal. The disruption from the construction of the pipeline is expected to be minor and temporary. Specific environmental studies would be required to assess impacts at the intake location and along the pipeline. It is assumed that the pipeline would be routed to avoid environmentally sensitive areas, where possible.

Agricultural and Rural Impacts

Ballinger, Bronte, Winters and Robert Lee are rural communities. Having a sustainable water supply source will improve the vitality of the rural community. No agricultural impacts are expected.

Impacts to Natural Resources and Key Parameters of Water Quality

Since this strategy provides water from an existing reservoir and water right, no impacts to natural resources or water quality are expected.

Impacts on Other Water Resources and Management Strategies

This strategy utilizes water from Fort Phantom Hill Reservoir which is operated, maintained, and used by the City of Abilene. Coordination on use from this source would be needed to avoid impacting Abilene's water supplies.

Other Issues Affecting Feasibility

This strategy is dependent upon agreements between multiple parties that are outside the scope of regional water planning. The economic viability of this strategy will depend on the results of these agreements.

Water User Group:	**Bronte, Robert Lee**
WMS Name:	**Purchase water from UCRA**
WMS Type:	Regional WMS
Strategy Yield:	500 acre-feet
Strategy Capital Cost:	$10,691,000
Strategy Annual Cost (During Amortization):	$2,730 per acre-foot $ 8.38 per thousand gallons
Strategy Annual Cost (After Amortization):	$ 940 per acre-foot $ 2.88 per thousand gallons

Strategy Description

This strategy proposes to purchase 500 acre-feet of treated water from San Angelo sources through the Upper Colorado River Authority (UCRA). This water would be used to supply both Bronte and Robert Lee. Bronte already sells treated water to Robert Lee and it is assumed that existing infrastructure could be used to facilitate sales from this strategy as well. This strategy includes a treated water pipeline from San Angelo to Bronte. Alternatively, this supply could be transported using the existing Spence pipeline to Robert Lee and then transported to Bronte. The Spence pipeline would need rehabilitation prior to implementing this strategy. San Angelo owns this infrastructure and would have to agree to rehabilitation. At the writing of this plan, San Angelo has not agreed to sell this water through UCRA to Bronte or rehabilitate the pipeline.

Quantity, Reliability and Cost

This strategy assumes that San Angelo would be willing to sell 500 acre-feet of supply through UCRA to Bronte. Since San Angelo has multiple sources, the reliability of this supply is considered to be high. However, the reliability and cost of this strategy depend on the specifics of the privately negotiated agreement that must be reached prior to the implementation of this strategy.

Environmental Factors

The disruption from the construction of the pipeline is expected to be minor and temporary.

Agricultural and Rural Impacts

Bronte and Robert Lee are rural communities. Having a sustainable water supply source will improve the vitality of the rural community. No agricultural impacts are expected.

Impacts to Natural Resources and Key Parameters of Water Quality

No impacts to natural resources or water quality are expected.

Impacts on Other Water Resources and Management Strategies

This strategy utilizes water from San Angelo sources and strategies. The use of this water by Bronte and Robert Lee could impact San Angelo and is contingent upon an agreement between all parties involved being reached. At the writing of this plan such an agreement is not in place and may not be agreeable to all parties. However, San Angelo may be willing to sell a portion of future West Texas Water Partnership or other strategy supplies.

Other Issues Affecting Feasibility

This strategy is dependent upon agreements between multiple parties that are outside the scope of regional water planning. The economic viability of this strategy will depend on the results of these agreements.

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Appendix D

Cost Estimates

Region F Cost Estimates

As part of the 2011 Region F Water Plan, cost estimates were developed for each of the recommended water management strategies in Region F. As appropriate, these cost estimates have been updated for the 2016 regional water plan. In accordance with the Texas Water Development Board guidance the costs for water management strategies are to be updated from second quarter 2008 dollars to September 2013 dollars. The methodology used to develop the 2016 costs is described in the following sections. Where updated unit costs were not available, the Engineering News Record (ENR) Index for construction was used to increase the costs from second quarter 2008 (September) costs to September 2013 costs. An increase of 111.6% from September 2008 to September 2013 was determined using the ENR Index method.

Introduction

1. The evaluation of water management strategies requires developing cost estimates. Guidance for cost estimates may be found in the TWDB's "First Amended General Guidelines for Regional Water Plan Development (2012-2017)", Section 5.1. Costs are to be reported in September 2013 dollars.

2. Standard unit costs for installed pipe, pump stations, standard treatment facilities, and well fields were developed and/or updated using the costing tool provided by the TWDB. The unit costs do not include engineering, contingency, financial and legal services, costs for land and rights-of-way, permits, environmental and archeological studies, or mitigation. The costs for these items are determined separately in the cost tables.

3. The information presented in this section is intended to be 'rule-of-thumb' guidance. Specific situations may call for alteration of the procedures and costs. Note that the costs in this memorandum provide a planning level estimate for comparison purposes.

4. It is important that when comparing alternatives that the cost estimates be similar and include similar items. If an existing reliable cost estimate is available for a project it should be used where appropriate. All cost estimates must meet the requirements set forth in the TWDB's "First Amended General Guidelines for Regional Water Plan Development (2012-2017)".

5. The cost estimates have two components:

   - Initial Capital Costs: Including total construction cost of facilities, engineering and legal contingencies, environmental and archaeology studies and mitigation, land acquisition and surveying, and interest incurred during construction (4.0% annual interest rate less a 1.0% rate of return on investment of unspent funds).

- Average Annual Costs: Including annual operation and maintenance costs, pumping energy costs, purchase of water and debt service.

TWDB does not require the consultant to determine life cycle or present value analysis. For most situations annual costs are sufficient for comparison purposes and a life-cycle analysis is not required.

ASSUMPTIONS FOR CAPITAL COSTS:

The unit cost and factors show in the Tables 1-7 were developed directly from the TWDB Costing Tool. These costs are the basis of the capital costs developed for this plan.

Conveyance Systems

Standard pipeline costs used for these cost estimates are shown in Table 1. Pump station costs are based on required Horsepower capacity and are listed in Table 2. The power capacity is to be determined from the hydraulic analyses included in the TWDB costing tool (or detailed analysis if available). Pipelines and pump stations are to be sized for peak pumping capacity.

- Pump efficiency is assumed to be 70 percent.
- Peaking factor of 2 times the average demand is to be used for strategies when the water is pumped directly to a water treatment plant. (or historical peaking factor, if available)
- The target flow velocity in pipes is 5 fps and the Hazen-Williams Factor is assumed to be 120.
- Peaking factor of 1.2 to 1.5 can be used if there are additional water sources and/or the water is transported to a terminal storage facility.
- Ground storage is to be provided at each booster pump station along the transmission line unless there is a more detailed design.
- Ground storage tanks should provide sufficient storage for 2.5 to 4 hours of pumping at peak capacity. Costs for ground storage are shown in Table 3. Covered storage tanks are used for all strategies transporting treated water.

Water Treatment Plants

Water treatment plants are to be sized for peak day capacity (assume peaking factor of 2 if no specific data is available). Costs estimated include six different treatment levels of varying degree. These levels are groundwater chlorine disinfection, iron and manganese removal, simple filtration, construction of a new conventional treatment plant, expansion of a conventional treatment plant, brackish desalination, and seawater desalination. Costs are also based upon a TDS factor that will increase or decrease the cost of treatment accordingly. These costs are summarized in Table 4. **All treatment plants are to be sized for finished water capacity**.

Direct Reuse

Direct reuse refers to the introduction of reclaimed water directly from a water reclamation plant to a distribution system. The following assumptions were made for direct potable and non-potable reuse strategies.

Direct Non-Potable Reuse

Non-potable reuse is the use of reclaimed water that is used directly for non-potable beneficial uses such as landscape irrigation. The TWDB costing tool currently does not have a direct non-potable reuse treatment plant improvements option, therefore the following assumptions were made.

- It was assumed that the cost of an iron and manganese removal plant would be an appropriate approximation of the improvements that would be needed at the Wastewater Treatment Plant. This cost was further refined by assuming that only upgrades to an existing facility would be required, and not construction of an entirely new plant.
- Approximately two miles of 6-inch pipeline was also included in the cost estimates for transport of the treated water to the destination. Since reuse is still relatively new, there is a lack of piping infrastructure for reuse water. It was also assumed that the pump station was included in the WWTP improvements.

Direct Potable Reuse

Direct potable reuse is the use of reclaimed water that is transported directly from a wastewater treatment plant to a drinking water system. The TWDB costing tool currently does not have a direct potable reuse treatment plant improvements option, therefore the following assumptions were made.

- Due to the high level of treatment that is required for direct potable reuse, the wastewater treatment plant improvements cost was assumed to be equivalent to 75% of a conventional treatment plant expansion plus brackish desalination treatment improvements. The 25% discount was given to Level 3 Treatment in order to alleviate any redundancy being assumed by the costing tool.

New Groundwater Wells

Cost estimates required for water management strategies that include additional wells or well fields were determined through the TWDB costing tool (unless a more detailed design was available). The associated costs are shown in Table 5. The costing tool differentiated the wells based upon purpose. The categories were Public Supply, Irrigation, and ASR. These cost relationships are "rule-of-thumb" in nature and are only appropriate in the broad context of the cost evaluations for the RWP process.

The cost relationships assume construction methods required for public water supply wells, including carbon steel surface casing and pipe-based, stainless steel, and wire-wrap screen. The cost estimates assume that wells would be gravel-packed in the screen sections and the surface casing cemented to their total depth. Estimates include the cost of drilling, completion, well development, well testing, pump, motor, motor controls, column pipe, installation and mobilization. The cost relationships do not include engineering, contingency, financial and legal services, land costs, or permits. A more detailed cost analysis should be completed prior to developing a project.

The costs associated with conveyance systems for multi-well systems can vary widely based on the distance between wells, terrain characteristics, well production, and distance to the treatment facility. These costs should be estimated using standard engineering approaches and site-specific information. For planning purposes, these costs were estimated using the TWDB costing tool's assumptions for conveyance. It is important to note that conveyance costs were not included for point of use water user groups such as mining.

Other Costs

- Engineering, contingency, construction management, financial and legal costs are to be estimated at 30 percent of construction cost for pipelines and 35 percent of construction costs for pump stations, treatment facilities and reservoir projects. (This is in accordance with TWDB guidance.)
- Permitting and mitigation for transmission and treatment projects are to be estimated at $25,000 per mile. For reservoirs, mitigation and permitting costs are assumed equal to twice the land purchase cost, unless site specific data is available.
- Right-of-way (ROW) costs for transmission lines are estimated through costs provided by the Texas A&M University Real Estate Center (http://recenter.tamu.edu/data/rland/) which gives current land costs based on county. The ROW width is assumed to be 20 ft. If a small pipeline follows existing right-of-ways (such as highways), no additional right-of-way cost may be assumed. Large pipelines will require ROW costs regardless of routing.

Interest during construction is the total of interest accrued at the end of the construction period using a 4 percent annual interest rate on total borrowed funds, less a 1 percent rate of return on investment of unspent funds. This is calculated assuming that the total estimated project cost (excluding interest during construction) would be drawn down at a constant rate per month during the construction period. Factors were determined for different lengths of time for project construction. These factors were used in cost estimating and are presented in Table 6.

ASSUMPTIONS FOR ANNUAL COSTS:

Annual costs are to be estimated using the following assumptions:

- Debt service for all transmission and treatment facilities is to be annualized over 20 years, but not longer than the life of the project. [Note: uniform amortization periods should be used when evaluating similar projects for an entity.]
- Annual interest rate for debt service is 5.5 percent.
- Water purchase costs are to be based on wholesale rates reported by the selling entity when possible. In lieu of known rates, a typical regional cost for treated water and raw water will be developed.
- Operation and Maintenance costs are to be calculated based on the construction cost of the capital improvement. Engineering, permitting, etc. should not be included as a basis for this calculation. However, a 20% allowance for construction contingencies should be included for all O&M calculations. Per the "First Amended General Guidelines for Regional Water Plan Development (2012-2017)", O&M should be calculated at:
  - 1 percent of the construction costs for pipelines
  - 1.5 percent for dams
  - 2.5 percent of the construction costs for pump stations
  - O&M Costs for the varying levels of water treatment plant improvements were developed by the TWDB and are shown in Table 7.
- Pumping costs are to be estimated using an electricity rate of $0.09 per Kilowatt Hour. If local data is available, this can be used.

Table 1

Pipeline Costs

Diameter	Soil		Rock	
	Rural	Urban	Rural	Urban
(Inches)	($/Foot)	($/Foot)	($/Foot)	(Feet)
6	$18	$25	$22	$30
8	$28	$39	$34	$47
10	$31	$44	$38	$53
12	$35	$48	$41	$58
14	$46	$64	$55	$78
16	$57	$81	$68	$97
18	$68	$97	$83	$116
20	$81	$112	$96	$135
24	$103	$144	$123	$172
30	$137	$191	$164	$230
36	$170	$239	$204	$287
42	$204	$286	$246	$343
48	$239	$334	$286	$401
54	$273	$382	$327	$457
60	$306	$429	$368	$515
66	$358	$501	$430	$602
72	$419	$587	$504	$705
78	$490	$687	$589	$825
84	$574	$804	$689	$965
90	$672	$941	$806	$1,129
96	$772	$1,082	$927	$1,298
102	$865	$1,211	$1,038	$1,453
108	$952	$1,332	$1,142	$1,599
114	$1,047	$1,465	$1,256	$1,758
120	$1,152	$1,612	$1,382	$1,934
132	$1,324	$1,854	$1,589	$2,225
144	$1,523	$2,132	$1,828	$2,559

Table 2
Pump Station Costs

Horsepower	Booster PS Cost ($-million)	Intake PS cost ($-millions)
0	$0.00	$0.00
5	$0.62	$0.67
10	$0.68	$0.72
20	$0.72	$0.77
25	$0.75	$0.82
50	$0.79	$1.03
100	$0.83	$1.55
200	$1.67	$2.06
300	$1.83	$2.58
400	$2.32	$3.09
500	$2.39	$3.61
600	$2.45	$4.12
700	$2.52	$4.64
800	$2.97	$5.15
900	$3.08	$5.67
1,000	$3.20	$6.18
2,000	$4.33	$8.66
3,000	$5.46	$10.00
4,000	$6.60	$11.34
5,000	$7.73	$12.37
6,000	$8.87	$13.40
7,000	$10.00	$14.43
8,000	$11.13	$15.46
9,000	$12.27	$16.49
10,000	$13.40	$17.52
20,000	$24.74	$28.86
30,000	$29.69	$38.13
40,000	$37.11	$48.44
50,000	$46.39	$57.72
60,000	$55.67	$66.99
70,000	$66.80	$77.30

Note:
1. Intake PS costs include intake and pump station.
2. Adjust pump station costs upward if the pump station is designed to move large quantities of water at a low head (i.e. low horsepower).
3. Assumed multiple pump setup for all pump stations.

Table 3
Ground Storage Tanks

Tank Volume (MG)	With Roof ($)	Without Roof ($)
0.05	$178,301	$118,524
0.1	$192,730	$174,179
0.5	$412,257	$374,123
1	$698,776	$618,386
1.5	$967,774	$674,041
2	$1,236,772	$803,902
2.5	$1,339,836	$922,426
3	$1,442,900	$1,040,950
3.5	$1,649,029	$1,154,320
4	$1,855,158	$1,267,691
5	$2,061,286	$1,463,513
6	$2,370,479	$1,752,093
7	$2,782,736	$2,009,754
8	$3,194,994	$2,370,479
10	$3,997,864	$3,071,316
12	$4,997,331	$3,916,444
14	$6,021,017	$4,740,958

Note: Costs assume steel tanks smaller than 1 MG, concrete tanks 1 MG and larger.

Table 4
Conventional Water Treatment Plant Costs

	Level 0	Level 1	Level 2	Level 3 (new)	Level 3 (exp)	Level 4	Level 5
	Chlorine Disinfection (GW)	Iron & Manganese Removal	Simple Filtration	Conventional Treatment	Conventional Treatment	Brackish Desalination	Seawater Desalination
Capacity (MGD)	Capital Cost ($)	Capital Cost ($)	Capital Cost ($)	Capital Cost ($)	Capital Cost ($)	Capital Cost ($)	Capital Cost ($)
0	0	0	0	0	0	0	0
0.1	17,948	224,345	1,030,643	1,373,739	1,373,739	916,221	2,202,644
1	69,098	900,371	3,607,251	4,844,022	4,844,022	3,664,883	14,738,196
10	440,703	3,747,009	19,066,897	32,980,578	18,551,575	24,777,648	98,615,306
50	2,203,515	10,882,523	72,145,015	135,606,271	66,991,800	94,233,468	372,343,747
75	3,305,272	15,701,003	105,469,141	199,327,155	106,502,260	131,935,273	520,364,186
100	4,407,030	19,236,530	138,793,267	261,974,046	129,095,574	167,517,457	659,848,640
150	6,610,545	29,438,241	205,441,519	385,074,680	193,640,235	234,539,403	922,162,931
200	8,814,060	33,898,368	272,089,771	506,100,496	238,822,748	297,793,331	1,169,350,182

Note: Plant is sized for finished peak day capacity.

Table 5
Cost Elements for Water Wells

Public Supply Well Costs						
	Well Capacity (MGD)					
Well Depth (ft)	100	175	350	700	1000	1800
150	$124,138	$188,450	$321,561	$363,439	$453,177	$662,565
300	$167,510	$239,301	$382,882	$438,220	$541,419	$767,259
500	$216,867	$299,127	$454,672	$523,472	$644,618	$892,892
700	$261,736	$352,969	$518,984	$601,244	$737,347	$1,003,569
1000	$343,996	$451,681	$638,635	$743,330	$909,345	$1,209,967
1500	$481,594	$617,696	$836,059	$981,135	$1,193,515	$1,550,971
2000	$619,192	$782,216	$1,033,482	$1,218,941	$1,479,181	$1,893,471
Irrigation Well Costs						
150	$68,800	$106,190	$180,972	$207,893	$263,231	$379,891
300	$91,234	$136,103	$221,353	$261,736	$332,031	$463,646
500	$113,669	$170,502	$264,727	$320,065	$406,812	$560,863
700	$131,615	$195,928	$302,118	$369,422	$472,620	$644,618
1000	$171,998	$252,762	$379,891	$471,124	$602,740	$809,137
1500	$240,797	$349,979	$508,515	$640,130	$818,111	$1,081,342
2000	$308,100	$444,203	$637,139	$807,642	$1,034,978	$1,355,043
ASR Well Costs						
150	$137,598	$212,379	$369,422	$417,282	$520,480	$767,259
300	$180,972	$263,231	$430,742	$492,063	$608,723	$873,449
500	$230,327	$324,553	$502,532	$577,315	$713,417	$997,587
700	$276,692	$378,395	$568,341	$655,087	$804,651	$1,109,759
1000	$357,456	$477,107	$686,496	$797,173	$976,649	$1,314,662
1500	$496,550	$641,627	$883,919	$1,034,978	$1,260,819	$1,655,665
2000	$632,653	$806,146	$1,081,342	$1,272,783	$1,546,484	$1,998,165

Table 6
Factors for Interest During Construction

Construction Period	Factor
6 months	0.0175
12 months	0.035
18 months	0.0525
24 months	0.07
36 months	0.105
48 month	0.14
60 months	0.175
72 months	0.21
84 months	0.245

Table 7
Annual Water Treatment Plant O&M Costs

	Level 0	Level 1	Level 2	Level 3 (New)	Level (Exp)	Level 4	Level 5
Capacity (MGD)	Chlorine Disinfection (GW)	Iron & Manganese Removal	Simple Filtration	Conventional Treatment	Conventional Treatment	Brackish Desalination	Seawater Desalination
0	0	0	0	0	0	0	0
0.1	5,384	37,017	103,064	68,687	68,687	83,293	374,449
1	20,729	148,561	360,725	242,201	242,201	333,171	2,505,493
10	132,211	618,256	1,906,690	1,649,029	927,579	2,252,513	16,764,602
50	661,054	1,795,616	7,214,502	6,780,314	3,349,590	8,566,679	63,298,437
75	991,582	2,590,666	10,546,914	9,966,358	5,325,113	11,994,116	88,461,912
100	1,322,109	3,174,027	13,879,327	13,098,702	6,454,779	15,228,860	112,174,269
150	1,983,163	4,857,310	20,544,152	19,253,734	9,682,012	21,321,764	156,767,698
200	2,644,218	5,593,231	27,208,977	25,305,025	11,941,137	27,072,121	198,789,531

WUGNAME:	Brown County WCID #1				
STRATEGY:	Groundwater Development in Concho County				
AMOUNT (ac-ft/yr):	1,680				
CONSTRUCTION COSTS					
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Groundwater rights		1,680	AC	$ 500	$ 840,000
Water wells	150 gpm	17	EA	$ 167,013	$ 2,839,000
Piping and other appurtenances		1	LS	$ 25,100	$ 25,000
Engineering and contingencies (35%)					$ 1,002,000
Well Field Subtotal					$ 4,706,000
Transmission					
Pipeline	16 in.	15,840	LF	$ 63	$ 1,000,000
Right of Way Easements		5	AC	$ 2,969	$ 15,000
Pump Station	160 H.P	1	EA	$ 1,331,180	$ 1,331,000
Ground storage	0.20 MG	1	EA	$ 247,612	$ 248,000
Engineering and contingencies (30%)					$ 778,000
Transmission Subtotal					$ 3,372,000
CONSTRUCTION TOTAL					$ 8,078,000
Permitting and Mitigation					$ 75,000
Interest During Construction	(12 months)				$ 283,000
TOTAL COST					**$ 8,436,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 706,000
Electricity ($0.09 kWh)					$ 144,000
Operation & Maintenance					$ 124,000
Total Annual Costs					**$ 974,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 580
Per 1,000 Gallons					$ 1.78
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 160
Per 1,000 Gallons					$ 0.49

WUGNAME:	CRMWD
STRATEGY:	Ward County Well Field Expansion and Development of Winkler County Well Field
AMOUNT (ac-ft/yr):	11,200

CONSTRUCTION COSTS

Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water wells		50	EA	$ 419,774	$ 20,989,000
Well field pipeline	10 in.	37,062	LF	$ 93	$ 3,438,000
Well field pipeline	16 in.	34,226	LF	$ 140	$ 4,797,000
Well field pipeline	20 in.	2,511	LF	$ 175	$ 440,000
Well field pipeline	24 in.	2,621	LF	$ 198	$ 519,000
Well field pipeline	30 in.	2,455	LF	$ 247	$ 607,000
Well field pipeline	36 in.	2,484	LF	$ 260	$ 645,000
Power Connection Costs			LS	$ 379,773	$ 380,000
Engineering and contingencies (35%)					$ 11,002,000
Subtotal Well field					$ 42,817,000

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	36 in.	158,400	LF	$ 260	$ 41,140,000
Terminal Reservoir Piping and Valves		1	LS	$ 444,104	$ 444,000
Right-of-way easements		90	AC	$ 572	$ 57,000
Engineering and Contingencies (30%)					$ 12,492,000
Subtotal Pipeline					$ 54,133,000

Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
North Well Field PS Improvements		1	LS	$ 1,674,795	$ 1,675,000
Transmission Pump Station Expansion	20 MGD	1	LS	$ 3,722,357	$ 3,722,000
New Transmission Booster Pump Station	50 MGD	1	EA	$ 11,053,715	$ 11,054,000
New Pump Station in Odessa	20 MGD	1	EA	$ 5,965,268	$ 5,965,000
Terminal Pump Station	20 MGD	1	EA	$ 5,965,268	$ 1,790,000
Engineering and Contingencies (35%)					$ 8,472,000
Subtotal of Pump Station(s)					$ 32,678,000

CONSTRUCTION TOTAL		$ 129,628,000
Permitting and Mitigation		$ 1,135,000
Interest During Construction	(24 months)	$ 9,153,000
TOTAL COST		**$ 139,916,000**

ANNUAL COSTS

Debt Service (5.5% for 20 years)	$ 11,708,000
Electricity ($0.09 kWh)	$ 1,001,000
Operation & Maintenance	$ 1,454,000
Total Annual Costs	**$ 14,163,000**

UNIT COSTS (Until Amortized)

Per Acre-Foot of treated water	$ 1,265
Per 1,000 Gallons	$ 3.88

UNIT COSTS (After Amortization)

Per Acre-Foot	$ 219
Per 1,000 Gallons	$ 0.67

WUGNAME:	CRMWD					
STRATEGY:	Aquifer Storage and Recovery (ASR) of Existing Surface Water Supplies in Ward County Well Field					
AMOUNT (ac-ft/yr):	5,000					
CONSTRUCTION COSTS						
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Conversion of Existing Wells for ASR		25	LS	200,000	$	5,000,000
Well Field Piping	24 in.	10,560	LF	113	$	1,194,000
Engineering and Contingencies (35%)					$	2,167,900
Subtotal of Well Field						
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Pipeline Connection to Odessa WTP	24 in.	26,400	LF	$ 159	$	4,185,000
Right-of-way easements		12	AC	$ 572	$	8,000
Engineering and Contingencies (30%)					$	1,258,000
Subtotal Pipeline					$	5,451,000
Pump Station						
Pump Stations	700	1	EA	$ 2,519,500	$	2,520,000
Storage tank	0.5	1	EA	$ 412,257	$	412,000
Power Connection		1	LS	$ 105,000	$	105,000
Engineering and Contingencies (35%)					$	1,063,000
Subtotal of Pump Station(s)					$	4,100,000
CONSTRUCTION TOTAL					$	9,551,000
Permitting and Mitigation					$	125,000
Interest During Construction	(18 months)				$	508,000
TOTAL COST					**$**	**10,184,000**
ANNUAL COSTS						
Debt Service (5.5% for 20 years)					$	852,000
Electricity ($0.09 kWh)					$	487,000
Operation & Maintenance					$	1,915,000
Total Annual Costs					**$**	**3,254,000**
UNIT COSTS (Until Amortized)						
Per Acre-Foot of treated water					$	651
Per 1,000 Gallons					$	2.00
UNIT COSTS (After Amortization)						
Per Acre-Foot					$	480
Per 1,000 Gallons					$	1.47

WUGNAME:	CRMWD				
STRATEGY:	Desalination of Brackish Surface Water (CRMWD Diverted Water System)				
AMOUNT (ac-ft/yr):	3,360				
CONSTRUCTION COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	16 in.	105,600	LF	$ 88	$ 9,307,000
Right-of-way easements		49	AC	$ 572	$ 28,000
Engineering and Contingencies (30%)					$ 3,267,000
Subtotal Pipeline					$ 12,602,000
Pump Station(s) & Ground	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Intake	4.4 MGD	1	EA	$1,728,417	$ 1,728,000
Pump Stations	600 HP	2	EA	$ 2,462,810	$ 4,926,000
Power Connection Costs	600 HP	2	LS	$ 91,988	$ 184,000
Storage tank	0.4 MG	1	EA	$ 379,264	$ 379,000
Engineering and Contingencies (35%)					$ 2,526,000
Subtotal of Pump Station(s)					$ 8,015,000
Treatment Facilities	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pre-Treatment	4	1	LS	$7,111,437	$ 7,111,000
WTP Expansion	3	1	LS	$ 8,863,069	$ 8,863,000
Engineering and Contingencies (35%)					$ 3,102,000
Subtotal of Treatment					$ 11,965,000
CONSTRUCTION TOTAL					$ 32,582,000
Permitting and Mitigation					$ 500,000
Interest During Construction (18 months)					$ 1,737,000
TOTAL COST					**$ 34,819,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 2,914,000
Electricity ($0.09 kWh)					$ 568,000
Operation & Maintenance					$ 2,714,000
Total Annual Costs					**$ 6,196,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 1,844
Per 1,000 Gallons					$ 5.66
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 977
Per 1,000 Gallons					$ 3.00

WUGNAME:	CRMWD				
STRATEGY:	Develop Additional Groundwater Supplies from Western Region F Counties				
AMOUNT (ac-ft/yr):	30,000				
CONSTRUCTION COSTS					
Well Field	**Quantity**	**Unit**	**Unit Price**		**Cost**
Purchase Groundwater Rights	30,000	AC	$500	$	15,000,000
Water wells	70	EA	$ 419,774	$	29,384,000
Well field collection	70	per well	$ 200,000	$	14,000,000
Engineering and contingencies (35%)				$	15,184,000
Subtotal Well field				$	58,568,000
CONSTRUCTION TOTAL				$	58,568,000
Interest During Construction	(24 months)			$	4,100,000
TOTAL COST				**$**	**62,668,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)				$	5,244,000
Electricity ($0.09 kWh)				$	5,750,000
Operation & Maintenance				$	1,085,000
Total Annual Costs				**$**	**12,079,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water				$	403
Per 1,000 Gallons				$	1.24
UNIT COSTS (After Amortization)					
Per Acre-Foot				$	228
Per 1,000 Gallons				$	0.70

WUGNAME:	CRMWD				
STRATEGY:	Transmission of Additional Groundwater Supplies from Western Region F Counties				
AMOUNT (ac-ft/yr):	30,000				
CONSTRUCTION COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	48 in.	475,200	LF	$ 287	$ 136,268,000
Right-of-way easements		218	AC	$ 572	$ 137,000
Engineering and Contingencies (30%)					$ 40,922,000
Subtotal Pipeline					$ 177,327,000
Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Stations	2250 HP	4	EA	$ 4,612,700	$ 18,451,000
Storage tank	3.4 MG	3	EA	$ 1,609,040	$ 4,827,000
Power Connection		2	LS	$ 337,500	$ 675,000
Engineering and Contingencies (35%)					$ 8,384,000
Subtotal of Pump Station(s)					$ 32,337,000
CONSTRUCTION TOTAL					$ 209,664,000
Permitting and Mitigation					$ 2,250,000
Interest During Construction	(24 months)				$ 14,834,000
TOTAL COST					**$ 226,748,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 18,974,000
Electricity ($0.09 kWh)					$ 3,306,000
Operation & Maintenance					$ 1,604,000
Total Annual Costs					**$ 23,884,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 796
Per 1,000 Gallons					$ 2.44
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 164
Per 1,000 Gallons					$ 0.50

WUGNAME:	CRMWD					
STRATEGY:	Desalination of Brackish Groundwater					
AMOUNT (ac-ft/yr):	11,200					
CONSTRUCTION COSTS						
Treatment Facilities	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
WTP (Desalination)	10 MGD	1	LS	$ 25,678,653	$	25,679,000.00
Engineering and Contingencies (35%)					$	8,987,650
Subtotal of Treatment					$	34,666,650
Disposal Facilities	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Pipeline	16 in.	26,400	LF	$ 69	$	1,821,600
Pump Station	300 HP	1	EA	$ 2,576,600	$	2,576,600
Injection Well		6	LS	$ 2,679,672	$	14,940,187.27
Engineering and Contingencies (35%)					$	6,768,436
Subtotal of Disposal Facilities					$	26,106,823
CONSTRUCTION TOTAL					$	60,773,473
Permitting and Mitigation					$	125,000
Interest During Construction	(24 months)				$	4,262,893
TOTAL COST					**$**	**65,161,366**
ANNUAL COSTS						
Debt Service (5.5% for 20 years)					$	5,452,659
Electricity ($0.09 kWh)					$	146,407
Operation & Maintenance					$	5,449,249
Total Annual Costs					**$**	**11,048,315**
UNIT COSTS (Until Amortized)						
Per Acre-Foot of treated water					$	986
Per 1,000 Gallons					$	3.03
UNIT COSTS (After Amortization)						
Per Acre-Foot					$	500
Per 1,000 Gallons					$	1.53

WUGNAME:	CRMWD
STRATEGY:	Aquifer Storage and Recovery (ASR) of Brackish Groundwater
AMOUNT (ac-ft/yr):	11,200

CONSTRUCTION COSTS					
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Conversion of existing wells for ASR		50	EA	$ 200,000	$ 10,000,000
Collection piping to and from RO plant	36 in.	10,560	LF	$ 188	$ 1,983,000
Engineering and contingencies (35%)	0				$ 4,194,000
Subtotal Well field					$ 16,177,000
CONSTRUCTION TOTAL					$ 16,177,000
Permitting and Mitigation					$ 50,000
Interest During Construction	4 months)				$ 1,135,890
TOTAL COST					**$ 17,362,890**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 1,453,000
Electricity ($0.09 kWh)					$ 545,000
Operation & Maintenance					$ 120,000
Total Annual Costs					**$ 2,118,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 189
Per 1,000 Gallons					$ 0.58
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 59
Per 1,000 Gallons					$ 0.18

WUGNAME:	Odessa				
STRATEGY:	RO Treatment of Existing Supplies				
AMOUNT (ac-ft/yr):	7,500				
CONSTRUCTION COSTS					
Water Treatment Plant	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
RO facility	10 MGD	1	LS	$ 25,678,653	$ 25,679,000
Engineering and contingencies (35%)					$ 8,988,000
Treatment Subtotal					$ 34,667,000
Disposal Facilities	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Injection Wells	1000 gpm	6	EA	$ 2,679,672	$ 16,078,000
Collection Piping	18 in.	10,000	LF	$ 107	$ 1,065,000
Power Connection		1	LS	$ 996,900	$ 997,000
Engineering and Contingencies (35%)					$ 6,349,000
Subtotal of Disposal Facilities					$ 24,489,000
CONSTRUCTION TOTAL					$ 59,156,000
Permitting and Mitigation					$ 47,000
Interest During Construction	(18 months)				$ 3,106,000
TOTAL COST					**$ 62,309,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 5,214,000
Electricity ($0.09 kWh)					$ 71,000
Operation & Maintenance					$ 2,799,000
Total Annual Costs					**$ 8,084,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 1,078
Per 1,000 Gallons					$ 3.31
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 383
Per 1,000 Gallons					$ 1.17

WUGNAME:	Odessa				
STRATEGY:	Develop Capitan Reef Complex Aquifer Supplies in Ward County				
AMOUNT (ac-ft/yr):	8,400				

CONSTRUCTION COSTS					
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water wells	950 gpm	15	EA	$ 3,230,567	$ 48,459,000
Ground Storage Tank	2.0 MG	1	EA	$ 1,236,772	$ 1,237,000
Wellfield Piping	30 in.	15,000	LF	$ 151	$ 2,264,000
Wellfield Piping	42 in.	15,000	LF	$ 226	$ 3,385,000
Wellfield Piping	48 in.	15,000	LF	$ 263	$ 3,945,000
Engineering and contingencies (35%)					$ 20,752,000
Well Field Subtotal					$ 80,042,000
Water Treatment Plant					
RO facility	7.5 MGD	1	LS	$ 20,059,232	$ 20,059,000
Engineering and contingencies (35%)					$ 7,021,000
Treatment Subtotal					$ 27,080,000
Disposal Facilities	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Injection Wells	1000 gpm	5	EA	$ 2,679,672	$ 13,398,000
Collection Piping	16 in.	10,000	LF	$ 63	$ 631,000
Power Connection		1	LS	$ 830,700	$ 831,000
Engineering and Contingencies (35%)					$ 5,201,000
Subtotal of Disposal Facilities					$ 20,061,000
CONSTRUCTION TOTAL					$ 127,183,000
Permitting and Mitigation					$ 260,000
Interest During Construction	(18 months)				$ 6,677,000
TOTAL COST					**$ 134,120,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 11,223,000
Electricity ($0.09 kWh)					$ 1,146,000
Operation & Maintenance					$ 2,758,000
Total Annual Costs					**$ 15,127,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 1,801
Per 1,000 Gallons					$ 5.53
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 465
Per 1,000 Gallons					$ 1.43

WUGNAME:	Odessa				
STRATEGY:	Develop Edwards Trinity and Capitan Reef Complex Aquifer Supplies in Pecos County Phase I				
AMOUNT (ac-ft/yr):	11,200				
CONSTRUCTION COSTS					
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water wells	1000 gpm	15	EA	$ 2,218,771	$ 33,282,000
Wellfield Piping	30 in.	21,120	LF	$ 151	$ 3,188,000
Wellfield Piping	42 in.	21,120	LF	$ 226	$ 4,766,000
Wellfield Piping	48 in.	14,780	LF	$ 263	$ 3,888,000
Engineering and contingencies (35%)					$ 15,793,000
Well Field Subtotal					$ 60,917,000
Water Treatment Plant					
RO facility	20 mgd	1	LS	$ 44,695,639	$ 44,696,000
Engineering and contingencies (35%)					$ 15,644,000
Treatment Subtotal					$ 60,340,000
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	54 in.	475,200	LF	$ 301	$ 142,986,000
Right-of-way easements		218	AC	$ 919	$ 221,000
Engineering and Contingencies (30%)					$ 42,896,000
Subtotal Pipeline					$ 186,103,000
Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Stations	1600 HP	2	EA	$ 3,875,640	$ 7,751,000
Storage tank	1.5 MG	2	EA	$ 967,774	$ 1,936,000
Power Connection		2	LS	$ 240,000	$ 480,000
Engineering and Contingencies (35%)					$ 3,558,000
Subtotal of Pump Station(s)					$ 13,725,000
Disposal Facilities	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Injection Wells	500 gpm	12	EA	$ 2,009,754	$ 24,117,000
Collection Piping	18 in.	10,000	LF	$ 76	$ 757,000
Power Connection		1	LS	$ 1,139,250	$ 1,139,000
Engineering and Contingencies (35%)					$ 9,105,000
Subtotal of Disposal Facilities					$ 35,118,000
CONSTRUCTION TOTAL					$ 356,203,000
Permitting and Mitigation					$ 2,567,000
Interest During Construction	(18 months)				$ 18,701,000
TOTAL COST					**$ 377,471,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 31,587,000
Electricity ($0.09 kWh)					$ 2,063,000
Operation & Maintenance					$ 6,842,000
Total Annual Costs					**$ 40,492,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 3,615
Per 1,000 Gallons					$ 11.10
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 795
Per 1,000 Gallons					$ 2.44

WUGNAME:	Odessa				
STRATEGY:	Develop Edwards Trinity and Capitan Reef Complex Aquifer Supplies in Pecos County Phase II				
AMOUNT (ac-ft/yr):	16,800				
CONSTRUCTION COSTS					
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water wells	1000 gpm	21	EA	$ 2,218,771	$ 46,594,000
Wellfield Piping	30 in.	31,680	LF	$ 151	$ 4,782,000
Wellfield Piping	42 in.	31,680	LF	$ 226	$ 7,149,000
Wellfield Piping	48 in.	22,180	LF	$ 263	$ 5,834,000
Engineering and contingencies (35%)					$ 22,526,000
Well Field Subtotal					$ 86,885,000
Water Treatment Plant					
RO facility	30 mgd	1	LS	$ 63,111,955	$ 63,112,000
Engineering and contingencies (35%)					$ 22,089,000
Treatment Subtotal					$ 85,201,000
Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Stations	2000 HP	3	EA	$ 4,329,200	$ 12,988,000
Storage tank	3.0 MG	3	EA	$ 1,442,900	$ 4,329,000
Power Connection		2	LS	$ 300,000	$ 600,000
Engineering and Contingencies (35%)					$ 6,271,000
Subtotal of Pump Station(s)					$ 24,188,000
Disposal Facilities	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Injection Wells	500 gpm	17	EA	$ 2,009,754	$ 34,166,000
Collection Piping	24 in.	10,000	LF	$ 113	$ 1,131,000
Power Connection		1	LS	$ 1,614,000	$ 1,614,000
Engineering and Contingencies (35%)					$ 12,919,000
Subtotal of Disposal Facilities					$ 49,830,000
CONSTRUCTION TOTAL					$ 246,104,000
Permitting and Mitigation					$ 452,000
Interest During Construction	(18 months)				$ 12,920,000
TOTAL COST					**$ 259,476,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 21,713,000
Electricity ($0.09 kWh)					$ 3,173,000
Operation & Maintenance					$ 7,741,000
Total Annual Costs					**$ 32,627,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 1,942
Per 1,000 Gallons					$ 5.96
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 650
Per 1,000 Gallons					$ 1.99

WUGNAME:	San Angelo				
STRATEGY:	Direct and/or Indirect Reuse for Municipal Use				
AMOUNT (ac-ft/yr):	7,000				
CONSTRUCTION COSTS					
Wastewater Treatment Facilities	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Wastewater Treatment Plant Improvements	15 MG	1	LS	$12,850,831	$ 12,851,000
Engineering and Contingencies (35%)					$ 4,498,000
Subtotal of Treatment					$ 17,349,000
Direct Reuse					
Treatment Facilities	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Land Acquisition		7	AC	$ 1,266	$ 9,000
Reuse Water Treatment Plant	13 MG	1	LS	$ 72,481,723	$ 72,482,000
Ground Storage Tank	1.5 MG	1	LS	$ 967,774	$ 968,000
Engineering and Contingencies (35%)					$ 25,711,000
Subtotal of Treatment					$ 99,170,000
Reject Facilities	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Disposal wells	500	9	LS	$ 2,009,754	$ 18,088,000
Engineering and Contingencies (35%)					$ 6,331,000
Subtotal of Reject Facilities					$ 24,419,000
CONSTRUCTION TOTAL					$ 140,938,000
Permitting and Mitigation					$ 1,500,000
Interest During Construction	(18 months)				$ 7,399,000
TOTAL COST					**$ 150,000,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 12,552,000
Operation & Maintenance					$ 7,231,000
Total Annual Costs					**$ 19,783,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 2,826
Per 1,000 Gallons					$ 8.67
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 1,033
Per 1,000 Gallons					$ 3.17

WUGNAME:	San Angelo				
STRATEGY:	Desalination of Other Aquifer Supplies in Tom Green County				
AMOUNT (ac-ft/yr):	3,750				
CONSTRUCTION COSTS					
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Purchase Groundwater Rights		6000	AC	$ 500	$ 3,000,000
Water wells	500 gpm	15	EA	$ 339,508	$ 5,093,000
Well field collection	24 in.	7500	LF	$ 159	$ 1,189,000
Engineering and contingencies (35%)					$ 3,249,000
Subtotal Well field					$ 12,531,000
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	24 in.	26,000	LF	$ 159	$ 4,122,000
Right-of-way easements		12	AC	$ 1,266	$ 17,000
Engineering and Contingencies (30%)					$ 1,242,000
Subtotal Pipeline					$ 5,381,000
Pump Stations	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Stations	440 HP	2	EA	$ 2,349,300	$ 4,699,000
Engineering and Contingencies (35%)					$ 1,645,000
Subtotal of Pumps					$ 6,344,000
Treatment Facilities	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
RO Water Treatment Plant	7 MG	1	LS	$ 18,045,055	$ 18,045,000
Ground Storage Tank	0.7 MG	1	LS	$ 509,127	$ 509,000
Engineering and Contingencies (35%)					$ 6,494,000
Subtotal of Treatment					$ 25,048,000
Reject Facilities	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Disposal wells	500	4	LS	$ 2,009,754	$ 8,039,000
Engineering and Contingencies (35%)					$ 2,814,000
Subtotal of Reject Facilities					$ 10,853,000
CONSTRUCTION TOTAL					$ 60,157,000
Permitting and Mitigation					$ 123,000
Interest During Construction	(24 months)				$ 4,211,000
TOTAL COST					**$ 64,491,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 5,397,000
Electricity ($0.09 kWh)					$ 154,000
Operation & Maintenance					$ 2,483,000
Total Annual Costs					**$ 8,034,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 2,142
Per 1,000 Gallons					$ 6.57
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 703
Per 1,000 Gallons					$ 2.16

WUGNAME:	San Angelo				
STRATEGY:	Hickory Well Field Expansion in McCulloch County				
AMOUNT (ac-ft/yr):	4,000				
CONSTRUCTION COSTS					
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water wells		8	EA	$ 1,669,447	$ 13,356,000
Well field piping		4,000	LF	$ 35	$ 139,000
Engineering and contingencies (30%)					$ 4,049,000
Subtotal Well Field					$ 17,544,000
Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Station Upgrade	500 HP	1	LS	$ 2,388,608	$ 2,389,000
Engineering and Contingencies (35%)					$ 836,000
Subtotal of Pump Station(s)					$ 3,225,000
Water Treatment					
RO Upgrades		1	LS	$ 4,000,000	$ 4,000,000
Engineering and Contingencies (35%)					$ 1,400,000
Subtotal of Treatment					$ 5,400,000
CONSTRUCTION TOTAL					$ 26,169,000
Permitting and Mitigation					$ 19,000
Interest During Construction	(12 months)				$ 916,000
TOTAL COST					**$ 27,104,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 2,190,000
Electricity ($0.09 kWh)					$ 1,278,000
Operation & Maintenance					$ 595,000
Total Annual Costs					**$ 4,063,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 1,016
Per 1,000 Gallons					$ 3.12
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 468
Per 1,000 Gallons					$ 1.44

WUGNAME:	San Angelo
STRATEGY:	Development of Edwards-Trinity Aquifer supplies in Schleicher County
AMOUNT (ac-ft/yr):	4,500

CONSTRUCTION COSTS

Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Groundwater rights purchase		4,500	AC	$ 500	$ 2,250,000
Water wells	170	26	EA	$ 289,799	$ 7,535,000
Well field piping	6 in	28,000	LF	$ 24	$ 671,000
Well field piping	12 in	20,000	LF	$ 46	$ 919,000
Well field piping	14 in	4,000	LF	$ 61	$ 244,000
Engineering and contingencies (35%)					$ 4,067,000
Subtotal Well Field					$ 15,686,000

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	24 in.	158,400	LF	$ 136	$ 21,512,000
Right-of-way easements		73	AC	$ 1,266	$ 92,000
Engineering and Contingencies (30%)					$ 6,481,000
Subtotal Pipeline					$ 28,085,000

Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Station	515 HP	1	EA	$ 2,398,425	$ 2,398,000
Storage tank	0.5 MG	1	EA	$ 412,257	$ 412,000
Engineering and Contingencies (35%)					$ 984,000
Subtotal of Pump Station(s)					$ 3,794,000

CONSTRUCTION TOTAL		$ 47,565,000
Permitting and Mitigation		$ 996,000
Interest During Construction	(24 months)	$ 3,330,000
TOTAL COST		**$ 51,891,000**
ANNUAL COSTS		
Debt Service (5.5% for 20 years)		$ 4,342,000
Electricity ($0.09 kWh)		$ 268,000
Operation & Maintenance		$ 519,000
Total Annual Costs		**$ 5,129,000**
UNIT COSTS (Until Amortized)		
Per Acre-Foot of treated water		$ 1,140
Per 1,000 Gallons		$ 3.50
UNIT COSTS (After Amortization)		
Per Acre-Foot		$ 175
Per 1,000 Gallons		$ 0.54

WUGNAME:	San Angelo
STRATEGY:	Development of Pecos Valley - Edwards Trinity Plateau Aquifer supplies in Pecos County
AMOUNT (ac-ft/yr):	12,000

CONSTRUCTION COSTS

Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Groundwater rights purchase		12,000	AC	$ 500	$ 6,000,000
Water wells	1800	7	EA	$ 697,463	$ 4,882,000
Well field piping	36 in	10,000	LF	$ 226	$ 2,257,000
Engineering and contingencies (35%)					$ 4,599,000
Subtotal Well Field					$ 17,738,000

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	36 in.	712,800	LF	$ 226	$ 160,859,000
Right-of-way easements		327	AC	$ 1,266	$ 414,000
Engineering and Contingencies (30%)					$ 48,382,000
Subtotal Pipeline					$ 209,655,000

Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Station	1200 HP	3	EA	$ 3,422,080	$ 10,266,000
Storage tank	1.2 MG	1	EA	$ 806,375	$ 806,000
Engineering and Contingencies (35%)					$ 3,875,000
Subtotal of Pump Station(s)					$ 14,947,000

CONSTRUCTION TOTAL		$ 242,340,000
Permitting and Mitigation		$ 3,422,000
Interest During Construction	(24 months)	$ 16,964,000
TOTAL COST		**$ 262,726,000**
ANNUAL COSTS		
Debt Service (5.5% for 20 years)		$ 21,985,000
Electricity ($0.09 kWh)		$ 1,023,000
Operation & Maintenance		$ 2,304,000
Total Annual Costs		**$ 25,312,000**
UNIT COSTS (Until Amortized)		
Per Acre-Foot of treated water		$ 2,109
Per 1,000 Gallons		$ 6.47
UNIT COSTS (After Amortization)		
Per Acre-Foot		$ 277
Per 1,000 Gallons		$ 0.85

WUGNAME:	San Angelo
STRATEGY:	Development of Capitan Reef Complex Aquifer Supplies in Pecos County
AMOUNT (ac-ft/yr):	11,100

CONSTRUCTION COSTS

Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Groundwater rights purchase		11,100	AC	$ 500	$ 5,550,000
Water wells	1000	12	EA	$ 2,218,771	$ 26,625,000
Well field piping	36 in	58,080	LF	$ 226	$ 13,107,000
Engineering and contingencies (35%)					$ 15,849,000
Subtotal Well Field					$ 61,131,000

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	36 in.	950,400	LF	$ 226	$ 214,479,000
Right-of-way easements		436	AC	$ 1,266	$ 552,000
Engineering and Contingencies (30%)					$ 64,509,000
Subtotal Pipeline					$ 279,540,000

Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Station	1050 HP	4	EA	$ 3,251,995	$ 13,008,000
Storage tank	1.0 MG	1	EA	$ 698,776	$ 699,000
Engineering and Contingencies (35%)					$ 4,797,000
Subtotal of Pump Station(s)					$ 18,504,000

CONSTRUCTION TOTAL		$ 359,175,000
Permitting and Mitigation		$ 4,775,000
Interest During Construction	(24 months)	$ 25,142,000
TOTAL COST		**$ 389,092,000**

ANNUAL COSTS

Debt Service (5.5% for 20 years)	$ 32,559,000
Electricity ($0.09 kWh)	$ 1,527,000
Operation & Maintenance	$ 3,208,000
Total Annual Costs	**$ 37,294,000**

UNIT COSTS (Until Amortized)

Per Acre-Foot of treated water	$ 3,360
Per 1,000 Gallons	$ 10.31

UNIT COSTS (After Amortization)

Per Acre-Foot	$ 427
Per 1,000 Gallons	$ 1.31

WUGNAME:	San Angelo				
STRATEGY:	Desalination of Brackish Groundwater				
AMOUNT (ac-ft/yr):	11,200				
CONSTRUCTION COSTS					
Treatment Facilities	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
RO Treatment	15 MG	1	LS	$ 35,487,481	$ 35,487,000
Engineering and Contingencies (35%)					$ 12,420,000
Subtotal of Treatment					$ 47,907,000
Reject Facilities	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Disposal wells	1000 gpm	4	LS	$ 2,679,672	$ 10,719,000
Engineering and Contingencies (35%)					$ 3,752,000
Subtotal of Reject Facilities					$ 14,471,000
CONSTRUCTION TOTAL					$ 62,378,000
Permitting and Mitigation					$ 234,000
Interest During Construction	(24 months)				$ 4,366,000
TOTAL COST					**$ 66,978,000**
ANNUAL COSTS*					
Debt Service (5.5% for 20 years)					$ 5,605,000
Operation & Maintenance					$ 3,656,000
Total Annual Costs					**$ 9,261,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 827
Per 1,000 Gallons					$ 2.54
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 326
Per 1,000 Gallons					$ 1.00

WUGNAME:	San Angelo			
STRATEGY:	Red Arroyo OCR			
AMOUNT (ac-ft/yr):	1,400			
CONSTRUCTION COSTS				
Item Description	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump, 150 HP Vertical Turbine	2	EA	$150,000	$300,000
Discharge piping, header, valves and miscellaneous equipment	1	LS	$200,000	$200,000
Pump station structure	1	LS	$75,000	$75,000
Electrical service to pump station	1	LS	$150,000	$150,000
Instrumentation and control	1	LS	$40,000	$40,000
Pipe, 36-inch ductile iron	2,000	LF	$200	$400,000
Pipe, 48-inch CMP	600	LF	$160	$96,000
Weir and emergency spillway	1	LS	$100,000	$100,000
Excavation and haulage	3,484,800	CY	$3	$10,454,000
33-inch water line relocation	1	LS	$1,000,000	$1,000,000
Inflow structure (dam and weir)	2	EA	$50,000	$100,000
Detention pond clay liner	400,000	CY	$8	$3,200,000
Rip-rap for inflow structure	1,000	SY	$10	$10,000
Headwall-wingwall for inflow pipes	4	EA	$5,000	$20,000
CONSTRUCTION TOTAL				$16,145,000
Engineering, Legal Costs and Contingencies				$5,616,000
Environmental & Archaeology Studies and Mitigation				$161,000
Land Acquisition and Surveying (151 acres)				$423,000
Interest During Construction (2 years)				$1,130,000
TOTAL COST				**$23,475,000**
ANNUAL COSTS				
Debt Service (5.5% for 20 years)				$1,964,000
Electricity ($0.09 kWh)				$66,000
Operation & Maintenance				$393,000
Water Purchase				$85,000
Total Annual Costs				$2,508,000
UNIT COSTS (Until Amortized)				
Per Acre-Foot of treated water				$1,791
Per 1,000 Gallons				$5.50
UNIT COSTS (After Amortization)				
Per Acre-Foot				$389
Per 1,000 Gallons				$1.19

WUGNAME:	UCRA					
STRATEGY:	Purchase water from San Angelo and Expand Transmission System					
AMOUNT (ac-ft/yr):	500					
CONSTRUCTION COSTS						
Northwest Supply Line	**Quantity**	**Unit**	**Unit Price**		**Cost**	
Water Line & Appurtenances	107,700	LF	Variable		$	9,710,000
Lakeview GST Pump Station	1	EA	$	1,262,000	$	1,262,000
Booster Pump Station	1	EA	$	1,262,000	$	1,262,000
400,000 gallon GST	1	EA	$	316,000	$	316,000
Engineering and contingencies					$	3,907,000
Subtotal					$	16,457,000
South Supply Line	**Quantity**	**Unit**	**Unit Price**		**Cost**	
Water Line & Appurtenances	74,500	LF	Variable		$	6,144,000
Booster Pump Station	3	EA	$	1,262,000	$	3,786,000
300,000 gallon GST	1	EA	$	242,000	$	242,000
200,000 gallon GST	2	EA	$	158,000	$	316,000
Engineering and contingencies					$	3,364,000
Subtotal					$	13,852,000
CONSTRUCTION TOTAL					$	30,309,000
Permitting and Mitigation					$	863,000
Interest During Construction	(12 months)				$	1,061,000
TOTAL COST					**$**	**32,233,000**
ANNUAL COSTS						
Debt Service (5.5% for 20 years)					$	2,697,000
Electricity ($0.09 kWh)					$	23,000
Operation & Maintenance					$	338,140
Total Annual Costs					**$**	**3,058,140**
UNIT COSTS (Until Amortized)						
Per Acre-Foot of treated water					$	6,116
Per 1,000 Gallons					$	18.77
UNIT COSTS (After Amortization)						
Per Acre-Foot					$	722
Per 1,000 Gallons					$	2.22

WUGNAME:	Andrews					
STRATEGY:	Develop Ogallala Aquifer Supplies					
AMOUNT (ac-ft/yr):	4,300					
CONSTRUCTION COSTS						
Phase I	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Water wells	400 gpm	5	EA	$	178,560	$ 893,000
Connector Pipeline and Pump Station Improvements		1	LS	$	1,624,200	$ 1,624,000
Gathering Lines	various	21120	LF	$	60	$ 1,267,000
Ground Storage Tank	.2 MG	1	LS	$	200,000	$ 200,000
Engineering and contingencies (35%)						$ 1,324,000
Subtotal Phase I						$ 5,308,000
Phase II	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Water wells	200 gpm	8	EA	$	224,915	$ 1,799,000
Well field collection	various	2000	LF	$	37	$ 75,000
Well field collection	18 in.	2500	LF	$	91	$ 228,000
Engineering and contingencies (35%)						$ 736,000
Subtotal Phase II						$ 2,838,000
Phase III						
Water wells	100 gpm	10	EA	$	138,595	$ 1,386,000
Well field collection	various	2,000	LF	$	60	$ 120,000
Transmission pipeline	20 in	42,240	LF	$	81	$ 3,412,000
Pump Station	200 HP	1	LS	$	1,665,911	$ 1,666,000
Ground Storage Tank	.2 MG	1	LS	$	200,000	$ 200,000
Engineering and contingencies (35%)						$ 2,304,000
Subtotal Phase III						$ 9,088,000
CONSTRUCTION TOTAL						**$ 17,234,000**
Permitting and Mitigation						$ 231,000
Interest During Construction	(24 months)					$ 1,206,000
TOTAL COST						**$ 18,671,000**
ANNUAL COSTS						
Debt Service (5.5% for 20 years)						$ 1,562,000
Electricity ($0.09 kWh)						$ 300,000
Operation & Maintenance						$ 233,000
Total Annual Costs						**$ 2,095,000**
UNIT COSTS (Until Amortized)						
Per Acre-Foot of treated water						$ 487
Per 1,000 Gallons						$ 1.50
UNIT COSTS (After Amortization)						
Per Acre-Foot						$ 124
Per 1,000 Gallons						$ 0.38

WUGNAME:	Ballinger				
STRATEGY:	Purchase Clyde's Water Right in Fort Phantom Hill Reservoir				
AMOUNT (ac-ft/yr):	990				
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	10 in.	343,200	LF	$ 40	$ 13,868,000
Right-of-way easements		158	AC	$ 1,266	$ 219,000
Engineering and Contingencies (30%)					$ 4,226,000
Subtotal Pipeline					$ 18,313,000
Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Intake Pump Station	875 HP	1	EA	$ 5,539,675	$ 5,540,000
Pump Stations	875 HP	4	EA	$ 3,053,550	$ 12,214,000
Storage tank	1 MGD	4	EA	$ 698,776	$ 2,795,000
Power Connection		1	LS	$ 656,250	$ 656,000
Engineering and Contingencies (35%)					$ 5,483,000
Subtotal of Pump Station(s)					$ 26,688,000
CONSTRUCTION TOTAL					$ 45,001,000
Permitting and Mitigation					$ 1,625,000
Interest During Construction	(6 months)				$ 467,000
TOTAL CAPITAL COST					**$ 47,093,000**
ANNUAL COSTS					**Cost**
Debt Service (5.5% for 20 years)					$ 3,941,000
O&M					$ 671,000
Electricity					$ 188,000
Total Annual Cost					**$ 4,800,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 4,848
Per 1,000 gallons					$ 14.88
UNIT COSTS (After Amortization)					
Per Acre-Foot of treated water					$ 868
Per 1,000 gallons					$ 2.66

WUGNAME:	Bangs					
STRATEGY:	Direct Non-potable Reuse For Public Parks Irrigation (Type I)					
AMOUNT (ac-ft/yr):	25					

CAPITAL COSTS						
Wastewater Treatment Plant Improvements	**Size**	**Quantity**	**Units**	**Unit Price**		**Cost**
Wastewater Treatment Plant Improvements	0.04 MGD	1	LS	$ 50,032	$	50,000
Engineering and Contingencies (35%)					$	18,000
Subtotal WWTP Improvements					$	68,000
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Transmission pipeline	6 in.	10,560	LF	$ 20	$	213,000
Right-of-way easements		5	AC	$ 2,969	$	16,000
Engineering and Contingencies (30%)					$	69,000
Subtotal Pipeline					$	298,000
CONSTRUCTION TOTAL					$	366,000
Permitting and Mitigation					$	50,000
Interest During Construction	(6 months)				$	6,000
TOTAL CAPITAL COST					**$**	**422,000**
ANNUAL COSTS						**Cost**
Debt Service (5.5% for 20 years)					$	35,000
O&M					$	3,000
Electricity					$	1,000
Total Annual Cost					**$**	**39,000**
UNIT COSTS (Until Amortized)						
Per Acre-Foot of treated water					$	1,560
Per 1,000 gallons					$	4.79
UNIT COSTS (After Amortization)						
Per Acre-Foot of treated water					$	160
Per 1,000 gallons					$	0.49

WUGNAME:	Big Spring				
STRATEGY:	Big Spring WTP Expansion				
AMOUNT (ac-ft/yr):	3,000				
CONSTRUCTION COSTS					
Water Treatment Plant Expansion	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water Treatment Plant Expansion	5.5 MGD	1	LS	$ 11,697,799	$ 11,698,000
Engineering and Contingencies (35%)					$ 4,094,000
Subtotal Water Treatment Plant Expansion					$ 15,792,000
CONSTRUCTION TOTAL					$ 15,792,000
Interest During Construction	(12 months)				$ 552,720
TOTAL COST					**$ 16,345,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 1,368,000
Operation & Maintenance					$ 585,000
Total Annual Costs					**$ 1,953,000**

WUGNAME:	Brady				
STRATEGY:	Advanced GroundwaterTreatment				
AMOUNT (ac-ft/yr):	617				

CONSTRUCTION COSTS

Water Treatment Plant Expansion	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water Treatment Plant Expansion	1.1 MGD	1	LS	$ 18,544,000	$ 18,544,000
Engineering and Contingencies					$ 1,854,000
Subtotal Water Treatment Plant Expansion					$ 20,398,000
CONSTRUCTION TOTAL					$ 20,398,000
TOTAL COST					**$ 20,398,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 1,707,000
Operation & Maintenance					$ 152,000
Total Annual Costs					**$ 1,859,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 3,013
Per 1,000 Gallons					$ 9.25
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 246
Per 1,000 Gallons					$ 0.76

WUGNAME:	Bronte, Robert Lee				
STRATEGY:	Develop Edwards-Trinity Aquifer Supplies in Nolan County (Region G)				
AMOUNT (ac-ft/yr):	78				
CONSTRUCTION COSTS					
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Purchase Groundwater Rights		200	AC	$ 500	$ 100,000
Water wells	150 gpm	2	EA	$ 172,493	$ 345,000
Well field collection	6 in.	400	LF	$ 20	$ 8,000
Engineering and contingencies (35%)					$ 124,000
Subtotal Well field					$ 477,000
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	8 in.	116,160	LF	$ 31	$ 3,636,000
Right-of-way easements		53	AC	$ 1,266	$ 74,000
Engineering and Contingencies (30%)					$ 1,113,000
Subtotal Pipeline					$ 4,823,000
Pump Stations	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Stations	36 HP	1	EA	$ 768,544	$ 769,000
Ground Storage Tank	0.02 MG	1	EA	$ 169,644	$ 170,000
Engineering and Contingencies (35%)					$ 329,000
Subtotal of Pumps					$ 1,268,000
CONSTRUCTION TOTAL					$ 6,568,000
Permitting and Mitigation					$ 552,000
Interest During Construction	(12 months)				$ 230,000
TOTAL COST					**$ 7,350,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 615,000
Electricity ($0.09 kWh)					$ 7,000
Operation & Maintenance					$ 71,000
Total Annual Costs					**$ 693,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 8,885
Per 1,000 Gallons					$ 27.27
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 1,000
Per 1,000 Gallons					$ 3.07

WUGNAME:	Bronte				
STRATEGY:	Bronte WTP Expansion				
AMOUNT (ac-ft/yr):	504				
CONSTRUCTION COSTS					
Water Treatment Plant Expansion	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water Treatment Plant Expansion	1.0 MGD	1	LS	$4,844,022	$4,844,000
Engineering and Contingencies (35%)					$1,695,000
Subtotal Water Treatment Plant Expansion					$6,539,000
CONSTRUCTION TOTAL					$6,539,000
Interest During Construction	(12 months)				$228,865
TOTAL COST					**$6,768,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$566,000
Operation & Maintenance					$242,000
Total Annual Costs					**$808,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 1,603
Per 1,000 Gallons					$ 4.92
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 480
Per 1,000 Gallons					$ 1.47

WUGNAME:	Bronte & Robert Lee					
STRATEGY:	Purchase water from UCRA					
AMOUNT (ac-ft/yr):	500					
CONSTRUCTION COSTS						
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Transmission pipeline	10 in	147,840	LF	$	35	$ 5,150,000
Right-of-way easements		68	AC	$	1,266	$ 95,000
Engineering and Contingencies (30%)						$ 1,574,000
Subtotal Pipeline						$ 6,819,000
Pump Stations	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Pump Stations	105 HP	2	EA	$	870,940	$ 1,742,000
Ground Storage Tank	0.05 MG	2	EA	$	178,301	$ 357,000
Engineering and Contingencies (35%)						$ 735,000
Subtotal of Pumps						$ 2,834,000
CONSTRUCTION TOTAL						$ 9,653,000
Permitting and Mitigation						$ 700,000
Interest During Construction	(12 months)					$ 338,000
TOTAL COST						**$ 10,691,000**
ANNUAL COSTS						
Debt Service (5.5% for 20 years)						$ 895,000
Electricity ($0.09 kWh)						$ 40,000
Operation & Maintenance						$ 104,000
Purchase Water Cost						$ 326,000
Total Annual Costs						**$ 1,365,000**
UNIT COSTS (Until Amortized)						
Per Acre-Foot of treated water						$ 2,730
Per 1,000 Gallons						$ 8.38
UNIT COSTS (After Amortization)						
Per Acre-Foot						$ 940
Per 1,000 Gallons						$ 2.88

WUGNAME:	Bronte, Ballinger, Winters, and Robert Lee				
STRATEGY:	Lake Brownwood to Runnels and Coke Counties				
AMOUNT (ac-ft/yr):	Winters	729			
	Ballinger	1345			
	Bronte	280			
	Robert Lee	448			
	Total	2,802			
CONSTRUCTION COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	20 in.	230,936	LF	$ 88	$ 20,403,000
Transmission pipeline	18 in.	93,471	LF	$ 76	$ 7,078,000
Transmission pipeline	12 in.	61,797	LF	$ 38	$ 2,371,000
Transmission pipeline	10 in.	54,357	LF	$ 35	$ 1,894,000
Right-of-way easements		202	AC	$ 1,474	$ 298,000
Engineering and Contingencies (30%)					$ 9,613,200
Subtotal Pipeline					$ 41,657,200
Pump Station	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Station at Lake Brownwood	700 HP	1	LS	$ 4,637,900	$ 4,638,000
Booster Station #1	700 HP	1	LS	$ 2,519,500	$ 2,519,500
Storage Tank at Booster Station #1	0.75 MG	1	LS	$ 496,255	$ 496,255
Booster Station #2	700 HP	1	LS	$ 2,519,500	$ 2,519,500
Storage Tank at Booster Station #2	0.75 MG	1	LS	$ 496,255	$ 496,255
Storage Tank at High Point	0.75 MG	1	LS	$ 496,255	$ 496,255
Outlet structure at Valley Creek		1	LS	$ 147,000	$ 147,000
Booster Station #3	400 HP	1	LS	$ 2,323,100	$ 2,323,100
Storage Tank at Booster Station #3	0.50 MG	1	LS	$ 374,123	$ 374,123
Engineering and Contingencies (35%)					$ 4,903,496
Subtotal of Pump Station(s)					$ 18,913,483
CONSTRUCTION TOTAL					$ 60,571,000
Permitting and Mitigation					$ 475,000
Interest During Construction	(12 months)				$ 2,120,000
TOTAL COST					**$ 63,166,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 5,286,000
Electricity ($0.09 kWh)					$ 249,000
Operation & Maintenance					$ 680,043
Raw Water Purchase					$ 1,370,000
Total Annual Costs					**$ 7,585,043**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 2,707
Per 1,000 Gallons					$ 8.31
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 821
Per 1,000 Gallons					$ 2.52
Notes: Cost for buying raw water is assumed to be $1.50 per 1,000 gallons					

WUGNAME:	Bronte, Ballinger, Winters, and Robert Lee				
STRATEGY:	Regional System from Fort Phantom Hill to Runnels and Coke Counties				
AMOUNT (ac-ft/yr):	Winters	175			
	Ballinger	500			
	Bronte	350			
	Robert Lee	130			
	Total	1,155			

CONSTRUCTION COSTS

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	12 in	237,600	LF	$ 45	$ 10,575,000
Transmission pipeline	8 in	79,200	LF	$ 36	$ 2,876,000
Transmission pipeline	10 in	105,600	LF	$ 40	$ 4,267,000
Right-of-way easements		194	AC	$ 1,266	$ 246,000
Engineering and Contingencies (30%)					$ 5,389,200
Subtotal Pipeline					$ 23,353,200

Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Intake Pump Station	875 HP	1	EA	$ 5,539,675	$ 5,540,000
Pump Stations	875 HP	3	EA	$ 3,053,550	$ 9,161,000
Pump Stations	90 HP	2	EA	$ 821,200	$ 1,642,000
Storage tank	1 MGD	6	EA	$ 698,776	$ 4,193,000
Power Connection		1	LS	$ 525,180	$ 525,000
Engineering and Contingencies (35%)					$ 5,432,000
Subtotal of Pump Station(s)					$ 26,493,000

CONSTRUCTION TOTAL		$ 49,846,000
Permitting and Mitigation		$ 2,000,000
Interest During Construction	(12 months)	$ 1,745,000
TOTAL COST		**$ 53,591,000**
ANNUAL COSTS		
Debt Service (5.5% for 20 years)		$ 4,484,000
Electricity ($0.09 kWh)		$ 235,257
Operation & Maintenance		$ 706,165
Total Annual Costs		**$ 5,425,422**
UNIT COSTS (Until Amortized)		
Per Acre-Foot of treated water		$ 4,697
Per 1,000 Gallons		$ 14.42
UNIT COSTS (After Amortization)		
Per Acre-Foot		$ 815
Per 1,000 Gallons		$ 2.50

WUGNAME:	Bronte				
STRATEGY:	Direct Potable Reuse				
AMOUNT (ac-ft/yr):	94				
CAPITAL COSTS					
Water Treatment Plant	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Land Acquisition		3	AC	1266	$ 4,000
Reuse Water Treatment Plant	0.13 MGD	1	LS	$ 2,058,069	$ 2,058,000
Engineering and Contingencies (35%)					$ 722,000
Subtotal WWTP Improvements					$ 2,784,000
CONSTRUCTION TOTAL					$ 2,784,000
Interest During Construction	(12 months)				$ 97,000
Permitting and Mitigation					$ 278,400
TOTAL CAPITAL COST					**$ 3,159,000**
ANNUAL COSTS					**Cost**
Debt Service (5.5% for 20 years)					$ 264,000
O&M					$ 131,000
Total Annual Cost					**$ 395,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 4,213
Per 1,000 gallons					$ 12.93
UNIT COSTS (After Amortization)					
Per Acre-Foot of treated water					$ 1,397
Per 1,000 gallons					$ 4.29

WUGNAME:	Bronte				
STRATEGY:	Rehabilitation of Oak Creek Pipeline				
AMOUNT (ac-ft/yr):	104				
CONSTRUCTION COSTS					
Pipeline Rehabilitation	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
New pipe	10"	29,100	LF	$ 35	$ 1,014,000
Replace storage tank	0.05 MG	1	LS	$ 118,524	$ 119,000
Engineering and Contingencies (30%)					$ 340,000
Subtotal Pipeline					$ 1,473,000
CONSTRUCTION TOTAL					**$ 1,473,000**
Interest During Construction	(6 months)				$ 26,000
TOTAL CAPITAL COST					**$ 1,499,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 125,400
Electricity ($.09/kwh)					$ 2,400
O&M					$ 14,700
Total Annual Cost					$ 142,500
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 1,370
Per 1,000 gallons					$ 4.21
UNIT COSTS (After Amortization)					
Per Acre-Foot of treated water					$ 164.42
Per 1,000 gallons					$ 0.50

WUGNAME:	Bronte						
STRATEGY:	New Groundwater Southeast of Bronte						
AMOUNT (ac-ft/yr):	200						
CONSTRUCTION COSTS							
Well Field	**Size**	**Quantity**	**Unit**		**Unit Price**		**Cost**
Groundwater rights		450	AC	$	335	$	151,000
Water wells	175 gpm	3	EA	$	205,400	$	616,000
Piping and other appurtenances		1	LS	$	30,800	$	31,000
Engineering and contingencies (35%)						$	226,450
Well Field Subtotal						$	1,024,450
Transmission							
Pipeline	10 in.	26,400	LF	$	35	$	920,000
Right of Way Easements		12	AC	$	1,266	$	15,000
Pump Station	20 HP	1	EA	$	719,230	$	719,000
Engineering and contingencies (30%)						$	496,000
Transmission Subtotal						$	2,150,000
RO Treatment							
RO Treatment	.75 mgd	1	EA	$	2,901,365	$	2,901,000
Engineering and contingencies (35%)						$	1,015,000
RO Subtotal						$	3,916,000
CONSTRUCTION TOTAL						$	7,090,000
Permitting and Mitigation						$	125,000
Interest During Construction	(12 months)					$	253,000
TOTAL COST						**$**	**7,468,000**
ANNUAL COSTS							
Debt Service (5.5% for 20 years)						$	625,000
Electricity ($0.09 kWh)						$	5,000
Operation & Maintenance						$	304,000
Water Treatment						$	38,000
Total Annual Costs						**$**	**972,000**
UNIT COSTS (Until Amortized)							
Per Acre-Foot of treated water						$	4,860
Per 1,000 Gallons						$	14.91
UNIT COSTS (After Amortization)							
Per Acre-Foot						$	1,735
Per 1,000 Gallons						$	5.32

WUGNAME:	Bronte						
STRATEGY:	New Groundwater at Oak Creek Reservoir						
AMOUNT (ac-ft/yr):	150						
CONSTRUCTION COSTS							
Well Field	**Size**	**Quantity**	**Unit**		**Unit Price**		**Cost**
Groundwater rights		150	AC	$	335	$	50,000
Water wells	100 gpm	3	EA	$	167,510	$	503,000
Piping and other appurtenances		1	LS	$	25,100	$	25,000
Engineering and contingencies (35%)						$	184,800
Well Field Subtotal						$	762,800
Transmission around lake							
Pipeline	6 in.	15,840	LF	$	23	$	371,000
Right of Way Easements		5	AC	$	1,266	$	6,000
Pump Station	15 HP	1	EA	$	699,523	$	700,000
Ground storage	0.10 MG	1	EA	$	192,730	$	193,000
Engineering and contingencies (30%)						$	381,000
Transmission Subtotal						$	1,651,000
CONSTRUCTION TOTAL						$	2,413,800
Permitting and Mitigation						$	75,000
Interest During Construction	(12 months)					$	87,108
TOTAL COST						**$**	**2,576,000**
ANNUAL COSTS							
Debt Service (5.5% for 20 years)						$	216,000
Electricity ($0.09 kWh)						$	3,000
Operation & Maintenance						$	32,000
Water Treatment						$	16,000
Total Annual Costs						**$**	**267,000**
UNIT COSTS (Until Amortized)							
Per Acre-Foot of treated water						$	1,780
Per 1,000 Gallons						$	5.46
UNIT COSTS (After Amortization)							
Per Acre-Foot						$	340
Per 1,000 Gallons						$	1.04

WUGNAME:	Brownwood				
STRATEGY:	Direct Potable Reuse				
AMOUNT (ac-ft/yr):	841				
CAPITAL COSTS					
Water Treatment Plant		**Quantity**	**Units**	**Unit Price**	**Cost**
Direct Potable Reuse Plant		1	LS	$ 6,007,345	$ 6,007,000
Engineering and Contingencies (35%)					$ 2,102,450
Subtotal WWTP Improvements					$ 8,109,450
CONSTRUCTION TOTAL					$ 8,100,000
Interest During Construction	(18 months)				$ 425,000
TOTAL CAPITAL COST					**$ 8,500,000**
ANNUAL COSTS					**Cost**
Debt Service (5.5% for 20 years)					$ 711,000
O&M					$ 585,000
Total Annual Cost					**$ 1,296,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 1,541
Per 1,000 gallons					$ 4.73
UNIT COSTS (After Amortization)					
Per Acre-Foot of treated water					$ 696
Per 1,000 gallons					$ 2.14

WUGNAME:	Colorado City				
STRATEGY:	Develop Additional Dockum Aquifer Supplies				
AMOUNT (ac-ft/yr):	2,240				
CONSTRUCTION COSTS					
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water wells	150 gpm	14	EA	$ 172,493	$ 2,415,000
Well field collection	6 in.	3500	LF	$ 24	$ 84,000
Well field collection	8 in.	3500	LF	$ 37	$ 131,000
Engineering and contingencies (35%)					$ 921,000
Subtotal Well field					$ 3,551,000
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	8 in.	18,480	LF	$ 37	$ 690,000
Right-of-way easements		8	AC	$ 1,266	$ 11,000
Engineering and Contingencies (30%)					$ 210,000
Subtotal Pipeline					$ 911,000
Pump Stations	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Stations	80 HP	1	EA	$ 813,300	$ 813,000
Ground Storage Tank	0.05 MG	1	EA	$ 178,301	$ 178,000
Engineering and Contingencies (35%)					$ 347,000
Subtotal of Pumps					$ 1,338,000
CONSTRUCTION TOTAL					$ 5,800,000
Permitting and Mitigation					$ 121,000
Interest During Construction	(12 months)				$ 203,000
TOTAL COST					**$ 6,124,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 512,000
Electricity ($0.09 kWh)					$ 109,000
Operation & Maintenance					$ 124,000
Total Annual Costs					**$ 745,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 333
Per 1,000 Gallons					$ 1.02
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 104
Per 1,000 Gallons					$ 0.32

WUGNAME:	Concho Rural WSC				
STRATEGY:	Desalination of Other Aquifer Supplies in Tom Green County				
AMOUNT (ac-ft/yr):	150				
CONSTRUCTION COSTS					
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Purchase Groundwater Rights		200	AC	$ 500	$ 100,000
Water wells	200 gpm	2	EA	$ 242,364	$ 485,000
Engineering and contingencies (35%)					$ 205,000
Subtotal Well field					$ 790,000
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	6 in.	11,000	LF	$ 20	$ 222,000
Right-of-way easements		5	AC	$ 1,266	$ 7,000
Engineering and Contingencies (30%)					$ 69,000
Subtotal Pipeline					$ 298,000
Pump Stations	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Stations	25 HP	1	EA	$ 752,000	$ 752,000
Engineering and Contingencies (35%)					$ 263,000
Subtotal of Pumps					$ 1,015,000
Treatment Facilities	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
RO Water Treatment Plant	0.27 MG	1	LS	$ 1,435,412	$ 1,435,000
Ground Storage Tank	0.03 MG	1	LS	$ 171,664	$ 172,000
Engineering and Contingencies (35%)					$ 562,000
Subtotal of Treatment					$ 2,169,000
Reject Facilities- Evaporation Pond	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Earthwork		25,500	CY	$ 5	$ 128,000
Soil Cement		2,239	CY	$ 90	$ 202,000
Grassing (Outside Slopes)		2	CY	$ 2,500	$ 5,000
Mob/demob		5%	LS		$ 17,000
Engineering and Contingencies (35%)					$ 123,000
Subtotal of Reject Facilities					$ 475,000
CONSTRUCTION TOTAL					$ 4,747,000
Permitting and Mitigation					$ 52,000
Interest During Construction	(24 months)				$ 332,000
TOTAL COST					**$ 5,131,000**

WUGNAME:	Concho Rural WSC	
STRATEGY:	Desalination of Other Aquifer Supplies in Tom Green County	
AMOUNT (ac-ft/yr):	150	
ANNUAL COSTS		
Debt Service (5.5% for 20 years)		$ 429,000
Electricity ($0.09 kWh)		$ 92,000
Operation & Maintenance		$ 180,000
Total Annual Costs		**$ 701,000**
UNIT COSTS (Until Amortized)		
Per Acre-Foot of treated water		$ 4,673
Per 1,000 Gallons		$ 14.34
UNIT COSTS (After Amortization)		
Per Acre-Foot		$ 1,813
Per 1,000 Gallons		$ 5.56

WUGNAME:	Concho Rural Water Corporation						
STRATEGY:	Develop Additional Lipan Aquifer Supplies						
AMOUNT (ac-ft/yr):	200						
CONSTRUCTION COSTS							
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**			**Cost**
Water wells	50 gpm	4	EA	$	74,865	$	299,000
Well field collection	6 in.	1000	LF	$	18	$	18,000
Engineering and contingencies (35%)						$	111,000
Subtotal Well field						$	428,000
CONSTRUCTION TOTAL						$	428,000
Permitting and Mitigation						$	5,000
Interest During Construction	(12 months)					$	15,000
TOTAL COST						**$**	**448,000**
ANNUAL COSTS							
Debt Service (5.5% for 20 years)						$	37,000
Electricity ($0.09 kWh)						$	3,000
Operation & Maintenance						$	17,000
Total Annual Costs						**$**	**57,000**
UNIT COSTS (Until Amortized)							
Per Acre-Foot of treated water						$	285
Per 1,000 Gallons						$	0.87
UNIT COSTS (After Amortization)							
Per Acre-Foot						$	100
Per 1,000 Gallons						$	0.31

WUGNAME:	Eden					
STRATEGY:	Direct Non-potable Reuse For Golf Course Irrigation (Type I)					
AMOUNT (ac-ft/yr):	50					
CAPITAL COSTS						
Wastewater Treatment Plant Improvements		**Quantity**	**Units**	**Unit Price**		**Cost**
Wastewater Treatment Plant Improvements		1	LS	$ 100,065	$	100,000
Engineering and Contingencies (30%)					$	30,000
Subtotal WWTP Improvements					$	130,000
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Transmission pipeline	6 in	10,560	LF	$ 20	$	213,000
Right-of-way easements		5	AC	$ 2,969	$	16,000
Engineering and Contingencies (30%)					$	68,700
Subtotal Pipeline					$	297,700
CONSTRUCTION TOTAL					$	427,700
Permitting and Mitigation					$	50,000
Interest During Construction	(6 months)				$	8,000
TOTAL CAPITAL COST					**$**	**485,700**
ANNUAL COSTS						**Cost**
Debt Service (5.5% for 20 years)					$	40,643
O&M					$	3,430
Electricity					$	1,034
Total Annual Cost					**$**	**45,108**
UNIT COSTS (Until Amortized)						
Per Acre-Foot of treated water					$	902
Per 1,000 gallons					$	2.77
UNIT COSTS (After Amortization)						
Per Acre-Foot of treated water					$	89
Per 1,000 gallons					$	0.27

WUGNAME:	Junction							
STRATEGY:	Develop Edwards-Trinity Plateau Aquifer Supplies							
AMOUNT (ac-ft/yr):	220							
CONSTRUCTION COSTS								
Well Field	**Size**	**Quantity**	**Unit**		**Unit Price**		**Cost**
Purchase Groundwater Rights		220	AC	$	500	$	110,000
Water wells	40 gpm	9	EA	$	82,659	$	744,000
Well field collection	6 in.	1800	LF	$	20	$	36,000
Engineering and contingencies (35%)						$	312,000
Subtotal Well field						$	1,202,000
Pipeline	**Size**	**Quantity**	**Unit**		**Unit Price**		**Cost**
Transmission pipeline	6 in.	15,840	LF	$	23	$	371,000
Right-of-way easements		7	AC	$	2,969	$	23,000
Engineering and Contingencies (30%)						$	118,000
Subtotal Pipeline						$	512,000
Pump Stations	**Size**	**Quantity**	**Unit**		**Unit Price**		**Cost**
Pump Stations	35 HP	1	EA	$	767,040	$	767,000
Ground Storage Tank	0.2 MG	2	EA	$	224,165	$	448,000
Engineering and Contingencies (35%)						$	425,000
Subtotal of Pumps						$	1,640,000
CONSTRUCTION TOTAL						$	3,354,000
Permitting and Mitigation						$	84,000
Interest During Construction	(12 months)					$	117,000
TOTAL COST						**$**	**3,555,000**
ANNUAL COSTS							
Debt Service (5.5% for 20 years)						$	297,000
Electricity ($0.09 kWh)						$	10,000
Operation & Maintenance						$	57,000
Total Annual Costs						**$**	**364,000**
UNIT COSTS (Until Amortized)							
Per Acre-Foot of treated water						$	1,655
Per 1,000 Gallons						$	5.08
UNIT COSTS (After Amortization)							
Per Acre-Foot						$	305
Per 1,000 Gallons						$	0.93

WUGNAME:	Junction				
STRATEGY:	Dredge River Intake				
AMOUNT (ac-ft/yr):	412				
CONSTRUCTION COSTS					
Dredging and disposal	**Quantity**	**Unit**	**Unit Price**		**Cost**
Bathymetric survey	15	AC	$ 2,000	$	30,000
Sediment Testing	25	EA	$ 1,000	$	25,000
Dredging and disposal	75,000	CY	$ 40	$	3,000,000
Engineering and Contingencies (35%)				$	1,069,250
Subtotal of Dredging and disposal				$	4,124,250
CONSTRUCTION TOTAL				$	4,124,250
Interest During Construction	(12 months)			$	144,000
TOTAL COST				**$**	**4,268,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)				$	357,000
Total Annual Costs				**$**	**357,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water				$	866.50
Per 1,000 Gallons				$	2.66
UNIT COSTS (After Amortization)					
Per Acre-Foot				$	-
Per 1,000 Gallons				$	-

WUGNAME:	Mason						
STRATEGY:	Additional Treatment						
AMOUNT (ac-ft/yr):	703						
CONSTRUCTION COSTS							
Water Treatment Plant Expansion	**Size**	**Quantity**	**Unit**		**Unit Price**		**Cost**
Water Treatment Plant Expansion	0.6 MGD	1	LS	$	599,915	$	600,000
Engineering and Contingencies (35%)						$	210,000
Subtotal Water Treatment Plant Expansion						$	810,000
CONSTRUCTION TOTAL						$	810,000
Interest During Construction	(12 months)					$	28,350
TOTAL COST						**$**	**838,000**
ANNUAL COSTS							
Debt Service (5.5% for 20 years)						$	70,000
Operation & Maintenance						$	99,000
Total Annual Costs						**$**	**169,000**
UNIT COSTS (Until Amortized)							
Per Acre-Foot of treated water						$	240
Per 1,000 Gallons						$	0.74
UNIT COSTS (After Amortization)							
Per Acre-Foot						$	141
Per 1,000 Gallons						$	0.43

WUGNAME:	Midland				
STRATEGY:	Development of Groundwater in Midland County (previously used for mining)				
AMOUNT (ac-ft/yr):	3,000				
CONSTRUCTION COSTS					
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water wells	50 gpm	60	EA	$ 81,263	$ 4,876,000
Well field collection	6 in.	158400	LF	$ 24	$ 3,799,000
Engineering and contingencies (35%)					$ 3,036,000
Subtotal Well field					$ 11,711,000
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	24 in.	26,400	LF	$ 159	$ 4,185,000
Right-of-way easements		12	AC	$ 1,076	$ 14,000
Engineering and Contingencies (30%)					$ 1,260,000
Subtotal Pipeline					$ 5,459,000
Pump Stations	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Stations	380 HP	1	EA	$ 2,224,980	$ 2,225,000
Ground Storage Tank	0.5 HP	1	LS	$ 432,449	$ 432,000
Engineering and Contingencies (35%)					$ 930,000
Subtotal of Pumps					$ 3,587,000
Treatment Facilities	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Land Acquisition		3	AC	$ 1,076	$ 3,000
RO Water Treatment Plant	5 MG	1	LS	$ 13,874,931	$ 13,875,000
Ground Storage Tank	0.5 MG	1	LS	$ 432,449	$ 432,000
Engineering and Contingencies (35%)					$ 5,009,000
Subtotal of Treatment					$ 19,319,000
Reject Facilities	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Disposal wells	1000	2	LS	$ 2,679,672	$ 5,359,000
Engineering and Contingencies (35%)					$ 1,876,000
Subtotal of Reject Facilities					$ 7,235,000
CONSTRUCTION TOTAL					$ 47,311,000
Permitting and Mitigation					$ 878,000
Interest During Construction	(24 months)				$ 3,312,000
TOTAL COST					**$ 51,501,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 4,310,000
Electricity ($0.09 kWh)					$ 146,000
Operation & Maintenance					$ 1,801,000
Total Annual Costs					**$ 6,257,000**

WUGNAME:	Midland		
STRATEGY:	Development of Groundwater in Midland County (previously used for mining)		
AMOUNT (ac-ft/yr):	3,000		
UNIT COSTS (Until Amortized)			
Per Acre-Foot of treated water		$	2,086
Per 1,000 Gallons		$	6.40
UNIT COSTS (After Amortization)			
Per Acre-Foot		$	649
Per 1,000 Gallons		$	1.99

WUGNAME:	Midland				
STRATEGY:	Additional T-Bar Ranch Supplies with Treatment				
AMOUNT (ac-ft/yr):	10,000				
CONSTRUCTION COSTS					
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water wells	750 gpm	25	EA	$ 484,158	$ 12,104,000
Well field collection	24 in.	12500	LF	$ 113	$ 1,414,000
Engineering and contingencies (35%)					$ 4,731,000
Subtotal Well field					$ 18,249,000
Pump Stations	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Stations	3000 HP	2	EA	$ 5,463,200	$ 10,926,000
Ground Storage Tank	2 MG	2	LS	$ 1,236,772	$ 2,474,000
Engineering and Contingencies (35%)					$ 4,690,000
Subtotal of Pumps					$ 18,090,000
Treatment Facilities	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Land Acquisition		9	AC	$572	$ 6,000
Ion Exchange Water Treatment Plant	18 MG	1	LS	$ 5,894,364	$ 5,894,000
Ground Storage Tank	2 MG	1	LS	$ 1,236,772	$ 1,237,000
Engineering and Contingencies (35%)					$ 2,496,000
Subtotal of Treatment					$ 9,633,000
Reject Facilities	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Disposal wells	1000 gpm	1	LS	$ 2,679,672	$ 2,680,000
Engineering and Contingencies (35%)					$ 938,000
Subtotal of Reject Facilities					$ 3,618,000
CONSTRUCTION TOTAL					$ 49,590,000
Permitting and Mitigation					$ 6,000
Interest During Construction	(18 months)				$ 2,603,000
TOTAL COST					**$ 52,199,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 4,368,000
Electricity ($0.09 kWh)					$ 1,167,000
Operation & Maintenance					$ 3,152,000
Total Annual Costs					**$ 8,687,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 869
Per 1,000 Gallons					$ 2.67
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 432
Per 1,000 Gallons					$ 1.33

WUGNAME:	Midland County Other				
STRATEGY:	Develop Groundwater from Winkler County				
AMOUNT (ac-ft/yr):	1,000				
CONSTRUCTION COSTS					
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water wells	500 gpm	15	EA	$ 988,058	$ 14,821,000
Well field collection	6 in.	17000	LF	$ 30	$ 515,000
Well field collection	8 in.	5000	LF	$ 47	$ 237,000
Well field collection	10 in.	2800	LF	$ 54	$ 150,000
Well field collection	12 in.	4500	LF	$ 59	$ 264,000
Well field collection	20 in.	4,000	LF	$ 135	$ 541,000
Engineering and contingencies (35%)					$ 5,785,000
Subtotal Well field					$ 22,000,000
Transmission Infrastructure	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission Infrastructure	24 in	93,250	LF		$ 29,000,000
Engineering and Contingencies (30%)					$ 9,000,000
Subtotal Transmission Infrastructure					$ 38,000,000
CONSTRUCTION TOTAL					$ 60,000,000
Permitting and Mitigation					$ 599,000
Interest During Construction	(12 months)				$ 2,100,000
TOTAL COST					**$ 62,699,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 5,247,000
Electricity ($0.09 kWh)					$ 97,000
Operation & Maintenance					$ 493,000
Total Annual Costs					**$ 5,837,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 5,837
Per 1,000 Gallons					$ 17.91
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 590
Per 1,000 Gallons					$ 1.81

WUGNAME:	Mitchell County Mining				
STRATEGY:	Direct Non-potable Reuse for sales from Colorado City (Type II)				
AMOUNT (ac-ft/yr):	250				
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	6 in.	10,560	LF	$ 20	$ 213,000
Right-of-way easements		5	AC	$ 2,969	$ 16,000
Engineering and Contingencies (30%)					$ 69,000
Subtotal Pipeline					$ 298,000
Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Stations	2 HP	1	EA	$ 248,040	$ 248,000
Storage tank	0.04 MGD	1	EA	$ 176,513	$ 177,000
Power Connection		1	LS	$ 300	$ 300
Engineering and Contingencies (35%)					$ 149,000
Subtotal of Pump Station(s)					$ 574,300
CONSTRUCTION TOTAL					$ 872,300
Permitting and Mitigation					$ 50,000
Interest During Construction	(6 months)				$ 10,000
TOTAL CAPITAL COST					**$ 932,000**
ANNUAL COSTS					**Cost**
Debt Service (5.5% for 20 years)					$ 78,000
O&M					$ 13,000
Electricity					$ 1,000
Total Annual Cost					**$ 92,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 368
Per 1,000 gallons					$ 1.13
UNIT COSTS (After Amortization)					
Per Acre-Foot of treated water					$ 56
Per 1,000 gallons					$ 0.17

WUGNAME:	McCulloch County-Other						
STRATEGY:	Purchase from Millersview Doole WSC						
AMOUNT (ac-ft/yr):	35						
CONSTRUCTION COSTS							
Transmission							
Pipeline	6 in.	10,560	LF	$	20	$	213,000
Right of Way Easements		5	AC	$	1,266	$	6,000
Engineering and contingencies (30%)						$	66,000
Transmission Subtotal						$	285,000
CONSTRUCTION TOTAL						$	285,000
Permitting and Mitigation						$	50,000
Interest During Construction	(12 months)					$	12,000
TOTAL COST						**$**	**347,000**
ANNUAL COSTS							
Debt Service (5.5% for 20 years)						$	29,000
Electricity ($0.09 kWh)						$	-
Operation & Maintenance						$	2,000
Purchase Water Cost						$	23,000
Total Annual Costs						**$**	**54,000**
UNIT COSTS (Until Amortized)							
Per Acre-Foot of treated water						$	1,543
Per 1,000 Gallons						$	4.73
UNIT COSTS (After Amortization)							
Per Acre-Foot						$	714
Per 1,000 Gallons						$	2.19

WUGNAME:	Menard						
STRATEGY:	Develop Hickory Aquifer Supplies						
AMOUNT (ac-ft/yr):	500						
CONSTRUCTION COSTS							
Well Field	**Size**	**Quantity**	**Unit**		**Unit Price**		**Cost**
Purchase Groundwater Rights		500	AC	$	500	$	250,000
Water wells	620 gpm	1	EA	$	1,907,991	$	1,908,000
Engineering and contingencies (35%)						$	755,000
Subtotal Well field						$	2,913,000
Pipeline	**Size**	**Quantity**	**Unit**		**Unit Price**		**Cost**
Transmission pipeline	8 in.	26,400	LF	$	36	$	959,000
Right-of-way easements		12	AC	$	2,969	$	39,000
Engineering and Contingencies (30%)						$	299,000
Subtotal Pipeline						$	1,297,000
Pump Stations	**Size**	**Quantity**	**Unit**		**Unit Price**		**Cost**
Pump Stations	60 HP	1	EA	$	797,500	$	798,000
Ground Storage Tank	0.5 MG	1	EA	$	374,123	$	374,000
Engineering and Contingencies (35%)						$	410,000
Subtotal of Pumps						$	1,582,000
CONSTRUCTION TOTAL						$	5,792,000
Permitting and Mitigation						$	125,000
Interest During Construction	(12 months)					$	203,000
TOTAL COST						**$**	**6,120,000**
ANNUAL COSTS							
Debt Service (5.5% for 20 years)						$	512,000
Electricity ($0.09 kWh)						$	88,000
Operation & Maintenance						$	83,000
Total Annual Costs						**$**	**683,000**
UNIT COSTS (Until Amortized)							
Per Acre-Foot of treated water						$	1,366
Per 1,000 Gallons						$	4.19
UNIT COSTS (After Amortization)							
Per Acre-Foot						$	342
Per 1,000 Gallons						$	1.05

WUGNAME:	City of Menard				
STRATEGY:	Direct Non-potable Reuse For Irrigation of City Farms (Type I)				
AMOUNT (ac-ft/yr):	67				
CAPITAL COSTS					
Wastewater Treatment Plant Improvements		**Quantity**	**Units**	**Unit Price**	**Cost**
Wastewater Treatment Plant Improvements		1	LS	$ 119,510	$ 120,000
Engineering and Contingencies (30%)					$ 36,000
Subtotal WWTP Improvements					$ 156,000
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	18 in	10,560	LF	$ 76	$ 800,000
Right-of-way easements		5	AC	$ 2,969	$ 16,000
Engineering and Contingencies (30%)					$ 244,800
Subtotal Pipeline					$ 1,060,800
CONSTRUCTION TOTAL					$ 1,216,800
Permitting and Mitigation					$ 50,000
Interest During Construction	(6 months)				$ 22,000
TOTAL CAPITAL COST					**$ 1,288,800**
ANNUAL COSTS					**Cost**
Debt Service (5.5% for 20 years)					$ 107,846
O&M					$ 9,688
Electricity					$ 1,374
Total Annual Cost					**$ 118,908**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 1,775
Per 1,000 gallons					$ 5.45
UNIT COSTS (After Amortization)					
Per Acre-Foot of treated water					$ 165
Per 1,000 gallons					$ 0.51

WUGNAME:	Pecos County WCID #1				
STRATEGY:	Develop Additional Edwards Trinity Plateau Supplies				
AMOUNT (ac-ft/yr):	250				
CONSTRUCTION COSTS					
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water wells	150 gpm	2	EA	$ 296,624	$ 593,000
Well field collection	6 in.	500	LF	$ 24	$ 12,000
Elevated Storage Tank	0.50 MG	1	EA	$ 1,151,228	$ 1,151,000
Engineering and contingencies (35%)					$ 615,000
Subtotal Well field					$ 2,371,000
CONSTRUCTION TOTAL					$ 2,371,000
Permitting and Mitigation					$ 2,000
Interest During Construction	(12 months)				$ 83,000
TOTAL COST					**$ 2,456,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 206,000
Electricity ($0.09 kWh)					$ 8,000
Operation & Maintenance					$ 33,000
Total Annual Costs					**$ 247,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 988
Per 1,000 Gallons					$ 3.03
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 164
Per 1,000 Gallons					$ 0.50

WUGNAME:	Robert Lee						
STRATEGY:	New Groundwater from Edwards-Trinity Plateau in Coke County						
AMOUNT (ac-ft/yr):	240						
CONSTRUCTION COSTS							
Well Field	**Size**		**Quantity**	**Unit**	**Unit Price**		**Cost**
Water wells	100	GPM	3	EA	$ 153,000	$	459,000
Engineering and contingencies (35%)						$	161,000
Subtotal Well field						$	620,000
Pipeline	**Size**		**Quantity**	**Unit**	**Unit Price**		**Cost**
Transmission pipeline	6	in.	79,200	LF	$ 23	$	1,855,000
Right-of-way easements			36	AC	$ 1,266	$	51,000
Engineering and Contingencies (30%)						$	557,000
Subtotal Pipeline						$	2,463,000
Pump Station(s) & Ground Storage	**Size**		**Quantity**	**Unit**			**Cost**
Pump Station	62	HP	2	EA	$ 799,392	$	1,599,000
Engineering and Contingencies (35%)						$	560,000
Subtotal of Pump Station(s)						$	2,159,000
CONSTRUCTION TOTAL						$	5,242,000
Permitting and Mitigation						$	375,000
Interest During Construction	(12 months)					$	183,000
TOTAL COST						**$**	**5,800,000**
ANNUAL COSTS							
Debt Service (5.5% for 20 years)						$	485,000
Electricity ($0.09kWh)						$	19,000
Operation & Maintenance						$	78,000
Groundwater Rights Lease						$	97,755
Total Annual Costs						**$**	**679,755**
UNIT COSTS (Until Amortized)							
Per Acre-Foot of treated water						$	2,832
Per 1,000 Gallons						$	8.69
UNIT COSTS (After Amortization)							
Per Acre-Foot						$	811
Per 1,000 Gallons						$	2.49

WUGNAME:	Robert Lee						
STRATEGY:	New Groundwater from Edwards-Trinity Plateau in Tom Green						
AMOUNT (ac-ft/yr):	160						

CONSTRUCTION COSTS

Well Field	**Size**		**Quantity**	**Unit**	**Unit Price**		**Cost**
Water wells	100	GPM	2	EA	$ 153,000	$	306,000
Engineering and contingencies (35%)						$	107,000
Subtotal Well field						$	413,000
Pipeline	**Size**		**Quantity**	**Unit**	**Unit Price**		**Cost**
Transmission pipeline	6	in.	79,200	LF	$ 23	$	1,855,000
Right-of-way easements			36	AC	$ 1,266	$	51,000
Engineering and Contingencies (30%)						$	557,000
Subtotal Pipeline						$	2,463,000
Pump Station(s) & Ground Storage	**Size**		**Quantity**	**Unit**			**Cost**
Pump Station	62	HP	2	EA	$ 799,392	$	1,599,000
Engineering and Contingencies (35%)						$	560,000
Subtotal of Pump Station(s)						$	2,159,000

CONSTRUCTION TOTAL		$	5,035,000
Permitting and Mitigation		$	375,000
Interest During Construction	(12 months)	$	176,000
TOTAL COST		**$**	**5,586,000**
ANNUAL COSTS			
Debt Service (5.5% for 20 years)		$	467,000
Electricity ($0.09kWh)		$	17,000
Operation & Maintenance		$	74,000
Groundwater Rights Lease		$	65,170
Total Annual Costs		**$**	**623,170**
UNIT COSTS (Until Amortized)			
Per Acre-Foot of treated water		$	3,895
Per 1,000 Gallons		$	11.95
UNIT COSTS (After Amortization)			
Per Acre-Foot		$	976
Per 1,000 Gallons		$	3.00

WUGNAME:	Robert Lee				
STRATEGY:	New Water Treatment Plant				
AMOUNT (ac-ft/yr):	500				
CONSTRUCTION COSTS					
Infrastructure Improvemens	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water Treatment Plant	1.0 mgd	1	LS	$ 4,844,022	$ 4,844,000
Additional Storage	0.1 MG	1	LS	$ 169,000	$ 169,000
Other Improvements		1	LS	$ 100,000	$ 100,000
Engineering and Contingencies (35%)					$ 1,790,000
Subtotal Infrastructure Improvements					$ 6,903,000
CONSTRUCTION TOTAL					$ 6,903,000
Permitting and Mitigation					$ 41,000
Interest During Construction	(6 months)				$ 121,000
TOTAL COST					**$ 7,065,000**
ANNUAL COSTS*					
Debt Service (5.5% for 20 years)*					$ 591,000
Operation & Maintenance					$ 242,000
Total Annual Costs					**$ 833,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 1,666
Per 1,000 Gallons					$ 5.11
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 484
Per 1,000 Gallons					$ 1.49

WUGNAME:	City of Sonora					
STRATEGY:	Direct Non-potable Reuse For Irrigation of Industrial and Municipal Parks (Type I)					
AMOUNT (ac-ft/yr):	62					
CAPITAL COSTS						
Wastewater Treatment Plant Improvements		**Quantity**	**Units**	**Unit Price**		**Cost**
Wastewater Treatment Plant Improvements		1	LS	$ 116,159	$	116,000
Engineering and Contingencies (30%)					$	34,800
Subtotal WWTP Improvements					$	150,800
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Transmission pipeline	6 in	10,560	LF	$ 20	$	213,000
Right-of-way easements		5	AC	$ 1,266	$	7,000
Engineering and Contingencies (30%)					$	66,000
Subtotal Pipeline					$	286,000
CONSTRUCTION TOTAL					$	436,800
Permitting and Mitigation					$	50,000
Interest During Construction	(6 months)				$	9,000
TOTAL CAPITAL COST					**$**	**495,800**
ANNUAL COSTS						**Cost**
Debt Service (5.5% for 20 years)					$	41,488
O&M					$	3,614
Electricity					$	1,288
Total Annual Cost					**$**	**46,391**
UNIT COSTS (Until Amortized)						
Per Acre-Foot of treated water					$	748
Per 1,000 gallons					$	2.30
UNIT COSTS (After Amortization)						
Per Acre-Foot of treated water					$	79
Per 1,000 gallons					$	0.24

WUGNAME:	Winters						
STRATEGY:	Purchase from Abilene						
AMOUNT (ac-ft/yr):	100						
CONSTRUCTION COSTS							
Transmission							
Pipeline	6 in.	21,120	LF	$	20	$	427,000
Right of Way Easements		10	AC	$	1,266	$	13,000
Engineering and contingencies (30%)						$	132,000
Transmission Subtotal						$	572,000
CONSTRUCTION TOTAL						$	572,000
Permitting and Mitigation						$	100,000
Interest During Construction	(12 months)					$	24,000
TOTAL COST						**$**	**696,000**
ANNUAL COSTS							
Debt Service (5.5% for 20 years)						$	58,000
Electricity ($0.09 kWh)						$	-
Operation & Maintenance						$	4,000
Purchase Water Cost						$	33,000
Total Annual Costs						**$**	**95,000**
UNIT COSTS (Until Amortized)							
Per Acre-Foot of treated water						$	950
Per 1,000 Gallons						$	2.92
UNIT COSTS (After Amortization)							
Per Acre-Foot						$	370
Per 1,000 Gallons						$	1.14

WUGNAME:	Winters					
STRATEGY:	Direct Potable Reuse					
AMOUNT (ac-ft/yr):	83					
CAPITAL COSTS						
Water Treatment Plant	**Size**	**Quantity**	**Units**	**Unit Price**		**Cost**
Land Acquistion		3	AC	1266	$	4,000
Reuse Water Treatment Plant	0.15 MGD	1	LS	$ 2,184,702	$	2,185,000
Engineering and Contingencies (35%)					$	766,000
Subtotal WWTP Improvements					$	2,955,000
CONSTRUCTION TOTAL					$	2,955,000
Interest During Construction	(12 months)				$	103,000
Permitting and Mitigation					$	295,500
TOTAL CAPITAL COST					**$**	**3,354,000**
ANNUAL COSTS						**Cost**
Debt Service (5.5% for 20 years)					$	281,000
O&M					$	139,000
Total Annual Cost					**$**	**420,000**
UNIT COSTS (Until Amortized)						
Per Acre-Foot of treated water					$	5,091
Per 1,000 gallons					$	15.62
UNIT COSTS (After Amortization)						
Per Acre-Foot of treated water					$	1,685
Per 1,000 gallons					$	5.17

WUGNAME:	Andrews County-Other				
STRATEGY:	Develop Additional Edwards-Trinity (Plateau) Aquifer Supplies				
AMOUNT (ac-ft/yr):	500				

CONSTRUCTION COSTS					
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water wells	20 gpm	38	EA	$ 67,337	$ 2,559,000
Engineering and contingencies (35%)					$ 896,000
Subtotal Well field					$ 3,455,000
CONSTRUCTION TOTAL					$ 3,455,000
Interest During Construction	(6months)				$ 60,000
TOTAL COST					**$ 3,515,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 294,000
Electricity ($0.09 kWh)					$ 6,000
Operation & Maintenance					$ 48,000
Total Annual Costs					**$ 348,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 696
Per 1,000 Gallons					$ 2.14
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 108
Per 1,000 Gallons					$ 0.33

Cost Estimate Summary
Livestock - Andrews - ET Plateau

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Well Fields (Wells, Pumps, and Piping)	$170,000
TOTAL COST OF FACILITIES	**$170,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$59,000
Interest During Construction (4% for 1 years with a 1% ROI)	$9,000
TOTAL COST OF PROJECT	**$238,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$20,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$2,000
Pumping Energy Costs (0.09 $/kW-hr)	$7,000
TOTAL ANNUAL COST	**$29,000**
Available Project Yield (acft/yr)	150
UNIT COSTS (Until Amortized)	
Annual Cost of Water ($ per acft)	$193
Annual Cost of Water ($ per 1,000 gallons)	$0.59
UNIT COSTS (After Amortization)	
Annual Cost of Water ($ per acft)	$60
Annual Cost of Water ($ per 1,000 gallons)	$0.18

KVA *2/6/2015*

Cost Estimate Summary ***Livestock - Andrews - Pecos Valley***	
Cost based on ENR CCI 9552 for 41518 and ***a PPI of 187 for 41518***	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Well Fields (Wells, Pumps, and Piping)	$48,000
TOTAL COST OF FACILITIES	**$48,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$17,000
Interest During Construction (4% for 1 years with a 1% ROI)	$3,000
TOTAL COST OF PROJECT	**$68,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$6,000
Operation and Maintenance	
Pumping Energy Costs (0.09 $/kW-hr)	$2,000
TOTAL ANNUAL COST	**$8,000**
Available Project Yield (acft/yr)	50
UNIT COSTS (Until Amortized)	
Annual Cost of Water ($ per acft)	$160
Annual Cost of Water ($ per 1,000 gallons)	$0.49
UNIT COSTS (After Amortization)	
Annual Cost of Water ($ per acft)	$40
Annual Cost of Water ($ per 1,000 gallons)	$0.12
KVA	*2/6/2015*

WUGNAME:	Coke County Mining				
STRATEGY:	Develop Additional Edwards-Trinity (Plateau) Aquifer				
AMOUNT (ac-ft/yr):	250				
CONSTRUCTION COSTS					
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water wells	100 gpm	5	EA	$ 97,000	$ 485,000
Engineering and contingencies (35%)					$ 170,000
Subtotal Well field					$ 655,000
CONSTRUCTION TOTAL					$ 655,000
Interest During Construction	(12 months)				$ 23,000
TOTAL COST					**$ 678,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 57,000
Electricity ($0.09kWh)					$ 11,000
Operation & Maintenance					$ 5,820.00
Total Annual Costs					**$ 73,820**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 295
Per 1,000 Gallons					$ 0.91
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 67
Per 1,000 Gallons					$ 0.21

WUGNAME:	Coleman County Mining				
STRATEGY:	Develop Additional Hickory Aquifer Supplies				
AMOUNT (ac-ft/yr):	65				
CONSTRUCTION COSTS					
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water wells	300 gpm	1	EA	$ 582,000	$ 582,000
Engineering and contingencies (35%)					$ 204,000
Subtotal Well field					$ 786,000
CONSTRUCTION TOTAL					$ 786,000
Interest During Construction	(12 months)				$ 28,000
TOTAL COST					**$ 814,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 68,000
Electricity ($0.09kWh)					$ 3,000
Operation & Maintenance					$ 6,984.00
Total Annual Costs					**$ 78,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 1,200
Per 1,000 Gallons					$ 3.68
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 154
Per 1,000 Gallons					$ 0.47

WUGNAME:	Concho County Mining				
STRATEGY:	Develop Additional Hickory Aquifer Supplies				
AMOUNT (ac-ft/yr):	200				
CONSTRUCTION COSTS					
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water wells	300 gpm	2	EA	$ 582,000	$ 1,164,000
Engineering and contingencies (35%)					$ 407,000
Subtotal Well field					$ 1,571,000
CONSTRUCTION TOTAL					$ 1,571,000
Interest During Construction	(12 months)				$ 55,000
TOTAL COST					**$ 1,626,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 136,000
Electricity ($0.09kWh)					$ 10,000
Operation & Maintenance					$ 13,968.00
Total Annual Costs					**$ 160,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 800
Per 1,000 Gallons					$ 2.46
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 120
Per 1,000 Gallons					$ 0.37

WUGNAME:	Howard County Other				
STRATEGY:	Purchase from Big Spring				
AMOUNT (ac-ft/yr):	485				
CONSTRUCTION COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	8 in.	10,560	LF	$ 31	$ 331,000
Right-of-way easements		5	AC	$ 1,266	$ 7,000
Engineering and Contingencies (30%)					$ 101,000
Subtotal Pipeline					$ 439,000
Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Stations	65 HP	1	EA	$ 801,450	$ 801,000
Storage tank	0.04 MGD	1	EA	$ 176,358	$ 176,000
Power Connection		1	LS	$ 9,750	$ 10,000
Engineering and Contingencies (35%)					$ 345,000
Subtotal of Pump Station(s)					$ 1,332,000
CONSTRUCTION TOTAL					$ 1,771,000
Interest During Construction	(12 months)				$ 62,000
TOTAL COST					**$ 1,833,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 153,000
Electricity ($0.09kWh)					$ 14,000
Operation & Maintenance					$ 28,055
Purchase Water Cost					$ 316,075
Total Annual Costs					**$ 511,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 1,054
Per 1,000 Gallons					$ 3.23
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 738
Per 1,000 Gallons					$ 2.27

Cost Estimate Summary ***Livestock - Howard - Dockum aqufer***	
Cost based on ENR CCI 9552 for 41518 and ***a PPI of 187 for 41518***	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Well Fields (Wells, Pumps, and Piping)	$366,000
TOTAL COST OF FACILITIES	**$366,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$128,000
Interest During Construction (4% for 1 years with a 1% ROI)	$18,000
TOTAL COST OF PROJECT	**$512,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$43,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$4,000
Pumping Energy Costs (0.09 $/kW-hr)	$8,000
TOTAL ANNUAL COST	**$55,000**
Available Project Yield (acft/yr)	150
UNIT COSTS (Until Amortized)	
Annual Cost of Water ($ per acft)	$367
Annual Cost of Water ($ per 1,000 gallons)	$1.13
UNIT COSTS (After Amortization)	
Annual Cost of Water ($ per acft)	$80
Annual Cost of Water ($ per 1,000 gallons)	$0.25
KVA	*2/6/2015*

WUGNAME:	Howard County Mining					
STRATEGY:	Develop Additional Dockum Aquifer Supplies					
AMOUNT (ac-ft/yr):	274					
CONSTRUCTION COSTS						
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Water wells	100 gpm	6	EA	$ 118,000	$	708,000
Engineering and contingencies (35%)					$	248,000
Subtotal Well field					$	956,000
CONSTRUCTION TOTAL					$	956,000
Interest During Construction	(12 months)				$	33,000
TOTAL COST					**$**	**989,000**
ANNUAL COSTS						
Debt Service (5.5% for 20 years)					$	83,000
Electricity ($0.09kWh)					$	14,000
Operation & Maintenance					$	8,496.00
Total Annual Costs					**$**	**105,000**
UNIT COSTS (Until Amortized)						
Per Acre-Foot of treated water					$	383
Per 1,000 Gallons					$	1.18
UNIT COSTS (After Amortization)						
Per Acre-Foot					$	82
Per 1,000 Gallons					$	0.25

WUGNAME:	Howard County Mining				
STRATEGY:	Develop Additional Ogallala Aquifer Supplies				
AMOUNT (ac-ft/yr):	31				
CONSTRUCTION COSTS					
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water wells	100 gpm	1	EA	$ 91,000	$ 91,000
Engineering and contingencies (35%)					$ 32,000
Subtotal Well field					$ 123,000
CONSTRUCTION TOTAL					$ 123,000
Interest During Construction	(12 months)				$ 4,000
TOTAL COST					**$ 127,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 11,000
Electricity ($0.09kWh)					$ 1,000
Operation & Maintenance					$ 1,092.00
Total Annual Costs					**$ 13,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 419
Per 1,000 Gallons					$ 1.29
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 67
Per 1,000 Gallons					$ 0.21

WUGNAME:	Irion County Mining				
STRATEGY:	Develop Additional Dockum Aquifer Supplies				
AMOUNT (ac-ft/yr):	150				
CONSTRUCTION COSTS					
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water wells	20 gpm	10	EA	$ 56,000	$ 560,000
Engineering and contingencies (35%)					$ 196,000
Subtotal Well field					$ 756,000
CONSTRUCTION TOTAL					$ 756,000
Interest During Construction	(12 months)				$ 26,000
TOTAL COST					**$ 782,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 65,000
Electricity ($0.09kWh)					$ 6,000
Operation & Maintenance					$ 7,000
Total Annual Costs					**$ 78,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 520
Per 1,000 Gallons					$ 1.60
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 87
Per 1,000 Gallons					$ 0.27

WUGNAME:	Irion County Mining				
STRATEGY:	Develop Additional Edwards-Trinity (Plateau) Aquifer				
AMOUNT (ac-ft/yr):	500				
CONSTRUCTION COSTS					
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water wells	20 gpm	32	EA	$ 46,000	$ 1,472,000
Engineering and contingencies (35%)					$ 515,000
Subtotal Well field					$ 1,987,000
CONSTRUCTION TOTAL					$ 1,987,000
Interest During Construction	(12 months)				$ 70,000
TOTAL COST					**$ 2,057,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 172,000
Electricity ($0.09kWh)					$ 16,000
Operation & Maintenance					$ 18,000.00
Total Annual Costs					**$ 206,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 412
Per 1,000 Gallons					$ 1.26
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 68
Per 1,000 Gallons					$ 0.21

Cost Estimate Summary	
Manufacturing - Kimble - ET Plateau	
Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Well Fields (Wells, Pumps, and Piping)	$218,000
TOTAL COST OF FACILITIES	**$218,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$76,000
Interest During Construction (4% for 1 years with a 1% ROI)	$11,000
TOTAL COST OF PROJECT	**$305,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$26,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$2,000
Pumping Energy Costs (0.09 $/kW-hr)	$14,000
TOTAL ANNUAL COST	**$42,000**
Available Project Yield (acft/yr)	300
UNIT COSTS (Until Amortized)	
Annual Cost of Water ($ per acft)	$140
Annual Cost of Water ($ per 1,000 gallons)	$0.43
UNIT COSTS (After Amortization)	
Annual Cost of Water ($ per acft)	$53
Annual Cost of Water ($ per 1,000 gallons)	$0.16
KVA	*2/6/2015*

WUGNAME:	Martin County-Other				
STRATEGY:	Develop Additional Dockum Aquifer Supplies				
AMOUNT (ac-ft/yr):	250				
CONSTRUCTION COSTS					
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water wells	50 gpm	7	EA	$ 438,719	$ 3,071,000
Engineering and contingencies (35%)					$ 1,075,000
Subtotal Well field					$ 4,146,000
CONSTRUCTION TOTAL					$ 4,146,000
Interest During Construction	(6months)				$ 73,000
TOTAL COST					**$ 4,219,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 353,000
Electricity ($0.09 kWh)					$ 10,000
Operation & Maintenance					$ 46,000
Total Annual Costs					**$ 409,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 1,636
Per 1,000 Gallons					$ 5.02
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 224
Per 1,000 Gallons					$ 0.69

Cost Estimate Summary *Livestock - Martin - Dockum aquifer*	
Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Well Fields (Wells, Pumps, and Piping)	$242,000
TOTAL COST OF FACILITIES	**$242,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$85,000
Interest During Construction (4% for 1 years with a 1% ROI)	$12,000
TOTAL COST OF PROJECT	**$339,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$28,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$2,000
Pumping Energy Costs (0.09 $/kW-hr)	$2,000
TOTAL ANNUAL COST	**$32,000**
Available Project Yield (acft/yr)	40
UNIT COSTS (Until Amortized)	
Annual Cost of Water ($ per acft)	$800
Annual Cost of Water ($ per 1,000 gallons)	$2.45
UNIT COSTS (After Amortization)	
Annual Cost of Water ($ per acft)	$100
Annual Cost of Water ($ per 1,000 gallons)	$0.31
KVA	*2/6/2015*

Cost Estimate Summary ***Mining - Martin - Dockum***	
Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Well Fields (Wells, Pumps, and Piping)	$484,000
TOTAL COST OF FACILITIES	**$484,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$170,000
Interest During Construction (4% for 1 years with a 1% ROI)	$23,000
TOTAL COST OF PROJECT	**$677,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$57,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$5,000
Pumping Energy Costs (0.09 $/kW-hr)	$11,000
TOTAL ANNUAL COST	**$73,000**
Available Project Yield (acft/yr)	210
UNIT COSTS (Until Amortized)	
Annual Cost of Water ($ per acft)	$348
Annual Cost of Water ($ per 1,000 gallons)	$1.07
UNIT COSTS (After Amortization)	
Annual Cost of Water ($ per acft)	$76
Annual Cost of Water ($ per 1,000 gallons)	$0.23
KVA	*2/6/2015*

Cost Estimate Summary ***Mining - Martin - ET Plateau***	
Cost based on ENR CCI 9552 for 41518 and ***a PPI of 187 for 41518***	
Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$1,686,000
TOTAL COST OF FACILITIES	**$1,686,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$590,000
Interest During Construction (4% for 1 years with a 1% ROI)	$80,000
TOTAL COST OF PROJECT	**$2,356,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$197,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$17,000
Pumping Energy Costs (0.09 $/kW-hr)	$68,000
TOTAL ANNUAL COST	**$282,000**
Available Project Yield (acft/yr)	1,500
UNIT COSTS (Until Amortized)	
Annual Cost of Water ($ per acft)	$188
Annual Cost of Water ($ per 1,000 gallons)	$0.58
UNIT COSTS (After Amortization)	
Annual Cost of Water ($ per acft)	$57
Annual Cost of Water ($ per 1,000 gallons)	$0.17
KVA	*2/6/2015*

Cost Estimate Summary ***McCulloch - Livestock***	
Cost based on ENR CCI 9552 for 41518 and ***a PPI of 187 for 41518***	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Well Fields (Wells, Pumps, and Piping)	$44,000
TOTAL COST OF FACILITIES	**$44,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$15,000
Interest During Construction (4% for 1 years with a 1% ROI)	$3,000
TOTAL COST OF PROJECT	**$62,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$5,000
Operation and Maintenance	
Pumping Energy Costs (0.09 $/kW-hr)	$1,000
TOTAL ANNUAL COST	**$6,000**
Available Project Yield (acft/yr)	30
UNIT COSTS (Until Amortized)	
Annual Cost of Water ($ per acft)	$200
Annual Cost of Water ($ per 1,000 gallons)	$0.61
UNIT COSTS (After Amortization)	
Annual Cost of Water ($ per acft)	$33
Annual Cost of Water ($ per 1,000 gallons)	$0.10
KVA	*2/6/2015*

WUGNAME: Midland, Andrews and Martin Co. Mining
STRATEGY: Direct Non-Potable Reuse water from City of Midland
AMOUNT (ac-ft/yr): 4,500

	Size	Quantity	Units	Unit Price	Cost
CONSTRUCTION COSTS					
Wastewater Treatment Plant Improvements	**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Wastewater Treatment Plant Improvements		1	LS	$ 8,168,000	$ 8,168,000
Engineering and Contingencies (35%)					$ 2,859,000
Subtotal WWTP Improvements					$ 11,027,000
Pipeline Segment 1					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	24 in.	63,360	LF	$ 113	$ 7,165,000
Right-of-way easements		29	AC	$ 1,076	$ 34,000
Engineering and Contingencies (30%)					$ 2,150,000
Subtotal Pipeline					$ 9,349,000
Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**		**Cost**
Pump Station	430 HP	2	EA	$ 2,342,750	$ 4,686,000
Ground Storage Tank(s)	0.4 MGD	2	EA	$ 324,851	$ 650,000
Engineering and Contingencies (35%)					$ 1,868,000
Subtotal of Pump Station(s)					$ 7,204,000
Pipeline Segment 2					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	16 in.	68,640	LF	$ 63	$ 4,332,000
Right-of-way easements		32	AC	$ 1,076	$ 37,000
Engineering and Contingencies (30%)					$ 1,300,000
Subtotal Pipeline					$ 5,669,000
Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**		**Cost**
Pump Station	315 HP	2	EA	$ 1,906,090	$ 3,812,000
Ground Storage Tank(s)	0.2 MGD	2	EA	$ 235,669	$ 471,000
Engineering and Contingencies (35%)					$ 1,499,000
Subtotal of Pump Station(s)					$ 5,782,000
Pipeline Segment 3					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Transmission pipeline	14 in.	63,360	LF	$ 51	$ 3,231,000
Right-of-way easements		29	AC	$ 1,076	$ 34,000
Engineering and Contingencies (30%)					$ 969,000
Subtotal Pipeline					$ 4,234,000
Pump Station(s) & Ground Storage	**Size**	**Quantity**	**Unit**		**Cost**
Pump Station	135 HP	2	EA	$ 1,121,980	$ 2,244,000
Ground Storage Tank(s)	0.13 MGD	2	EA	$ 191,079	$ 382,000
Engineering and Contingencies (35%)					$ 919,000
Subtotal of Pump Station(s)					$ 3,545,000
CONSTRUCTION TOTAL					$ 46,810,000
Permitting and Mitigation					$ 925,000
Interest During Construction	(12 months)				$ 1,638,000

TOTAL COST (All Counties)	**$**	**49,373,000**
Andrews County Total Cost	**$**	**28,197,000**
Martin County Total Cost	**$**	**17,827,000**
Midland County Total Cost	**$**	**3,349,000**
ANNUAL COSTS		
Debt Service (5.5% for 20 years)	$	4,131,000
Electricity ($0.09kWh)	$	298,000
Operation & Maintenance	$	536,000
Total Annual Costs	**$**	**4,965,000**
UNIT COSTS (Until Amortized)		
Per Acre-Foot of treated water	$	1,103
Per 1,000 Gallons	$	3.39
UNIT COSTS (After Amortization)		
Per Acre-Foot	$	185
Per 1,000 Gallons	$	0.57
ANNUAL COSTS (Andrews County)		
Debt Service (5.5% for 20 years)	$	2,360,000
Electricity ($0.09kWh)	$	182,000
Operation & Maintenance	$	310,000
Total Annual Costs	$	2,852,000
UNIT COSTS (Until Amortized)		
Per Acre-Foot of treated water	$	1,141
Per 1,000 Gallons	$	3.50
UNIT COSTS (After Amortization)		
Per Acre-Foot	$	197
Per 1,000 Gallons	$	0.60
ANNUAL COSTS (Martin County)		
Debt Service (5.5% for 20 years)	$	1,492,000
Electricity ($0.09kWh)	$	95,000
Operation & Maintenance	$	194,000
Total Annual Costs	$	1,781,000
UNIT COSTS (Until Amortized)		
Per Acre-Foot of treated water	$	1,187
Per 1,000 Gallons	$	3.64
UNIT COSTS (After Amortization)		
Per Acre-Foot	$	193
Per 1,000 Gallons	$	0.59
ANNUAL COSTS (Midland County)		
Debt Service (5.5% for 20 years)	$	280,000
Electricity ($0.09kWh)	$	20,000
Operation & Maintenance	$	32,000
Total Annual Costs	$	332,000
UNIT COSTS (Until Amortized)		
Per Acre-Foot of treated water	$	664
Per 1,000 Gallons	$	2.04
UNIT COSTS (After Amortization)		
Per Acre-Foot	$	104
Per 1,000 Gallons	$	0.32

WUGNAME:	Runnels County Mining					
STRATEGY:	Develop Other Aquifer Supplies					
AMOUNT (ac-ft/yr):	76					
CONSTRUCTION COSTS						
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Water wells	75 gpm	2	EA	$ 50,000	$	100,000
Engineering and contingencies (35%)					$	35,000
Subtotal Well field					$	135,000
CONSTRUCTION TOTAL					$	135,000
Interest During Construction	(12 months)				$	5,000
TOTAL COST					**$**	**140,000**
ANNUAL COSTS						
Debt Service (5.5% for 20 years)					$	12,000
Electricity ($0.09kWh)					$	3,000
Operation & Maintenance					$	1,200.00
Total Annual Costs					**$**	**16,000**
UNIT COSTS (Until Amortized)						
Per Acre-Foot of treated water					$	211
Per 1,000 Gallons					$	0.65
UNIT COSTS (After Amortization)						
Per Acre-Foot					$	55
Per 1,000 Gallons					$	0.17

Cost Estimate Summary Livestock - Scurry	
Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Well Fields (Wells, Pumps, and Piping)	$102,000
TOTAL COST OF FACILITIES	**$102,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$36,000
Interest During Construction (4% for 1 years with a 1% ROI)	$5,000
TOTAL COST OF PROJECT	**$143,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$12,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$1,000
Pumping Energy Costs (0.09 $/kW-hr)	$4,000
TOTAL ANNUAL COST	**$17,000**
Available Project Yield (acft/yr)	92
UNIT COSTS (Until Amortized)	
Annual Cost of Water ($ per acft)	$185
Annual Cost of Water ($ per 1,000 gallons)	$0.57
UNIT COSTS (After Amortization)	
Annual Cost of Water ($ per acft)	$54
Annual Cost of Water ($ per 1,000 gallons)	$0.17
KVA	*2/6/2015*

WUGNAME:	Scurry County Mining				
STRATEGY:	Develop Local Alluvium Aquifer Supplies				
AMOUNT (ac-ft/yr):	80				
CONSTRUCTION COSTS					
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water wells	75 gpm	2	EA	$ 50,000	$ 100,000
Engineering and contingencies (35%)					$ 35,000
Subtotal Well field					$ 135,000
CONSTRUCTION TOTAL					$ 135,000
Interest During Construction	(12 months)				$ 5,000
TOTAL COST					**$ 140,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 12,000
Electricity ($0.09kWh)					$ 3,000
Operation & Maintenance					$ 1,200.00
Total Annual Costs					**$ 16,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 200
Per 1,000 Gallons					$ 0.61
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 53
Per 1,000 Gallons					$ 0.16

Cost Estimate Summary ***Steam Electric Power - Ward***	
Cost based on ENR CCI 9552 for 41518 and ***a PPI of 187 for 41518***	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Well Fields (Wells, Pumps, and Piping)	$1,919,000
TOTAL COST OF FACILITIES	**$1,919,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$672,000
Interest During Construction (4% for 1 years with a 1% ROI)	$91,000
TOTAL COST OF PROJECT	**$2,682,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$224,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$19,000
Pumping Energy Costs (0.09 $/kW-hr)	$255,000
TOTAL ANNUAL COST	**$498,000**
Available Project Yield (acft/yr)	5,600
UNIT COSTS (Until Amortized)	
Annual Cost of Water ($ per acft)	$88.93
Annual Cost of Water ($ per 1,000 gallons)	$0.27
UNIT COSTS (After Amortization)	
Annual Cost of Water ($ per acft)	$49
Annual Cost of Water ($ per 1,000 gallons)	$0.15
KVA	*2/6/2015*

WUGNAME:	Winkler County Other				
STRATEGY:	Develop Pecos Valley Aquifer Supplies				
AMOUNT (ac-ft/yr):	500				
CONSTRUCTION COSTS					
Well Field	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Water wells	350 gpm	3	EA	$ 455,000	$ 1,365,000
Engineering and contingencies (35%)					$ 478,000
Subtotal Well field					$ 1,843,000
CONSTRUCTION TOTAL					$ 1,843,000
Interest During Construction	(12 months)				$ 65,000
TOTAL COST					**$ 1,908,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$ 160,000
Electricity ($0.09kWh)					$ 23,000
Operation & Maintenance					$ 43,478
Total Annual Costs					**$ 226,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$ 452
Per 1,000 Gallons					$ 1.39
UNIT COSTS (After Amortization)					
Per Acre-Foot					$ 133
Per 1,000 Gallons					$ 0.41

Appendix E

Strategy Evaluation Matrix and Quantified Environmental Impact Matrix

INTRODUCTION

In accordance with TWDB rules and guidelines, the Region F Water Planning Group has adopted a standard procedure for ranking potential water management strategies. This procedure classifies the strategies using the TWDB's standard categories developed for regional water planning.

The strategies are ranked based upon the following categories;

- Quantity
- Reliability
- Cost
- Environmental Factors
- Agricultural Resources/Rural Areas
- Other Natural Resources
- Key Water Quality Parameters
- Third Party Social & Economic Factors

Each category is quantitatively assessed and assigned a ranking from 1 to 5. With the exception of the Environmental Factors category, **Table 1** shows the correlation between the category and the ranking. The Environmental Factors score is taken directly from the Environmental Matrix where the environmental ramifications are evaluated in more detail.

Table 1
Evaluation Matrix Category Ranking Correlation

Rank	Quantity	Cost per Ac-Ft	Reliability	Remaining Strategy Impacts
1	Meets 0-25% Shortage	>$5,000	Low	High
2	Meets 25-50% Shortage	$1,000-$5,000	Low to Medium	Medium
3	Meets 50-75% of Shortage	$500-$1,000	Medium	Low
4	Meets 75-100% of Shortage	$0-$500	Medium to High	None
5	Exceeds Shortage	No Cost	High	Positive Impact

Environmental/Agricultural Matrix

The Environmental/Agricultural Matrix is used to quantify the impacts and determine the score of the 'Environmental Factors' and 'Agricultural Resources' categories on the Evaluation Matrix.

The Environmental Matrix takes into consideration the following categories;

- Total Acres Impacted
- Total Wetland Acres Impacted
- Environmental Water Needs
- Habitat

- Threatened and Endangered Species
- Cultural Resources
- Bays & Estuaries
- Environmental Water Quality
- Agricultural Impacts (temporary and permanent)

Each category is quantitatively assessed and assigned a ranking from 1 to 5. The Overall Environmental Impacts column averages all of the rankings assigned to the strategy. This value is also illustrated in the Evaluation Matrix as the Environmental Factors rank. A single rank is assigned for agricultural impacts based on the quantified permanent impacts. **Table 2** shows the correlation between the rank assigned within each category.

Table 2
Environmental Matrix Category Ranking Correlation

Rank	Acres Impacted	Threatened and Endangered Species	Agricultural Impacts	All Remaining Categories
1	Greater than 500 Acres and/or Wetlands	Greater than 20	Greater than 2,000 acres	High Impact
2	100-500 Acres	Between 15-20	Between 50 and 2,000 acres	Medium Impact
3	50-100 Acres	Between 10-15 or 'varies'	Between 6 and 50 acres	Low Impact
4	0-50 Acres	Between 5-10	Between 0 and 5 acres	No Impact or n/a
5	None	Between 0-5 (or n/a)	Provides water to agriculture or rural	Positive

Acres Impacted
Acres Impacted refers to the total amount of area that will be impacted due to the implementation of a strategy.

The following conservative assumptions were made (unless more detailed information was available);
- Each well will impact approximately 1 acre of land
- The acres impacted for pipelines is equivalent to the right of way easements required
- Reservoirs will impact an area equal to their surface area
- A conventional water treatment plant will impact 5 acres
- Conservation, Precipitation Enhancement and Subordination strategies will have no impact on acres

Wetland Acres
Wetland Acres refers to how many acres that are classified as wetlands are impacted by implementation of the strategy. The only strategy that had an impact on surrounding wetlands was the Red Arroyo Reservoir strategy. The total acreage was determined using the National Wetlands Inventory located at http://www.fws.gov/wetlands/Data/Mapper.html .

Environmental Water Needs

Environmental Water Needs refers to how the strategy will impact the area's overall environmental water needs. Water is vital to the environmental health of a region, and so it is important to take into account how strategies will impact the amount of water that will be available to the environment.

The following conservative assumptions were made (unless more detailed information was available);

- The majority of the strategies will have a low impact on environmental water needs
- Subordination strategies will have a medium impact because subordination assumes that downstream senior water rights do not make priority calls on major Region F municipal water rights. This means that the water will be used upstream and will decrease the amount of water that is available to the environment later on downstream.
- Reuse will also have a medium impact if the effluent was previously used for irrigation or discharged back into the water system. This will decrease the overall amount of water that is available to the environment by diverting the effluent and using it for another purpose
- Precipitation Enhancement and Brush Control will have a positive impact because both of these strategies increase the amount of water available to the environment.

Habitat

Habitat refers to how the strategy will impact the habitat of the local area. The more area that is impacted due to the implementation of the strategy, the more the area's habitat will be disrupted.

The following conservative assumptions were made (unless more detailed information was available);

- Strategies with less than 100 acres impacted will have a low impact
- Strategies above 100 acres impacted will have a medium impact

Threatened and Endangered Species

Threatened and endangered species refers to how the strategy will impact those species in the area once implemented.

The following conservative assumptions were made (unless more detailed information was available);

- Only applicable to strategies implementing infrastructure
- Rankings were based on the amount of threatened and endangered species located within the county. This amount was found using the Texas Parks and Wildlife Database located at http://tpwd.texas.gov/gis/rtest/ and the U.S. Fish and Wildlife Service Database located at http://www.fws.gov/endangered/ .
- This ranking only includes threatened and endangered species as defined in the TWDB guidelines and does not include species without official protection such as those proposed for listing or species that are considered rare or otherwise of special concern.

Agricultural Resources

Impacts to Agricultural Resources is quantified based on the permanent impacts to water supplies to irrigation users or direct impacts to irrigated acreage. Projects with only temporary impacts, such as pipeline projects, would be classified as low impacts. Specific assumptions include:

- If the location of the strategy is known and data is available, actual impacts to agricultural lands will be used.
- If a strategy is located in a rural area of a county with significant irrigation use (>10,000 irrigated acres), it is assumed that the strategy could potentially impact agricultural lands. Since most

projects will avoid direct impacts to agricultural lands, the quantity of impacts is estimated to be no more than 10% of the total area for the strategy.
- If a strategy impacts more than 2,000 acres of agricultural land, the impacts are classified as "high". If a strategy impacts between 5 and 50 acres of agricultural lands, the impacts are classified as "low". If the strategy impacts less than 5 acres, it was assumed to negligible.
- If a strategy will reduce the available water to an irrigation user (by county) by the greater of 10% current irrigation use or 5,000 ac-ft/yr, the strategy is determined to have "high" impacts. If a strategy will reduce the available water to an irrigation user (by county) by 1% of current irrigation use or 500 ac-ft/yr, the strategy is determined to have "low" impacts.
- If the entity already holds water rights for the strategy, the impacts would be "none".
- If the strategy does not impact any agricultural or rural user, "none" is selected.
- For strategies that provide water to agricultural and rural users, the strategy is rated as "positive impacts."

Cultural Resources

Cultural Resources refers to how the strategy will impact cultural resources located within the area. Cultural resources are defined as the collective evidence of the past activities and accomplishments of people. Locations, buildings and features with scientific, cultural or historic value are considered to be cultural resources.

The following conservative assumptions were made (unless more detailed information was available);
- Only applicable to strategies implementing infrastructure
- All applicable strategies will have a low impact on cultural resources

Bays and Estuaries

Region F is located too far away from and bays or estuaries to have a quantifiable impact. Therefore this category was assumed to be non-applicable for every strategy.

Environmental Water Quality

Environmental Water Quality refers to the impact that the implementation of the strategy will have on the area's applicable water quality. Most strategies were assumed to have a low impact on water quality. Conservation, weather modification, and aquifer storage and recovery, were scored as having no impact on water quality.

Strategy Evaluation Matrix

Entity	County Used	Basin Used	Strategy	Quantity (Ac-Ft/Yr)	Maximum Need	Percentage of Max Need Met	Quantity Score	Reliability	Cost ($/Ac-Ft)	Cost Score	Impacts of Strategy on:					Overall Score (5-45)	Implementation Issues	Comments
											Environmental Factors	Agricultural Resources/ Rural Areas	Other Natural Resources	Key Water Quality Parameters	Third Party Social & Economic Factors			
Andrews	Andrews	Colorado	Conservation	213	7,529	3%	1	3	$533	3	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Andrews	Colorado	Purchase Reuse from Midland	1,500	2,678	56%	3	5	$1,141	2	4	4	4	3	4	29	Must reach agreement with the City of Midland.	
Mining	Andrews	Colorado, Rio Grande	Conservation	277	2,678	10%	1	1	$20,000	1	4	4	4	3	5	23	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Andrews	Colorado, Rio Grande	Conservation	3,758	31,377	12%	1	3	$650	3	4	5	4	3	5	28	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Andrews	Andrews	Colorado	New Groundwater (Ogallala)	4,300	7,529	57%	3	3	$487	4	4	4	4	3	5	30		The City can pursue this strategy independently but cannot receive state funding to do so due to modeled availability constraints
County-Other	Andrews	Colorado, Rio Grande	New Groundwater (Edwards Trinity)	500	487	103%	5	3	$696	3	4	4	4	3	5	31	The most significant issue willl be locating areas with sufficient well production	
Livestock	Andrews	Colorado	New Groundwater (Edwards Trinity)	150	166	90%	4	3	$193	4	4	4	4	3	5	31	The most significant issue willl be locating areas with sufficient well production	
Livestock	Andrews	Colorado	New Groundwater (Pecos Valley)	50	166	30%	3	3	$160	4	4	4	4	3	5	30	The most significant issue willl be locating areas with sufficient well production	
County-Other	Borden	Colorado, Brazos	Conservation	4	0	101%	5	3	$1,196	2	4	4	4	3	5	30	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Borden	Colorado	Conservation	65	0	101%	5	1	$20,000	1	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Borden	Colorado, Brazos	Conservation	399	3,243	12%	1	3	$650	3	4	5	4	3	5	28	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Bangs	Brown	Colorado	Conservation	9	0	101%	5	3	$776	3	4	4	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Brookesmith SUD	Brown	Colorado	Conservation	45	0	101%	5	3	$398	4	4	4	4	3	5	32	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Brownwood	Brown	Colorado	Conservation	129	0	101%	5	3	$448	4	4	4	4	3	5	32	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Coleman County SUD	Brown	Colorado	Conservation	19	213	9%	1	3	$636	3	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Early	Brown	Colorado	Conservation	16	0	101%	5	3	$661	3	4	4	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Santa Anna	Brown	Colorado	Conservation	6	0	101%	5	3	$909	3	4	4	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Zephyr WSC	Brown	Colorado	Conservation	26	0	101%	5	3	$602	3	4	4	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Brown	Colorado	Conservation	67	0	101%	5	1	$20,000	1	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Brown	Colorado, Brazos	Conservation	752	3,098	24%	1	3	$650	3	4	5	4	3	5	28	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Bangs	Brown	Colorado	Reuse	25	0	101%	5	5	$1,560	2	4	4	3	4	4	31	Possible public resistance to reuse of water	Adequate monitoring and oversight will be required to protect public health and safety
Brownwood	Brown	Colorado	Reuse	841	0	101%	5	5	$1,541	2	4	4	4	4	4	32	Possible public resistance to reuse of water	Adequate monitoring and oversight will be required to protect public health and safety
BCWID	Brown	Colorado	Subordination	6,981	0	101%	5	3	$0	5	4	4	4	3	5	33	A definitive assessment of the impacts on senior water right holders and the benefits to junior water rights holders must be determined prior to implementation.	Subordination based on generic assessment. Site-specific data not available.

Strategy Evaluation Matrix

Entity	County Used	Basin Used	Strategy	Quantity (Ac-Ft/Yr)	Maximum Need	Percentage of Max Need Met	Quantity Score	Reliability	Cost ($/Ac-Ft)	Cost Score	Impacts of Strategy on: Environmental Factors	Agricultural Resources/ Rural Areas	Other Natural Resources	Key Water Quality Parameters	Third Party Social & Economic Factors	Overall Score (5-45)	Implementation Issues	Comments
Bronte	Coke	Colorado	Conservation	5	347	101%	5	3	$959	3	4	4	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Robert Lee	Coke	Colorado	Conservation	6	299	2%	1	3	$938	3	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Robert Lee	Coke	Colorado	Bronte	178	299	60%	3	5	$652	3	4	4	4	3	4	30		
Mining	Coke	Colorado	Conservation	34	318	11%	1	1	$20,000	1	4	4	4	3	5	23	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Coke	Colorado	Conservation	115	202	57%	3	3	$650	3	4	5	4	3	5	30	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Bronte	Coke	Colorado	Expanded Use (Pipeline Rehab)	104	347	101%	5	5	$1,370	2	4	4	4	4	5	33		
Bronte	Coke	Colorado	New Groundwater (Wells SE of Bronte)	200	347	101%	5	3	$4,860	2	4	4	4	3	5	30	The most significant issue willl be locating areas with sufficient well production	
Bronte	Coke	Colorado	New Groundwater (Wells at Oak Creek)	150	347	101%	5	1	$1,780	2	4	4	4	3	5	28	The most significant issue willl be locating areas with sufficient well production	
Bronte	Coke	Colorado	WTP Expansion	504	347	145%	5	5	$1,603	2	4	4	4	4	5	33		
Bronte	Coke	Colorado	Lake Brownwood to Runnels and Coke Counties	280	347	81%	4	3	$2,707	2	3	4	4	3	3	26	Still would need to reach an agreement with Brownwood and partners.	
Bronte	Coke	Colorado	Direct Potable Reuse	94	347	27%	3	5	$4,213	2	4	4	3	3	4	28		
Bronte, Robert Lee	Coke	Colorado	Purchase from UCRA	500	347	144%	5	3	$2,730	2	3	4	4	3	3	27	Still would need to reach an agreement with UCRA and San Angelo.	
Bronte	Coke	Colorado	Nolan County Groundwater	78	347	22%	1	3	$8,885	1	3	4	4	3	4	23		
Bronte	Coke	Colorado	Phantom Hill to Runnels and Coke Counties	350	347	101%	5	3	$4,697	2	3	4	4	3	3	27	Still would need to reach an agreement with Ballinger and partners.	
Mining	Coke	Colorado	New Groundwater (Edwards Trinity)	250	318	79%	4	3	$295	4	4	4	4	3	5	31	The most significant issue willl be locating areas with sufficient well production	
County-Other	Coke	Colorado	Voluntary Transfer from Coke County Irrigation	24	24	100%	4	5	$458	4	4	4	4	3	4	32		
Robert Lee	Coke	Colorado	New Water Treatment Plant	500	299	167%	5	5	$1,666	2	4	4	4	3	5	32	Financing	1 mgd treatment expansion and new storage tank
Robert Lee	Coke	Colorado	New Groundwater (Edwards Trinity)	240	299	80%	4	3	$2,832	2	4	4	4	3	5	29		
Bronte	Coke	Colorado	Subordination	176	347	0%	0	3	$0	5	4	4	4	3	5	28	A definitive assessment of the impacts on senior water right holders and the benefits to junior water rights holders must be determined prior to implementation.	Subordination based on generic assessment. Site-specific data not available.
Robert Lee	Coke	Colorado	Subordination	224	299	75%	3	3	$0	5	4	4	4	3	5	31	A definitive assessment of the impacts on senior water right holders and the benefits to junior water rights holders must be determined prior to implementation.	Subordination based on generic assessment. Site-specific data not available.
Mining	Coke	Colorado	Subordination	38	318	12%	1	3	$0	5	4	4	4	3	5	29	A definitive assessment of the impacts on senior water right holders and the benefits to junior water rights holders must be determined prior to implementation.	Subordination based on generic assessment. Site-specific data not available.
Steam Electric Power	Coke	Colorado	Conservation	528	528	100%	4	3	$7,409	1	4	4	4	3	5	28		
Coleman	Coleman	Colorado	Conservation	27	1,052	3%	1	3	$597	3	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Coleman	Colorado	Conservation	8	62	13%	1	1	$20,000	1	4	4	4	3	5	23	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Coleman	Colorado	Conservation	77	743	10%	1	3	$650	3	4	5	4	3	5	28	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Coleman	Coleman	Colorado	Subordination	2,102	1,052	200%	5	3	$0	5	4	4	4	3	5	33	A definitive assessment of the impacts on senior water right holders and the benefits to junior water rights holders must be determined prior to implementation.	Subordination based on generic assessment. Site-specific data not available.
Coleman County SUD	Coleman	Colorado	Subordination	214	213	100%	5	3	$0	5	4	4	4	3	5	33	A definitive assessment of the impacts on senior water right holders and the benefits to junior water rights holders must be determined prior to implementation.	Subordination based on generic assessment. Site-specific data not available.

Strategy Evaluation Matrix

Entity	County Used	Basin Used	Strategy	Quantity (Ac-Ft/Yr)	Maximum Need	Percentage of Max Need Met	Quantity Score	Reliability	Cost ($/Ac-Ft)	Cost Score	Impacts of Strategy on: Environmental Factors	Agricultural Resources/ Rural Areas	Other Natural Resources	Key Water Quality Parameters	Third Party Social & Economic Factors	Overall Score (5-45)	Implementation Issues	Comments
Irrigation	Coleman	Colorado	Subordination	743	743	100%	4	3	$0	5	4	5	4	3	5	33	A definitive assessment of the impacts on senior water right holders and the benefits to junior water rights holders must be determined prior to implementation.	Subordination based on generic assessment. Site-specific data not available.
Mining	Coleman	Colorado	New Groundwater (Hickory)	65	62	105%	5	3	$1,200	2	3	4	4	3	5	29	The most significant issue willl be locating areas with sufficient well production	
BCWID	Concho	Colorado	New Groundwater	1,680	0	101%	5	3	$580	3	3	4	3	4	5	30		Additional study will be needed once a more specific location for this strategy has been selected
Eden	Concho	Colorado	Conservation	16	0	101%	5	3	$658	3	4	4	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Concho	Colorado	Conservation	34	212	16%	1	1	$20,000	1	4	4	4	3	5	23	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Concho	Colorado	Conservation	1,062	5,249	20%	1	3	$650	3	4	5	4	3	5	28	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Eden	Concho	Colorado	Reuse	50	0	101%	5	5	$902	3	4	4	3	4	4	32	Possible public resistance to reuse of water	Adequate monitoring and oversight will be required to protect public health and safety
Mining	Concho	Colorado	New Groundwater (Hickory)	200	212	94%	4	3	$800	3	3	4	4	3	5	29	The most significant issue willl be locating areas with sufficient well production	
Crane	Crane	Rio Grande	Conservation	26	0	101%	5	3	$628	3	4	4	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Crane	Rio Grande	Conservation	60	0	101%	5	1	$20,000	1	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Crockett County WCID	Crockett	Rio Grande	Conservation	24	0	101%	5	3	$620	3	4	4	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Crockett	Rio Grande	Conservation	129	1,293	10%	1	1	$20,000	1	4	4	4	3	5	23	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Crockett	Colorado, Rio Grande	Conservation	210	0	101%	5	3	$650	3	4	5	4	3	5	32	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Crockett	Rio Grande	Reuse	75	1,293	6%	1	5	$0	5	4	4	4	4	4	31		
Irrigation	Crockett	Colorado, Rio Grande	Weather Modification	9	0	101%	5	1	$1	4	4	5	4	4	5	32	Local opposition has caused some programs to shut down, and other programs have readjusted target areas which limits continuous and reliable data	
Ector County UD	Ector	Colorado	Conservation	162	0	101%	5	3	$533	3	4	4	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Greater Gardendale WSC	Ector	Colorado	Conservation	28	0	101%	5	3	$656	3	4	4	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Odessa	Ector	Colorado	Conservation	1,231	19,491	6%	1	3	$316	4	4	4	4	3	5	28	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Ector	Colorado, Rio Grande	Conservation	151	0	101%	5	1	$20,000	1	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Odessa	Ector	Colorado	Subordination	19,491	19,491	100%	4	3	$0	5	4	4	4	3	5	32	A definitive assessment of the impacts on senior water right holders and the benefits to junior water rights holders must be determined prior to implementation.	Subordination based on generic assessment. Site-specific data not available.
Irrigation	Ector	Colorado, Rio Grande	Subordination	189	0	101%	5	3	$0	5	4	5	4	3	5	34	A definitive assessment of the impacts on senior water right holders and the benefits to junior water rights holders must be determined prior to implementation.	Subordination based on generic assessment. Site-specific data not available.
Odessa	Ector	Colorado	Expanded Use (RO Treatment)	7,500	19,491	38%	3	n/a	$ 1,078	2	4	4	3	3	5	24		
Odessa	Ector	Colorado	New Groundwater (Edwards Trinity and Capitan Reef)	28,000	19,491	144%	5	3	$5,557	1	3	4	4	3	5	28	The most significant issue willl be locating areas with sufficient well production	

Strategy Evaluation Matrix

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County-Other	Ector	Colorado, Rio Grande	Purchase Additional Supply from Odessa	809	809	100%	4	5	$652	3	4	4	4	3	4	31		
Steam Electric Power	Ector	Colorado	Sales from City of Odessa	4,000	19,033	21%	1	5	$652	3	4	4	4	3	4	28		
Steam Electric Power	Ector	Colorado	Conservation	15,033	19,033	79%	4	3	$836	3	4	4	4	3	5	30		
Irrigation	Ector	Colorado, Rio Grande	Conservation	210	0	101%	5	3	$7,036	1	4	5	4	3	5	30	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Glasscock	Colorado	Conservation	240	0	101%	5	1	$20,000	1	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Glasscock	Colorado	Conservation	2,268	0	101%	5	3	$207	4	4	5	4	3	5	33	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Big Spring	Howard	Colorado	Conservation	193	3,885	5%	1	3	$399	4	4	4	4	3	5	28	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Coahoma	Howard	Colorado	Conservation	5	0	101%	5	3	$1,027	2	4	4	4	3	5	30	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Howard	Colorado	Conservation	192	2,591	7%	1	1	$20,000	1	4	4	4	3	5	23	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Howard	Colorado	Conservation	722	3,415	21%	1	3	$189	4	4	5	4	3	5	29	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Big Spring	Howard	Colorado	Subordination	3,885	3,885	100%	4	3	$0	5	4	4	4	3	5	32	A definitive assessment of the impacts on senior water right holders and the benefits to junior water rights holders must be determined prior to implementation.	Subordination based on generic assessment. Site-specific data not available.
Mining	Howard	Colorado	Subordination	1,000	2,591	39%	3	3	$0	5	4	4	4	3	5	31	A definitive assessment of the impacts on senior water right holders and the benefits to junior water rights holders must be determined prior to implementation.	Subordination based on generic assessment. Site-specific data not available.
Big Spring	Howard	Colorado	Expanded Use (WTP Expansion)	3,885	3,885	100%	4	5	$651	3	4	4	4	4	5	33		
Livestock	Howard	Colorado	New Groundwater (Dockum)	150	129	116%	5	3	$367	4	4	4	4	3	5	32	The most significant issue willl be locating areas with sufficient well production	
Mining	Howard	Colorado	New Groundwater (Ogallala)	31	2,591	1%	1	3	$419	4	4	4	4	3	5	28	The most significant issue willl be locating areas with sufficient well production	
Mining	Howard	Colorado	New Groundwater (Dockum)	274	2,591	11%	1	3	$383	4	4	4	4	3	5	28	The most significant issue willl be locating areas with sufficient well production	
County Other	Howard	Colorado	Purchase from Big Spring	485	485	100%	4	5	$1,054	2	4	4	4	3	4	30		
Manufacturing	Howard	Colorado	Purchase from Big Spring	1,396	1,396	100%	4	5	$652	3	4	4	4	3	4	31		
Mining	Howard	Colorado	Purchase from CRMWD's Diverted Water System	242	2,591	9%	1	5	$326	4	4	4	4	3	4	29		
Mertzon	Irion	Colorado	Conservation	5	0	101%	5	3	$1,058	2	4	4	4	3	5	30	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Irion	Colorado	Conservation	235	1,984	12%	1	1	$20,000	1	4	4	4	3	5	23	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Irion	Colorado	Conservation	210	359	59%	3	3	$1,008	2	4	5	4	3	5	29	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Irion	Colorado	New Groundwater (Dockum)	150	1,984	8%	1	3	$520	3	4	4	4	3	5	27	The most significant issue willl be locating areas with sufficient well production	
Mining	Irion	Colorado	New Groundwater (Edwards Trinity)	500	1,984	25%	3	3	$296	4	4	4	4	3	5	30	The most significant issue willl be locating areas with sufficient well production	
Irrigation	Irion	Colorado	Weather Modification	110	359	31%	3	1	$0	4	4	5	4	4	5	30	Local opposition has caused some programs to shut down, and other programs have readjusted target areas which limits continuous and reliable data	
Junction	Kimble	Colorado	Conservation	15	640	2%	1	3	$676	3	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.

Strategy Evaluation Matrix

Entity	County Used	Basin Used	Strategy	Quantity (Ac-Ft/Yr)	Maximum Need	Percentage of Max Need Met	Quantity Score	Reliability	Cost ($/Ac-Ft)	Cost Score	Impacts of Strategy on: Environmental Factors	Agricultural Resources/ Rural Areas	Other Natural Resources	Key Water Quality Parameters	Third Party Social & Economic Factors	Overall Score (5-45)	Implementation Issues	Comments
Mining	Kimble	Colorado	Conservation	1	0	101%	5	1	$20,000	1	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Junction	Kimble	Colorado	Subordination	412	640	64%	3	3	$0	5	4	4	4	3	5	31	A definitive assessment of the impacts on senior water right holders and the benefits to junior water rights holders must be determined prior to implementation.	Subordination based on generic assessment. Site-specific data not available.
Junction	Kimble	Colorado	Expanded Use (Dredging River Intake)	412	640	64%	3	3	$867	3	3	4	2	2	5	25	This strategy assumes that the dredged material is relatively clean. If contamination is found, the water quality impacts must be evaluated	A suitable location for disposal of the dredged material must be found
Junction	Kimble	Colorado	New Groundwater (Edwards Trinity)	216	640	34%	3	3	$1,655	2	3	4	4	3	5	27	The most significant issue willl be locating areas with sufficient well production	
Manufacturing	Kimble	Colorado	New Groundwater (Edwards Trinity)	300	983	31%	3	3	$140	4	3	4	4	3	5	29	The most significant issue willl be locating areas with sufficient well production	
Irrigation	Kimble	Colorado	Conservation	326	1,496	22%	1	3	$1,044	2	4	5	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Loving	Rio Grande	Conservation	74	0	101%	5	1	$20,000	1	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Stanton	Martin	Colorado	Conservation	20	320	6%	1	3	$664	3	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Martin	Colorado	Conservation	247	3,039	8%	1	1	$20,000	1	4	4	4	3	5	23	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Martin	Colorado	Conservation	5,254	25,157	21%	1	3	$47	4	4	5	4	3	5	29	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Stanton	Martin	Colorado	Subordination	331	320	103%	5	3	$0	5	4	4	4	3	5	33	A definitive assessment of the impacts on senior water right holders and the benefits to junior water rights holders must be determined prior to implementation.	Subordination based on generic assessment. Site-specific data not available.
County-Other	Martin	Colorado	New Groundwater (Dockum)	250	243	103%	5	3	$1,636	2	3	4	4	3	5	29	The most significant issue willl be locating areas with sufficient well production	
Livestock	Martin	Colorado	New Groundwater (Dockum)	40	38	105%	5	3	$800	3	4	4	4	3	5	31	The most significant issue willl be locating areas with sufficient well production	
Mining	Martin	Colorado	New Groundwater (Edwards Trinity)	1,500	3,039	49%	3	3	$188	4	4	4	4	3	5	30	The most significant issue willl be locating areas with sufficient well production	
Mining	Martin	Colorado	New Groundwater (Dockum)	210	3,039	7%	1	3	$348	4	4	4	4	3	5	28	The most significant issue willl be locating areas with sufficient well production	
Mining	Martin	Colorado	Purchase Reuse from Midland	1,500	3,039	49%	3	5	$1,187	2	4	4	4	3	4	29	Must reach agreement with the City of Midland.	
Manufacturing	Martin	Colorado	Purchase GW Rights from Irrigation	29	29	100%	4	5	$500	4	4	4	4	3	4	32		
Mason	Mason	Colorado	Conservation	12	703	2%	1	3	$719	3	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Mason	Colorado	Conservation	72	0	101%	5	1	$20,000	1	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Mason	Colorado	Conservation	1,208	0	101%	5	3	$2,644	2	4	5	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mason	Mason	Colorado	Additional Treatment	703	703	100%	4	3	$240	4	3	4	5	3	5	31		
Brady	McCulloch	Colorado	Conservation	33	1,419	2%	1	3	$555	3	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
County-Other	McCulloch	Colorado	Conservation	3	36	9%	1	3	$1,286	2	4	4	4	3	5	26	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Millersview-Doole WSC	McCulloch	Colorado	Conservation	27	147	18%	1	3	$607	3	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.

Strategy Evaluation Matrix

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Richland SUD	McCulloch	Colorado	Conservation	14	0	101%	5	3	$692	3	4	4	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	McCulloch	Colorado	Conservation	625	3,618	17%	1	1	$20,000	1	4	4	4	3	5	23	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	McCulloch	Colorado	Conservation	524	2,184	24%	1	3	$1,499	2	4	5	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Brady	McCulloch	Colorado	Subordination	0	1,419	0%	0	3	$0	5	4	4	4	3	5	28	A definitive assessment of the impacts on senior water right holders and the benefits to junior water rights holders must be determined prior to implementation.	Subordination based on generic assessment. Site-specific data not available.
Millersview-Doole WSC	McCulloch	Colorado	Subordination	517	147	352%	5	3	$0	5	4	4	4	3	5	33	A definitive assessment of the impacts on senior water right holders and the benefits to junior water rights holders must be determined prior to implementation.	Subordination based on generic assessment. Site-specific data not available.
Brady	McCulloch	Colorado	Advanced Groundwater Treatment	608	1,419	43%	3	5	$3,013	2	4	4	4	4	4	30		
Livestock	McCulloch	Colorado	New Groundwater (Edwards Trinity)	30	24	125%	5	3	$200	4	3	4	4	3	5	31	The most significant issue willl be locating areas with sufficient well production	
County Other	McCulloch	Colorado	Purchase from Millersview-Doole	35	36	97%	4	5	$1,543	2	3	4	4	3	4	29		
Manufacturing	McCulloch	Colorado	Purchase from Brady	284	284	100%	4	5	$500	4	4	4	4	3	4	32		
San Angelo	McCulloch	Colorado	New Groundwater (Hickory)	4,000	14,772	27%	3	5	$1,016	2	3	4	4	3	5	29		As currently adopted, there is no available water for this strategy due to MAG limits
Menard	Menard	Colorado	Conservation	8	210	4%	1	3	$813	3	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Menard	Colorado	Conservation	76	0	101%	5	1	$20,000	1	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Menard	Colorado	Conservation	377	426	89%	4	3	$397	4	4	5	4	3	5	32	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Menard	Menard	Colorado	Reuse	67	210	32%	3	5	$1,775	2	4	4	3	4	4	29	Possible public resistance to reuse of water	Adequate monitoring and oversight will be required to protect public health and safety
Menard	Menard	Colorado	New Groundwater (Hickory)	500	210	238%	5	3	$1,366	2	3	4	4	3	5	29	The most significant issue willl be locating areas with sufficient well production	This strategy assumes that the water will meet primary drinking standards once blended with City's existing supply
Midland	Midland	Colorado	Conservation	1,236	31,072	4%	1	3	$313	4	4	4	4	3	5	28	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
County-Other	Midland	Colorado	Conservation	239	0	101%	5	3	$398	4	4	4	4	3	5	32	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Midland	Colorado	Conservation	273	0	101%	5	1	$20,000	1	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Midland	Colorado	Conservation	4,913	0	101%	5	3	$2,501	2	4	5	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Midland	Midland	Colorado	Subordination	8,527	31,072	27%	3	3	$0	5	4	4	4	3	5	31	A definitive assessment of the impacts on senior water right holders and the benefits to junior water rights holders must be determined prior to implementation.	Subordination based on generic assessment. Site-specific data not available.
Midland	Midland	Colorado	Treatment)	10,000	31,072	32%	3	5	$869	3	3	4	3	4	5	30		
Midland	Midland	Colorado	New Groundwater	3,000	31,072	10%	1	3 to 1	$2,086	2	3	3	4	3	5	21	The most significant issue willl be locating areas with sufficient well production	
Midland	Midland	Colorado	Purchase from CRMWD	4,000	31,072	13%	1	5	$652	3	4	4	4	3	4	28		
Midland	Midland	Colorado	West Texas Water Partnership	4,000	31,072	13%	1	5	$1,256	2	4	4	4	3	5	28		
County-Other	Midland	Colorado	County	1,000	0	101%	5	5	$5,837	1	4	4	3	4	5	31		
Mining	Midland	Colorado	Purchase Reuse from Midland	500	0	101%	5	5	$664	3	4	4	4	3	4	32	Must reach agreement with the City of Midland.	
Colorado City	Mitchell	Colorado	Conservation	33	0	101%	5	3	$593	3	4	4	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.

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Loraine	Mitchell	Colorado	Conservation	4	0	101%	5	3	$1,231	2	4	4	4	3	5	30	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
County-Other	Mitchell	Colorado	Conservation	29	0	101%	5	3	$597	3	4	4	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Mitchell	Colorado	Conservation	52	0	101%	5	1	$20,000	1	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Mitchell	Colorado	Conservation	230	0	101%	5	3	$7,824	1	4	5	4	3	5	30	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Steam Electric Power	Mitchell	Colorado	Subordination	3,720	4,847	77%	4	3	$0	5	4	4	4	3	5	32	A definitive assessment of the impacts on senior water right holders and the benefits to junior water rights holders must be determined prior to implementation.	Subordination based on generic assessment. Site-specific data not available.
Steam Electric Power	Mitchell	Colorado	Conservation	1,127	4,847	23%	1	3	$1,623	2	4	4	4	3	5	26		
Mining	Mitchell	Colorado	Reuse	250	0	101%	5	5	$368	4	4	4	3	4	4	33		
Colorado City	Mitchell	Colorado	New Groundwater (Dockum)	2,240	0	101%	5	3	$333	4	3	4	4	3	5	31	The most significant issue willl be locating areas with sufficient well production	This is not a recommended strategy due to DFC and MAG limits
CRMWD	Multiple	Colorado	Subordination	20,257	26,843	75%	4	3	$0	5	4	4	4	3	5	32	A definitive assessment of the impacts on senior water right holders and the benefits to junior water rights holders must be determined prior to implementation.	Subordination based on generic assessment. Site-specific data not available.
CRMWD	Multiple	Colorado	Expanded Use (Well Field Expansion)	11,200	26,843	42%	3	5	$1,265	2	3	4	4	4	5	30		
UCRA	Multiple	Colorado	Expanded Use (Expand Transmission System to Purchase Water from San Angelo)	500	349	143%	5	5	$6,116	1	4	4	4	4	5	32		Details and cost of a contract increase will need to be negotiated between UCRA and San Angelo
CRMWD	Multiple	Colorado	New Groundwater (Western Region F Counties)	30,000	26,843	112%	5	5	$1,199	2	3	4	3	4	5	31		Additional study will be needed once a more specific location for this strategy has been selected
CRMWD	Multiple	Colorado	Desalination (Desalination of CRMWD Diverted Water System)	3,360	26,843	13%	1	3	$1,844	2	3	4	5	3	5	26		Further study will be needed to determine the impacts on the recycling brine waste stream in the diverted water system.
San Angelo	Multiple	Colorado	Desalination (Brackish GW Supplies)	0	14,772	0%	0	3	$827	3	3	4	3	3	5	24		
San Angelo and UCRA	Multiple	Colorado	Brush Control (North Concho River, Twin Buttes Reservoir, O.H. Ivie)	1,000	15,121	7%	1	2	$100	4	3	4	2	3	5	24	Brush control is an on-going process that must be continually maintained in order to receive benefits	No attributed water savings, but it is assumed that surface water supplies gained through subordination will be more reliable
BCWID	Multiple	Colorado	Brush Control (Lake Brownwood)	350	0	101%	5	2	$857	3	3	4	2	3	5	27	Brush control is an on-going process that must be continually maintained in order to receive benefits	No attributed water savings, but it is assumed that surface water supplies gained through subordination will be more reliable
Fort Stockton	Pecos	Rio Grande	Conservation	66	0	101%	5	3	$352	4	4	4	4	3	5	32	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Iraan	Pecos	Rio Grande	Conservation	10	0	101%	5	3	$842	3	4	4	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Pecos	Reeves	Colorado	Conservation	64	0	101%	5	3	$332	4	4	4	4	3	5	32	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Pecos WCID	Pecos	Rio Grande	Conservation	25	0	101%	5	3	$635	3	4	4	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Pecos	Rio Grande	Conservation	75	0	101%	5	1	$20,000	1	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Pecos	Rio Grande	Conservation	18,903	0	101%	5	3	$463	4	4	5	4	3	5	33	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
San Angelo	Pecos	Colorado	New Groundwater (Pecos Valley/Edwards Trinity in Pecos County)	12,000	14,772	81%	4	3	$2,109	2	3	3	4	3	5	27		The necessary infrastructure to move water from Pecos County to Tom Green County will be expensive
Pecos County WCID	Pecos	Colorado	New Groundwater (Edwards Trinity)	250	0	101%	5	3	$988	3	3	4	4	3	5	30	The most significant issue willl be locating areas with sufficient well production	

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Irrigation	Pecos	Rio Grande	Weather Modification	264	0	101%	5	1	$4	4	4	5	4	4	5	32	Local opposition has caused some programs to shut down, and other programs have readjusted target areas which limits continuous and reliable data	
San Angelo	Pecos	Colorado	New Groundwater (Capitan Reef)	11,100	14,772	75%	4	3	$3,360	2	3	4	4	3	5	28		The necessary infrastructure to move water from Pecos County to Tom Green County will be expensive
Big Lake	Reagan	Colorado	Conservation	24	0	101%	5	3	$638	3	4	4	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Reagan	Colorado, Rio Grande	Conservation	295	0	101%	5	1	$20,000	1	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Reagan	Colorado	Conservation	2,773	0	101%	5	3	$112	4	4	5	4	3	5	33	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Reagan	Colorado	Weather Modification	1,469	0	101%	5	1	$0	4	4	5	4	4	5	32	Local opposition has caused some programs to shut down, and other programs have readjusted target areas which limits continuous and reliable data	
Madera Valley WSC	Reeves	Rio Grande	Conservation	14	0	101%	5	3	$728	3	4	4	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
County-Other	Reeves	Rio Grande	Conservation	23	0	101%	5	3	$634	3	4	4	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Reeves	Rio Grande	Conservation	184	0	101%	5	1	$20,000	1	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Reeves	Rio Grande	Conservation	13,469	0	101%	5	3	$4	4	4	5	4	3	5	33	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Reeves	Rio Grande	Weather Modification	240	0	101%	5	1	$3	4	4	5	4	4	5	32	Local opposition has caused some programs to shut down, and other programs have readjusted target areas which limits continuous and reliable data	
Ballinger	Runnels	Colorado	Conservation	22	822	3%	1	3	$621	3	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Miles	Runnels	Colorado	Conservation	6	124	5%	1	3	$977	3	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Winters	Runnels	Colorado	Conservation	15	355	4%	1	3	$676	3	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Runnels	Colorado	Conservation	19	95	20%	1	1	$20,000	1	4	4	4	3	5	23	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Runnels	Colorado	Conservation	477	1,642	29%	3	3	$1,206	2	4	5	4	3	5	29	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Winters	Runnels	Colorado	Reuse	83	355	23%	1	5	$5,091	1	4	4	4	4	4	27	Possible public resistance to reuse of water	Adequate monitoring and oversight will be required to protect public health and safety
Mining	Runnels	Colorado	New Groundwater	76	95	80%	4	3	$211	4	3	4	4	3	5	30	The most significant issue willl be locating areas with sufficient well production	
Ballinger	Runnels	Colorado	Fort Phantom Hill Supplies	990	822	120%	5	5	$4,848	2	3	4	4	3	4	30		
Winters	Runnels	Colorado	Purchase from Provider	100	355	28%	3	5	$950	3	4	4	4	3	4	30		
Ballinger	Runnels	Colorado	Subordination	752	822	91%	4	3	$0	5	4	4	4	3	5	32	A definitive assessment of the impacts on senior water right holders and the benefits to junior water rights holders must be determined prior to implementation.	Subordination based on generic assessment. Site-specific data not available.
Miles	Runnels	Colorado	Subordination	124	124	100%	4	3	$0	5	4	4	4	3	5	32	A definitive assessment of the impacts on senior water right holders and the benefits to junior water rights holders must be determined prior to implementation.	Subordination based on generic assessment. Site-specific data not available.

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											Environmental Factors	Agricultural Resources/ Rural Areas	Other Natural Resources	Key Water Quality Parameters	Third Party Social & Economic Factors			
Winters	Runnels	Colorado	Subordination	186	355	52%	3	3	$0	5	4	4	4	3	5	31	A definitive assessment of the impacts on senior water right holders and the benefits to junior water rights holders must be determined prior to implementation.	Subordination based on generic assessment. Site-specific data not available.
Manufacturing	Runnels	Colorado	Subordination	11	69	16%	1	3	$0	5	4	4	4	3	5	29	A definitive assessment of the impacts on senior water right holders and the benefits to junior water rights holders must be determined prior to implementation.	Subordination based on generic assessment. Site-specific data not available.
El Dorado	Schleicher	Colorado	Conservation	11	0	101%	5	3	$736	3	4	4	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Schleicher	Colorado, Rio Grande	Conservation	51	0	101%	5	1	$20,000	1	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Schleicher	Colorado, Rio Grande	Conservation	83	0	101%	5	3	$1,057	2	4	5	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Schleicher	Colorado, Rio Grande	Weather Modification	102	0	101%	5	1	$0	4	4	5	4	4	5	32	Local opposition has caused some programs to shut down, and other programs have readjusted target areas which limits continuous and reliable data	
San Angelo	Schleicher	Colorado	New Groundwater (Edwards Trinity)	4,500	14,772	30%	3	3	$1,140	2	4	4	4	3	5	28		
Snyder	Scurry	Colorado	Conservation	134	1,812	7%	1	3	$536	3	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
County-Other	Scurry	Colorado	Voluntary Transfer from Scurry County Irrigation	150	501	30%	3	3	$500	4	4	4	4	3	5	30		
County-Other	Scurry	Colorado	Purchase from Snyder	351	501	70%	3	3	$652	3	4	4	4	3	5	29		
Mining	Scurry	Colorado, Brazos	Conservation	34	435	8%	1	1	$20,000	1	4	4	4	3	5	23	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Scurry	Colorado, Brazos	Conservation	885	6,321	14%	1	3	$191	4	4	5	4	3	5	29	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Snyder	Scurry	Colorado	Subordination	1,812	1,812	100%	4	3	$0	5	4	4	4	3	5	32	A definitive assessment of the impacts on senior water right holders and the benefits to junior water rights holders must be determined prior to implementation.	Subordination based on generic assessment. Site-specific data not available.
Mining	Scurry	Colorado, Brazos	New Groundwater	80	435	18%	1	3	$200	4	3	4	4	3	5	27	The most significant issue willl be locating areas with sufficient well production	
Livestock	Scurry	Colorado, Brazos	New Groundwater	92	92	100%	4	3	$185	4	3	4	4	3	5	30	The most significant issue willl be locating areas with sufficient well production	
Sterling	Sterling	Colorado	Conservation	5	0	101%	5	3	$986	3	4	4	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Sterling	Colorado	Conservation	67	0	101%	5	1	$20,000	1	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Sterling	Colorado	Conservation	135	0	101%	5	3	$53,744	1	4	5	4	3	5	30	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Sterling	Colorado	Weather Modification	25	0	101%	5	1	$1	4	4	5	4	4	5	32	Local opposition has caused some programs to shut down, and other programs have readjusted target areas which limits continuous and reliable data	
Sonora	Sutton	Colorado	Conservation	21	0	101%	5	3	$640	3	4	4	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Sutton	Colorado, Rio Grande	Conservation	53	0	101%	5	1	$20,000	1	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Sutton	Colorado, Rio Grande	Conservation	260	0	101%	5	3	$3,451	2	4	5	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.

Strategy Evaluation Matrix

Entity	County Used	Basin Used	Strategy	Quantity (Ac-Ft/Yr)	Maximum Need	Percentage of Max Need Met	Quantity Score	Reliability	Cost ($/Ac-Ft)	Cost Score	Impacts of Strategy on:					Overall Score (5-45)	Implementation Issues	Comments
											Environmental Factors	Agricultural Resources/ Rural Areas	Other Natural Resources	Key Water Quality Parameters	Third Party Social & Economic Factors			
Sonora	Sutton	Colorado	Reuse	62	0	101%	5	5	$748	3	4	4	3	4	4	32	Possible public resistance to reuse of water	Adequate monitoring and oversight will be required to protect public health and safety
Irrigation	Sutton	Colorado, Rio Grande	Weather Modification	34	0	101%	5	1	$1	4	4	5	4	4	5	32	Local opposition has caused some programs to shut down, and other programs have readjusted target areas which limits continuous and reliable data	
Mining	Tom Green	Colorado	Conservation	81	0	101%	5	1	$20,000	1	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Tom Green	Colorado	Conservation	11,175	31,451	36%	3	3	$48	4	4	5	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
San Angelo	Tom Green	Colorado	Subordination	3,699	14,772	25%	3	3	$0	5	4	4	4	3	5	31	A definitive assessment of the impacts on senior water right holders and the benefits to junior water rights holders must be determined prior to implementation.	Subordination based on generic assessment. Site-specific data not available.
Manufacturing	Tom Green	Colorado	Subordination	428		101%	5	3	$0	5	4	4	4	3	5	33	A definitive assessment of the impacts on senior water right holders and the benefits to junior water rights holders must be determined prior to implementation.	Subordination based on generic assessment. Site-specific data not available.
San Angelo	Tom Green	Colorado	Reuse	7,000	14,772	47%	3	5	$2,826	2	4	1	3	4	2	24	Possible public resistance to reuse of water	Adequate monitoring and oversight will be required to protect public health and safety
San Angelo	Tom Green	Colorado	New Surface Water (Red Arroyo Reservoir)	1,400	14,772	9%	1	3	$1,791	2	3	3	3	3	5	23	Existing groundwater may cause structural issues with the proposed impoundment.	There is not enough unappropriated water in the Red Arroyo for a new water right
San Angelo	Tom Green	Colorado	Desalination (Other Aquifer Supplies)	3,750	14,772	25%	3	3	$2,142	2	3	4	4	3	5	27	The most significant challenge for this strategy is the lack of data on water quality/quantity from these formations	
Irrigation	Tom Green	Colorado	Weather Modification	4,945	31,451	16%	1	1	$0	4	4	5	4	4	5	28	Local opposition has caused some programs to shut down, and other programs have readjusted target areas which limits continuous and reliable data	
County Other	Tom Green	Colorado	Purchase Water through UCRA	543	543	100%	4	5	$6,116	1	4	4	4	3	4	29		
Manufacturing	Tom Green	Colorado	Purchase Water from San Angelo	1,508	2,357	64%	3	5	$652	3	4	4	4	3	4	30		
Bronte & Robert Lee	Coke	Colorado	Purchase Water through UCRA	500	347	144%	5	5	$2,730	2	4	4	4	3	4	31		
Concho Rural WC	Tom Green	Colorado	New Groundwater (Lipan)	200	0	101%	5	3	$285	4	3	4	4	3	5	31	The most significant issue willl be locating areas with sufficient well production	
Concho Rural WC	Tom Green	Colorado	Supplies	150	0	101%	5	3	$4,673	2	3	4	4	3	5	29		
Concho Rural WC	Tom Green	Colorado	Conservation	41	0	101%	5	3	$523	3	4	4	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
San Angelo	Tom Green	Colorado	Conservation	949	14,772	6%	1	3	$319	4	4	4	4	3	5	28	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
McCamey	Upton	Rio Grande	Conservation	14	0	101%	5	3	$723	3	4	4	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Rankin	Upton	Rio Grande	Conservation	6	0	101%	5	3	$1,036	2	4	4	4	3	5	30	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Upton	Colorado, Rio Grande	Conservation	297	0	101%	5	1	$20,000	1	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Upton	Colorado, Rio Grande	Conservation	1,380	0	101%	5	3	$347	4	4	5	4	3	5	33	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Odessa	Ward	Colorado	New Groundwater (Capitan Reef)	8,400	19,491	43%	3	3	$1,801	2	4	4	4	3	5	28	The most significant issue willl be locating areas with sufficient well production	
Monahans	Ward	Rio Grande	Conservation	48	0	101%	5	3	$428	4	4	4	4	3	5	32	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
County-Other	Ward	Rio Grande	Conservation	26	0	101%	5	3	$617	3	4	4	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.

Strategy Evaluation Matrix

Entity	County Used	Basin Used	Strategy	Quantity (Ac-Ft/Yr)	Maximum Need	Percentage of Max Need Met	Quantity Score	Reliability	Cost ($/Ac-Ft)	Cost Score	Impacts of Strategy on: Environmental Factors	Agricultural Resources/ Rural Areas	Other Natural Resources	Key Water Quality Parameters	Third Party Social & Economic Factors	Overall Score (5-45)	Implementation Issues	Comments
Mining	Ward	Rio Grande	Conservation	67	0	101%	5	1	$20,000	1	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Ward	Rio Grande	Conservation	821	0	101%	5	3	$58,254	1	4	5	4	3	5	30	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Steam Electric Power	Ward	Rio Grande	New Groundwater (Pecos Valley)	5,600	5,569	101%	5	3	$89	4	4	4	4	3	5	32	The most significant issue willl be locating areas with sufficient well production	
Steam Electric Power	Ward	Rio Grande	Conservation	5,569	5,569	100%	4	3	$5,644	1	4	4	4	3	5	28		
Irrigation	Ward	Rio Grande	Weather Modification	46	0	101%	5	1	$1	4	4	5	4	4	5	32	Local opposition has caused some programs to shut down, and other programs have readjusted target areas which limits continuous and reliable data	
CRMWD	Ward	Colorado	Expanded Use (ASR)	5,000	26,843	19%	1	3	$651	3	4	4	4	3	5	27		Further study is needed to confirm that ASR is feasible at Ward County's Well Field
CRMWD	Ward	Colorado	New Groundwater (ASR of Brackish GW)	0	26,843	0%	0	5	$189	4	4	4	3	5	5	30	The suitability of the Pecos Valley Aquifer for ASR has not been firmly established.	Injection of water into the subsurface will likely require a Class V permit from TCEQ
CRMWD	Ward	Colorado	Desalination (Brackish GW Supplies)	0	26,843	0%	0	3	$986	3	3	4	3	3	5	24		
Kermit	Winkler	Rio Grande	Conservation	33	0	101%	5	3	$552	3	4	4	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
County-Other	Winkler	Rio Grande	Conservation	20	421	5%	1	3	$892	3	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Wink	Winkler	Rio Grande	Conservation	8	0	101%	5	3	$932	3	4	4	4	3	5	31	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Mining	Winkler	Rio Grande	Conservation	82	0	101%	5	1	$20,000	1	4	4	4	3	5	27	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Irrigation	Winkler	Rio Grande	Conservation	737	0	101%	5	3	$0	5	4	5	4	3	5	34	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
County-Other	Winkler	Rio Grande	New Groundwater (Pecos Valley)	500	421	119%	5	3	$398	4	4	4	4	3	5	32	The most significant issue willl be locating areas with sufficient well production	

Strategy Evaluation Matrix

				Environmental Factors															Agricultural Impacts		
Entity	County	Basin	Strategy	Acres Impacted	Wetland Acres	Acres Impacted Score	Envir Water Needs	Envir Water Needs Score	Habitat	Habitat Score	Threat and Endanger Species	Threat and Endanger Species Score	Cultural Resources	Cultural Resources Score	Bays & Estuaries	Bays & Estuaries Score	Envir Water Quality	Overall Environmental Impacts	Permanent Ag Acres Impacted	Temp Ag Acres Impacted	Agricultural Resources Score
Andrews	Andrews	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	Andrews	Colorado	Purchase Reuse from	32	n/a	4	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	3	4
Mining	Andrews	Colorado, Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Andrews	Colorado, Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Andrews	Andrews	Colorado	New Groundwater (Ogallala)	23	n/a	4	Low	3	Low	3	9	4	Low	3	None	5	3	4	1	2	4
County-Other	Andrews	Colorado, Rio Grande	New Groundwater (Edwards Trinity)	38	n/a	4	Low	3	Low	3	9	4	Low	3	None	5	3	4	4	4	4
Livestock	Andrews	Colorado	New Groundwater (Edwards Trinity)	5	n/a	4	Low	3	Low	3	9	4	Low	3	None	5	3	4	1	1	4
Livestock	Andrews	Colorado	New Groundwater	1	n/a	4	Low	3	Low	3	9	4	Low	3	None	5	3	4	0	0	4
County-Other	Borden	Colorado, Brazos	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	Borden	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Borden	Colorado, Brazos	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Bangs	Brown	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Brookesmith SUI	Brown	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Brownwood	Brown	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Coleman County	Brown	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Early	Brown	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Santa Anna	Brown	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Zephyr WSC	Brown	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	Brown	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Brown	Colorado, Brazos	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Bangs	Brown	Colorado	Reuse	5	n/a	4	Medium	2	Low	3	n/a	5	Low	3	None	5	3	4	0	0	4
Brownwood	Brown	Colorado	Reuse	5	n/a	4	Medium	2	Low	3	n/a	5	Low	3	None	5	3	4	0	0	4
BCWID	Brown	Colorado	Subordination	0	n/a	5	Medium	2	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Bronte	Coke	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Robert Lee	Coke	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Robert Lee	Coke	Colorado	Purchase Additional Supply from Bronte	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Mining	Coke	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Coke	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Bronte	Coke	Colorado	Expanded Use	0	n/a	5	Low	3	Low	3	9	4	n/a	4	None	5	3	4	0	0	4
Bronte	Coke	Colorado	New Groundwater (Wells SE of Bronte)	12	n/a	4	Low	3	Low	3	9	4	Low	3	None	5	3	4	0	0	4
Bronte	Coke	Colorado	New Groundwater (Wells at Oak Creek)	8	n/a	4	Low	3	Low	3	9	4	Low	3	None	5	3	4	0	0	4
Bronte	Coke	Colorado	WTP Expansion	0	n/a	5	Low	3	Low	3	9	4	n/a	4	None	5	3	4	0	0	4
Bronte	Coke	Colorado	Lake Brownwood to Runnels and Coke	1,266	n/a	1	Low	3	Medium	2	9	4	Low	3	None	5	3	3	0	0	4
Bronte	Coke	Colorado	Direct Potable Reuse	5	n/a	4	Low	3	Low	3	9	4	Low	3	None	5	3	4	0	0	4
Bronte, Robert L	Coke	Colorado	Purchase from UCRA	68	n/a	3	Low	3	Low	3	9	4	Low	3	None	5	3	3	0	0	4
Bronte	Coke	Colorado	Nolan County	53	n/a	3	Low	3	Low	3	9	4	Low	3	None	5	3	3	0	0	4
Bronte	Coke	Colorado	Regional System from Fort Phantom Hill to Runnels and	202	n/a	2	Low	3	Medium	2	9	4	Low	3	None	5	3	3	0	0	4
Mining	Coke	Colorado	New Groundwater (Edwards Trinity)	5	n/a	4	Low	3	Low	3	9	4	Low	3	None	5	3	4	0	0	4
County-Other	Coke	Colorado	Voluntary Transfer from Coke County	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Robert Lee	Coke	Colorado	New Water	5	n/a	4	Low	3	Low	3	9	4	Low	3	None	5	3	4	0	0	4
Robert Lee	Coke	Colorado	New Groundwater (Edwards Trinity)	0	n/a	5	Medium	2	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Bronte	Coke	Colorado	Subordination	0	n/a	5	Medium	2	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Robert Lee	Coke	Colorado	Subordination	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Mining	Coke	Colorado	Subordination	0	n/a	5	Medium	2	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Steam Electric Po	Coke	Colorado	Conservation	0	n/a	5	Medium	2	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Coleman	Coleman	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	Coleman	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4

Strategy Evaluation Matrix

Entity	County	Basin	Strategy	Environmental Factors															Agricultural Impacts		
				Acres Impacted	Wetland Acres	Acres Impacted Score	Envir Water Needs	Envir Water Needs Score	Habitat	Habitat Score	Threat and Endanger Species	Threat and Endanger Species Score	Cultural Resources	Cultural Resources Score	Bays & Estuaries	Bays & Estuaries Score	Envir Water Quality	Overall Environmental Impacts	Permanent Ag Acres Impacted	Temp Ag Acres Impacted	Agricultural Resources Score
Irrigation	Coleman	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Coleman	Coleman	Colorado	Subordination	0	n/a	5	Medium	2	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Coleman County	Coleman	Colorado	Subordination	0	n/a	5	Medium	2	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Irrigation	Coleman	Colorado	Subordination	0	n/a	5	Medium	2	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	5
Mining	Coleman	Colorado	New Groundwater	1	n/a	4	Low	3	Low	3	15	3	Low	3	None	5	3	3	0	0	4
BCWID	Concho	Colorado	New Groundwater	5	n/a	4	Low	3	Low	3	15	3	Low	3	None	5	3	3	0	0	4
Eden	Concho	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	Concho	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Concho	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Eden	Concho	Colorado	Reuse	5	n/a	4	Medium	2	Low	3	n/a	5	Low	3	None	5	3	4	0	0	4
Mining	Concho	Colorado	New Groundwater	2	n/a	4	Low	3	Low	3	15	3	Low	3	None	5	3	3	0	0	4
Crane	Crane	Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	Crane	Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Crockett County	Crockett	Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	Crockett	Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Crockett	Colorado, Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Mining	Crockett	Rio Grande	Reuse	5	n/a	4	Medium	2	Low	3	n/a	5	Low	3	None	5	3	4	0	0	4
Irrigation	Crockett	Colorado, Rio Grande	Weather Modification	0	n/a	5	Positive	5	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Ector County UD	Ector	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Greater Gardend	Ector	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Odessa	Ector	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	Ector	Colorado, Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Odessa	Ector	Colorado	Subordination	0	n/a	5	Medium	2	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Irrigation	Ector	Colorado, Rio Grande	Subordination	0	n/a	5	Medium	2	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	5
Odessa	Ector	Colorado	Expanded Use (RO	11	n/a	4	Low	3	Low	3	7	4	Low	3	None	5	3	4	0	0	4
Odessa	Ector	Colorado	New Groundwater (Edwards Trinity and	281	n/a	2	Low	3	Medium	2	7	4	Low	3	None	5	3	3	0	0	4
County-Other	Ector	Colorado, Rio Grande	Purchase Additional Supply from Odessa	25	n/a	4	Low	3	Low	3	n/a	5	Low	3	None	5	3	4	0	0	4
Steam Electric Po	Ector	Colorado	Sales from City of	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Steam Electric Po	Ector	Colorado	Conservation	0	n/a	5	Medium	2	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Ector	Colorado, Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Mining	Glasscock	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Glasscock	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Big Spring	Howard	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Coahoma	Howard	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	Howard	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Howard	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Big Spring	Howard	Colorado	Subordination	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Mining	Howard	Colorado	Subordination	0	n/a	5	Medium	2	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Big Spring	Howard	Colorado	Expanded Use (WTP	0	n/a	5	Medium	2	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Livestock	Howard	Colorado	New Groundwater	0	n/a	5	Low	3	Low	3	7	4	n/a	4	None	5	3	4	0	0	4
Mining	Howard	Colorado	New Groundwater	1	n/a	4	Low	3	Low	3	7	4	Low	3	None	5	3	4	0	0	4
Mining	Howard	Colorado	New Groundwater	6	n/a	4	Low	3	Low	3	7	4	Low	3	None	5	3	4	0	0	4
County Other	Howard	Colorado	Purchase from Big	5	n/a	4	Low	3	Low	3	7	4	Low	3	None	5	3	4	0	0	4
Manufacturing	Howard	Colorado	Purchase from Big	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Mining	Howard	Colorado	Purchase from CRMWD's Diverted	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Mertzon	Irion	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	Irion	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Irion	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Mining	Irion	Colorado	New Groundwater	10	n/a	4	Low	3	Low	3	n/a	5	Low	3	None	5	3	4	0	0	4
Mining	Irion	Colorado	New Groundwater (Edwards Trinity)	32	n/a	4	Low	3	Low	3	8	4	Low	3	None	5	3	4	0	0	4
Irrigation	Irion	Colorado	Weather	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Junction	Kimble	Colorado	Conservation	0	n/a	5	Positive	5	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	Kimble	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Junction	Kimble	Colorado	Subordination	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4

Strategy Evaluation Matrix

Entity	County	Basin	Strategy	Environmental Factors															Agricultural Impacts		
				Acres Impacted	Wetland Acres	Acres Impacted Score	Envir Water Needs	Envir Water Needs Score	Habitat	Habitat Score	Threat and Endanger Species	Threat and Endanger Species Score	Cultural Resources	Cultural Resources Score	Bays & Estuaries	Bays & Estuaries Score	Envir Water Quality	Overall Environmental Impacts	Permanent Ag Acres Impacted	Temp Ag Acres Impacted	Agricultural Resources Score
Junction	Kimble	Colorado	Expanded Use (Dredging River	15	n/a	4	Medium	2	Low	3	16	2	Low	3	None	5	3	3	0	0	4
Junction	Kimble	Colorado	New Groundwater (Edwards Trinity)	16	n/a	4	Low	3	Low	3	16	2	Low	3	None	5	3	3	0	0	4
Manufacturing	Kimble	Colorado	New Groundwater (Edwards Trinity)	5	n/a	4	Low	3	Low	3	16	2	Low	3	None	5	3	3	0	0	4
Irrigation	Kimble	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Mining	Loving	Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Stanton	Martin	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	Martin	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Martin	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Stanton	Martin	Colorado	Subordination	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
County-Other	Martin	Colorado	New Groundwater	7	n/a	4	Medium	2	Low	3	7	4	Low	3	None	5	3	3	1	1	4
Livestock	Martin	Colorado	New Groundwater	1	n/a	4	Low	3	Low	3	7	4	Low	3	None	5	3	4	0	0	4
Mining	Martin	Colorado	New Groundwater (Edwards Trinity)	47	n/a	4	Low	3	Low	3	7	4	Low	3	None	5	3	4	5	5	4
Mining	Martin	Colorado	New Groundwater	2	n/a	4	Low	3	Low	3	7	4	Low	3	None	5	3	4	0	0	4
Mining	Martin	Colorado	Purchase Reuse from	29	n/a	4	Low	3	Low	3	n/a	5	Low	3	None	5	3	4	0	3	4
Manufacturing	Martin	Colorado	Purchase GW Rights from Irrigation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Mason	Mason	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	Mason	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Mason	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Mason	Mason	Colorado	Additional	5	n/a	4	Low	3	Low	3	16	2	Low	3	None	5	3	3	0	0	4
Brady	McCulloch	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
County-Other	McCulloch	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Millersview-Dool	McCulloch	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Richland SUD	McCulloch	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	McCulloch	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	McCulloch	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Brady	McCulloch	Colorado	Subordination	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Millersview-Dool	McCulloch	Colorado	Subordination	0	n/a	5	Medium	2	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Brady	McCulloch	Colorado	Advanced	0	n/a	5	Low	3	Low	3	16	2	n/a	4	None	5	3	4	0	0	4
Livestock	McCulloch	Colorado	New Groundwater (Edwards Trinity)	1	n/a	4	Medium	2	Low	3	16	2	Low	3	None	5	3	3	0	0	4
County Other	McCulloch	Colorado	Purchase from	5	n/a	4	Low	3	Low	3	16	2	Low	3	None	5	3	3	0	0	4
Manufacturing	McCulloch	Colorado	Purchase from Brady	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
San Angelo	McCulloch	Colorado	New Groundwater	8	n/a	4	Low	3	Low	3	16	2	Low	3	None	5	3	3	0	0	4
Menard	Menard	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	Menard	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Menard	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Menard	Menard	Colorado	Reuse	5	n/a	4	Low	3	Low	3	n/a	5	Low	3	None	5	3	4	0	0	4
Menard	Menard	Colorado	New Groundwater	13	n/a	4	Medium	2	Low	3	16	2	Low	3	None	5	3	3	0	0	4
Midland	Midland	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
County-Other	Midland	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	Midland	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Midland	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Midland	Midland	Colorado	Subordination	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Midland	Midland	Colorado	Expanded Use (Additional T-Bar	35	n/a	4	Medium	2	Low	3	7	4	Low	3	None	5	3	3	0	4	4
Midland	Midland	Colorado	New Groundwater	79	n/a	3	Low	3	Low	3	7	4	Low	3	None	5	3	3	6	8	3
Midland	Midland	Colorado	Purchase from	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Midland	Midland	Colorado	West Texas Water	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
County-Other	Midland	Colorado	Develop Groundwater from	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Mining	Midland	Colorado	Purchase Reuse from	29	n/a	4	Low	3	Low	3	n/a	5	Low	3	None	5	3	4	0	3	4
Colorado City	Mitchell	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Loraine	Mitchell	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
County-Other	Mitchell	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	Mitchell	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Mitchell	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Steam Electric Po	Mitchell	Colorado	Subordination	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Steam Electric Po	Mitchell	Colorado	Conservation	0	n/a	5	Medium	2	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	Mitchell	Colorado	Reuse	5	n/a	4	Medium	2	Low	3	n/a	5	Low	3	None	5	3	4	0	0	4
Colorado City	Mitchell	Colorado	New Groundwater	22	n/a	4	Medium	2	Low	3	9	4	Low	3	None	5	3	3	0	0	4
CRMWD	Multiple	Colorado	Subordination	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4

Strategy Evaluation Matrix

				Environmental Factors															Agricultural Impacts		
Entity	**County**	**Basin**	**Strategy**	**Acres Impacted**	**Wetland Acres**	**Acres Impacted Score**	**Envir Water Needs**	**Envir Water Needs Score**	**Habitat**	**Habitat Score**	**Threat and Endanger Species**	**Threat and Endanger Species Score**	**Cultural Resources**	**Cultural Resources Score**	**Bays & Estuaries**	**Bays & Estuaries Score**	**Envir Water Quality**	**Overall Environmental Impacts**	**Permanent Ag Acres Impacted**	**Temp Ag Acres Impacted**	**Agricultural Resources Score**
CRMWD	Multiple	Colorado	Expanded Use (Well Field Expansion)	140	n/a	2	Medium	2	Medium	2	n/a	5	Low	3	None	5	3	3	0	0	4
UCRA	Multiple	Colorado	Expanded Use (Expand Transmission System	0	n/a	5	Low	3	Low	3	varies	3	n/a	4	None	5	3	4	0	0	4
CRMWD	Multiple	Colorado	New Groundwater (Western Region F	288	n/a	2	Low	3	Medium	2	varies	3	Low	3	None	5	3	3	0	0	4
CRMWD	Multiple	Colorado	Desalination (Desalination of	54	n/a	3	Low	3	Low	3	varies	3	Low	3	None	5	3	3	0	0	4
San Angelo	Multiple	Colorado	Desalination (Brackish GW	9	n/a	4	Low	3	Low	3	varies	3	Low	3	None	5	3	3	0	0	4
San Angelo and U	Multiple	Colorado	Brush Control (North Concho River, Twin Buttes Reservoir,	2,000	n/a	1	Low	3	Medium	2	varies	3	Low	3	None	5	3	3	0	0	4
BCWID	Multiple	Colorado	Brush Control (Lake	1000	n/a	1	Positive	5	Medium	2	varies	3	Low	3	None	5	3	3	0	0	4
Fort Stockton	Pecos	Rio Grande	Conservation	0	n/a	5	Positive	5	Low	3	varies	3	n/a	4	None	5	4	4	0	0	4
Iraan	Pecos	Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Pecos	Reeves	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Pecos WCID	Pecos	Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	Pecos	Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Pecos	Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
San Angelo	Pecos	Colorado	New Groundwater (Pecos Valley/Edwards	334	n/a	2	Low	3	Medium	2	26	1	Low	3	None	5	3	3	15	33	3
Pecos County W(	Pecos	Colorado	New Groundwater (Edwards Trinity)	2	n/a	4	Low	3	Low	3	26	1	Low	3	None	5	3	3	0	0	4
Irrigation	Pecos	Rio Grande	Weather	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
San Angelo	Pecos	Colorado	New Groundwater	448	n/a	2	Positive	5	Medium	2	26	1	Low	3	None	5	3	3	1	45	4
Big Lake	Reagan	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	Reagan	Colorado, Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Reagan	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Irrigation	Reagan	Colorado	Weather	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Madera Valley W	Reeves	Rio Grande	Conservation	0	n/a	5	Positive	5	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
County-Other	Reeves	Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	Reeves	Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Reeves	Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Irrigation	Reeves	Rio Grande	Weather	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Ballinger	Runnels	Colorado	Conservation	0	n/a	5	Positive	5	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Miles	Runnels	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Winters	Runnels	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	Runnels	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Runnels	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Winters	Runnels	Colorado	Reuse	3	n/a	4	Low	3	Low	3	n/a	5	Low	3	None	5	3	4	0	0	4
Mining	Runnels	Colorado	New Groundwater	2	n/a	4	Medium	2	Low	3	14	3	Low	3	None	5	3	3	0	0	4
Ballinger	Runnels	Colorado	Fort Phantom Hill	158	n/a	2	Low	3	Medium	2	14	3	Low	3	None	5	3	3	0	0	4
Winters	Runnels	Colorado	Purchase from	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Ballinger	Runnels	Colorado	Subordination	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Miles	Runnels	Colorado	Subordination	0	n/a	5	Medium	2	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Winters	Runnels	Colorado	Subordination	0	n/a	5	Medium	2	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Manufacturing	Runnels	Colorado	Subordination	0	n/a	5	Medium	2	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
El Dorado	Schleicher	Colorado	Conservation	0	n/a	5	Medium	2	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	Schleicher	Colorado, Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Schleicher	Colorado, Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Irrigation	Schleicher	Colorado, Rio Grande	Weather Modification	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
San Angelo	Schleicher	Colorado	New Groundwater (Edwards Trinity)	99	n/a	3	Positive	5	Low	3	10	4	Low	3	None	5	3	4	0	0	4
Snyder	Scurry	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
County-Other	Scurry	Colorado	Voluntary Transfer from Scurry County	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
County-Other	Scurry	Colorado	Purchase from	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4

Strategy Evaluation Matrix

				Environmental Factors															Agricultural Impacts		
Entity	**County**	**Basin**	**Strategy**	**Acres Impacted**	**Wetland Acres**	**Acres Impacted Score**	**Envir Water Needs**	**Envir Water Needs Score**	**Habitat**	**Habitat Score**	**Threat and Endanger Species**	**Threat and Endanger Species Score**	**Cultural Resources**	**Cultural Resources Score**	**Bays & Estuaries**	**Bays & Estuaries Score**	**Envir Water Quality**	**Overall Environmental Impacts**	**Permanent Ag Acres Impacted**	**Temp Ag Acres Impacted**	**Agricultural Resources Score**
Mining	Scurry	Colorado, Brazos	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Scurry	Colorado, Brazos	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Snyder	Scurry	Colorado	Subordination	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Mining	Scurry	Colorado, Brazos	New Groundwater	2	n/a	4	Medium	2	Low	3	12	3	Low	3	None	5	3	3	0	0	4
Livestock	Scurry	Colorado, Brazos	New Groundwater	3	n/a	4	Low	3	Low	3	12	3	Low	3	None	5	3	3	0	0	4
Sterling	Sterling	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	Sterling	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Sterling	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Irrigation	Sterling	Colorado	Weather	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Sonora	Sutton	Colorado	Conservation	0	n/a	5	Positive	5	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	Sutton	Colorado, Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Sutton	Colorado, Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Sonora	Sutton	Colorado	Reuse	5	n/a	4	Low	3	Low	3	n/a	5	Low	3	None	5	3	4	0	0	4
Irrigation	Sutton	Colorado, Rio Grande	Weather Modification	0	n/a	5	Medium	2	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Mining	Tom Green	Colorado	Conservation	0	n/a	5	Positive	5	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Tom Green	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
San Angelo	Tom Green	Colorado	Subordination	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Manufacturing	Tom Green	Colorado	Subordination	0	n/a	5	Medium	2	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
San Angelo	Tom Green	Colorado	Reuse	16	n/a	4	Medium	2	Low	3	n/a	5	Low	3	None	5	3	4	unknown	unknown	1
San Angelo	Tom Green	Colorado	New Surface Water (Red Arroyo	151	16.27	2	Medium	2	Medium	2	14	3	Low	3	None	5	3	3	15	15	3
San Angelo	Tom Green	Colorado	Desalination (Other Aquifer Supplies)	36	n/a	1	Medium	2	Low	3	14	3	Low	3	None	5	3	3	2	4	4
Irrigation	Tom Green	Colorado	Weather	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
County Other	Tom Green	Colorado	Purchase Water	0	n/a	5	Positive	5	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Manufacturing	Tom Green	Colorado	Purchase Water from	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Bronte & Robert	Coke	Colorado	Purchase Water	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Concho Rural W	Tom Green	Colorado	New Groundwater	4	n/a	4	Low	3	Low	3	15	3	Low	3	None	5	3	3	0	0	4
Concho Rural W	Tom Green	Colorado	Desalination of Other Aquifer Supplies	7	n/a	4	Low	3	Low	3	15	3	Low	3	None	5	3	3	0	1	4
Concho Rural W	Tom Green	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
San Angelo	Tom Green	Colorado	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
McCamey	Upton	Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Rankin	Upton	Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	Upton	Colorado, Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Upton	Colorado, Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Odessa	Ward	Colorado	New Groundwater	20	n/a	4	Low	3	Low	3	n/a	5	Low	3	None	5	3	4	0	0	4
Monahans	Ward	Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
County-Other	Ward	Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	Ward	Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Ward	Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
Steam Electric P	Ward	Rio Grande	New Groundwater	6	n/a	4	Positive	5	Low	3	12	3	Low	3	None	5	3	4	0	0	4
Steam Electric P	Ward	Rio Grande	Conservation	0	n/a	5	Medium	2	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Ward	Rio Grande	Weather	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
CRMWD	Ward	Colorado	Expanded Use (ASR)	12	n/a	4	Low	3	Low	3	12	3	Low	3	None	5	4	4	0	0	4
CRMWD	Ward	Colorado	New Groundwater (ASR of Brackish GW)	0	n/a	5	Low	3	Low	3	12	3	n/a	4	None	5	4	4	0	0	4
CRMWD	Ward	Colorado	Desalination (Brackish GW	11	n/a	4	Low	3	Low	3	12	3	Low	3	None	5	3	3	0	0	4
Kermit	Winkler	Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
County-Other	Winkler	Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Wink	Winkler	Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Mining	Winkler	Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	4
Irrigation	Winkler	Rio Grande	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	4	4	0	0	5
County-Other	Winkler	Rio Grande	New Groundwater	3	n/a	4	Low	3	Low	3	7	4	Low	3	None	5	3	4	0	0	4

Appendix F

Table of Recommended and Alternative Strategies

Table F-1
Summary of Recommended Strategies

Entity	County Used	Expected Online Date	Capital Cost	First Decade Unit Cost ($/ac-ft/yr)	Total Yield 2020	2030	2040	2050	2060	2070	Last Decade Unit Cost ($/ac-ft/yr)
Additional Treatment											
Big Spring	Howard	2020	$16,345,000	$651	3,677	2,190	2,682	3,115	3,523	3,885	$195
Brady	McCulloch	2020	$20,398,000	$3,013	608	609	614	616	617	616	$246
Bronte	Coke	2020	$6,768,000	$1,603	504	504	504	504	504	504	$480
Mason	Mason	2020	$838,000	$240	703	693	685	680	680	680	$141
Odessa	Ector	2020	$62,309,000	$1,078	7,500	7,500	7,500	7,500	7,500	7,500	$383
Aquifer Storage and Recovery											
CRMWD	Multiple	2030	$10,184,000	$651		5,000	5,000	5,000	5,000	5,000	$480
Brush Control											
San Angelo and UCRA	Multiple	2020	$0	$100	2,240	2,240	2,240	2,240	2,240	2,240	$100
BCWID	Multiple	2020	$0	$857	20,257	20,257	20,257	20,257	20,257	20,257	$857
Desalination											
CRMWD	Multiple	2040	$34,819,000	$1,844			3,360	3,360	3,360	3,360	$977
San Angelo	Tom Green	2050	$64,491,000	$2,142				3,750	3,750	3,750	$703
Develop Other or Local Groundwater Supplies											
Mining	Runnels	2020	$140,000	$211	76	73	46	18	0	0	$55
Mining	Scurry	2020	$140,000	$200	80	80	80	80	80	80	$53
Livestock	Scurry	2020	$143,000	$185	92	92	92	92	92	92	$54
Concho Rural WSC	Tom Green	2020	$5,131,000	$4,673	150	150	150	150	150	150	$1,813
Develop Dockum Aquifer Supplies											
Livestock	Howard	2020	$512,000	$367	150	150	150	150	150	150	$80
Mining	Howard	2020	$989,000	$383	274	274	274	274	274	274	$82
Mining	Irion	2020	$782,000	$520	150	150	150	50	0	0	$87
County-Other	Martin	2020	$4,219,000	$1,636	250	250	250	250	250	250	$224
Livestock	Martin	2020	$339,000	$800	40	40	40	40	40	40	$100
Mining	Martin	2020	$677,000	$348	210	210	210	210	210	210	$76

Table F-1
Summary of Recommended Strategies

Entity	County Used	Expected Online Date	Capital Cost	First Decade Unit Cost ($/ac-ft/yr)	Total Yield						Last Decade Unit Cost ($/ac-ft/yr)
					2020	2030	2040	2050	2060	2070	
Develop Edwards-Trinity Plateau Aquifer Supplies											
County-Other	Andrews	2020	$3,515,000	$696	500	500	500	500	500	500	$108
Livestock	Andrews	2020	$238,000	$193	150	150	150	150	150	150	$60
Bronte, Robert Lee	Coke	2020	$7,350,000	$8,885	78	78	78	78	78	78	$1,000
Mining	Coke	2020	$678,000	$295	250	250	250	250	250	250	$67
Junction	Kimble	2020	$3,555,000	$1,655	216	220	220	220	220	220	$305
Mining	Irion	2020	$2,057,000	$296	500	500	500	100	0	0	$70
Manufacturing	Kimble	2020	$305,000	$140	300	300	300	300	300	300	$53
Mining	Martin	2020	$2,356,000	$188	1,500	1,500	1,000	1,000	500	500	$57
Livestock	McCulloch	2020	$62,000	$200	30	30	30	30	30	30	$33
Pecos County WCID #1	Pecos	2020	$2,456,000	$988	250	250	250	250	250	250	$164
Steam Electric Power	Crockett	2020	$0	$0	776	907	1,067	1,262	1,500	1,662	$0
Develop Hickory Aquifer Supplies											
Mining	Coleman	2020	$814,000	$1,200	65	65	65	65	65	65	$154
Mining	Concho	2020	$1,626,000	$800	200	200	200	200	200	200	$120
Menard	Menard	2020	$6,120,000	$1,366	500	500	500	500	500	500	$342
Develop Ogallala Aquifer Supplies											
Mining	Howard	2020	$127,000	$419	20	31	31	31	3	3	$67
Develop Pecos Valley Aquifer Supplies											
Livestock	Andrews	2020	$68,000	$160	50	50	50	50	50	50	$40
County Other	Midland	2030	$62,699,000	$5,837		1,000	1,000	1,000	1,000	1,000	$590
Steam Electric Power	Ward	2020	$2,682,000	$89	5,600	5,600	5,600	5,600	5,600	5,600	$49
County Other	Winkler	2020	$1,908,000	$398	500	500	500	500	500	500	$79
Dredging River Intake											
Junction	Kimble	2020	$4,268,000	$867	412	412	412	412	412	412	$0
Expansion of Existing Supplies											
CRMWD	Ward/Winkler	2020	$139,916,000	$1,265	11,200	11,200	11,200	11,200	11,200	11,200	$219
Midland Additional T-Bar	Midland	2030	$52,199,000	$869		10,000	10,000	10,000	10,000	10,000	$432

Table F-1
Summary of Recommended Strategies

Entity	County Used	Expected Online Date	Capital Cost	First Decade Unit Cost ($/ac-ft/yr)	Total Yield 2020	2030	2040	2050	2060	2070	Last Decade Unit Cost ($/ac-ft/yr)
Irrigation Conservation											
Irrigation	Andrews	2020	$1,894,900	$41,321	1,895	3,758	3,726	3,726	3,726	3,726	$0
Irrigation	Borden	2020	$200,000	$41,321	200	399	399	399	399	399	$0
Irrigation	Brown	2020	$471,750	$41,321	472	752	750	750	750	750	$0
Irrigation	Coke	2020	$48,250	$41,321	48	96	115	115	115	115	$0
Irrigation	Coleman	2020	$38,500	$41,321	39	77	77	77	77	77	$0
Irrigation	Concho	2020	$486,700	$41,321	487	969	1,062	1,062	1,062	1,062	$0
Irrigation	Crane	2020	$0	$41,321	0	0	0	0	0	0	$0
Irrigation	Crockett	2020	$23,950	$41,321	24	47	69	69	69	69	$0
Irrigation	Ector	2020	$71,600	$41,321	72	142	210	210	210	210	$0
Irrigation	Glasscock	2020	$2,268,280	$41,321	2,268	2,250	2,232	2,232	2,232	2,232	$0
Irrigation	Howard	2020	$336,100	$41,321	336	665	722	722	722	722	$0
Irrigation	Irion	2020	$73,350	$41,321	73	144	210	210	210	210	$0
Irrigation	Kimble	2020	$146,950	$41,321	147	283	326	326	326	326	$0
Irrigation	Loving	2020	$0	$41,321	0	0	0	0	0	0	$0
Irrigation	McCulloch	2020	$179,200	$41,321	179	354	524	524	524	524	$0
Irrigation	Martin	2020	$1,816,100	$41,321	1,816	3,567	5,254	5,254	5,254	5,254	$0
Irrigation	Mason	2020	$414,700	$41,321	415	817	1,208	1,208	1,208	1,208	$0
Irrigation	Menard	2020	$126,500	$41,321	127	252	377	377	377	377	$0
Irrigation	Midland	2020	$1,663,800	$41,321	1,664	3,302	4,913	4,913	4,913	4,913	$0
Irrigation	Mitchell	2020	$230,380	$41,321	230	229	228	228	228	228	$0
Irrigation	Pecos	2020	$6,301,150	$41,321	6,301	12,602	18,903	18,903	18,903	18,903	$0
Irrigation	Reagan	2020	$956,500	$41,321	957	1,881	2,773	2,773	2,773	2,773	$0
Irrigation	Reeves	2020	$4,567,850	$41,321	4,568	9,058	13,469	13,469	13,469	13,469	$0
Irrigation	Runnels	2020	$200,450	$41,321	200	399	477	477	477	477	$0
Irrigation	Schleicher	2020	$70,700	$41,321	71	83	81	81	81	81	$0
Irrigation	Scurry	2020	$365,250	$41,321	365	706	885	885	885	885	$0
Irrigation	Sterling	2020	$49,150	$41,321	49	94	135	135	135	135	$0
Irrigation	Sutton	2020	$90,150	$41,321	90	177	260	260	260	260	$0
Irrigation	Tom Green	2020	$4,678,950	$41,321	4,679	9,335	11,175	11,175	11,175	11,175	$0
Irrigation	Upton	2020	$473,650	$41,321	474	934	1,380	1,380	1,380	1,380	$0

Table F-1
Summary of Recommended Strategies

Entity	County Used	Expected Online Date	Capital Cost	First Decade Unit Cost ($/ac-ft/yr)	Total Yield						Last Decade Unit Cost ($/ac-ft/yr)
					2020	2030	2040	2050	2060	2070	
Irrigation	Ward	2020	$280,650	$41,321	281	554	821	821	821	821	$0
Irrigation	Winkler	2020	$245,600	$41,321	246	491	737	737	737	737	$0
Mining Conservation (Recycling)											
Mining	Andrews	2020	$5,540,000	$124	277	260	222	176	135	104	$0
Mining	Borden	2020	$1,300,000	$716	48	65	55	35	17	8	$0
Mining	Brown	2020	$1,340,000	$149	66	66	67	67	66	66	$0
Mining	Coke	2020	$680,000	$124	34	34	30	26	23	20	$0
Mining	Coleman	2020	$160,000	$124	8	7	7	6	5	5	$0
Mining	Concho	2020	$680,000	$124	34	33	30	26	22	20	$0
Mining	Crane	2020	$1,200,000	$785	43	59	60	48	37	28	$0
Mining	Crockett	2020	$2,580,000	$234	121	129	88	48	14	4	$0
Mining	Ector	2020	$3,020,000	$281	138	151	135	110	89	75	$0
Mining	Glasscock	2020	$4,800,000	$124	240	217	167	118	77	56	$0
Mining	Howard	2020	$3,840,000	$297	174	192	136	80	33	14	$0
Mining	Irion	2020	$4,700,000	$214	223	235	170	104	50	24	$0
Mining	Kimble	2020	$20,000	$124	1	1	1	1	1	1	$0
Mining	Loving	2020	$1,480,000	$702	55	74	65	53	42	33	$0
Mining	Martin	2020	$4,940,000	$124	247	210	158	101	54	29	$0
Mining	Mason	2020	$1,440,000	$124	72	66	50	40	32	26	$0
Mining	McCulloch	2020	$12,500,000	$124	625	584	465	394	339	294	$0
Mining	Menard	2020	$1,520,000	$124	76	75	67	58	50	44	$0
Mining	Midland	2020	$5,460,000	$124	273	239	184	124	74	52	$0
Mining	Mitchell	2020	$1,040,000	$522	42	52	44	35	26	20	$0
Mining	Pecos	2020	$1,500,000	$1,065	48	75	75	60	47	37	$0
Mining	Reagan	2020	$5,900,000	$124	295	238	172	98	37	14	$0
Mining	Reeves	2020	$3,680,000	$1,328	107	184	178	145	114	90	$0
Mining	Runnels	2020	$380,000	$124	19	19	17	15	13	11	$0
Mining	Schleicher	2020	$1,020,000	$435	43	51	39	27	17	10	$0
Mining	Scurry	2020	$680,000	$1,295	20	32	34	25	17	12	$0
Mining	Sterling	2020	$1,340,000	$489	55	67	57	37	19	10	$0
Mining	Sutton	2020	$1,060,000	$1,311	31	50	53	40	27	18	$0

Table F-1
Summary of Recommended Strategies

Entity	County Used	Expected Online Date	Capital Cost	First Decade Unit Cost ($/ac-ft/yr)	Total Yield 2020	2030	2040	2050	2060	2070	Last Decade Unit Cost ($/ac-ft/yr)
Mining	Tom Green	2020	$1,620,000	$282	74	76	78	78	79	81	$0
Mining	Upton	2020	$5,940,000	$124	297	254	201	135	81	56	$0
Mining	Ward	2020	$1,340,000	$452	56	67	59	45	32	23	$0
Mining	Winkler	2020	$1,640,000	$945	55	82	69	53	37	26	$0
Municipal Conservation											
Andrews	Andrews	2020	$0	$533	82	99	136	157	183	213	$423
Borden County-Other	Borden	2020	$701,400	$1,196	4	4	4	4	4	4	$1,183
Bangs	Brown	2020	$0	$776	9	9	9	9	9	9	$769
Brookesmith SUD	Brown	2020	$0	$398	44	45	45	45	45	45	$388
Brownwood	Brown	2020	$0	$448	126	129	129	129	129	129	$522
Coleman County SUD	Brown	2020	$0	$636	19	19	19	19	19	19	$632
Early	Brown	2020	$0	$661	16	16	16	16	16	16	$657
Santa Anna	Brown	2020	$0	$909	6	6	6	6	6	6	$900
Zephyr WSC	Brown	2020	$0	$602	25	26	26	26	26	26	$600
Bronte	Coke	2020	$900,000	$959	17	17	16	16	16	16	$959
Robert Lee	Coke	2020	$0	$938	6	6	6	6	6	6	$938
Coleman	Coleman	2020	$0	$597	26	27	27	27	27	27	$595
Eden	Concho	2020	$0	$658	16	16	16	16	16	16	$656
Crane	Crane	2020	$0	$628	20	21	23	24	25	26	$600
Crockett County WCID	Crockett	2020	$0	$620	21	23	23	24	24	24	$607
Ector County UD	Ector	2020	$0	$533	83	94	102	135	149	162	$470
Greater Gardendale WSC	Ector	2020	$0	$656	16	19	21	23	26	28	$591
Odessa	Ector	2020	$0	$316	716	825	924	1,026	1,128	1,231	$309
Big Spring	Howard	2020	$0	$399	181	191	193	193	193	193	$444
Coahoma	Howard	2020	$848,000	$1,027	5	5	5	5	5	5	$996
Mertzon	Irion	2020	$0	$1,058	5	5	5	5	5	5	$1,052
Junction	Kimble	2020	$1,891,700	$676	45	46	46	45	45	45	$674
Stanton	Martin	2020	$0	$664	15	17	18	19	20	20	$625
Mason	Mason	2020	$1,568,400	$719	12	12	12	12	12	12	$719
Brady	McCulloch	2020	$0	$555	32	33	33	33	33	33	$523
McCulloch County-Other	McCulloch	2020	$0	$1,286	3	3	3	3	3	3	$1,239

Table F-1
Summary of Recommended Strategies

Entity	County Used	Expected Online Date	Capital Cost	First Decade Unit Cost ($/ac-ft/yr)	Total Yield						Last Decade Unit Cost ($/ac-ft/yr)
					2020	2030	2040	2050	2060	2070	
Millersview-Doole WSC	McCulloch	2020	$0	$607	24	25	25	26	26	27	$596
Richland SUD	McCulloch	2020	$0	$692	13	14	14	14	14	14	$679
Menard	Menard	2020	$1,183,200	$813	25	25	25	24	24	24	$813
Midland	Midland	2020	$0	$313	813	879	973	1,062	1,150	1,236	$309
Midland County-Other	Midland	2020	$0	$398	145	164	183	202	220	239	$371
Colorado City	Mitchell	2020	$0	$593	28	31	32	32	32	33	$535
Loraine	Mitchell	2020	$0	$1,231	3	4	4	4	4	4	$1,172
Mitchell County-Other	Mitchell	2020	$3,361,800	$597	26	27	28	28	29	29	$589
Fort Stockton	Pecos	2020	$0	$352	50	53	57	60	63	66	$265
Iraan	Pecos	2020	$0	$842	7	8	8	9	9	10	$758
Pecos WCID	Pecos	2020	$0	$635	19	20	22	23	24	25	$602
Big Lake	Reagan	2020	$2,708,800	$638	18	21	22	23	24	24	$605
Madera Valley WSC	Reeves	2020	$1,673,300	$728	11	12	12	13	13	14	$687
Pecos	Reeves	2020	$6,834,400	$332	53	56	59	62	63	64	$272
Reeves County-Other	Reeves	2020	$0	$634	19	20	21	22	23	23	$611
Ballinger	Runnels	2020	$2,669,400	$621	58	59	58	58	58	58	$618
Miles	Runnels	2020	$0	$977	5	6	6	6	6	6	$911
Winters	Runnels	2020	$0	$676	14	15	15	15	15	15	$672
El Dorado	Schleicher	2020	$1,471,200	$736	11	11	11	11	11	11	$736
Snyder	Scurry	2020	$0	$536	75	86	93	100	104	134	$509
Sterling City	Sterling	2020	$0	$986	5	5	5	5	5	5	$963
Sonora	Sutton	2020	$2,486,600	$640	18	20	20	20	21	21	$623
Concho Rural WSC	Tom Green	2020	$0	$523	33	35	37	38	40	41	$427
San Angelo	Tom Green	2020	$0	$319	656	753	793	842	894	949	$317
McCamey	Upton	2020	$1,698,600	$723	11	12	13	13	13	14	$686
Rankin	Upton	2020	$876,900	$1,036	5	5	5	5	6	6	$948
Monahans	Ward	2020	$0	$428	41	43	45	47	48	48	$362
Ward County-Other	Ward	2020	$2,946,700	$617	22	23	24	25	25	26	$599
Kermit	Winkler	2020	$0	$552	32	32	32	33	33	33	$524
Winkler County-Other	Winkler	2020	$1,787,400	$892	6	10	12	15	18	20	$629
Wink	Winkler	2020	$0	$932	6	6	7	7	8	8	$811

Table F-1
Summary of Recommended Strategies

Entity	County Used	Expected Online Date	Capital Cost	First Decade Unit Cost ($/ac-ft/yr)	Total Yield						Last Decade Unit Cost ($/ac-ft/yr)
					2020	2030	2040	2050	2060	2070	
Rehabilitation of Pipeline											
Bronte	Coke	2020	$1,499,000	$1,370	104	104	104	104	104	104	$164
Reuse											
Bangs	Brown	2020	$422,000	$1,560	25	25	25	25	25	25	$160
Brownwood	Brown	2020	$8,500,000	$1,541	841	841	841	841	841	841	$696
Mining	Mitchell	2020	$932,000	$368	250	250	250	250	250	250	$56
Mining	Crockett	2020	$0	n/a	75	75	75	75	75	75	n/a
Eden	Concho	2020	$485,700	$902	50	50	50	50	50	50	$89
Menard	Menard	2020	$1,288,800	$1,775	67	67	67	67	67	67	$165
Mining	Midland	2020	$3,349,000	$664	500	500	500	500	500	500	$104
Mining	Andrews	2020	$28,197,000	$1,141	2,500	2,500	2,500	2,500	2,500	2,500	$197
Mining	Martin	2020	$17,827,000	$1,187	1,500	1,200	600	500	0	0	$193
Sonora	Sutton	2020	$495,800	$748	62	62	62	62	62	62	$79
Winters	Runnels	2020	$3,354,000	$5,091	83	83	83	83	83	83	$1,685
San Angelo	Multiple	2020	$150,000,000	$2,826	7,000	7,000	7,000	7,000	7,000	7,000	$1,033
Steam Electric Power Conservation (Alternative Cooling Technologies)											
Steam Electric	Coke	2020	$50,490,000	$7,409	247	289	339	401	477	528	$5,057
Steam Electric	Ector	2020	$56,090,000	$836	3,286	4,263	6,165	8,604	11,597	15,033	$541
Steam Electric	Mitchell	2020	$16,830,000	$1,623	1,127	1,030	933	837	740	674	$622

Table F-1
Summary of Recommended Strategies

Entity	County Used	Expected Online Date	Capital Cost	First Decade Unit Cost ($/ac-ft/yr)	Total Yield 2020	2030	2040	2050	2060	2070	Last Decade Unit Cost ($/ac-ft/yr)
Subordination											
Bronte	Coke	2020	$0	$0	400	400	400	400	400	400	$0
Robert Lee	Coke	2020	$0	$0	6	6	6	6	6	6	$0
Mining	Coke	2020	$0	$0	38	36	34	32	30	28	$0
Coleman	Coleman	2020	$0	$0	2,102	2,061	2,024	1,985	1,938	1,891	$0
Coleman County SUD	Brown	2020	$0	$0	214	211	206	202	202	203	$0
Irrigation	Coleman	2020	$0	$0	743	743	743	743	743	743	$0
Odessa	Ector	2020	$0	$0	11,671	7,523	10,146	13,053	16,214	19,491	$0
Irrigation	Ector	2020	$0	$0	189	110	134	156	178	196	$0
Big Spring	Howard	2020	$0	$0	3,677	2,190	2,682	3,115	3,523	3,885	$0
Mining	Howard	2020	$0	$0	1,000	1,000	1,000	982	320	43	$0
Junction	Kimble	2020	$0	$0	412	412	412	412	412	412	$0
Stanton	Martin	2020	$0	$0	253	160	202	249	292	330	$0
Brady	McCulloch	2020	$0	$0	1,892	1,854	1,816	1,778	1,740	1,700	$0
Millersview-Doole WSC	McCulloch	2020	$0	$0	517	302	369	236	267	294	$0
Midland	Midland	2020	$0	$0	8,527	(299)	(298)	(297)	(297)	(296)	$0
Steam Electric Power	Mitchell	2020	$0	$0	1,480	1,460	1,440	1,420	1,400	1,380	$0
Ballinger	Runnels	2020	$0	$0	752	675	693	563	558	554	$0
Miles	Runnels	2020	$0	$0	112	124	121	119	119	119	$0
Winters	Runnels	2020	$0	$0	186	182	178	174	170	165	$0
Manufacturing	Runnels	2020	$0	$0	11	10	10	11	11	11	$0
Snyder	Scurry	2020	$0	$0	1,268	807	1,030	1,280	1,544	1,812	$0
San Angelo	Tom Green	2020	$0	$0	3,271	3,090	2,909	2,737	2,561	2,389	$0
Manufacturing (San Angelo Sales)	Tom Green	2020	$0	$0	428	404	396	378	361	343	$0
BCWID (non-allocated)	Brown	2020	$0	$0	6,981	6,693	6,405	6,117	5,829	5,540	$0
CRMWD (non –allocated)	Multiple	2020	$0	$0	5,527	20,834	17,318	13,566	10,225	6,444	$0

Table F-1
Summary of Recommended Strategies

Entity	County Used	Expected Online Date	Capital Cost	First Decade Unit Cost ($/ac-ft/yr)	Total Yield 2020	2030	2040	2050	2060	2070	Last Decade Unit Cost ($/ac-ft/yr)
Voluntary Transfer (Purchase)											
County-Other	Coke	2020	$11,000	$458	24	22	20	20	20	20	$0
Robert Lee	Coke	2020	$0	$652	176	177	178	178	178	178	$652
County-Other	Ector	2050	$0	$652				221	520	809	$652
Steam Electric Power	Ector	2020	$0	$652	4,000	4,000	4,000	4,000	4,000	4,000	$652
County-Other	Howard	2020	$1,833,000	$1,054	449	485	480	478	475	475	$738
Manufacturing	Howard	2020	$0	$652	614	773	895	998	1,191	1,396	$652
Mining	Howard	2020	$0	$326	238	240	242	0	0	0	$326
Manufacturing	Martin	2020	$14,500	$500	25	26	25	26	28	29	$0
Manufacturing	McCulloch	2020	$142,000	$500	201	217	230	241	261	284	$0
County-Other	McCulloch	2020	$347,000	$1,543	35	35	35	35	35	35	$714
Ballinger	Runnels	2020	$47,093,000	$4,848	990	955	920	886	851	816	$868
Winters	Runnels	2020	$696,000	$950	100	100	100	100	100	100	$370
Midland	Midland	2030	$26,116,800	$1,256	0	4,000	4,000	4,000	4,000	4,000	$710
Midland	Midland	2030	$0	$652	0	4,000	4,000	4,000	4,000	4,000	$652
County-Other	Scurry	2020	$75,000	$500	150	150	150	150	150	150	$0
County-Other	Scurry	2020	$0	$652	158	182	210	250	299	351	$652
UCRA	Tom Green	2020	$32,233,000	$6,116	331	348	404	453	499	543	$722
Manufacturing	Tom Green	2020	$0	$652	783	1,055	1,261	1,475	1,733	2,014	$652
County-Other	Tom Green	2020	$0	$6,116	331	348	404	453	499	543	$722
Weather Modification											
Irrigation	Crockett	2020	$0	$0.69	9	9	9	9	9	9	$0.69
Irrigation	Irion	2020	$0	$0.30	110	110	110	110	110	110	$0.30
Irrigation	Pecos	2020	$0	$4.33	264	264	264	264	264	264	$4.33
Irrigation	Reagan	2020	$0	$0.29	1,469	1,469	1,469	1,469	1,469	1,469	$0.29
Irrigation	Reeves	2020	$0	$2.84	240	240	240	240	240	240	$2.84
Irrigation	Schleicher	2020	$0	$0.35	102	102	102	102	102	102	$0.35
Irrigation	Sterling	2020	$0	$0.71	25	25	25	25	25	25	$0.71
Irrigation	Sutton	2020	$0	$0.66	34	34	34	34	34	34	$0.66
Irrigation	Tom Green	2020	$0	$0.31	4,945	4,945	4,945	4,945	4,945	4,945	$0.31
Irrigation	Ward	2020	$0	$1.21	46	46	46	46	46	46	$1.21

Table F-2
Summary of Alternate Strategies

Entity	County Used	Capital Cost	First Decade Unit Cost ($/ac-ft/yr)	Total Yield 2020	2030	2040	2050	2060	2070	Last Decade Unit Cost ($/ac-ft/yr)
Aquifer Storage and Recovery										
CRMWD	Multiple	$17,362,890	$189	Included in Develop Additional Groundwater Supplies						$59
Desalination										
CRMWD	Multiple	$65,161,366	$986	Included in Develop Additional Groundwater Supplies						$500
San Angelo	Tom Green	$66,978,000	$827	Included in Develop Additional Groundwater Supplies						$326
Develop Additional Groundwater Supplies										
BCWID	Multiple	$8,436,000	$580	1,680	1,680	1,680	1,680	1,680	1,680	$160
San Angelo	Pecos	$262,726,000	$2,109	12,000	12,000	12,000	12,000	12,000	12,000	$277
Bronte	Coke	$7,468,000	$4,860	200	200	200	200	200	200	$1,735
Bronte	Coke	$2,576,000	$1,780	150	150	150	150	150	150	$340
Midland	Midland	$51,501,000	$2,086	3,000	3,000	3,000	3,000	3,000	3,000	$649
Odessa	Ector	$615,679,000	$5,557	11,200	28,000	28,000	28,000	28,000	28,000	$1,445
Robert Lee	Tom Green	$5,586,000	$3,895	160	160	160	160	160	160	$976
CRMWD	Multiple	$62,668,000	$1,199	30,000	30,000	30,000	30,000	30,000	30,000	$392
Develop Capitan Reef Complex Aquifer Supplies										
San Angelo	Pecos	$389,092,000	$3,360	11,100	11,100	11,100	11,100	11,100	11,100	$427
Odessa	Ward	$134,120,000	$1,801	8,400	8,400	8,400	8,400	8,400	8,400	$465
Develop Dockum Aquifer Supplies										
Colorado City	Mitchell	$6,124,000	$333	2,240	2,240	2,240	2,240	2,240	2,240	$104
Develop Edwards-Trinity Plateau Aquifer Supplies										
San Angelo	Tom Green	$51,891,000	$1,140	4,500	4,500	4,500	4,500	4,500	4,500	$175
Robert Lee	Coke	$5,800,000	$2,832	240	240	240	240	240	240	$811
Develop Hickory Aquifer Supplies										
San Angelo	McCulloch	$27,104,000	$1,016	2,703	6,003	7,970	7,953	7,950	7,953	$468
Develop Lipan Aquifer Supplies										
Concho Rural Water Corporation	Tom Green	$448,000	$285	200	200	200	200	200	200	$100

Table F-2
Summary of Alternate Strategies

Entity	County Used	Capital Cost	First Decade Unit Cost ($/ac-ft/yr)	Total Yield 2020	2030	2040	2050	2060	2070	Last Decade Unit Cost ($/ac-ft/yr)
Develop Ogallala Aquifer Supplies										
Andrews	Andrews	$18,671,000	$389	1,680	3,360	4,300	4,300	4,300	4,300	$124
Expansion of Existing										
CRMWD	Western Region F Counties	$226,748,000	$1,199	30,000	30,000	30,000	30,000	30,000	30,000	$392
New WTP										
Bronte	Coke	$3,159,000	$4,213	94	94	94	94	94	94	$1,397
Robert Lee	Coke	$7,065,000	$1,666	500	500	500	500	500	500	$484
Off-Channel Reservoir										
San Angelo	Multiple	$23,475,000	$1,791	1,400	1,400	1,400	1,400	1,400	1,400	$389
Steam Electric Power Conservation (Alternative Cooling Technologies)										
Steam Electric	Ward	$56,090,000	$5,644	1,079	1,718	2,496	3,445	4,603	5,569	$1,345
Regional Water Management Strategies										
Bronte, Ballinger, Winters, Robert Lee (Regional System from Brownwood)	Coke & Runnels	$63,166,000	$2,707	2,802	2,802	2,802	2,802	2,802	2,802	$821
Bronte & Robert Lee (Purchase from UCRA)	Coke	$10,691,000	$2,730	500	500	500	500	500	500	$940
Bronte, Ballinger, Winters, Robert Lee (Regional System from Lake Fort Phantom Hill)	Coke & Runnels	$53,591,000	$4,697	1,155	1,155	1,155	1,155	1,155	1,155	$815

Appendix G

Consistency Matrix

CHECKLIST FOR COMPARISON OF THE REGIONAL WATER PLAN TO APPLICABLE WATER PLANNING REGULATIONS

The purpose of this attachment is to facilitate the determination of how the Regional Water Plan is consistent with the long-term protection of the water, agricultural, and natural resources of the State of Texas, particularly within this region. The following checklist includes a regulatory citation (Column 1) for all subsections and paragraphs contained in the following applicable portions of the water planning regulations:

- 31 TAC Chapter 358.3
- 31 TAC Chapter 357.3
- 31 TAC Chapter 357.4
- 31 TAC Chapter 357.2
- 31 TAC Chapter 357.5

According to 31 TAC Chapter 357.41, the Regional Water Plan is considered to be consistent with the long-term protection of the State's resources if complies with the above listed requirements. Therefore, the Regional Water Plan has been compared to each applicable section of the regulations as a means of determining consistency.

The checklist also includes a summary description of each cited regulation (Column 2). It should be understood that this summary is intended only to provide a general description of the particular section of the regulation and should not be assumed to contain all specifics of the actual regulation. The evaluation of the Regional Water Plan should be performed against the complete regulation, as contained in the actual 31 TAC 358 and 31 TAC 357 regulations.

Column 3 of the checklist provides the evaluation response as affirmative, negative, or not applicable. A "Yes" in this column indicates that the Regional Water Plan has been evaluated to comply with the stated section of the regulation. A "No" response indicates that the Regional Water Plan does not comply with the stated regulation. A response of "NA" (or not applicable) indicates that the stated section of the regulation does not apply to this Regional Water Plan.

The evidence of where, in the Regional Water Plan, the stated regulation is addressed is provided in Column 4. Where the regulation is addressed in multiple locations within the Regional Water Plan, this column may cite only the primary locations. In addition to identifying where the regulation is addressed, this column may include commentary about the application of the regulation in the Regional Water Plan.

The above-listed regulations are repetitive, in some instances. One section of the regulations may be restated or paraphrased elsewhere within the regulations. In some cases, multiple sections of the regulations may be combined into one separate regulation section. Therefore, Column 5 provides cross-referencing.

Regulatory Citation (Col 1)	Summary of Requirement (Col 2)	Response (Yes/No/ NA) (Col 3)	Location(s) in Regional Plan and/or Commentary (Col 4)	Regulatory Cross References (Col 5)
Guidance Principles				
31 TAC §358.3				
358.3 (1)	The state water plan shall provide for the preparation for and response to drought conditions.	Yes	Chapters 2, 3, 5, 7	
(2)	The RWP and SWP shall serve as water supply plans under drought of record conditions.	Yes	See above	
(3)	Consideration shall be given to the construction and improvement of surface water resources and the application of principles that result in voluntary redistribution of water resources.	Yes	Chapter 5	
(4)	Provide for the orderly development, management, and conservation of water resources and preparation for and response to drought conditions so that sufficient water will be available at a reasonable cost to satisfy a reasonable projected use of water to ensure public health, safety, and welfare; further economic development; and protect the agricultural and natural resources of the regional water planning area.	Yes	Chapters 5, 6, Appendices C and D	
(5)	Include identification of those policies and action that may be needed to meet Texas' water supply needs and prepare for and respond to drought conditions.	Yes	Chapters 5 and 7	
(6)	Decision-making shall be open to and accountable to the public with decisions based on accurate, objective and reliable information with full dissemination of planning results except for those matters made confidential by law.	Yes	Chapter 10	
(7)	Establish terms of participation in water planning efforts that shall be equitable and shall not unduly hinder participation.	Yes	Chapter 10	
(8)	Consideration of the effect of policies or water management strategies on the public interest of the state, water supply, and those entities involved in providing this supply throughout the entire state.	Yes	Chapter 8	
(9)	Consideration of all water management strategies the regional water plan determines to be potentially feasible when developing plans to meet future water needs and to respond to drought so that cost effective water management strategies which are consistent with long-term protection of the state's water resources, agricultural resources, and natural resources are considered and approved.	Yes	Chapters 5 and 6	
(10)	Consideration of opportunities that encourage and result in voluntary transfers of water resources, including but not limited to regional water banks, sales, leases, options, subordination agreements, and financing agreements.	Yes	Chapter 5	
(11)	Consideration of a balance of economic, social, aesthetic, and ecological viability.	Yes	Appendix E	
(12)	For regional water planning areas without approved regional water plans or water providers for which revised plans are not developed through the regional water planning process, the use of information from the adopted state water plan and other completed studies that are sufficient for water planning shall represent the water supply plan for that area or water provider.	NA		
(13)	All surface waters are held in trust by the state, their use is subject to rights granted and administered by the Commission, and the use of surface water is governed by the prior appropriation doctrine, unless adjudicated otherwise.	Yes	Chapter 3	
(14)	Existing water rights, water contracts, and option agreements shall be protected. However, potential amendments of water rights, contracts and agreements may be considered and evaluated. Any amendments will require the eventual consent of the owner.	Yes	Chapters 3 and 5	
(15)	The production and use of groundwater in Texas is governed by the rule of capture doctrine unless and to the extent that such production and use is regulated by a groundwater conservation district.	Yes	Chapter 3	§36.002
(16)	Consideration of recommendations of river and stream segments of unique ecological value to the legislature for potential protection.	Yes	Chapter 8	
(17)	Consideration of recommendation of sites of unique value for the construction of reservoirs to the legislature for potential protection.	Yes	Chapter 8	
(18)	Consideration of water planning and management activities of local, regional, state, and federal agencies, along with existing local, regional, and state water plans and information and existing state and federal programs and goals.	Yes	Chapters 1 and 5	
(19)	Designated water quality and related water uses as shown in the state water quality management plan shall be improved or maintained.	Yes	Chapter 6	
(20)	Coordination of water planning and management activities of RWPGs to identify common needs and issues and achieve efficient use of water supplies, including the Board and other relevant RWPGs, working together to identify common needs, issues, and challenges while working together to resolve conflicts in a fair, equitable, and efficient manner.	Yes	Entire RWP	

Regulatory Citation (Col 1)	Summary of Requirement (Col 2)	Response (Yes/No/ NA) (Col 3)	Location(s) in Regional Plan and/or Commentary (Col 4)	Regulatory Cross References (Col 5)
(21)	The water management strategies identified in approved RWPs to meet needs shall be described in sufficient detail to allow a state agency making a financial or regulatory decision to determine if a proposed action before the state agency is consistent with an approved RWP.	Yes	Chapter 5, Appendices C and D	
(22)	The evaluation of water management strategies shall use environmental information in accordance with the Commission's adopted environmental flow standards where applicable or, in basins where standards are not available or have not been adopted, information from existing site-specific studies or state consensus environmental planning criteria.	NA	No new appropriations are recommended	30 TAC Chapter 298
(23)	Consideration of environmental water needs including instream flows and bay and estuary inflows, including adjustments by the RWPGs to water management strategies to provide for environmental water needs including instream flows and bay and estuary needs. Consideration shall be consistent with the Commission's adopted environmental flow standards in basins where standards have been adopted.	NA	No new appropations are recommended. Existing instream requalations considered	30 TAC Chapter 298
(24)	Planning shall be consistent with all laws applicable to water use for the state and regional water planning area.	Yes	Entire RWP	
(25)	The inclusion of ongoing water development projects that have been permitted by the Commission or a predecessor agency.	NA	None in Region F	
(26)	Specific recommendations of water management strategies shall be based upon identification, analysis, and comparison of all water management strategies the RWPG determines to be potentially feasible so that the cost effective water management strategies which are environmentally sensitive are considered and adopted unless the RWPG demonstrates that adoption of such strategies is not appropriate.	Yes	Chapter 5, and Appendix E	§357.34(d)(3)(A) §357.34(d)(3)(B)
(27)	Achieve efficient use of existing water supplies, explore opportunities for and the benefits of developing regional water supply facilities or providing regional management of water facilities, coordinate the actions of local and regional water resource management agencies, provide substantial involvement by the public in the decision-making process, and provide full dissemination of planning results.	Yes	Chapters 5 and 10	
(28)	Consideration of existing regional water planning efforts when developing RWPs.	Yes	Chapters 1 and 5	
Chapter One Description of the Regional Water Planning Area				
31 TAC §357.30				
	RWPGs shall describe their regional water planning area including the following:			
357.3 (1)	Social and economic aspects of a region such as information on current population, economic activity and economic sectors heavily dependent on water resources	Yes	1.1	
(2)	Current water use and major water demand centers	Yes	1.2	
(3)	Current groundwater, surface water, and reuse supplies including major springs that are important for water supply or protection of natural resources	Yes	1.3	
(4)	Wholesale water providers	Yes	1.5.1	
(5)	Agricultural and natural resources	Yes	1.4	
(6)	Identified water quality problems	Yes	1.7.1, 1.8	
(7)	Identified threats to agricultural and natural resources due to water quantity problems or water quality problems related to water supply	Yes	1.8	
(8)	Summary of existing local and regional water plans	Yes	1.6	
(9)	The identified historic drought(s) of record within the planning area	Yes	1.7.1 and Chapter 7	
(10)	Current preparations for drought within the RWPA	Yes	1.6.3, Chapter 7, and regionfwater.org	
(11)	Information compiled by the Board from water loss audits	Yes	1.6.2	§358.6
(12)	An identification of each threat to agricultural and natural resources and a discussion of how that threat will be addressed or affected by the water management strategies evaluated in the plan.		1.8 and Chapter 6	
Chapter Two Projected Non-Municipal, Municipal and Population Water Demands				
31 TAC §357.31				
357.31 (a)	Present projected population and water demands by WUG.	Yes	2.2, 2.3, Attachment 2A and 2B	§357.10

Regulatory Citation (Col 1)	Summary of Requirement (Col 2)	Response (Yes/No/ NA) (Col 3)	Location(s) in Regional Plan and/or Commentary (Col 4)	Regulatory Cross References (Col 5)
(b)	Present projected water demands associated with WWPs by category of water use, including municipal, manufacturing, irrigation, steam electric power generation, mining, and livestock for each county or portion of a county in the RWPA.	Yes	2.4	
(c)	Report the current contractual obligations of WUG and WWPs to supply water in addition to any demands projected for the WUG or WWP.	Yes	2.3, 2.4	§357.32
(d)	Municipal demands shall be adjusted to reflect water savings due to plumbing fixture requirements identified in the Texas Health and Safety Code, Chapter 372.	Yes	2.3.1 Table 2.6	Texas Health and Safety Code, Chapter 372
(e)	In developing RWPs, RWPGs shall use:			
(e) (1)	Population and water demand projections developed by the EA that will be contained in the next state water plan and adopted by the Board after consultation with the RWPGs, Commission, Texas Department of Agriculture, and the Texas Parks and Wildlife Department.	Yes	2.2, 2.3, 2.4	
(e) (2)	RWPGs may request revisions of Board adopted population or water demand projections if the request demonstrates that population or water demand projections no longer represents a reasonable estimate of anticipated conditions based on changed conditions and or new information.	Yes	2.1 -Adjustments to population projections were made to six cities and water demand adjustments were made to municipal and agricultural users due to prolonged extreme drought	§357.21(c)
(f)	Population and water demand projections shall be presented for each planning decade for each of the above reporting categories.	Yes	2.2, 2.3, 2.4	
Chapter Three Water Supply Analysis				
31 TAC §357.32				
357.32 (a)	RWPGs shall evaluate:			
(a) (1)	Source water availability during drought of record conditions.	Yes	Chapter 3	
(a) (2)	Existing water supplies that are legally and physically available to WUGs and wholesale water suppliers within the RWPA for use during the drought of record.	Yes	3.1, 3.2, 3.3	
(b)	Consider surface water and groundwater data from the state water plan, existing water rights, contracts and option agreements relating to water rights, other planning and water supply studies, and analysis of water supplies existing in and available to the RWPA during drought of record conditions	Yes	3.1, 3.2	
(c)	Evaluation of the existing surface water available during drought of record shall be based on firm yield. The analysis may be based on justified operational procedures other than firm yield.	Yes	3.2.2	
(d)	Use modeled available groundwater volumes for groundwater availability, as issued by the Board, and incorporate such information in its RWP unless no modeled available groundwater volumes are provided.	Yes	3.1.1	
(e)	Evaluate the existing water supplies for each WUG and WWP	Yes	3.5, 3.6	
(f)	Water supplies based on contracted agreements will be based on the terms of the contract, which may be assumed to renew upon contract termination if the contract contemplates renewal or extensions.	Yes	3.5, 3.6	
(g)	Evaluation results shall be reported by WUG in accordance with §357.31(a) of this title (relating to Projected Population and Water Demands) and WWPs in accordance with §357.31(b) of this title	Yes	Chapter 2, Chapter 3, Appendix J	§357.31(a) §357.31(b)
Chapter Four Identification of Water Needs				
31 TAC §357.33				
357.33 (a)	Include comparisons of existing water supplies and projected water demands to identify water needs.	Yes	4.2	
(b)	Compare projected water demands with existing water supplies available to WUGs and WWPs in a planning area to determine whether WUGs will experience water surpluses or needs for additional supplies. Results will be reported for WUGs and for WWPs by categories of use including municipal, manufacturing, irrigation, steam electric, mining, and livestock watering for each county or portion of a county in a RWPA.	Yes	4.2, and Attachment 4B	§357.31 §357.32
(c)	The social and economic impacts of not meeting water needs will be evaluated by RWPGs and reported for each RWPA.	Yes	Chapter 6 and Appendix I	

Regulatory Citation (Col 1)	Summary of Requirement (Col 2)	Response (Yes/No/ NA) (Col 3)	Location(s) in Regional Plan and/or Commentary (Col 4)	Regulatory Cross References (Col 5)
(d)	Results of evaluations will be reported by WUG in accordance with §357.31(a) of this title and WWPs in accordance with §357.31(b) of this title.	Yes	Attachment 4A and 4B	§357.31(a) §357.31(b)
(e)	Perform a secondary water needs analysis for all WUGs and WWPs for which conservation water management strategies or direct reuse water management strategies are recommended. This secondary water needs analysis will calculate the water needs that would remain after assuming all recommended conservation and direct reuse water management strategies are fully implemented. The resulting secondary water needs volumes shall be presented in the RWP by WUG and WWP and decade.	Yes	4.3	
Chapter Five Identification and Evaluation of Potentially Feasible Water Management Strategies				
31 TAC §357.34				
357.34 (a)	Identify and evaluate potentially feasible water management strategies for all WUGs and WWPs with identified water needs.	Yes	Chapter 5	
(b)	Identify potentially feasible water management strategies to meet water supply needs. Strategies shall be developed for WUGs and WWPs. The strategies shall meet new water supply obligations necessary to implement recommended water management strategies of WWPs and WUGs.	Yes	Subchapter 5A	§357.33 §357.12(b)
(c)	Potential Feasible Water Management Strategies should include, but are not limited to:			
(c) (1)	Expanded use of existing supplies including system optimization and conjunctive use of water resources, reallocation of reservoir storage to new uses, voluntary redistribution of water resources including contracts, water marketing, regional water banks, sales, leases, options, subordination agreements, and financing agreements, subordination of existing water rights through voluntary agreements, enhancements of yields of existing sources, and improvement of water quality including control of naturally occurring chlorides.	Yes	Subchapters 5A.1.4 and 5C (Subordination) - Reallocation of reservoir storage is extremely limited in Region F. Due to limited supply, this strategy was not considered for Region F.	
(c) (2)	New supply development including construction and improvement of surface water and groundwater resources, brush control, precipitation enhancement, desalination, water supply that could be made available by cancellation of water rights based on data provided by the Commission, rainwater harvesting, and aquifer storage and recovery.	Yes	Subchapters 5A.1.5, 5A1.6 (Precipitation Enhancement), and 5C (Brush Control)- RWPG did not consider water right cancellation to be a feasible strategy for Region F.	
(c) (3)	Conservation and drought management measures including demand management.	Yes	Subchapters 5A1.1, 5B and Chapter 7	
(c) (4)	Reuse of wastewater.	Yes	Subchapter 5A.1.2	
(c) (5)	Interbasin transfers of surface water.	NA	There are no new interbasin strategies for Region F	
(c) (6)	Emergency transfers of surface water including a determination of the part of each water right for non-municipal use in the RWPA that may be transferred without causing unreasonable damage to the property of the non-municipal water rights holder in accordance with Texas Water Code §11.139 (relating to Emergency Authorizations).	Yes	Chapter 7	§11.139
(d)	Evaluations of Potentially Feasible Water Management Strategies should include the following analyses:			
(d) (1)	For the purpose of evaluating potentially feasible water management strategies, the Commission's most current Water Availability Model with assumptions of no return flows and full utilization of senior water rights, is to be used. Alternative assumptions may be used with written approval from the EA.	Yes	Subchapter 5A.1 and Chapter 3	
(d) (2)	An equitable comparison between and consistent evaluation and application of all water management strategies the RWPGs determine to be potentially feasible for each water supply need.	Yes	Subchapter 5D, 5E and Attachment 5A	
(d) (3) (A)	A quantitative reporting of the net quantity, reliability, and cost of water delivered and treated for the end user's requirements during drought of record conditions, taking into account and reporting anticipated strategy water losses, incorporating factors used calculating infrastructure debt payments and may include present costs and discounted present value costs. Costs do not include distribution of water within a WUG after treatment.	Yes	Subchapters 5B, 5C, 5D, 5E, Appendices C, D, and E	
(d) (3) (B)	A quantitative reporting of the environmental factors including effects on environmental water needs, wildlife habitat, cultural resources, and effect of upstream development on bays, estuaries, and arms of the Gulf of Mexico.	Yes	Appendix E	30 TAC Chapter 298
(d) (3) (C)	A quantitative reporting of the impacts to agricultural resources.	Yes	Appendix E	
(d) (4)	Discussion of the plan's impact on other water resources of the state including other water management strategies and groundwater and surface water interrelationships.	Yes	Chapter 6 and Appendix C	

Regulatory Citation (Col 1)	Summary of Requirement (Col 2)	Response (Yes/No/ NA) (Col 3)	Location(s) in Regional Plan and/or Commentary (Col 4)	Regulatory Cross References (Col 5)
(d) (5)	Discussion of each threat to agricultural or natural resources identified pursuant to §357.30(7) of this title (relating to Description of the Regional Water Planning Area) including how that threat will be addressed or affected by the water management strategies evaluated	Yes	Chapter 6 and Appendix C	§357.30(7)
(d) (6)	If applicable, consideration and discussion of the provisions in Texas Water Code §11.085(k)(1) for interbasin transfers of surface water. At minimum, this consideration will include a summation of water needs in the basin of origin and in the receiving basin.	NA	There are no new interbasin strategies for Region F	§11.085(k)(1)
(d) (7)	Consideration of third-party social and economic impacts resulting from voluntary redistributions of water including analysis of third-party impacts of moving water from rural and agricultural areas.	Yes	Chapter 6 and Appendix E	
(d) (8)	A description of the major impacts of recommended water management strategies on key parameters of water quality identified by RWPGs as important to the use of a water resource and comparing conditions with the recommended water management strategies to current conditions using best available data.	Yes	Chapter 6 and Appendix C	
(d) (9)	Consideration of water pipelines and other facilities that are currently used for water conveyance as described in §357.22(a)(3) of this title (relating to General Considerations for Development of Regional Water Plans).	Yes	Chapter 7, Appendices C and D	§357.22(a)(3)
(d) (10)	Other factors as deemed relevant by the RWPG including recreational impacts.	Yes	Appendix C	
(e)	Evaluate and present potentially feasible water management strategies with sufficient specificity to allow state agencies to make financial or regulatory decisions to determine consistency of the proposed action before the state agency with an approved RWP.	Yes	Chapter 5	
(f)	Conservation, Drought Management Measures, and Drought Contingency Plans shall be considered by RWPGs when developing the regional plans, particularly during the process of identifying, evaluating, and recommending water management strategies. RWPs shall incorporate water conservation planning and drought contingency planning in the regional water planning area.	Yes	Chapter 5 and 7	
(f) (1)	Drought management measures including water demand management. RWPGs shall consider drought management measures for each need identified in §357.33 of this title and shall include such measures for each user group to which Texas Water Code §11.1272 (relating to Drought Contingency Plans for Certain Applicants and Water Right Holders) applies. Impacts of the drought management measures on water needs must be consistent with guidance provided by the Commission in its administrative rules implementing Texas Water Code §11.1272. If a RWPG does not adopt a drought management strategy for a need it must document the reason in the RWP.	Yes	Chapter 7 and Subchapter 5A - Drought management considered for all uses with needs but not recommended	§357.33 §11.1272
(f) (2)	Must consider water conservation practices, including potentially applicable best management practices, for each identified water need.	Yes	Subchapter 5B and Appendix C	
(f) (2) (A)	Include water conservation practices for each user group to which Texas Water Code §11.1271 and §13.146 (relating to Water Conservation Plans) apply. The impact of these water conservation practices on water needs must be consistent with requirements in appropriate Commission administrative rules.	Yes	Subchapter 5B and Appendix C	§11.1271 §13.146
(f) (2) (B)	Consider water conservation practices for each WUG beyond the minimum requirements of subparagraph (A) of this paragraph, whether or not the WUG is subject to Texas Water Code §11.1271 and §13.146. If RWPGs do not adopt a water conservation strategy to meet an identified need, they shall document the reason in the RWP.	Yes	Subchapters 5B, 5D, 5E and Appendix C	§11.1271 §13.146
(f) (2) (C)	For each WUG or WWP that is to obtain water from a proposed interbasin transfer, RWPGs will include a water conservation strategy that will result in the highest practicable level of water conservation and efficiency achievable.	NA	There are no new interbasin strategies for Region F	§11.085
(f) (2) (D)	Consider strategies to address any issues identified in the information compiled by the Board from the water loss audits performed by retail public utilities pursuant to §358.6 of this title (relating to Water Loss Audits).	Yes	Subchapter 5B and Appendix C	§358.6
(g)	Include a subchapter consolidating the RWPG's recommendations regarding water conservation. RWPGs shall include in the RWPs model water conservation plans pursuant to Texas Water Code §11.1271	Yes	Subchapter 5B	§11.1271
31 TAC §357.35				
357.35 (a)	Recommend water management strategies to be used during a drought of record based on the potentially feasible water management strategies evaluated under §357.34 of this title (relating to Identification and Evaluation of Potentially Feasible Water Management Strategies).	Yes	Chapter 5, Appendices C and D	§357.34

Regulatory Citation (Col 1)	Summary of Requirement (Col 2)	Response (Yes/No/ NA) (Col 3)	Location(s) in Regional Plan and/or Commentary (Col 4)	Regulatory Cross References (Col 5)
(b)	Recommend specific water management strategies based upon the identification, analysis, and comparison of water management strategies by the RWPG that the RWPG determines are potentially feasible so that the cost effective water management strategies that are environmentally sensitive are considered and adopted unless a RWPG demonstrates that adoption of such strategies is inappropriate.	Yes	Chapter 5, Appendices C and D	§357.34
(c)	Strategies will be selected by the RWPGs so that cost effective water management strategies, which are consistent with long-term protection of the state's water resources, agricultural resources, and natural resources are adopted.	Yes	Chapter 5, Appendices C and D	
(d)	Identify and recommend water management strategies for all WUGs and WWPs with identified water needs and that meet all water needs during the drought of record except in cases where: (1) no water management strategy is feasible. In such cases, RWPGs must explain why no management strategies are feasible; or (2) a political subdivision that provides water supply other than water supply corporations, counties, or river authorities explicitly does not participate in the regional water planning process for needs located within its boundaries or extraterritorial jurisdiction.	Yes	Chapter 5, Appendices C and D	
(e)	Specific recommendations of water management strategies to meet an identified need will not be shown as meeting a need for a political subdivision if the political subdivision in question objects to inclusion of the strategy for the political subdivision and specifies its reasons for such objection. This does not prevent the inclusion of the strategy to meet other needs.	Yes	Chapter 5, Appendices C and D	
(f)	Recommended strategies shall protect existing water rights, water contracts, and option agreements, but may consider potential amendments of water rights, contracts and agreements, which would require the eventual consent of the owner.	Yes	Chapter 5, Appendices C and D	
(g)	RWPGs shall report the following			
(g) (1)	Recommended water management strategies and the associated results of all the potentially feasible water management strategy evaluations by WUG and WWP. If a WUG or WWP lies in one or more counties or RWPAs or river basins, data will be reported for each river basin, RWPA, and county.	Yes	Appendix J	
(g) (2)	Calculated planning management supply factors for each WUG and WWP included in the RWP assuming all recommended water management strategies are implemented. This calculation shall be based on the sum of: the total existing water supplies, plus all water supplies from recommended water management strategies for each entity; divided by that entity's total projected water demand, within the planning decade. The resulting calculated safety factor shall be presented in the plan by entity and decade for every WUG and WWP	Yes	Appendix J	
(g) (3)	Fully evaluated Alternative Water Management Strategies included in the adopted RWP shall be presented together in one place in the RWP.	Yes	Appendix F	
Chapter Six Impacts of Regional Water Plan and Consistency with Protection of Water Resources, Agricultural Resources, and Natural Resources				
31 TAC §357.40				
357.40 (a)	RWPs shall include a description of the impacts of the RWP regarding:			
(b) (1)	Agricultural resources pursuant to §357.34(d)(3)(C) of this title (relating to Identification and Evaluation of Potentially Feasible Water Management Strategies)	Yes	Chapter 6 and Appendix C	§357.34(d)(3)(C)
(b) (2)	Other water resources of the state including other water management strategies and groundwater and surface water interrelationships pursuant to §357.34(d)(4) of this title	Yes	Chapter 6 and Appendix C	§357.34(d)(4)
(b) (3)	Threats to agricultural and natural resources identified pursuant to §357.34(d)(5) of this title	Yes	Chapter 6 and Appendix C	§357.34(d)(5)
(b) (4)	Third-party social and economic impacts resulting from voluntary redistributions of water including analysis of third-party impacts of moving water from rural and agricultural areas pursuant to §357.34(d)(7) of this title	Yes	Appendix E	§357.34(d)(7)
(b) (5)	Major impacts of recommended water management strategies on key parameters of water quality pursuant to §357.34(d)(8) of this title	Yes	6.2	§357.34(d)(8)
(b) (6)	Effects on navigation	Yes	6.5 - The Region F Plan does not have an impact on navigation	
(c)	Include a summary of the identified water needs that remain unmet by the RWP.	Yes	Chapter 6	
31 TAC §357.41				

Regulatory Citation (Col 1)	Summary of Requirement (Col 2)	Response (Yes/No/ NA) (Col 3)	Location(s) in Regional Plan and/or Commentary (Col 4)	Regulatory Cross References (Col 5)
357.41	Describe how RWPs are consistent with the long-term protection of the state's water resources, agricultural resources, and natural resources as embodied in the guidance principles in §358.3(4) and (8) of this title (relating to Guidance Principles).	Yes	6.6, 6.7, 6.8, 6.9, 6.10, and 6.11	§358.3(4) and (8)
Chapter Seven Drought Response Information, Activities, and Recommendations				
31 TAC §357.42				
357.42 (a)	Consolidate and present information on current and planned preparations for, and responses to, drought conditions in the region including, but not limited to, drought of record conditions based on the following subsections.	Yes	7	
(b)	Conduct an overall assessment of current preparations for drought within the RWPA including a description of how water suppliers in the RWPA identify and respond to the onset of drought. This may include information from local drought contingency plans.	Yes	7.2	
(c)	Develop drought response recommendations regarding the management of existing groundwater and surface water sources in the RWPA designated in accordance with §357.32 of this title (relating to Water Supply Analysis), including:			
(c) (1)	Factors specific to each source of water supply to be considered in determining whether to initiate a drought response for each water source including specific recommended drought response triggers	Yes	7.5	§357.32
(c) (2)	Actions to be taken as part of the drought response by the manager of each water source and the entities relying on each source, including the number of drought stages	Yes	7.5	§357.32
(c) (3)	Triggers and actions developed in paragraphs (1) and (2) of this subsection may consider existing triggers and actions associated with existing drought contingency plans.	Yes	7.5	§357.32
(d)	Collect information on existing major water infrastructure facilities that may be used for interconnections in event of an emergency shortage of water. In accordance with Texas Water Code §16.053(r), this information is CONFIDENTIAL INFORMATION and cannot be disseminated to the public. The associated information is to be collected by a subgroup of RWPG members in a closed meeting and submitted separately to the EA in accordance with guidance to be provided by EA.	Yes	No confidential information received	Texas Water Code §16.053(r)
(e)	Provide general descriptions of local drought contingency plans that involve making emergency connections between water systems or WWP systems that do not include locations or descriptions of facilities that are disallowed under subsection (d) of this section.	Yes	7.3	
(f)	RWPGs may designate recommended and alternative drought management water management strategies and other recommended drought measures in the RWP including:			
(f) (1)	List and description of the recommended drought management water management strategies and associated WUGs and WWPs, if any, that are recommended by the RWPG. Information to include associated triggers to initiate each of the recommended drought management water management strategies	NA	7.6 - Region F does not recommend specific drought management strategies. Region F recommends the implementation of drought contingency plans by suppliers when appropriate to reduce demand during drought and prolong current supplies.	
(f) (2)	List and description of alternative drought management water management strategies and associated WUGs and WWPs, if any, that are included in the plan. Information to include associated triggers to initiate each of the alternative drought management water management strategies	NA	No alternative drought management strategies were included in the Region F Plan	
(f) (3)	List of all potentially feasible drought management water management strategies that were considered or evaluated by the RWPG but not recommended	NA	Region F does not recommend specific drought management strategies.	
(f) (4)	List and summary of any other recommended drought management measures, if any, that are included in the RWP, including associated triggers if applicable	NA	Region F does not recommend specific drought management strategies.	
(g)	Evaluate potential emergency responses to local drought conditions or loss of existing water supplies; the evaluation shall include identification of potential alternative water sources that may be considered for temporary emergency use by WUGs and WWPs in the event that the existing water supply sources become temporarily unavailable to the WUGs and WWPs due to unforeseeable hydrologic conditions such as emergency water right curtailment, unanticipated loss of reservoir conservation storage, or other localized drought impacts. RWPGs shall evaluate, at a minimum, municipal WUGs that: (1) have existing populations less than 7,500 (2) rely on a sole source for its water supply regardless of whether the water is provided by a WWP (3) all county-other WUGs	Yes	7.4	
(h)	Consider any relevant recommendations from the Drought Preparedness Council.	Yes	Chapter 7	

Regulatory Citation (Col 1)	Summary of Requirement (Col 2)	Response (Yes/No/ NA) (Col 3)	Location(s) in Regional Plan and/or Commentary (Col 4)	Regulatory Cross References (Col 5)
(i)	Make drought preparation and response recommendations regarding:			
(i) (1)	Development of, content contained within, and implementation of local drought contingency plans required by the Commission	Yes	7.2, 7.5 and Appendices	
(i) (2)	Current drought management preparations in the RWPA including: (A) drought response triggers; and (B) responses to drought conditions;	Yes	7.2, 7.5 and Appendices	
(i) (3)	The Drought Preparedness Council and the State Drought Preparedness Plan	Yes	7.2, 7.5 and Appendices	
(i) (4)	Any other general recommendations regarding drought management in the region or state	Yes	7.2, 7.5 and Appendices	
(j)	Develop region-specific model drought contingency plans.	Yes	7.5.3, regionfwater.org	
Chapter Eight Policy Recommendations and Unique Sites				
31 TAC §357.43				
357.43 (a)	The RWPs shall contain any regulatory, administrative, or legislative recommendations developed by the RWPGs	Yes	8.3	
(b)	May include in adopted RWPs recommendations for all or parts of river and stream segments of unique ecological value located within the RWPA by preparing a recommendation package consisting of a physical description giving the location of the stream segment, maps, and photographs of the stream segment and a site characterization of the stream segment documented by supporting literature and data. The recommendation package shall address each of the criteria for designation of river and stream segments of ecological value found in this subsection. The RWPG shall forward the recommendation package to the Texas Parks and Wildlife Department and allow the Texas Parks and Wildlife Department 30 days for its written evaluation of the recommendation. The adopted RWP shall include, if available, Texas Parks and Wildlife Department's written evaluation of each river and stream segment recommended as a river or stream segment of unique ecological value.	NA	8.1 - Region F WPG does not recommend the designation of any ecologically unique stream segments	
(b) (1)	May recommend a river or stream segment as being of unique ecological value based upon the criteria set forth in §358.2 of this title (relating to Definitions)	NA	8.1 - Region F WPG does not recommend the designation of any ecologically unique stream segments	§358.2
(b) (2)	For every river and stream segment that has been designated as a unique river or stream segment by the legislature, during a session that ends not less than one year before the required date of submittal of an adopted RWP to the Board, or recommended as a unique river or stream segment in the RWP, the RWPG shall assess the impact of the RWP on these segments. The assessment shall be a quantitative analysis of the impact of the plan on the flows important to the river or stream segment, as determined by the RWPG, comparing current conditions to conditions with implementation of all recommended water management strategies. The assessment shall also describe the impact of the plan on the unique features cited in the region's recommendation of that segment	NA	8.1 - Region F WPG does not recommend the designation of any ecologically unique river or stream segments	
(c)	May recommend sites of unique value for construction of reservoirs by including descriptions of the sites, reasons for the unique designation and expected beneficiaries of the water supply to be developed at the site. The criteria at §358.2 of this title shall be used to determine if a site is unique for reservoir construction.	NA	8.2 - Region F WPG does not recommend any unique sites for reservoir development	§358.2
(d)	Any other recommendations that the RWPG believes are needed and desirable to achieve the stated goals of state and regional water planning including to facilitate the orderly development, management, and conservation of water resources and prepare for and respond to drought conditions.	Yes	8.4	
(e)	May develop information as to the potential impacts of any proposed changes in law prior to or after changes are enacted.	Yes	8.3	
(f)	Consider making legislative recommendations to facilitate more voluntary water transfers in the region.	Yes	8.3	
Chapter Nine Infrastructure Financing Analysis				
31 TAC §357.44				
357.44	Assess and quantitatively report on how individual local governments, regional authorities, and other political subdivisions in their RWPA propose to finance recommended water management strategies.	Yes	Chapter 9 and Appendix M	
Chapter Ten Public Participation and Plan Adoption				
31 TAC §357.21				
357.21 (a)	Conduct all business in meetings posted and held in accordance with the Texas Open Meetings Act, Texas Government Code Chapter 551, with a copy of all materials presented or discussed available for public inspection prior to and following the meetings.	Yes	Chapter 10	Texas Government Code Chapter 551

Regulatory Citation (Col 1)	Summary of Requirement (Col 2)	Response (Yes/No/ NA) (Col 3)	Location(s) in Regional Plan and/or Commentary (Col 4)	Regulatory Cross References (Col 5)
(b-d)	All public notices required by the TWDB by the RWPG shall comply with 31 TAC §357.21 and shall meet the requirements specified therein.	Yes	Chapter 10	
31 TAC §357.50				
357.5 (a)	Submit their adopted RWPs to the Board every five years on a date to be disseminated by the EA, as modified by subsection (e)(2) of this section, for approval and inclusion in the state water plan.	Yes	The Region F Water Plan will be submitted to the EA accordingly	
(b)	Prior to the adoption of the RWP, the RWPGs shall submit concurrently to the EA and the public an IPP. The IPP submitted to the EA must be in the electronic and paper format specified by the EA. Each RWPG must certify that the IPP is complete and adopted by the RWPG.	Yes	Chapter 10	
(c)	Distribute the IPP in accordance with §357.21(d)(5) of this title (relating to Notice and Public Participation).	Yes	Chapter 10	
(d)	Solicit, and consider the necessary comments when adopting a RWP.	Yes	Chapter 10, Appendix K, and Appendix L	
(e)	Submit the IPP and the adopted RWPs and amendments to approved RWPs to the EA in conformance with 31 TAC §357.50 (e).	Yes	The Region F Water Plan will be submitted to the EA accordingly	
(f)	Submit in a timely manner to the EA information on any known interregional conflict between RWPs.	NA	There are no known interregional conflicts between RWPs.	
(g)	Modify the RWP to incorporate Board resolutions of interregional conflicts	NA	See above	
(h)	Seek to resolve conflicts with other RWPGs and shall participate in any Board sponsored efforts to resolve interregional conflicts.	NA	See above	
Chapter Eleven Implementation and Comparison to the Previous Regional Water Plan				
31 TAC §357.45				
357.45 (a)	Describe the level of implementation of previously recommended water management strategies. Information on the progress of implementation of all water management strategies that were recommended in the previous RWP, including conservation and drought management water management strategies; and the implementation of projects that have affected progress in meeting the state's future water needs.	Yes	11.3	
(b)	RWPGs shall provide a brief summary of how the RWP differs from the previously adopted RWP with regards to:			
(b) (1)	Water demand projections	Yes	11.2.1	
(b) (2)	Drought of record and hydrologic and modeling assumptions used in planning for the region	Yes	11.2.2	
(b) (3)	Groundwater and surface water availability, existing water supplies, and identified water needs for WUGs and WWPs	Yes	11.2.3, 11.2.4, 11.2.5	
(b) (4)	Recommended and alternative water management strategies.	Yes	11.2.6	

Appendix H

Drought Triggers and Actions

Table H -1
Drought Triggers and Actions by Water Provider

			Onset of Drought				Severe Drought	
Water Provider	**Stage 1 Trigger**	**Response**	**Stage 2 Trigger**	**Response**	**Stage 3 Trigger**	**Response**	**Stage 4 Trigger**	**Response**
Ballinger	Lake Ballinger is below 1,666 feet above msl or 7.5 feet below the spillway overflow.	Outside watering restrictions. Contact wholesale water customers to discuss water supply/demand conditions and request initiate voluntary measures to reduce water use.	Lake Ballinger is below 1,662 feet above msl or 11.5 feet below spillway overflow.	Outside watering restrictions. Distribution of fines for anyone not abiding to the water calendar.	Lake Ballinger is below 1,658 feet above msl or 15.5 feet below spillway overflow.	Irrigation by all commercial, industrial and residential customers is prohibited except during designate hours. Water from fire hydrants is limited to fire fighting and related activities. Distribution of fines for violating provisions.	Lake Ballinger is below 1,654 feet above sea level or 19.5 feet below spillway overflow.	Irrigation by all commercial, industrial and residential customers is prohibited except during designate hours. Prohibited use of potable water supplied by City for non-essential water use. Distribution of fines for violating provisions.
Balmorhea	Intake pond capacity<= 70%	Achieve voluntary 60% reduction in total water use for nonessential purposes and practice water conservation	Intake pond capacity<= 50%	Achieve 85% reduction in daily water demand. Implement best management practices for supply management.	Intake pond capacity<= 70%	Achieve 90% reduction in total water unsafe. Implement best management practices for supply management.	Emergency water shortage	Assess the severity of the problem and identify actions need to solve the problem. Inform appropriate parties and undertake necessary actions.
Big Spring	Begins every April 1st and ends September 30th	Public notification and customer awareness to encourage efficient water use.	CRMWD initiates drought Stage II. Water treatment as % of capacity = 95% for 7 consecutive days	Achieve 5 % reduction in total water use. Visually inspect lines and repair leaks. Voluntary watering restrictions. Wholesale customers to initiate voluntary measures to reduce water use.	CRMWD initiates Stage III. Capacity >= 95% water demand for 15 consecutive days.	Achieve 10% reduction in total water use. Visually inspect lines and repair leaks on a regular basis. Reduce or discontinue flushing of water mains except for dead end mains and reduce/discontinue irrigation of public landscaped areas. Implement mandatory retails customers/public and wholesale customer restrictions	CRMWD initiate drought Stage IV. Capacity exceed 12 MGD for 10 consecutive days.	Achieve 35% reduction in total water use. Inspection lines and repair leaks daily. Reduce or discontinue flushing of water mains. Begin water rationing if needed. Implement retail customers/public and wholesale customer restrictions.
Brookesmith SUD	Begins every April 1st and ends September 30th	Public notification and customer awareness to encourage efficient water use.	Demand as % of pumping capacity 3.4 MGD for 3 consecutive days.	Achieve a 6% reduction in daily water demand. Visually inspect lines and repair leaks on a daily basis. Voluntary watering restrictions.	Demand >= 3.7 for 3 consecutive days or 4 MGD on a single day	Achieve a 10% reduction in total daily water demand. Visually inspect lines and repair leaks on a regular basis. Flushing is prohibited except for dead end mains or it is needed to maintain water quality. Mandatory watering restrictions.	Supply contamination. Production or distribution limitations. System outage.	Achieve a 25% reduction in daily water demand. Visually inspect lines and repair leaks on a daily basis. All outdoor watering is prohibited.
Brown County WID	Lake Brownwood is below elevation 1,420 feet msl. (76% capacity)	Advise customer of early conditions. Initiate Stage I of Drought Contingency Plans. Increase public education. Request voluntary conservation measures.	Lake Brownwood is below elevation 1,417 feet msl. (64% capacity)	Request decrease in water usage. Implement watering restrictions.	Lake Brownwood is below elevation 1,414 feet msl. (52% capacity)	Request to severely reduce water usage. Watering restrictions. District may reduce water delivery in accordance with pro rate curtailment.	Lake Brownwood is below elevation 1,411 feet msl. (43% capacity)	District may call an emergency meeting with customers. Completely restrict watering. District may evaluate the need to discontinue delivery of water for second crops and non-essential uses. May reduce water delivery in accordance with pro rate curtailment.
Brownwood	Brown Count WID #1 declares Stage 1 Drought. High demand on system. Drought monitor indicates drought conditions.	Achieve a 5% reduction in total water use. Voluntary watering schedule. Notify major commercial and industrial water users. Increase leak detection and repair efforts	Brown County WID #1 declares Stage 2 Drought. Inability to maintain 70% storage capacity over-night due to high demand. Demand exceeds 85% capacity for 3 consecutive days. Demand exceeds 90% capacity for 1 day.	Achieve 15% reduction in total water use. Mandatory watering schedule. Increase utility oversight of water waste.	Brown County WID #1 declares Stage 3 Drought. Inability to maintain 50% storage capacity over-night due to high demand. Demand exceeds 90% capacity for 3 consecutive days. Demand exceeds 95% capacity for 1 day.	Achieve 30% reduction in total water use. Mandatory watering schedule. Implement utility enforcement of watering schedule and water waste.	Brown County WID #1 declares Stage 4 Drought. Inability to maintain 35% storage capacity over-night due to high demand. Demand exceeds 95% capacity for 3 consecutive days. Demand exceeds 100% capacity for 1 day.	Achieve 50% reduction in total water use. Mandatory watering schedule. Reduce non-essential commercial water use by 50% to 100%.
CRMWD	J.B. Thomas Reservoir Elevation is 2,216.32. E.V. Spence elevation is 1,846.67. O.H. Ivie elevation is 1,517.73	Initiate engineering studies to evaluate alternative actions if conditions worsen. Implement viable alternative water supplies. Request cities to implement Stage 1. Discontinue pumping operations at the Big Spring Odessa intake.	J.B. Thomas Reservoir Elevation is 2,213.90. E.V. Spence elevation is 1,842.18. O.H. Ivie elevation is 1,512.07	Initiate engineering studies to evaluate alternative actions if conditions worsen. Implement viable alternative water supplies. Request cities to implement Stage 2. Being operation of Snyder Well Field. Refrain from large-scale releases for water quality purposes.	J.B. Thomas Reservoir Elevation is 2,211.10. E.V. Spence elevation is 1,836.52. O.H. Ivie elevation is 1,504.46	Initiate engineering studies to evaluate alternative actions if conditions worsen. Implement viable alternative water supplies. Being pump back operation with water from Ivie or Spence Reservoirs.	Emergency	Assess the situation. Determine what corrective measures are needed, estimated time for repairs, water demands of customers relying on the system, alternative sources of supply, current storage capacity, and customer's storage capacity.
Early City	Brown County WID#1 declares Stage 1. High demand on the system.	Achieve 5% reduction in water uses. Retail and wholesale customers requested to follow Stage 1 watering schedule. Initiate increase public information campaign.	Brown County WID#1 declares Stage 2. Daily water demand exceeds 85% of pumping, treatment, or storage capacity for 3 consecutive days.	Achieve 15% reduction in water use. Retail and wholesale customers required to follow Stage 2 watering schedule. Increase utility oversight of water-use restrictions and water waste.	Brown County WID#1 declares Stage 3. Daily water demand exceeds 90% of pumping, treatment, or storage capacity for 3 consecutive days.	Achieve 30% reduction in water use. Retail and wholesale customers required to follow Stage 3 watering schedule. Increase utility enforcement of water-use restrictions and water waste. Parks and school landscapes limited to drip irrigation and hand-held hose for trees, shrubs, and planters.	Brown County WID#1 declares Stage 4. Daily water demand exceeds 95% of pumping, treatment, or storage capacity for 3 consecutive days. Major limitations of water system restrictions.	Achieve 50% reduction in water use. Retail and wholesale customers required to follow Stage 4 watering schedule. Watering only after 7pm-midnight on watering day.

Table H -1
Drought Triggers and Actions by Water Provider

			Onset of Drought				Severe Drought	
Water Provider	**Stage 1 Trigger**	**Response**	**Stage 2 Trigger**	**Response**	**Stage 3 Trigger**	**Response**	**Stage 4 Trigger**	**Response**
Fort Stockton	Annually May 1 through September 30. Demand equals or exceeds 5 MG for 3 consecutive days or 6 MG on a single day.	Achieve voluntary 20% reduction in total water uses. Reduce to 4 MG daily demand. Voluntarily conserve water and adhere to prescribed restrictions on certain water use.	Demand equals or exceeds 5MG for 7 consecutive days or 6 MG on a single day.	Achieve voluntary 20% reduction in total water uses. Reduce to 4 MG daily demand. Voluntarily conserve water and adhere to prescribed restrictions on certain water uses.	Demand equals or exceeds 6 MG for 7 consecutive days or 7 MG on a single day.	Achieve voluntary 33% reduction in total water use, lower daily water demand to 4MG daily demand. Required to comply with the requirements and restrictions on certain non-essential water uses for Stage 3.	Demand equals and exceeds 7 MG for 1 consecutive days or when static water level in the City of Fort Stockton water supply well(s) is equal to or greater than 300 feet.	Achieve voluntary 43% reduction in total water use, and reduce daily water demand to an acceptable daily demand of 4 MG.
Menard	missing page in plan	Achieve voluntary 5% reduction in GPD use. Voluntary watering limits and water conservation measures.	Menard Well A is at 6' level and/or water does not run over the Stockpen Crossing Dam	missing page in plan	Menard Well A is at 5' level. Water does not run over the Stockpen Crossing Dam. No rain has been received for 30 consecutive days. Triple digit heat for 40 days and the river level is below 2.40.	Achieve 10% reduction in GPD use.	Menard Well A is at 4' level. Water does not run over the Stockpen Crossing Dam. No rain been received for 60 days. Triple digit heat for 60 days and river level reaches 2.0	missing page
Midland	CRMWD initiates Stage 1. Request from Midland Fresh Water Supply District due to limitation in available supplies or transmission. Demand reaches 94% of the treatment plant capacity for 5 consecutive days.	Achieve voluntary 10% reduction in daily water demand. Implement voluntary water use restrictions: limit irrigations of landscaped areas to watering schedule. Implement reduced flushing of water mains and increased use of alternative supply source(s) if available.	CRMWD initiates Stage 2. Request from CRMWD/Midland Fresh Water Supply District due to limitation in available supplies or their transmission lines. Demand reaches or exceed 95% of water plant's capacity for 5 consecutive days.	Achieve 15% reduction in daily water demand. Implement reduced flushing of water mains, reduce irrigation of public landscaped areas, increased use of an alternative supply source. Watering schedules	CRMWD initiates Stage 3. Failure or threatening failure of a major system component will result in immediate health or safety hazard. Total daily water demand reaches the system limit.	Achieve 20% reduction in daily water demand. Reduce irrigation of public landscaped areas to minimum required to avoid vegetation loss. Water use restrictions.	CRMWD initiates Stage 4. Request from Midland Fresh Water Supply District #1 to initiate due to limitation in available supplies or transmission. Treated water storage levels do no restore overnight.	Achieve a 30 day sustainable demand level which well fields can provide 23 MGD. Reduced or discontinued flushing of water mains except emergencies reduced or discontinued irrigation of public landscaped areas. Water use restrictions.
Mitchel County Utility Co.	Initiates every April 1st to September 30th.	Voluntary limit the use of water for non-essential purposes to practice water conservation.	Overnight recovery rate reaches 20 feet. Production or distribution limitation.	Achieve 10% reduction in daily water demand. Visually inspect lines and repair leaks on a daily basis. Monthly review of customer use records and follow up on any that have unusually high usage. Restricted watering schedule.	Overnight recovery rate reaches 30 feet. Production or distribution limitations.	Achieve 15% reduction in daily water demand. Visually inspect lines and repair leaks. Flushing is prohibited except for dead end mains. Water restrictions for irrigated landscaped areas, swimming pools, hydrants, etc.	Overnight recovery rate reaches 30 feet. Production or distribution limitations.	Achieve 20% reduction in daily water demand. Visually inspect lines and repair leaks on a daily basis. Flushing is prohibited for dead end mains and only between hours of 9 pm and 3 am. Irrigation of landscaped areas is absolutely prohibited. Use of water to wash vehicles.
Monahans	Pumping capacity<= 50% well's capacity. Demand >= 6 MG for 4 consecutive days or 8 MG in single day.	Achieve 20% reduction in daily water demand. Limit flushing of water mains to emergency need and begin preliminary activation of alternative water supply. Voluntary water use restrictions.	Pumping capacity <75% well's capacity. Demand >= 7 MG for 4 consecutive days or 9 MG in a single day.	Achieve 40% reduction in daily water demand. Discontinue flushing of water mains, reduce or discontinue irrigation of public landscaped areas, and use of an alternative supply source. Watering restrictions. Restaurants prohibited from serving water unless requested. Prohibited uses of non-essential water uses.	Pumping capacity <= 4 MGD	Achieve 60% reduction in daily water demand. Discontinue flushing water mains, discontinue irrigation of public landscaped areas, use an alternative supply sources, use reclaimed water for non-potable purposes. Water use restrictions.	Pumping capacity <= 1 MGD	Achieve 80% reduction in daily water demand. Discontinue flushing of water mains, discontinue irrigation of public landscaped areas, use an alternative supply sources, use of reclaimed water for non-potable purposes. Water use restrictions
Odessa	Daily demand> 90% of treatment plant's capacity to produce or pump water for three consecutive days.	Achieve voluntary 1-5% reduction in daily water demand. Raise public awareness of need to conserve water supply. Request voluntary reductions in nonessential water use. Water use restrictions.	Daily demand> 95% of treatment plant's capacity to produce or pump water for three consecutive days.	Achieve 5-10% reduction in daily water demand. Implement mandatory restrictions on nonessential water Reduce fire hydrant flushing except where needed to maintain water quality. Water use restrictions.	Daily demand> 98% of treatment plant's capacity to produce or pump water for three consecutive days or the moderate conditions have remained in effect for an extended period.	Achieve 10-15% reduction in daily water demand. Implement ban on certain types of non-essential water uses. Consider implementation of a surcharge for excess water usage. Discontinue all fire hydrants flushing except where critical to maintaining water quality. Reduce or discontinue irrigation of public landscaped areas irrigated with the raw or potable water sources.	Extended duration of severe conditions. Extreme operational conditions such as major line breaks, pump or system failures which cause loss of capability to provide normal water service. Natural or man-made contamination of water sources.	Reduce water usage as deemed necessary by the Administrator to alleviate the emergency conditions, maintain fire flows, and/or state requirements for the maintenance of distribution systems. Implement emergency response appropriate for the type and anticipated duration of the emergency.
Robert Lee	Demand>= 50% of safe operating capacity of 0.5 MGD for 7 consecutive days. Storage in Lake EV Spence Reservoir<=108,400 acre-feet.	Achieve a voluntary 10% reduction in daily water demand. Voluntary water use restrictions.	Demand>= 60% of safe operating capacity of 0.5 MGD for 7 consecutive days. Storage in Lake EV Spence Reservoir<=77,180 acre-feet.	Achieve 30% reduction in daily water demand. Mandatory limitation on outdoor water use.	Demand>= 70% of safe operating capacity of 0.5 MGD for 7 consecutive days. Storage in Lake EV Spence Reservoir<=29,550 acre-feet.	Achieve 35% reduction in daily water demand. Mandatory prohibition on outdoor water use. Utilize alternative sources if necessary.	Emergency water shortage when a major water line breaks, pump or system failures occur, which cause unprecedented loss of capability to provide water service. Natural or man-made contamination of the water supply source(s)	Assess severity of problem and identify actions needed and time required to solve the problem. Notify appropriate city, county, state emergency response officials, if appropriate.
San Angelo	Total amount of water available < 24-month supply	Watering restrictions. Water usage fee.	Total amount of water available < 18-month supply	Watering restrictions. Water usage fee.	Total amount of water available < 12-month supply	Watering restrictions. Water usage fee.	N/A	N/A

Table H -1
Drought Triggers and Actions by Water Provider

			Onset of Drought				Severe Drought	
Water Provider	**Stage 1 Trigger**	**Response**	**Stage 2 Trigger**	**Response**	**Stage 3 Trigger**	**Response**	**Stage 4 Trigger**	**Response**
Snyder	Begin April 1st to Sept 30th.	Voluntarily limit the use of water for nonessential purposes and to practice water conservation.	Average daily water use exceeds the plant capacity for three consecutive days. CRMWD is unable to supply the daily raw water demand.	Achieve 15% reduction in daily water demand. Visually inspect lines and repair leaks on a daily basis. Reduce landscape irrigation to half the normal irrigation schedule.	Imminent or actual failure of a major component of the system, which would cause an immediate health or safety hazard. Water demand is exceeding the firm system capacity of 8 MGD for 3 consecutive days. Average daily water use exceeds the plant capacity for 3 consecutive days. CRMWD is unable to supply the daily water demand.	Achieve 30% reduction in daily water demand. Visually inspect lines and repair leaks on a regular basis. Watering restrictions.	Major water main break, pump or system failures occur, or any event which cause unprecedented loss of the capability to provide water service, or natural or man-made contamination of the water supply sources occur.	Achieve a maximum reduction as possible to maintain potable water delivery. Irrigation of landscaped areas is absolutely prohibited. Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle is absolutely prohibited.
Upton	Well field has to use 85% of the total well count to keep the ground storage tanks at full capacity for a 48 hour period.	Achieve voluntary 10% reduction in daily water demand. Contact wholesale water customers to initiate voluntary measures to reduce water. Provide weekly report to news media with information regarding current water supply and/or demand conditions.	Takes all water wells to maintain capacity for a 24 hour period.	Achieve 20% reduction in total water use, daily water demand. Initiate weekly contact with wholesale water customers to discuss water supply and/or demand conditions. Provide weekly report to news media with information regarding current water supply and/or demand conditions.	Water demand is exceeding the systems capacity on a regular basis.	Achieve 40% reduction of total water use and daily water demand. Request wholesale customers to initiate additional mandatory measures to reduce non-essential water use.	Emergency water shortage if a major water line breaks, pump or system failures occur, which cause unprecedented loss of capability to provide water service. Natural or man-made contamination of the water supply source.	Assess severity of the problem and identify actions needed and time required to solve the problem. Inform appropriate parties.

Table H-2
Source Managers and Users

Source	Manager	User
Ballinger/Moonen Lake	Ballinger	County Other (Runnels County)
		Manufacturing (Runnels County)
		Ballinger
Lake Balmorhea	Reeves County WCID 1	Irrigation (Reeves County)
Lake Brownwood	Brown County WID #1	Bangs
		Brookesmith SUD
		Brownwood
		Coleman County WSC
		County-Other (Brown County)
		Early
		Irrigation (Brown County)
		Manufacturing (Brown County)
		Zephyr WSC
Brady Creek Reservoir	Brady	County Other (McCulloch County)
		Manufacturing (McCulloch County)
		Brady
Lake Coleman	Coleman	Coleman County SUD
		Coleman
		County-Other (Coleman County)
		Irrigation (Coleman County)
		Manufacturing (Coleman County)
Champion Lake	Texas Electric Service Company	Steam Electric Power (Mitchell County)
Colorado River MWD Reservoir System	CRMWD	Ballinger
		Big Spring
		Coahoma
		County-Other (Coke County)
		County-Other (Ector County)
		County-Other (Scurry County)
		County-Other (Runnels County)
		Ector County UD
		Irrigation (Ector County)
		Manufacturing (Ector County)
		Manufacturing (Howard County)
		Manufacturing (Runnels County)
		Midland
		Millersview-Doole WSC
		Mining (Coke County)
		Mining (Howard County)
		Odessa
		Robert Lee
		Rotan
		Snyder
		Stanton

Table H-2
Source Managers and Users

Source	Manager	User
E.V. Spence (Non System)	CRMWD	San Angelo
		Robert Lee
		County-Other (Coke County)
Hords Creek Lake	USACOE	Coleman County SUD
		Coleman
		County-Other (Coleman County)
		Irrigation (Coleman County)
		Manufacturing (Coleman County)
Nasworthy	San Angelo	Irrigation (Tom Green County)
		Manufacturing (Tom Green County)
		San Angelo
Oak Creek	Sweetwater	Bronte
		Robert Lee
		County-Other (Coke County)
		Sweetwater
		Steam Electric Power (Coke County)
O.C. Fisher	San Angelo	UCRA (Miles, Tom Green County-Other)
		Manufacturing (Tom Green County)
		San Angelo
O.H. Ivie (Non System Portion)	CRMWD	Abilene
		Ballinger
		Midland
		Millersview-Doole WSC
		San Angelo
Red Bluff Lake	Red Bluff Water Power Control District	Irrigation (Pecos County)
		Irrigation (Reeves County)
		Irrigation (Ward County)
Twin Buttes	San Angelo	San Angelo
		Irrigation (Tom Green County)
		Manufacturing (Tom Green County)
Lake Winters	Winters	County-Other (Runnels County)
		Manufacturing (Runnels County)
		Winters
Colorado Run-of-River - Brown County		Irrigation (Brown County)
Colorado Run-of-River - Coke County		Irrigation (Coke County)
Colorado Run-of-River - Coleman County		Irrigation (Coleman County)
Colorado Run-of-River - Concho County		County-Other (Concho County)
Colorado Run-of-River - Ector County		Irrigation (Ector County)
Colorado Run-of-River - Irion County		Irrigation (Irion County)
Colorado Run-of-River - Kimble County		Irrigation (Kimble County)
		Manufacturing (Kimble County)
		Mining (Kimble County)

Table H-2
Source Managers and Users

Source	Manager	User
Colorado Run-of-River - Kimble County	Junction	Junction
		County-Other (Kimble County)
Colorado Run-of-River - McCulloch County		Irrigation (McCulloch County)
Colorado Run-of-River - Menard County		Irrigation (Menard County)
		County-Other (Menard County)
		Menard
Colorado Run-of-River - Mitchell County		Irrigation (Mitchell County)
Colorado Run-of-River - Runnels County		Irrigation (Runnels County)
Colorado Run-of-River - Scurry County		Irrigation (Scurry County)
Colorado Run-of-River - Sterling County		Irrigation (Sterling County)
Colorado Run-of-River - Sutton County		Irrigation (Sutton County)
Concho Run-of River - Tom Green County	San Angelo	Irrigation (Tom Green County)
		Manufacturing (Tom Green County)
		San Angelo
Rio Grande Run-Of-River - Jeff Davis County (Region E)		County-Other (Reeves County)
		Irrigation (Jeff Davis County Region E)
Rio Grande Run-of-River - Pecos County		Irrigation (Pecos County)
Dockum Aquifer - Andrews County		Livestock (Andrews County)
		Mining (Andrews County)
Dockum Aquifer - Ector County		Livestock (Ector County)
		Manufacturing (Ector County)
		Mining (Ector County)
Dockum Aquifer - Howard County		County-Other (Howard County)
		Irrigation (Howard County)
		Livestock (Howard County)
		Mining (Howard County)
Dockum Aquifer - Loving County		Mining (Loving County)
Dockum Aquifer - Mitchell County		Colorado City
		County-Other (Mitchell County)
		Irrigation (Mitchell County)
		Livestock (Mitchell County)
		Loraine
		Mining (Mitchell County)
Dockum Aquifer - Reagan County		Livestock (Reagan County)
Dockum Aquifer - Reeves County		County-Other (Reeves County)
		Livestock (Reeves County)
		Manufacturing (Reeves County)
		Pecos (Reeves County)
Dockum Aquifer - Scurry County		County-Other (Scurry County)
		Irrigation (Scurry County)
		Livestock (Scurry County)
		Manufacturing (Scurry County)
		Mining (Scurry County)
		Snyder (Emergency Supply Only)

Table H-2
Source Managers and Users

Source	Manager	User
Dockum Aquifer - Ward County		County-Other (Ward County)
		Irrigation (Ward County)
		Livestock (Ward County)
Dockum Aquifer - Winkler County		County-Other (Winkler County)
		Kermit
		Livestock (Winkler County)
		Mining (Winkler Other)
Edwards Trinity Plateau Aquifer - Coke County		County-Other (Coke County)
		Irrigation (Coke County)
		Livestock (Coke County)
Edwards Trinity Plateau Aquifer - Concho County		County-Other (Concho County)
		Livestock (Concho County)
Edwards Trinity Plateau Aquifer - Crockett County		County-Other (Crockett County)
		Crockett County WCID #!
		Irrigation (Crockett County)
		Livestock (Crockett County)
		Mining (Crockett County)
		Steam Electric Power (Crockett County)
Edwards Trinity Plateau Aquifer - Ector County		County-Other (Ector County)
		Greater Gardendale WSC
		Irrigation (Ector County)
		Livestock (Ector County)
		Manufacturing (Ector County)
		Mining (Ector County)
Edwards Trinity Plateau Aquifer - Glasscock County		County-Other (Glasscock County)
		Irrigation (Glasscock County)
		Livestock (Glasscock County)
		Mining (Glasscock County)
Edwards Trinity Plateau Aquifer - Howard County		County-Other (Howard County)
		Irrigation (Howard County)
		Manufacturing (Howard County)
Edwards Trinity Plateau Aquifer - Irion County		County-Other (Irion County)
		Livestock (Irion County)
		Mertzon
		Mining (Irion County)
Edwards Trinity Plateau Aquifer - Kimble County		County-Other (Kimble County)
		Irrigation (Kimble County)
		Livestock (Kimble County)
		Manufacturing (Kimble County)
		Mining (Kimble County)
Edwards Trinity Plateau Aquifer - McCulloch County		Livestock (McCulloch County)

Table H-2
Source Managers and Users

Source	Manager	User
Edwards Trinity Plateau Aquifer - Menard County		County-Other (Menard County)
		Livestock (Menard County)
		Mining (Menard County)
Edwards Trinity Plateau Aquifer - Midland County		County-Other (Midland County)
		Irrigation (Midland County)
		Livestock (Midland County)
		Midland
		Manufacturing (Midland County)
		Mining (Midland County)
Edwards Trinity Plateau Aquifer - Pecos County		County-Other (Pecos County)
		Fort Stockton
		Iraan
		Irrigation (Pecos County)
		Livestock (Pecos County)
		Manufacturing (Pecos County)
		Mining (Pecos County)
Edwards Trinity Plateau Aquifer - Reagan County		Big Lake
		County-Other (Reagan County)
		Irrigation (Reagan County)
		Livestock (Reagan County)
		Mining (Reagan County)
Edwards Trinity Plateau Aquifer - Reeves County		County-Other (Reeves County)
		Livestock (Reeves County)
Edwards Trinity Plateau Aquifer - Schleicher County		County-Other (Schleicher County)
		El Dorado
		Irrigation (Schleicher County)
		Livestock (Schleicher County)
		Mining (Schleicher County)
Edwards Trinity Plateau Aquifer - Sterling County		County-Other (Sterling County)
		Irrigation (Sterling County)
		Livestock (Sterling County)
		Mining (Sterling County)
Edwards Trinity Plateau Aquifer - Sutton County		County-Other (Sutton County)
		Irrigation (Sutton County)
		Livestock (Sutton County)
		Mining (Sutton County)
		Sonora
Edwards Trinity Plateau Aquifer -Tom Green County		Concho Rural WSC
		County-Other (Tom Green County)
		Irrigation (Tom Green County)
		Livestock (Tom Green County)

Table H-2
Source Managers and Users

Source	Manager	User
Edwards Trinity Plateau Aquifer -Upton County		County-Other (Upton County)
		Irrigation (Upton County)
		Livestock (Upton County)
		McCamey
		Mining (Upton County)
		Rankin
Ellenburger-Sana Saba Aquifer - Mason County		County-Other (Mason County)
		Livestock (Mason County)
Ellenburger - San Saba Aquifer - McCulloch County		Livestock (McCulloch County)
		Mining (McCulloch County)
Ellenburger - San Saba Aquifer - Menard County		County-Other (Menard County)
		Livestock (Menard County)
		Mining (Menard County)
Ellenburger - San Saba Aquifer - San Saba County (Region K)		Richland SUD
Hickory Aquifer - Concho County		County-Other (Concho County)
		Eden
Hickory Aquifer - Mason County		County-Other (Mason County)
		Irrigation (Mason County)
		Livestock (Mason County)
		Mason
		Mining (Mason County)
Hickory Aquifer - McCulloch County		Brady
		County-Other (McCulloch County)
		Irrigation (McCulloch County)
		Livestock (McCulloch County)
		Manufacturing (McCulloch County)
		Millersview-Doole WSC
		Mining (McCulloch County)
		San Angelo
Lipan Aquifer - Concho County		Irrigation (Concho County)
Lipan Aquifer - Runnels County		Livestock (Runnels County)
Lipan Aquifer - Tom Green County		Concho Rural WSC
		County-Other (Tom Green County)
		Irrigation (Tom Green County)
		Livestock (Tom Green County)
		Mining (Tom Green County)
Marble Falls Aquifer - Mason County		County-Other (Mason County)

Table H-2
Source Managers and Users

Source	Manager	User
Ogallala Aquifer - Andrews County	Great Plains Water System Inc., Andrews	Andrews
	Great Plains Water System Inc.	County-Other (Andrews & Ector Counties)
		Irrigation (Andrews County)
		Livestock (Andrews County)
		Manufacturing (Andrews & Ector Counties)
	Great Plains Water System Inc.	Mining (Andrews & Ector Counties)
	Great Plains Water System Inc.	Steam Electric Power (Ector County)
Ogallala Aquifer - Borden County		County-Other (Borden County)
		Irrigation (Borden County)
Ogallala Aquifer - Ector County		County-Other (Ector County)
		Irrigation (Ector County)
		Livestock (Ector County)
Ogallala Aquifer - Glasscock County		County-Other (Glasscock County)
		Irrigation (Glasscock County)
		Livestock (Glasscock County)
Ogallala Aquifer - Howard County		County-Other (Howard County)
		Irrigation (Howard County)
		Livestock (Howard County)
		Manufacturing (Howard County)
		Mining (Howard County)
Ogallala Aquifer -Martin County		County-Other (Martin County)
	CRMWD	CRMWD system customers
		Irrigation (Martin County)
		Livestock (Martin County)
		Manufacturing (Martin County)
	University Lands	Midland
		Mining (Martin County)
	Stanton	Stanton
Ogallala Aquifer - Midland County		County-Other (Midland County)
		Irrigation (Midland County)
		Livestock (Midland County)
		Manufacturing (Midland County)
		Mining (Midland County)
Other Aquifer - Borden County		County-Other (Borden County)
		Irrigation (Borden County)
		Mining (Borden County)
Other Aquifer - Brown County		Livestock (Brown County)
		Mining (Brown County)

Table H-2
Source Managers and Users

Source	Manager	User
Other Aquifer - Coke County		Bronte (Coke County)
		County-Other (Coke County)
		Irrigation (Coke County)
		Livestock (Coke County)
		Mining (Coke County)
		Robert Lee
Other Aquifer - Coleman County		Livestock (Coleman County)
		Mining (Coleman County)
Other Aquifer - Concho County		County-Other (Concho County)
		Eden
		Irrigation (Concho County)
		Livestock (Concho County)
		Mining (Concho County)
Other Aquifer - Irion County		Irrigation (Irion County)
		Livestock (Irion County)
Other Aquifer - McCulloch County		Livestock (McCulloch County)
Other Aquifer - Menard County		County-Other (Menard County)
		Livestock (Menard County)
Other Aquifer - Mitchell County		Livestock (Mitchell County)
Other Aquifer - Pecos County		Livestock (Pecos County)
Other Aquifer - Runnels County		County-Other (Runnels County)
		Irrigation (Runnels County)
		Livestock (Runnels County)
		Mining (Runnels County)
Other Aquifer - Scurry County		County-Other (Scurry County)
Other Aquifer - Sterling County		County-Other (Sterling County)
		Irrigation (Sterling County)
		Livestock (Sterling County)
		Sterling City
Other Aquifer - Tom Green County		County-Other (Tom Green County)
		Irrigation (Tom Green County)
		Livestock (Tom Green County)
		Mining (Tom Green County)
Pecos Valley - Edwards-Trinity Plateau Aquifer - Crane County		Crane
		County-Other (Crane County)
		Irrigation (Crane County)
		Livestock (Crane County)
		Mining (Crane County)
Pecos Valley Aquifer - Ector County		Livestock (Ector County)
		Manufacturing (Ector County)
Pecos Valley Aquifer - Loving County		County-Other (Loving County)
		Livestock (Loving County)
		Mining (Loving County)

Table H-2
Source Managers and Users

Source	Manager	User
Pecos Valley - Edwards-Trinity Plateau Aquifer - Pecos County		County-Other (Pecos County)
		Irrigation (Pecos County)
		Mining (Pecos County)
		Pecos County WCID #1
Pecos Valley Aquifer - Pecos County		Livestock (Pecos County)
Pecos Valley - Edwards-Trinity Plateau Aquifer - Reeves County		Irrigation (Reeves County)
		Livestock (Reeves County)
		Madera Valley WSC (Reeves County)
		Mining (Reeves County)
Pecos Valley Aquifer - Ward County		County-Other (Crane, Reeves, Ward Counties)
		Crane
		Livestock (Ward County)
		Manufacturing (Reeves, Ward County)
		Mining (Ward County)
		Monahans
		Pecos
		Steam Electric Power (Ward County)
	CRMWD	CRMWD system customers
Pecos Valley - Edwards-Trinity Plateau Aquifer - Winkler County		County-Other (Winkler County)
		Irrigation (Winkler County)
		Livestock (Winkler County)
		Midland
		Mining (Winkler County)
		Monahans
		Wink
Rustler Aquifer - Pecos County		Irrigation (Pecos County)
		Livestock (Pecos County)
Rustler Aquifer - Reeves County		Livestock (Reeves County)
Trinity Aquifer - Brown County		County-Other (Brown County)
		Irrigation (Brown County)
		Livestock (Brown County)
		Mining (Brown County)

Table H-3
Drought Triggers and Actions by Source

Source Name	Type (sw/ gw)	Factor considered	TRIGGERS						ACTIONS					
			Source Manager			Users			Source Manager			Users		
			Mild	Severe	Critical/ Emergency	Mild	Severe	Critical/ Emergency	Mild	Severe	Critical/ Emergency	Mild	Severe	Critical/ Emergency
Ballinger/ Moonen Lake	sw	Water Level	1,666	1,662	1,658	same as manager			outside watering limits; request voluntary reduction of use	outside watering limits; fines for violation	prohibit outdoor use; prohibit non essential use; fines	outside watering limits; voluntary reduction of use	outside watering limits; fines for violation	prohibit outdoor use; prohibit non essential use; fines
Lake Balmorhea	sw	Capacity/ Rainfall	<70% intake pond capacity; or no rainfall for 15 consecutive days	<50% intake pond capacity; or no rainfall for 20 consecutive days	<70% intake pond capacity; or no rainfall for 15 consecutive days	same as manager			Achieve voluntary 60% reduction of use for nonessential purposes; water conservation	Achieve 85% reduction in daily water demand. Implement BMPs for supply management.	Achieve 90% reduction in total water usage. Implement BMPs for supply management.	same as manager		
Lake Brownwood	sw	Water Level	1,420	1,417	1,414	same as manager			Initiate stage 1 of DCP; increase public education; request voluntary reduction of use	Initiate stage 2 of DCP; request decrease in use; implement watering restrictions	Initiate stages 3/4 of DCP; request to severely reduce use; may curtail usage and discontinue nonessential uses	Initiate stage 1 of DCP; voluntary reduction of use	Initiate stage 2 of DCP; decrease in use; implement watering restrictions	Initiate stages 3/4 of DCP; severely reduce use; may have reduced deliveries; discontinue all nonessential uses
Brady Creek Reservoir	sw	Supply as % of Demand	supply <= 80% of consumptive needs	supply <= 70% of consumptive needs	supply <= 60% of consumptive needs	same as manager			voluntary 10% reduction of use	20% reduction of use; outdoor watering limits	30% reduction of use; prohibit outdoor water use	same as manager		
Lake Coleman	sw	Water Level	1705 or demand => 3.3 MGD for 5 consecutive days	1,702	1,700	same as manager			voluntary 10% reduction of use; limit outdoor watering; public education	20% reduction; potential pro rata curtailment of customers; further watering restrictions	30% reduction; pro rata curtailment of customers; further watering restrictions	same as manager		
Champion Creek Reservoir/ Lake Colorado City	sw	Water Level	<70% capacity	<60% capacity	<50% capacity	n/a			monitor usage and reservoir levels	coordinate with other facilities on power needs and consider decreasing power production from this facility	coordinate with other facilities on power needs and consider decreasing power production from this facility	n/a		
E.V. Spence	sw	Water Level	1,847	1,842	1,836	same as manager			initiate engineering studies; implement alt supplies; request initiation of Stage 1 of DCPs by San Angelo and Robert Lee and other users	initiate engineering studies; implement alt supplies; request initiation of Stage 1 of DCPs by San Angelo and Robert Lee and other users	initiate engineering studies; implement alt supplies; request initiation of Stage 1 of DCPs by San Angelo and Robert Lee and other users	Initiate stage 1 of DCP	Initiate stage 2 of DCP	Initiate stage 3 of DCP
Hords Creek Lake	sw	Demand/ Curtailment	COE curtails usage or demand => 3.3 MGD for 5 consecutive days	COE significantly curtails usage	COE completely curtails usage	same as manager			voluntary 10% reduction of use; limit outdoor watering; public education	20% reduction; potential pro rata curtailment of customers; further watering restrictions	30% reduction; pro rata curtailment of customers; further watering restrictions	same as manager		

Table H-3
Drought Triggers and Actions by Source

Source Name	Type (sw/ gw)	Factor considered	TRIGGERS						ACTIONS					
			Source Manager			Users			Source Manager			Users		
			Mild	Severe	Critical/ Emergency	Mild	Severe	Critical/ Emergency	Mild	Severe	Critical/ Emergency	Mild	Severe	Critical/ Emergency
J.B. Thomas	sw	Water Level	2,216	2,213	2,211	same as manager			Discontinue pumping at Big Spring/Odessa intake; initiate engineering studies; implement alt supplies; request initiation of Stage 1 of DCPs by Snyder and other users	Begin operation of Snyder well field; initiate engineering studies; implement alt supplies; request initiation of Stage 2 of DCPs by Snyder and other users	Begin pump back operation from Ivie or Spence if available; initiate engineering studies; implement alt supplies; request initiation of Stage 3 of DCPs by Snyder and other users	Initiate stage 1 of DCP	Initiate stage 2 of DCP	Initiate stage 3 of DCP
Nasworthy	sw	San Angelo System Supply	< 24 months supply	< 18 months supply	< 12 months supply	same as manager			watering restrictions; water usage fees	increased watering restrictions; increased water usage fees	increased watering restrictions; increased water usage fees	same as manager		
Oak Creek	sw	Water Level	10 ft. below the spillway	18 ft. below the spillway	19.7 ft. below the spillway	same as manager			voluntary reduction of non-essential use	limited outdoor watering; fines for violators	no outside watering; increased rates; pro rata curtailment	same as manager		
O.C. Fisher	sw	San Angelo System Supply	< 24 months supply	< 18 months supply	< 12 months supply	same as manager			watering restrictions; water usage fees	increased watering restrictions; increased water usage fees	increased watering restrictions; increased water usage fees	same as manager		
O.H. Ivie	sw	Water Level	1,517	1,512	1,504	same as manager			initiate engineering studies; implement alt supplies; request initiation of Stage 1 of DCPs	initiate engineering studies; implement alt supplies; request initiation of Stage 2 of DCPs; refrain from Ivie releases	initiate engineering studies; implement alt supplies; request initiation of Stage 3of DCPs	Initiate stage 1 of DCP	Initiate stage 2 of DCP	Initiate stage 3 of DCP
Red Bluff Lake	sw	Reservoir Storage	100,000 acre-feet	75,000 acre-feet	50,000 acre-feet	same as manager			reduce amount available to users	reduce amount available to users	reduce amount available to users	reduce irrigated acreage	reduce irrigated acreage	stop irrigation
Twin Buttes	sw	San Angelo System Supply	< 24 months supply	< 18 months supply	< 12 months supply	same as manager			watering restrictions; water usage fees	increased watering restrictions; increased water usage fees	increased watering restrictions; increased water usage fees	same as manager		
Lake Winters	sw	Water Level	<= 50% storage	<= 40% storage	<= 30% storage	same as manager			voluntary 10% reduction of use; request customers to reduce use	mandatory measures to reduce non-essential water use by 30%; weekly contact with customers; weekly media report	mandatory measures to reduce water use by 60%; pro rata curtailment of customers; any other necessary measures	same as manager		
Colorado Run-of-River	sw	Drought Monitor	D1 (Moderate)	D2 (Severe)	D4 (Critical)	D1 (Moderate)	D2 (Severe)	D4 (Critical)	Review DCP; Initiate actions if appropriate	Review DCP; Initiate actions; consider additional supplies		Review DCP and implement ,if appropriate; consider voluntary demand reductions	Review DCP; Initiate actions; consider additional supplies	
Rio Grande Run-of-River	sw	Drought Monitor	D1 (Moderate)	D2 (Severe)	D4 (Critical)	D1 (Moderate)	D2 (Severe)	D4 (Critical)	Review DCP; Initiate actions if appropriate	Review DCP; Initiate actions; consider additional supplies		Review DCP and implement ,if appropriate; consider voluntary demand reductions	Review DCP; Initiate actions; consider additional supplies	

Table H-3
Drought Triggers and Actions by Source

Source Name	Type (sw/ gw)	Factor considered	TRIGGERS						ACTIONS					
			Source Manager			Users			Source Manager			Users		
			Mild	Severe	Critical/ Emergency	Mild	Severe	Critical/ Emergency	Mild	Severe	Critical/ Emergency	Mild	Severe	Critical/ Emergency
Capitan Reef Complex Aquifer	gw	Drought Monitor	D1 (Moderate)	D2 (Severe)	D4 (Critical)	D1 (Moderate)	D2 (Severe)	D4 (Critical)	Review DCP; Initiate actions if appropriate	Review DCP; Initiate actions; consider additional supplies		Review DCP and implement ,if appropriate; consider voluntary demand reductions	Review DCP; Initiate actions; consider additional supplies	
Dockum Aquifer	gw	Drought Monitor	D1 (Moderate)	D2 (Severe)	D4 (Critical)	D1 (Moderate)	D2 (Severe)	D4 (Critical)	Review DCP; Initiate actions if appropriate	Review DCP; Initiate actions; consider additional supplies		Review DCP and implement ,if appropriate; consider voluntary demand reductions	Review DCP; Initiate actions; consider additional supplies	
Edwards Trinity Plateau Aquifer	gw	Drought Monitor	D1 (Moderate)	D2 (Severe)	D4 (Critical)	D1 (Moderate)	D2 (Severe)	D4 (Critical)	Review DCP; Initiate actions if appropriate	Review DCP; Initiate actions; consider additional supplies		Review DCP and implement ,if appropriate; consider voluntary demand reductions	Review DCP; Initiate actions; consider additional supplies	
Ellenburger-San Saba Aquifer	gw	Drought Monitor	D1 (Moderate)	D2 (Severe)	D4 (Critical)	D1 (Moderate)	D2 (Severe)	D4 (Critical)	Review DCP; Initiate actions if appropriate	Review DCP; Initiate actions; consider additional supplies		Review DCP and implement ,if appropriate; consider voluntary demand reductions	Review DCP; Initiate actions; consider additional supplies	
Hickory Aquifer	gw	Drought Monitor	D1 (Moderate)	D2 (Severe)	D4 (Critical)	D1 (Moderate)	D2 (Severe)	D4 (Critical)	Review DCP; Initiate actions if appropriate	Review DCP; Initiate actions; consider additional supplies		Review DCP and implement ,if appropriate; consider voluntary demand reductions	Review DCP; Initiate actions; consider additional supplies	
Lipan Aquifer	gw	Drought Monitor	D1 (Moderate)	D2 (Severe)	D4 (Critical)	D1 (Moderate)	D2 (Severe)	D4 (Critical)	Review DCP; Initiate actions if appropriate	Review DCP; Initiate actions; consider additional supplies		Review DCP and implement ,if appropriate; consider voluntary demand reductions	Review DCP; Initiate actions; consider additional supplies	
Marble Falls Aquifer	gw	Drought Monitor	D1 (Moderate)	D2 (Severe)	D4 (Critical)	D1 (Moderate)	D2 (Severe)	D4 (Critical)	Review DCP; Initiate actions if appropriate	Review DCP; Initiate actions; consider additional supplies		Review DCP and implement ,if appropriate; consider voluntary demand reductions	Review DCP; Initiate actions; consider additional supplies	
Ogallala Aquifer	gw	Drought Monitor	D1 (Moderate)	D2 (Severe)	D4 (Critical)	D1 (Moderate)	D2 (Severe)	D4 (Critical)	Review DCP; Initiate actions if appropriate	Review DCP; Initiate actions; consider additional supplies		Review DCP and implement ,if appropriate; consider voluntary demand reductions	Review DCP; Initiate actions; consider additional supplies	

Table H-3
Drought Triggers and Actions by Source

Source Name	Type (sw/ gw)	Factor considered	TRIGGERS						ACTIONS					
			Source Manager			Users			Source Manager			Users		
			Mild	Severe	Critical/ Emergency	Mild	Severe	Critical/ Emergency	Mild	Severe	Critical/ Emergency	Mild	Severe	Critical/ Emergency
Other Aquifer	gw	Drought Monitor	D1 (Moderate)	D2 (Severe)	D4 (Critical)	D1 (Moderate)	D2 (Severe)	D4 (Critical)	Review DCP; Initiate actions if appropriate	Review DCP; Initiate actions; consider additional supplies		Review DCP and implement ,if appropriate; consider voluntary demand reductions	Review DCP; Initiate actions; consider additional supplies	
Pecos Valley Aquifer	gw	Drought Monitor	D1 (Moderate)	D2 (Severe)	D4 (Critical)	D1 (Moderate)	D2 (Severe)	D4 (Critical)	Review DCP; Initiate actions if appropriate	Review DCP; Initiate actions; consider additional supplies		Review DCP and implement ,if appropriate; consider voluntary demand reductions	Review DCP; Initiate actions; consider additional supplies	
Pecos Valley Edwards-Trinity Plateau Aquifer	gw	Drought Monitor	D1 (Moderate)	D2 (Severe)	D4 (Critical)	D1 (Moderate)	D2 (Severe)	D4 (Critical)	Review DCP; Initiate actions if appropriate	Review DCP; Initiate actions; consider additional supplies		Review DCP and implement ,if appropriate; consider voluntary demand reductions	Review DCP; Initiate actions; consider additional supplies	
Rustler Aquifer	gw	Drought Monitor	D1 (Moderate)	D2 (Severe)	D4 (Critical)	D1 (Moderate)	D2 (Severe)	D4 (Critical)	Review DCP; Initiate actions if appropriate	Review DCP; Initiate actions; consider additional supplies		Review DCP and implement ,if appropriate; consider voluntary demand reductions	Review DCP; Initiate actions; consider additional supplies	
Trinity Aquifer	gw	Drought Monitor	D1 (Moderate)	D2 (Severe)	D4 (Critical)	D1 (Moderate)	D2 (Severe)	D4 (Critical)	Review DCP; Initiate actions if appropriate	Review DCP; Initiate actions; consider additional supplies		Review DCP and implement ,if appropriate; consider voluntary demand reductions	Review DCP; Initiate actions; consider additional supplies	

Appendix I

Socioeconomic Impacts of Unmet Water Needs in the Region F Planning Area

Socioeconomic Impacts of Projected Water Shortages

for the Region F Regional Water Planning Area

Prepared in Support of the 2016 Region F Regional Water Plan

Texas Water Development Board

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Executive Summary

Evaluating the social and economic impacts of not meeting identified water needs is a required part of the regional water planning process. The Texas Water Development Board (TWDB) estimates those impacts for regional water planning groups, and summarizes the impacts in the state water plan. The analysis presented is for the Region F Regional Water Planning Group.

Based on projected water demands and existing water supplies, the Region F planning group identified water needs (potential shortages) that would occur within its region under a repeat of the drought of record for six water use categories. The TWDB then estimated the socioeconomic impacts of those needs—if they are not met—for each water use category and as an aggregate for the region.

The analysis was performed using an economic modeling software package, IMPLAN (Impact for Planning Analysis), as well as other economic analysis techniques, and represents a snapshot of socioeconomic impacts that may occur during a single year during a drought of record within each of the planning decades. For each water use category, the evaluation focused on estimating income losses and job losses. The income losses represent an approximation of gross domestic product (GDP) that would be foregone if water needs are not met.

The analysis also provides estimates of financial transfer impacts, which include tax losses (state, local, and utility tax collections); water trucking costs; and utility revenue losses. In addition, social impacts were estimated, encompassing lost consumer surplus (a welfare economics measure of consumer wellbeing); as well as population and school enrollment losses.

It is estimated that not meeting the identified water needs in Region F would result in an annually combined lost income impact of approximately $5.8 billion in 2020, decreasing to $2.9 billion in 2070 (Table ES-1). In 2020, the region would lose approximately 31,500 jobs, and by 2070 job losses would decrease to approximately 29,400.

All impact estimates are in year 2013 dollars and were calculated using a variety of data sources and tools including the use of a region-specific IMPLAN model, data from the TWDB annual water use estimates, the U.S. Census Bureau, Texas Agricultural Statistics Service, and Texas Municipal League.

Table ES-1: Region F Socioeconomic Impact Summary

Regional Economic Impacts	2020	2030	2040	2050	2060	2070
Income losses ($ millions)*	$5,827	$5,997	$4,778	$3,419	$2,960	$2,922
Job losses	31,446	32,787	28,332	24,551	26,372	29,418
Financial Transfer Impacts	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Tax losses on production and imports ($ millions)*	$651	$664	$501	$336	$233	$204
Water trucking costs ($ millions)*	$2	$2	$2	$3	$3	$4
Utility revenue losses ($ millions)*	$79	$95	$116	$138	$143	$179
Utility tax revenue losses ($ millions)*	$1	$2	$2	$3	$3	$3
Social Impacts	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Consumer surplus losses ($ millions)*	$52	$59	$86	$119	$172	$228
Population losses	5,773	6,020	5,202	4,506	4,842	5,401
School enrollment losses	1,068	1,114	962	834	896	999

**** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.***

1 Introduction

Water shortages during a repeat of the drought of record would likely curtail or eliminate certain economic activity in businesses and industries that rely heavily on water. Insufficient water supplies could not only have an immediate and real impact on existing businesses and industry, but they could also adversely and chronically affect economic development in Texas. From a social perspective, water supply reliability is critical as well. Shortages could disrupt activity in homes, schools and government and could adversely affect public health and safety. For these reasons, it is important to evaluate and understand how water supply shortages during drought could impact communities throughout the state.

Administrative rules (31 Texas Administrative Code §357.33 (c)) require that regional water planning groups evaluate the social and economic impacts of not meeting water needs as part of the regional water planning process, and rules direct the TWDB staff to provide technical assistance upon request. Staff of the TWDB's Water Use, Projections, & Planning Division designed and conducted this analysis in support of the Region F Regional Water Planning Group.

This document summarizes the results of the analysis and discusses the methodology used to generate the results. Section 1 summarizes the water needs calculation performed by the TWDB based on the regional water planning group's data. Section 2 describes the methodology for the impact assessment and discusses approaches and assumptions specific to each water use category (i.e., irrigation, livestock, mining, steam-electric, municipal and manufacturing). Section 3 presents the results for each water use category with results summarized for the region as a whole. Appendix A presents details on the socioeconomic impacts by county.

1.1 Identified Regional Water Needs (Potential Shortages)

As part of the regional water planning process, the TWDB adopted water demand projections for each water user group (WUG) with input from the planning groups. WUGs are composed of cities, utilities, combined rural areas (designated as county-other), and the county-wide water use of irrigation, livestock, manufacturing, mining and steam-electric power. The demands are then compared to the existing water supplies of each WUG to determine potential shortages, or needs, by decade. Existing water supplies are legally and physically accessible for immediate use in the event of drought. Projected water demands and existing supplies are compared to identify either a surplus or a need for each WUG.

Table 1-1 summarizes the region's identified water needs in the event of a repeat of the drought of record. Demand management, such as conservation, or the development of new infrastructure to increase supplies are water management strategies that may be recommended by the planning group to meet those needs. This analysis assumes that no strategies are implemented, and that the identified needs correspond to future water shortages. Note that projected water needs generally increase over time, primarily due to anticipated population and economic growth. To provide a general sense of proportion, total projected needs as an overall percentage of total demand by water use category are presented in aggregate in Table 1-1. Projected needs for individual water user groups within the aggregate vary greatly, and may reach 100% for a given WUG and water use category. Detailed water needs by WUG and county appear in Chapter 4 of the 2016 Region F Regional Water Plan.

Table 1-1 Regional Water Needs Summary by Water Use Category

Water Use Category		2020	2030	2040	2050	2060	2070
Irrigation	Water Needs (acre-feet per year)	113,431	112,939	110,869	111,029	111,016	109,354
	% of the category's total water demand	19%	19%	19%	19%	19%	19%
Livestock	Water Needs (acre-feet per year)	368	397	403	420	446	445
	% of the category's total water demand	2%	2%	2%	2%	3%	3%
Manufacturing	Water Needs (acre-feet per year)	3,528	3,718	4,202	4,663	5,277	5,917
	% of the category's total water demand	32%	31%	33%	35%	38%	40%
Mining	Water Needs (acre-feet per year)	15,516	15,180	10,334	5,402	2,629	1,480
	% of the category's total water demand	28%	27%	22%	16%	11%	8%
Municipal	Water Needs (acre-feet per year)	35,661	44,602	55,513	66,651	77,064	87,740
	% of the category's total water demand	25%	30%	35%	39%	42%	45%
Steam-electric power	Water Needs (acre-feet per year)	13,568	15,847	18,560	22,029	26,317	30,786
	% of the category's total water demand	71%	74%	77%	80%	83%	85%
Total water needs		**182,072**	**192,683**	**199,881**	**210,194**	**222,749**	**235,722**

2 Economic Impact Assessment Methodology Summary

This portion of the report provides a summary of the methodology used to estimate the potential economic impacts of future water shortages. The general approach employed in the analysis was to obtain estimates for income and job losses on the smallest geographic level that the available data would support, tie those values to their accompanying historic water use estimate (volume), and thereby determine a maximum impact per acre-foot of shortage for each of the socioeconomic measures. The calculations of economic impacts were based on the overall composition of the economy using many underlying economic "sectors." Sectors in this analysis refer to one or more of the 440 specific production sectors of the economy designated within IMPLAN (Impact for Planning Analysis), the economic impact modeling software used for this assessment. Economic impacts within this report are estimated for approximately 310 of those sectors, with the focus on the more water intense production sectors. The economic impacts for a single water use category consist of an aggregation of impacts to multiple related economic sectors.

2.1 Impact Assessment Measures

A required component of the regional and state water plans is to estimate the potential economic impacts of shortages due to a drought of record. Consistent with previous water plans, several key variables were estimated and are described in Table 2-1.

Table 2-1 Socioeconomic Impact Analysis Measures

Regional Economic Impacts	Description
Income losses - value added	The value of output less the value of intermediate consumption; it is a measure of the contribution to GDP made by an individual producer, industry, sector, or group of sectors within a year. For a shortage, value added is a measure of the income losses to the region, county, or WUG and includes the direct, indirect and induced monetary impacts on the region.
Income losses - electrical power purchase costs	Proxy for income loss in the form of additional costs of power as a result of impacts of water shortages.
Job losses	Number of part-time and full-time jobs lost due to the shortage.
Financial Transfer Impacts	**Description**
Tax losses on production and imports	Sales and excise taxes (not collected due to the shortage), customs duties, property taxes, motor vehicle licenses, severance taxes, other taxes, and special assessments less subsidies.
Water trucking costs	Estimate for shipping potable water.
Utility revenue losses	Foregone utility income due to not selling as much water.
Utility tax revenue losses	Foregone miscellaneous gross receipts tax collections.
Social Impacts	**Description**
Consumer surplus losses	A welfare measure of the lost value to consumers accompanying less water use.
Population losses	Population losses accompanying job losses.
School enrollment losses	School enrollment losses (K-12) accompanying job losses.

2.1.1 Regional Economic Impacts

Two key measures were included within the regional economic impacts classification: income losses and job losses. Income losses presented consist of the sum of value added losses and additional purchase costs of electrical power. Job losses are also presented as a primary economic impact measure.

Income Losses - Value Added Losses

Value added is the value of total output less the value of the intermediate inputs also used in production of the final product. Value added is similar to Gross Domestic Product (GDP), a familiar measure of the productivity of an economy. The loss of value added due to water shortages was estimated by input-output analysis using the IMPLAN software package, and includes the direct, indirect, and induced monetary impacts on the region.

Income Losses - Electric Power Purchase Costs

The electrical power grid and market within the state is a complex interconnected system. The industry response to water shortages, and the resulting impact on the region, are not easily modeled using traditional input/output impact analysis and the IMPLAN model. Adverse impacts on the region will occur, and were represented in this analysis by the additional costs associated with power purchases from other generating plants within the region or state. Consequently, the analysis employed additional power purchase costs as a proxy for the value added impacts for that water use category, and these are included as a portion of the overall income impact for completeness.

For the purpose of this analysis, it was assumed that power companies with insufficient water will be forced to purchase power on the electrical market at a projected higher rate of 5.60 cents per kilowatt hour. This rate is based upon the average day-ahead market purchase price of electricity in Texas from the recent drought period in 2011.

Job Losses

The number of jobs lost due to the economic impact was estimated using IMPLAN output associated with the water use categories noted in Table 1-1. Because of the difficulty in predicting outcomes and a lack of relevant data, job loss estimates were not calculated for the steam-electric power production or for certain municipal water use categories.

2.1.2 Financial Transfer Impacts

Several of the impact measures estimated within the analysis are presented as supplemental information, providing additional detail concerning potential impacts on a sub-portion of the economy or government. Measures included in this category include lost tax collections (on production and imports), trucking costs for imported water, declines in utility revenues, and declines in utility tax revenue collected by the state. Many of these measures are not solely adverse, with some having both positive and negative impacts. For example, cities and residents would suffer if forced to pay large costs for trucking in potable water. Trucking firms, conversely, would benefit from the transaction. Additional detail for each of these measures follows.

Tax Losses on Production and Imports

Reduced production of goods and services accompanying water shortages adversely impacts the collection of taxes by state and local government. The regional IMPLAN model was used to estimate reduced tax collections associated with the reduced output in the economy.

Water Trucking Costs

In instances where water shortages for a municipal water user group were estimated to be 80 percent or more of water demands, it was assumed that water would be trucked in to support basic consumption and sanitation needs. For water shortages of 80 percent or greater, a fixed cost of $20,000 per acre-foot of water was calculated and presented as an economic cost. This water trucking cost was applied for both the residential and non-residential portions of municipal water needs and only impacted a small number of WUGs statewide.

Utility Revenue Losses

Lost utility income was calculated as the price of water service multiplied by the quantity of water not sold during a drought shortage. Such estimates resulted from city-specific pricing data for both water and wastewater. These water rates were applied to the potential water shortage to determine estimates of lost utility revenue as water providers sold less water during the drought due to restricted supplies.

Utility Tax Losses

Foregone utility tax losses included estimates of uncollected miscellaneous gross receipts taxes. Reduced water sales reduce the amount of utility tax that would be collected by the State of Texas for water and wastewater service sales.

2.1.3 Social Impacts

Consumer Surplus Losses of Municipal Water Users

Consumer surplus loss is a measure of impact to the wellbeing of municipal water users when their water use is restricted. Consumer surplus is the difference between how much a consumer is willing and able to pay for the commodity (i.e., water) and how much they actually have to pay. The difference is a benefit to the consumer's wellbeing since they do not have to pay as much for the commodity as they would be willing to pay. However, consumer's access to that water may be limited, and the associated consumer surplus loss is an estimate of the equivalent monetary value of the negative impact to the consumer's wellbeing, for example, associated with a diminished quality of their landscape (i.e., outdoor use). Lost consumer surplus estimates for reduced outdoor and indoor use, as well as residential and commercial/institutional demands, were included in this analysis. Consumer surplus is an attempt to measure effects on wellbeing by monetizing those effects; therefore, these values should not be added to the other monetary impacts estimated in the analysis.

Lost consumer surplus estimates varied widely by location and type. For a 50 percent shortage, the estimated statewide consumer surplus values ranged from $55 to $2,500 per household (residential use), and from $270 to $17,400 per firm (non-residential).

Population and School Enrollment Losses

Population losses due to water shortages, as well as the related loss of school enrollment, were based upon the job loss estimates and upon a recent study of job layoffs and the resulting adjustment of the labor market, including the change in population.[1] The study utilized Bureau of Labor Statistics data regarding layoffs between 1996 and 2013, as well as Internal Revenue Service data regarding migration, to model an estimate of the change in the population as the result of a job layoff event. Layoffs impact both out-migration, as well as in-migration into an area, both of which can negatively affect the population of an area. In addition, the study found that a majority of those who did move following a layoff moved to another labor market rather than an adjacent county. Based on this study, a simplified ratio of job and net population losses was calculated for the state as a whole: for every 100 jobs lost, 18 people were assumed to move out of the area. School enrollment losses were estimated as a proportion of the population lost.

2.2 Analysis Context

The context of the economic impact analysis involves situations where there are physical shortages of surface or groundwater due to drought of record conditions. Anticipated shortages may be nonexistent in earlier decades of the planning horizon, yet population growth or greater industrial, agricultural or other sector demands in later decades may result in greater overall demand, exceeding the existing supplies. Estimated socioeconomic impacts measure what would happen if water user groups experience water shortages for a period of one year. Actual socioeconomic impacts would likely become larger as drought of record conditions persist for periods greater than a single year.

2.2.1 IMPLAN Model and Data

Input-Output analysis using the IMPLAN (Impact for Planning Analysis) software package was the primary means of estimating value added, jobs, and taxes. This analysis employed county and regional level models to determine key impacts. IMPLAN is an economic impact model, originally developed by the U.S. Forestry Service in the 1970's to model economic activity at varying geographic levels. The model is currently maintained by the Minnesota IMPLAN Group (MIG Inc.) which collects and sells county and state specific data and software. The year 2011 version of IMPLAN, employing data for all 254 Texas counties, was used to provide estimates of value added, jobs, and taxes on production for the economic sectors associated with the water user groups examined in the study. IMPLAN uses 440 sector-specific Industry Codes, and those that rely on water as a primary input were assigned to their relevant planning water user categories (manufacturing, mining, irrigation, etc.). Estimates of value added for a water use category were obtained by summing value added estimates across the relevant IMPLAN sectors

[1] Foote, Andrew, Grosz, Michel, Stevens, Ann. "Locate Your Nearest Exit: Mass Layoffs and Local Labor Market Response." University of California, Davis. April 2015. http://paa2015.princeton.edu/uploads/150194

associated with that water use category. Similar calculations were performed for the job and tax losses on production and import impact estimates.

Note that the value added estimates, as well as the job and tax estimates from IMPLAN, include three components:

- *Direct effects* representing the initial change in the industry analyzed;
- *Indirect effects* that are changes in inter-industry transactions as supplying industries respond to reduced demands from the directly affected industries; and,
- *Induced effects* that reflect changes in local spending that result from reduced household income among employees in the directly and indirectly affected industry sectors.

2.2.2 Elasticity of Economic Impacts

The economic impact of a water need is based on the relative size of the water need to the water demand for each water user group (Figure 2-1). Smaller water shortages, for example, less than 5 percent, were anticipated to result in no initial negative economic impact because water users are assumed to have a certain amount of flexibility in dealing with small shortages. As a water shortage deepens, however, such flexibility lessens and results in actual and increasing economic losses, eventually reaching a representative maximum impact estimate per unit volume of water. To account for such ability to adjust, an elasticity adjustment function was used in estimating impacts for several of the measures. Figure 2-1 illustrates the general relationship for the adjustment functions. Negative impacts are assumed to begin accruing when the shortage percentage reaches the lower bound b1 (10 percent in Figure 2-1), with impacts then increasing linearly up to the 100 percent impact level (per unit volume) once the upper bound for adjustment reaches the b2 level shortage (50 percent in Figure 2-1 example).

Initially, the combined total value of the three value added components (direct, indirect, and induced) was calculated and then converted into a per acre-foot economic value based on historical TWDB water use estimates within each particular water use category. As an example, if the total, annual value added for livestock in the region was $2 million and the reported annual volume of water used in that industry was 10,000 acre-feet, the estimated economic value per acre-foot of water shortage would be $200 per acre-foot. Negative economic impacts of shortages were then estimated using this value as the maximum impact estimate ($200 per acre-foot in the example) applied to the anticipated shortage volume in acre-feet and adjusted by the economic impact elasticity function. This adjustment varied with the severity as percentage of water demand of the anticipated shortage. If one employed the sample elasticity function shown in Figure 2-1, a 30% shortage in the water use category would imply an economic impact estimate of 50% of the original $200 per acre-foot impact value (i.e., $100 per acre-foot).

Such adjustments were not required in estimating consumer surplus, nor for the estimates of utility revenue losses or utility tax losses. Estimates of lost consumer surplus relied on city-specific demand curves with the specific lost consumer surplus estimate calculated based on the relative percentage of the city's water shortage. Estimated changes in population as well as changes in school enrollment were indirectly related to the elasticity of job losses.

Assumed values for the bounds b1 and b2 varied with water use category under examination and are presented in Table 2-2.

Figure 2-1 Example Economic Impact Elasticity Function (as applied to a single water user's shortage)

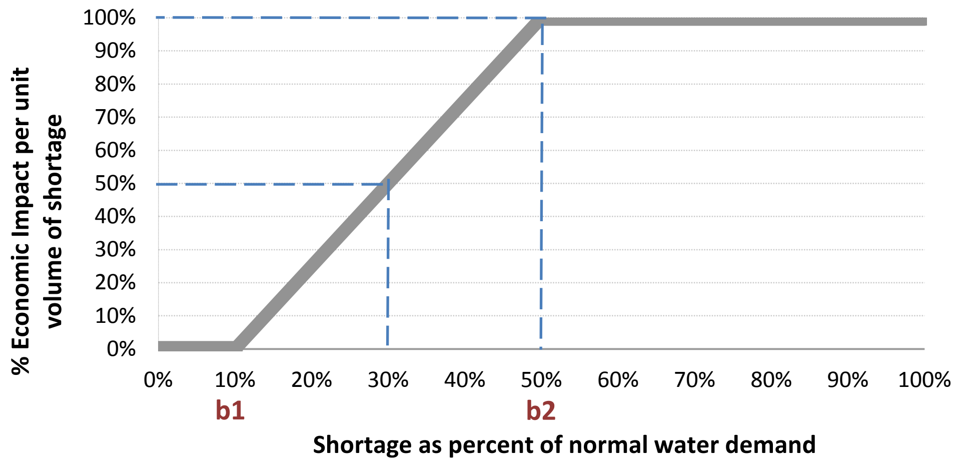

Table 2-2 Economic Impact Elasticity Function Lower and Upper Bounds

Water use category	Lower Bound (b1)	Upper Bound (b2)
Irrigation	5%	50%
Livestock	5%	10%
Manufacturing	10%	50%
Mining	10%	50%
Municipal (non-residential water intensive)	50%	80%
Steam-electric power	20%	70%

2.3 Analysis Assumptions and Limitations

Modeling of complex systems requires making assumptions and accepting limitations. This is particularly true when attempting to estimate a wide variety of economic impacts over a large geographic area and into future decades. Some of the key assumptions and limitations of the methodology include:

1. The foundation for estimating socioeconomic impacts of water shortages resulting from a drought are the water needs (potential shortages) that were identified as part of the regional water planning process. These needs have some uncertainty associated with them, but serve as a reasonable basis for evaluating potential economic impacts of a drought of record event.

2. All estimated socioeconomic impacts are snapshot estimates of impacts for years in which water needs were identified (i.e., 2020, 2030, 2040, 2050, 2060, and 2070). The estimates are independent and distinct "what if" scenarios for each particular year, and water shortages are assumed to be temporary events resulting from severe drought conditions. The evaluation assumed that no recommended water management strategies are implemented. In other words, growth occurs, future shocks are imposed on an economy at 10-year intervals, and the resulting impacts are estimated. Note that the estimates presented were not cumulative (i.e., summing up expected impacts from today up to the decade noted), but were simply an estimate of the magnitude of annual socioeconomic impacts should a drought of record occur in each particular decade based on anticipated supplies and demands for that same decade.

3. Input-output models such as IMPLAN rely on a static profile of the structure of the economy as it appears today. This presumes that the relative contributions of all sectors of the economy would remain the same, regardless of changes in technology, supplies of limited resources, and other structural changes to the economy that may occur into the future. This was a significant assumption and simplification considering the 50-year time period examined in this analysis. To presume an alternative future economic makeup, however, would entail positing many other major assumptions that would very likely generate as much or more error.

4. This analysis is not a cost-benefit analysis. That approach to evaluating the economic feasibility of a specific policy or project employs discounting future benefits and costs to their present value dollars using some assumed discount rate. The methodology employed in this effort to estimate the economic impacts of future water shortages did not use any discounting procedures to weigh future costs differently through time.

5. Monetary figures are reported in constant year 2013 dollars.

6. Impacts are annual estimates. The estimated economic model does not reflect the full extent of impacts that might occur as a result of persistent water shortages occurring over an extended duration. The drought of record in most regions of Texas lasted several years.

7. Value added estimates are the primary estimate of the economic impacts within this report. One may be tempted to add consumer surplus impacts to obtain an estimate of total adverse economic impacts to the region, but the consumer surplus measure represents the change to the wellbeing of households (and other water users), not an actual change in the flow of dollars through the economy. The two categories (value added and consumer surplus) are both valid impacts but should not be summed.

8. The value added, jobs, and taxes on production and import impacts include the direct, indirect and induced effects described in Section 2.2.1. Population and school enrollment losses also indirectly include such effects as they are based on the associated losses in employment. The remaining measures (consumer surplus, utility revenue, utility taxes, additional electrical power purchase costs, and potable water trucking costs), however, do not include any induced or indirect effects.

9. The majority of impacts estimated in this analysis may be considered smaller than those that might occur under drought of record conditions. Input-output models such as IMPLAN only capture "backward linkages" on suppliers (including households that supply labor to directly affected industries). While this is a common limitation in these types of economic impact modeling efforts, it is important to note that "forward linkages" on the industries that use the outputs of the directly affected industries can also be very important. A good example is impacts on livestock operators. Livestock producers tend to suffer substantially during droughts, not because there is not enough water for their stock, but because reductions in available pasture and higher prices for purchased hay have significant economic effects on their operations. Food processors could be in a similar situation if they cannot get the grains or other inputs that they need. These effects are not captured in IMPLAN, which is one reason why the impact estimates are likely conservative.

10. The methodology did not capture "spillover" effects between regions – or the secondary impacts that occur outside of the region where the water shortage is projected to occur.

11. The model did not reflect dynamic economic responses to water shortages as they might occur, nor does the model reflect economic impacts associated with a recovery from a drought of record including:
    a. The likely significant economic rebound to the landscaping industry immediately following a drought;
    b. The cost and years to rebuild liquidated livestock herds (a major capital item in that industry);
    c. Direct impacts on recreational sectors (i.e., stranded docks and reduced tourism); or,
    d. Impacts of negative publicity on Texas' ability to attract population and business in the event that it was not able to provide adequate water supplies for the existing economy.

12. Estimates for job losses and the associated population and school enrollment changes may exceed what would actually occur. In practice, firms may be hesitant to lay off employees, even in difficult economic times. Estimates of population and school enrollment changes are based on regional evaluations and therefore do not accurately reflect what might occur on a statewide basis.

13. The results must be interpreted carefully. It is the general and relative magnitudes of impacts as well as the changes of these impacts over time that should be the focus rather than the absolute numbers. Analyses of this type are much better at predicting relative percent differences brought about by a shock to a complex system (i.e., a water shortage) than the precise size of an impact. To illustrate, assuming that the estimated economic impacts of a drought of record on the manufacturing and mining water user categories are $2.0 and $1.0 million, respectively, one should be more confident that the economic impacts on manufacturing are twice as large as those on mining and that these impacts will likely be in the millions of dollars. But one should have less confidence that the actual total economic impact experienced would be $3.0 million.

3 Analysis Results

This section presents a breakdown of the results of the regional analysis for Region F. Projected economic impacts for six water use categories (irrigation, livestock. municipal, manufacturing, mining, and steam-electric power) are also reported by decade.

3.1 Overview of the Regional Economy

Table 3-1 presents the 2011 economic baseline as represented by the IMPLAN model and adjusted to 2013 dollars for Region F. In year 2011, Region F generated about $35 billion in gross state product associated with 377,000 jobs based on the 2011 IMPLAN data. These values represent an approximation of the current regional economy for a reference point.

Table 3-1 Region F Economy

Income($ millions)*	Jobs	Taxes on production and imports ($ millions)*
$35,169	**377,146**	**$3,312**

****Year 2013 dollars based on 2011 IMPLAN model value added estimates for the region.***

The remainder of Section 3 presents estimates of potential economic impacts for each water use category that could reasonably be expected in the event of water shortages associated with a drought of record and if no recommended water management strategies were implemented.

3.2 Impacts for Irrigation Water Shortages

Seventeen of the 32 counties in the region are projected to experience water shortages in the irrigated agriculture water use category for one or more decades within the planning horizon. Estimated impacts to this water use category appear in Table 3-2. Note that tax collection impacts were not estimated for this water use category. IMPLAN data indicates a negative tax impact (i.e., increased tax collections) for the associated production sectors, primarily due to past subsidies from the federal government. Two factors led to excluding any reported tax impacts: 1) Federal support (subsidies) has lessened greatly since the year 2011 IMPLAN data was collected, and 2) It was not considered realistic to report increasing tax revenue collections for a drought of record.

Table 3-2 Impacts of Water Shortages on Irrigation in Region

Impact Measures	2020	2030	2040	2050	2060	2070
Income losses ($ millions)*	$24	$24	$24	$24	$24	$23
Job losses	650	648	634	635	635	624

**** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.***

3.3 Impacts for Livestock Water Shortages

Five of the 32 counties in the region are projected to experience water shortages in the livestock water use category for one or more decades within the planning horizon. Estimated impacts to this water use category appear in Table 3-3. Note that tax impacts are not reported for this water use category for similar reasons that apply to the irrigation water use category described above.

Table 3-3 Impacts of Water Shortages on Livestock in Region

Impact Measures	2020	2030	2040	2050	2060	2070
Income losses ($ millions)*	$9	$10	$10	$10	$11	$11
Jobs losses	331	360	365	380	404	403

**** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.***

3.4 Impacts for Municipal Water Shortages

Sixteen of the 32 counties in the region are projected to experience water shortages in the municipal water use category for one or more decades within the planning horizon. Impact estimates were made for the two subtypes of use within municipal use: residential, and non-residential. The latter includes commercial and institutional users. Consumer surplus measures were made for both residential and non-residential demands. In addition, available data for the non-residential, water-intensive portion of municipal demand allowed use of IMPLAN and TWDB Water Use Survey data to estimate income loss, jobs, and taxes. Trucking cost estimates, calculated for shortages exceeding 80 percent, assumed a fixed cost of $20,000 per acre-foot to transport water for municipal use. The estimated impacts to this water use category appear in Table 3-4.

Table 3-4 Impacts of Water Shortages on Municipal Water Users in Region

Impact Measures	2020	2030	2040	2050	2060	2070
Income losses[1] ($ millions)*	$109	$140	$268	$481	$779	$1,016
Job losses[1]	2,221	2,846	5,464	9,896	15,880	20,688
Tax losses on production and imports[1] ($ millions)*	$10	$13	$26	$46	$74	$97
Consumer surplus losses ($ millions)*	$52	$59	$86	$119	$172	$228
Trucking costs ($ millions)*	$2	$2	$2	$3	$3	$4
Utility revenue losses ($ millions)*	$79	$95	$116	$138	$143	$179
Utility tax revenue losses ($ millions)*	$1	$2	$2	$3	$3	$3

[1] Estimates apply to the water-intensive portion of non-residential municipal water use.
**** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.***

3.5 Impacts of Manufacturing Water Shortages

Manufacturing water shortages in the region are projected to occur in 8 of the 32 counties in the region for at least one decade of the planning horizon. Estimated impacts to this water use category appear in Table 3-5.

Table 3-5 Impacts of Water Shortages on Manufacturing in Region

Impact Measures	2020	2030	2040	2050	2060	2070
Income losses ($ millions)*	$303	$304	$365	$423	$482	$542
Job losses	2,544	2,843	3,271	3,699	4,187	4,694
Tax losses on production and Imports ($ millions)*	$18	$18	$22	$25	$29	$32

**** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.***

3.6 Impacts of Mining Water Shortages

Mining water shortages in the region are projected to occur in 11 of the 32 counties in the region for at least one decade of the planning horizon. Estimated impacts to this water use type appear in Table 3-6.

Table 3-6 Impacts of Water Shortages on Mining in Region

Impact Measures	2020	2030	2040	2050	2060	2070
Income losses ($ millions)*	$5,078	$5,164	$3,693	$1,976	$1,047	$598
Job losses	25,699	26,091	18,597	9,940	5,267	3,009
Tax losses on production and Imports ($ millions)*	$621	$632	$452	$242	$128	$73

**** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.***

3.7 Impacts of Steam-Electric Water Shortages

Steam-electric water shortages in the region are projected to occur in 5 of the 32 counties in the region for at least one decade of the planning horizon. Estimated impacts to this water use category appear in Table 3-7.

Note that estimated economic impacts to steam-electric water users:

- Are reflected as an income loss proxy in the form of the estimated additional purchasing costs for power from the electrical grid that could not be generated due to a shortage;
- Do not include estimates of impacts on jobs. Because of the unique conditions of power generators during drought conditions and lack of relevant data, it was assumed that the industry would retain, perhaps relocating or repurposing, their existing staff in order to manage their ongoing operations through a severe drought.
- Does not presume a decline in tax collections. Associated tax collections, in fact, would likely increase under drought conditions since, historically, the demand for electricity increases during times of drought, thereby increasing taxes collected on the additional sales of power.

Table 3-7 Impacts of Water Shortages on Steam-Electric Power in Region

Impact Measures	2020	2030	2040	2050	2060	2070
Income Losses ($ millions)*	$304	$355	$419	$506	$616	$732

**** Year 2013 dollars, rounded.***

3.8 Regional Social Impacts

Projected changes in population, based upon several factors (household size, population, and job loss estimates), as well as the accompanying change in school enrollment, were also estimated and are summarized in Table 3-8.

Table 3-8 Region-wide Social Impacts of Water Shortages in Region

Impact Measures	2020	2030	2040	2050	2060	2070
Consumer surplus losses ($ millions)*	$52	$59	$86	$119	$172	$228
Population losses	5,773	6,020	5,202	4,506	4,842	5,401
School enrollment losses	1,068	1,114	962	834	896	999

**** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.***

Appendix A - County Level Summary of Estimated Economic Impacts for Region F

County level summary of estimated economic impacts of not meeting identified water needs by water use category and decade (in 2013 dollars, rounded). Values presented only for counties with projected economic impacts for at least one decade.

**** Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000***

		Income losses (Million $)*						Job losses						Consumer Surplus (Million $)*					
County	Water Use Category	2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070
ANDREWS	IRRIGATION	$7	$7	$7	$7	$7	$7	178	182	183	188	196	194	-	-	-	-	-	-
ANDREWS	LIVESTOCK	$2	$3	$3	$3	$4	$4	89	103	110	125	148	148	-	-	-	-	-	-
ANDREWS	MANUFACTURING	$8	$13	$18	$26	$33	$37	49	81	108	156	197	222	-	-	-	-	-	-
ANDREWS	MINING	$1,118	$1,140	$1,146	$891	$690	$499	5,621	5,735	5,765	4,482	3,470	2,510	-	-	-	-	-	-
ANDREWS	MUNICIPAL	-	-	$0	$66	$167	$214	-	-	4	1,351	3,409	4,370	$0	$1	$1	$6	$23	$33
ANDREWS Total		**$1,135**	**$1,163**	**$1,174**	**$994**	**$901**	**$761**	**5,937**	**6,100**	**6,170**	**6,302**	**7,422**	**7,444**	**$0**	**$1**	**$1**	**$6**	**$23**	**$33**
BORDEN	IRRIGATION	$1	$1	$1	$1	$1	$1	23	23	23	23	23	23	-	-	-	-	-	-
BORDEN Total		**$1**	**$1**	**$1**	**$1**	**$1**	**$1**	**23**	**23**	**23**	**23**	**23**	**23**	**-**	**-**	**-**	**-**	**-**	**-**
BROWN	IRRIGATION	$0	$0	$0	$0	$0	$0	6	6	6	6	5	5	-	-	-	-	-	-
BROWN	MUNICIPAL	-	-	-	-	-	-	-	-	-	-	-	-	$0	$0	$0	$0	$0	$0
BROWN Total		**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**6**	**6**	**6**	**6**	**5**	**5**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
COKE	IRRIGATION	$0	$0	$0	$0	$0	$0	-	-	-	-	-	-	-	-	-	-	-	-
COKE	MINING	$130	$128	$107	$84	$62	$36	657	644	537	425	311	183	-	-	-	-	-	-
COKE	MUNICIPAL	$7	$7	$7	$7	$7	$7	136	134	135	135	135	135	$3	$3	$3	$3	$3	$3
COKE	STEAM-ELECTRIC POWER	$6	$7	$8	$10	$11	$13	-	-	-	-	-	-						
COKE Total		**$143**	**$141**	**$121**	**$101**	**$80**	**$56**	**793**	**779**	**672**	**560**	**446**	**318**	**$3**	**$3**	**$3**	**$3**	**$3**	**$3**
COLEMAN	IRRIGATION	$0	$0	$0	$0	$0	$0	4	4	4	4	4	4	-	-	-	-	-	-
COLEMAN	MANUFACTURING	$1	$1	$1	$1	$1	$1	13	13	13	13	13	13	-	-	-	-	-	-
COLEMAN	MINING	$27	$26	$22	$16	$10	$6	133	131	110	79	50	29	-	-	-	-	-	-
COLEMAN	MUNICIPAL	$24	$23	$23	$23	$23	$23	480	476	465	464	462	462	$6	$6	$6	$6	$6	$6
COLEMAN Total		**$51**	**$51**	**$46**	**$40**	**$34**	**$30**	**630**	**624**	**591**	**559**	**530**	**508**	**$6**	**$6**	**$6**	**$6**	**$6**	**$6**

		Income losses (Million $)*						Job losses						Consumer Surplus (Million $)*					
County	Water Use Category	2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070
CONCHO	IRRIGATION	$1	$1	$1	$1	$1	$1	39	38	38	38	37	37	-	-	-	-	-	-
CONCHO	MINING	$78	$74	$44	$18	$3	-	390	371	220	90	17	-	-	-	-	-	-	-
CONCHO Total		**$79**	**$75**	**$45**	**$19**	**$5**	**$1**	**428**	**409**	**258**	**128**	**55**	**37**	**-**	**-**	**-**	**-**	**-**	**-**
CROCKETT	MINING	$506	$553	$304	$13	-	-	2,544	2,783	1,531	66	-	-	-	-	-	-	-	-
CROCKETT	STEAM-ELECTRIC POWER	$19	$22	$26	$30	$36	$40	-	-	-	-	-	-	-	-	-	-	-	-
CROCKETT Total		**$525**	**$575**	**$330**	**$43**	**$36**	**$40**	**2,544**	**2,783**	**1,531**	**66**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
ECTOR	STEAM-ELECTRIC POWER	$159	$198	$244	$302	$374	$457	-	-	-	-	-	-	-	-	-	-	-	-
ECTOR	MUNICIPAL	-	-	-	-	-	-	-	-	-	-	-	-	$8	$1	$2	$5	$10	$16
ECTOR Total		**$159**	**$198**	**$244**	**$302**	**$374**	**$457**	**-**	**-**	**-**	**-**	**-**	**-**	**$8**	**$1**	**$2**	**$5**	**$10**	**$16**
HOWARD	IRRIGATION	$1	$1	$1	$1	$1	$1	19	21	21	20	20	19	-	-	-	-	-	-
HOWARD	LIVESTOCK	$4	$4	$4	$4	$4	$4	122	138	138	138	138	138	-	-	-	-	-	-
HOWARD	MANUFACTURING	$117	$86	$120	$148	$173	$199	373	276	382	473	554	635	-	-	-	-	-	-
HOWARD	MINING	$996	$1,109	$764	$420	$137	$5	5,011	5,577	3,840	2,114	689	27	-	-	-	-	-	-
HOWARD	MUNICIPAL	$0	$1	$1	$1	$1	$1	1	25	23	22	21	21	$2	$1	$1	$2	$2	$3
HOWARD Total		**$1,118**	**$1,202**	**$890**	**$575**	**$316**	**$210**	**5,526**	**6,037**	**4,404**	**2,767**	**1,421**	**840**	**$2**	**$1**	**$1**	**$2**	**$2**	**$3**
IRION	IRRIGATION	$0	$0	$0	$0	$0	$0	1	1	1	1	1	1	-	-	-	-	-	-
IRION	MINING	$779	$849	$375	-	-	-	3,916	4,271	1,884	-	-	-	-	-	-	-	-	-
IRION Total		**$779**	**$849**	**$375**	**$0**	**$0**	**$0**	**3,917**	**4,272**	**1,885**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**
KIMBLE	IRRIGATION	$0	$0	$0	$0	$0	$0	5	4	4	3	3	2	-	-	-	-	-	-
KIMBLE	MANUFACTURING	$48	$52	$56	$59	$63	$68	242	259	277	294	316	340	-	-	-	-	-	-
KIMBLE	MUNICIPAL	$20	$20	$19	$19	$19	$19	407	403	396	393	392	392	$3	$3	$3	$3	$3	$3
KIMBLE Total		**$69**	**$72**	**$75**	**$78**	**$83**	**$87**	**654**	**666**	**677**	**690**	**711**	**735**	**$3**	**$3**	**$3**	**$3**	**$3**	**$3**
MARTIN	IRRIGATION	$7	$7	$6	$6	$6	$6	164	160	151	152	148	144	-	-	-	-	-	-
MARTIN	LIVESTOCK	$1	$1	$1	$1	$1	$1	27	26	25	26	26	25	-	-	-	-	-	-
MARTIN	MINING	$1,301	$1,071	$732	$396	$59	-	6,542	5,388	3,681	1,993	299	-	-	-	-	-	-	-
MARTIN	MUNICIPAL	$1	$1	$1	$1	$1	$1	29	29	19	26	25	23	$0	$0	$0	$0	$0	$1
MARTIN Total		**$1,310**	**$1,080**	**$740**	**$405**	**$67**	**$8**	**6,763**	**5,604**	**3,876**	**2,197**	**497**	**192**	**$0**	**$0**	**$0**	**$0**	**$0**	**$1**
MASON	MUNICIPAL	$12	$12	$12	$12	$12	$12	252	248	245	243	243	243	$3	$3	$3	$3	$3	$3
MASON Total		**$12**	**$12**	**$12**	**$12**	**$12**	**$12**	**252**	**248**	**245**	**243**	**243**	**243**	**$3**	**$3**	**$3**	**$3**	**$3**	**$3**

		Income losses (Million $)*						Job losses						Consumer Surplus (Million $)*					
County	Water Use Category	2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070
MCCULLOCH	IRRIGATION	$0	$0	$0	$0	$0	$0	10	10	9	9	9	9	-	-	-	-	-	-
MCCULLOCH	MANUFACTURING	$18	$19	$20	$21	$23	$25	219	236	247	256	276	302	-	-	-	-	-	-
MCCULLOCH	MINING	$20	$15	$3	-	-	-	259	192	39	-	-	-	-	-	-	-	-	-
MCCULLOCH	MUNICIPAL	$3	$4	$3	$3	$3	$3	63	74	63	64	64	66	$9	$9	$9	$9	$9	$9
MCCULLOCH Total		**$41**	**$38**	**$27**	**$24**	**$26**	**$28**	**551**	**511**	**358**	**329**	**350**	**377**	**$9**	**$9**	**$9**	**$9**	**$9**	**$9**
MENARD	IRRIGATION	$0	$0	$0	$0	$0	$0	-	-	-	-	-	-	-	-	-	-	-	-
MENARD	MUNICIPAL	$2	$2	$2	$1	$1	$1	39	34	31	30	30	30	$0	$0	$0	$0	$0	$0
MENARD Total		**$2**	**$2**	**$2**	**$1**	**$1**	**$1**	**39**	**35**	**31**	**30**	**30**	**30**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
MIDLAND	MUNICIPAL	-	-	$101	$215	$344	$481	-	-	2,063	4,375	7,004	9,801	$0	$10	$30	$46	$66	$91
MIDLAND Total		**-**	**-**	**$101**	**$215**	**$344**	**$481**	**-**	**-**	**2,063**	**4,375**	**7,004**	**9,801**	**$0**	**$10**	**$30**	**$46**	**$66**	**$91**
MITCHELL	STEAM-ELECTRIC POWER	$116	$112	$108	$104	$99	$96	-	-	-	-	-	-	-	-	-	-	-	-
MITCHELL Total		**$116**	**$112**	**$108**	**$104**	**$99**	**$96**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
RUNNELS	IRRIGATION	$0	$0	$0	$0	$0	$0	9	9	8	8	8	8	-	-	-	-	-	-
RUNNELS	MANUFACTURING	$3	$4	$4	$4	$5	$5	58	62	67	75	81	87	-	-	-	-	-	-
RUNNELS	MINING	$25	$24	$11	$2	-	-	127	120	55	10	-	-	-	-	-	-	-	-
RUNNELS	MUNICIPAL	$33	$23	$25	$45	$45	$45	672	470	501	916	914	914	$6	$5	$5	$8	$8	$8
RUNNELS Total		**$62**	**$51**	**$40**	**$52**	**$50**	**$50**	**867**	**660**	**632**	**1,009**	**1,003**	**1,009**	**$6**	**$5**	**$5**	**$8**	**$8**	**$8**
SCURRY	IRRIGATION	$2	$2	$2	$1	$1	$1	39	38	36	35	33	32	-	-	-	-	-	-
SCURRY	LIVESTOCK	$2	$2	$2	$2	$2	$2	93	93	93	92	92	92	-	-	-	-	-	-
SCURRY	MINING	$99	$175	$186	$135	$86	$52	499	878	936	680	431	260	-	-	-	-	-	-
SCURRY	MUNICIPAL	$2	$0	$1	$3	$4	$5	47	10	30	51	77	103	$1	$0	$1	$1	$2	$3
SCURRY Total		**$106**	**$179**	**$192**	**$142**	**$93**	**$61**	**678**	**1,019**	**1,095**	**858**	**632**	**487**	**$1**	**$0**	**$1**	**$1**	**$2**	**$3**
TOM GREEN	IRRIGATION	$5	$5	$5	$5	$5	$5	153	151	149	148	146	144	-	-	-	-	-	-
TOM GREEN	MANUFACTURING	$107	$129	$146	$164	$185	$208	1,590	1,916	2,176	2,433	2,750	3,095	-	-	-	-	-	-
TOM GREEN	MUNICIPAL	$5	$46	$73	$84	$150	$199	95	944	1,489	1,801	3,047	4,044	$10	$16	$21	$27	$36	$49
TOM GREEN Total		**$117**	**$180**	**$224**	**$252**	**$339**	**$411**	**1,838**	**3,011**	**3,814**	**4,382**	**5,943**	**7,284**	**$10**	**$16**	**$21**	**$27**	**$36**	**$49**
WARD	STEAM-ELECTRIC POWER	$4	$16	$34	$60	$95	$127	-	-	-	-	-	-	-	-	-	-	-	-
WARD Total		**$4**	**$16**	**$34**	**$60**	**$95**	**$127**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

		Income losses (Million $)*						Job losses						Consumer Surplus (Million $)*					
County	Water Use Category	2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070
WINKLER	MUNICIPAL	-	-	-	$1	$3	$4	-	-	-	24	55	83	-	$0	$0	$0	$1	$1
WINKLER Total		**-**	**-**	**-**	**$1**	**$3**	**$4**	**-**	**-**	**-**	**24**	**55**	**83**	**-**	**$0**	**$0**	**$0**	**$1**	**$1**
Grand Total		**$5,827**	**$5,997**	**$4,778**	**$3,419**	**$2,960**	**$2,922**	**31,446**	**32,787**	**28,332**	**24,551**	**26,372**	**29,418**	**$52**	**$59**	**$86**	**$119**	**$172**	**$228**

Appendix J

Database Reports

Appendix J, Data Tables
Preface

As required by regional water planning rules and guidelines, the data used in developing the regional water plans must be reported by water user, source, county and basin. These data are incorporated into the state water planning database, hence forward called "DB17".

Data tables are developed by water user group (WUG), wholesale water provider (WWP), and water source. Unfortunately, not all of the data easily fits into the structure of DB17. Specifically, groundwater sources are not constrained by political boundaries (county and regional lines), nor by river basin divides. However, this water source is represented as such.

Water supplies must be identified by source. This includes source type (surface water, groundwater, reuse, aquifer storage and recovery or precipitation enhancement), location (reservoir, county, basin), and river basin. Water users that utilize multiple sources of water must account for the quantity and end user of each source. This structure is very difficult to represent systems that blend multiple sources of water prior to distribution. It also poses challenges to accurately represent conjunctive use strategies that use different volumes of water from each source, pending annual availability. Generally, for conjunctive use operations, the decadal averages are represented in DB17.

The following data tables represent, to the best of the consultant's ability, the essence of the regional water plan. For some water user groups, the entity sells water to other users. These sales are included in the projected water needs for the water users in the regional plan. This relationship between seller and customer are represented in DB17, but may not be reflected in the following data reports. As a result, there may be differences in projected water needs between the regional water plan chapter tables and the data reports.

Also, the report tables were developed for each user group as a whole, regardless of county or basin splits. The splitting of these data by counties and basin can result in rounding differences between the report tables and following data tables. Differences of less than 10 on a county basis are considered consistent with the regional water plan report.

While the DB17 data adequately represents the regional water plan within the constraints of the data structure, it is highly recommended that the user of this data refer to the written plan for clarification and description of the water needs and water management strategies.

Source Availability

REGION F

GROUNDWATER	COUNTY	BASIN	SALINITY	SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
CAPITAN REEF COMPLEX AQUIFER	PECOS	RIO GRANDE	FRESH	11,122	11,122	11,122	11,122	11,122	11,122
CAPITAN REEF COMPLEX AQUIFER	REEVES	RIO GRANDE	FRESH	1,007	1,007	1,007	1,007	1,007	1,007
CAPITAN REEF COMPLEX AQUIFER	WARD	RIO GRANDE	FRESH	1,051	1,051	1,051	1,051	1,051	1,051
CAPITAN REEF COMPLEX AQUIFER	WINKLER	RIO GRANDE	FRESH	1,061	1,061	1,061	1,061	1,061	1,061
DOCKUM AQUIFER	ANDREWS	COLORADO	FRESH	715	715	715	715	715	715
DOCKUM AQUIFER	ANDREWS	RIO GRANDE	FRESH	135	135	135	135	135	135
DOCKUM AQUIFER	BORDEN	BRAZOS	FRESH	33	33	33	33	33	33
DOCKUM AQUIFER	BORDEN	COLORADO	FRESH	482	482	482	482	482	482
DOCKUM AQUIFER	CRANE	RIO GRANDE	FRESH	2,000	2,000	2,000	2,000	2,000	2,000
DOCKUM AQUIFER	CROCKETT	COLORADO	FRESH	80	80	80	80	80	80
DOCKUM AQUIFER	CROCKETT	RIO GRANDE	FRESH	2	2	2	2	2	2
DOCKUM AQUIFER	ECTOR	COLORADO	FRESH	13	13	13	13	13	13
DOCKUM AQUIFER	ECTOR	RIO GRANDE	FRESH	515	515	515	515	515	515
DOCKUM AQUIFER	GLASSCOCK	COLORADO	FRESH	900	900	900	900	900	900
DOCKUM AQUIFER	HOWARD	COLORADO	FRESH	592	592	592	592	592	592
DOCKUM AQUIFER	IRION	COLORADO	FRESH	150	150	150	150	150	150
DOCKUM AQUIFER	LOVING	RIO GRANDE	FRESH	1,000	1,000	1,000	1,000	1,000	1,000
DOCKUM AQUIFER	MARTIN	COLORADO	FRESH	500	500	500	500	500	500
DOCKUM AQUIFER	MIDLAND	COLORADO	FRESH	0	0	0	0	0	0
DOCKUM AQUIFER	MITCHELL	COLORADO	FRESH	14,018	14,018	14,018	14,018	14,018	14,018
DOCKUM AQUIFER	PECOS	RIO GRANDE	FRESH	13,965	13,965	13,965	13,965	13,965	13,965
DOCKUM AQUIFER	REAGAN	COLORADO	FRESH	1,837	1,837	1,837	1,837	1,837	1,837
DOCKUM AQUIFER	REAGAN	RIO GRANDE	FRESH	227	227	227	227	227	227
DOCKUM AQUIFER	REEVES	RIO GRANDE	FRESH	5,000	5,000	5,000	5,000	5,000	5,000
DOCKUM AQUIFER	SCURRY	BRAZOS	FRESH	306	306	306	306	306	306
DOCKUM AQUIFER	SCURRY	COLORADO	FRESH	903	903	903	903	903	903
DOCKUM AQUIFER	STERLING	COLORADO	FRESH	10	10	10	10	10	10
DOCKUM AQUIFER	UPTON	COLORADO	FRESH	0	0	0	0	0	0
DOCKUM AQUIFER	UPTON	RIO GRANDE	FRESH	219	219	219	219	219	219
DOCKUM AQUIFER	WARD	RIO GRANDE	FRESH	7,000	7,000	7,000	7,000	7,000	7,000
DOCKUM AQUIFER	WINKLER	COLORADO	FRESH	33	33	33	33	33	33
DOCKUM AQUIFER	WINKLER	RIO GRANDE	FRESH	9,967	9,967	9,967	9,967	9,967	9,967
EDWARDS-TRINITY-HIGH PLAINS AQUIFER	BORDEN	BRAZOS	FRESH	65	65	65	65	65	65
EDWARDS-TRINITY-HIGH PLAINS AQUIFER	BORDEN	COLORADO	FRESH	41	41	41	41	41	41
EDWARDS-TRINITY-PLATEAU AQUIFER	ANDREWS	COLORADO	FRESH	3,000	3,000	3,000	3,000	3,000	3,000
EDWARDS-TRINITY-PLATEAU AQUIFER	COKE	COLORADO	FRESH	998	998	998	998	998	998
EDWARDS-TRINITY-PLATEAU AQUIFER	CONCHO	COLORADO	FRESH	487	487	487	487	487	487

Source Availability

REGION F									
				SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
GROUNDWATER	COUNTY	BASIN	SALINITY	2020	2030	2040	2050	2060	2070
EDWARDS-TRINITY-PLATEAU AQUIFER	CRANE	RIO GRANDE	FRESH	26	26	26	26	26	26
EDWARDS-TRINITY-PLATEAU AQUIFER	CROCKETT	COLORADO	FRESH	19	19	19	19	19	19
EDWARDS-TRINITY-PLATEAU AQUIFER	CROCKETT	RIO GRANDE	FRESH	5,407	5,407	5,407	5,407	5,407	5,407
EDWARDS-TRINITY-PLATEAU AQUIFER	ECTOR	COLORADO	FRESH	4,918	4,918	4,918	4,918	4,918	4,918
EDWARDS-TRINITY-PLATEAU AQUIFER	ECTOR	RIO GRANDE	FRESH	504	504	504	504	504	504
EDWARDS-TRINITY-PLATEAU AQUIFER	GLASSCOCK	COLORADO	FRESH	65,213	65,213	65,213	65,213	65,213	65,213
EDWARDS-TRINITY-PLATEAU AQUIFER	HOWARD	COLORADO	FRESH	1,650	1,650	1,650	1,650	1,650	1,650
EDWARDS-TRINITY-PLATEAU AQUIFER	IRION	COLORADO	FRESH	2,293	2,293	2,293	2,293	2,293	2,293
EDWARDS-TRINITY-PLATEAU AQUIFER	KIMBLE	COLORADO	FRESH	1,387	1,387	1,387	1,387	1,387	1,387
EDWARDS-TRINITY-PLATEAU AQUIFER	MARTIN	COLORADO	FRESH	1,500	1,500	1,500	1,500	1,500	1,500
EDWARDS-TRINITY-PLATEAU AQUIFER	MASON	COLORADO	FRESH	18	18	18	18	18	18
EDWARDS-TRINITY-PLATEAU AQUIFER	MCCULLOCH	COLORADO	FRESH	148	148	148	148	148	148
EDWARDS-TRINITY-PLATEAU AQUIFER	MENARD	COLORADO	FRESH	2,571	2,571	2,571	2,571	2,571	2,571
EDWARDS-TRINITY-PLATEAU AQUIFER	MIDLAND	COLORADO	FRESH	23,251	23,251	23,251	23,251	23,251	23,251
EDWARDS-TRINITY-PLATEAU AQUIFER	PECOS	RIO GRANDE	FRESH	115,938	115,938	115,938	115,938	115,938	115,938
EDWARDS-TRINITY-PLATEAU AQUIFER	REAGAN	COLORADO	FRESH	67,250	67,250	67,250	67,250	67,250	67,250
EDWARDS-TRINITY-PLATEAU AQUIFER	REAGAN	RIO GRANDE	FRESH	1,028	1,028	1,028	1,028	1,028	1,028
EDWARDS-TRINITY-PLATEAU AQUIFER	REEVES	RIO GRANDE	FRESH	3,389	3,389	3,389	3,389	3,389	3,389
EDWARDS-TRINITY-PLATEAU AQUIFER	SCHLEICHER	COLORADO	FRESH	6,410	6,410	6,410	6,410	6,410	6,410
EDWARDS-TRINITY-PLATEAU AQUIFER	SCHLEICHER	RIO GRANDE	FRESH	1,640	1,640	1,640	1,640	1,640	1,640
EDWARDS-TRINITY-PLATEAU AQUIFER	STERLING	COLORADO	FRESH	2,497	2,497	2,497	2,497	2,497	2,497
EDWARDS-TRINITY-PLATEAU AQUIFER	SUTTON	COLORADO	FRESH	1,386	1,386	1,386	1,386	1,386	1,386
EDWARDS-TRINITY-PLATEAU AQUIFER	SUTTON	RIO GRANDE	FRESH	5,052	5,052	5,052	5,052	5,052	5,052
EDWARDS-TRINITY-PLATEAU AQUIFER	TOM GREEN	COLORADO	FRESH	2,798	2,798	2,798	2,798	2,798	2,798
EDWARDS-TRINITY-PLATEAU AQUIFER	UPTON	COLORADO	FRESH	18,357	18,357	18,357	18,357	18,357	18,357
EDWARDS-TRINITY-PLATEAU AQUIFER	UPTON	RIO GRANDE	FRESH	4,022	4,022	4,022	4,022	4,022	4,022
ELLENBURGER-SAN SABA AQUIFER	BROWN	COLORADO	BRACKISH	4,000	4,000	4,000	4,000	4,000	4,000
ELLENBURGER-SAN SABA AQUIFER	BROWN	COLORADO	FRESH	131	131	131	131	131	131
ELLENBURGER-SAN SABA AQUIFER	CONCHO	COLORADO	FRESH	0	0	0	0	0	0

Source Availability

REGION F

GROUNDWATER	COUNTY	BASIN	SALINITY	SOURCE AVAILABILITY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
ELLENBURGER-SAN SABA AQUIFER	KIMBLE	COLORADO	FRESH	304	304	304	304	304	304
ELLENBURGER-SAN SABA AQUIFER	MASON	COLORADO	FRESH	5,801	5,801	5,801	5,801	5,801	5,801
ELLENBURGER-SAN SABA AQUIFER	MCCULLOCH	COLORADO	FRESH	5,369	5,369	5,369	5,369	5,369	5,369
ELLENBURGER-SAN SABA AQUIFER	MENARD	COLORADO	FRESH	791	791	791	791	791	791
HICKORY AQUIFER	BROWN	COLORADO	FRESH	12	12	12	12	12	12
HICKORY AQUIFER	BROWN	COLORADO	BRACKISH	2,000	2,000	2,000	2,000	2,000	2,000
HICKORY AQUIFER	COLEMAN	COLORADO	FRESH	500	500	500	500	500	500
HICKORY AQUIFER	CONCHO	COLORADO	FRESH	2,001	2,001	2,001	2,001	2,001	2,001
HICKORY AQUIFER	KIMBLE	COLORADO	FRESH	6	6	6	6	6	6
HICKORY AQUIFER	MASON	COLORADO	FRESH	12,294	12,294	12,294	12,294	12,294	12,294
HICKORY AQUIFER	MCCULLOCH	COLORADO	FRESH	7,152	7,152	7,152	7,152	7,152	7,152
HICKORY AQUIFER	MENARD	COLORADO	FRESH	1,016	1,016	1,016	1,016	1,016	1,016
LIPAN AQUIFER	CONCHO	COLORADO	FRESH	1,893	1,893	1,893	1,893	1,893	1,893
LIPAN AQUIFER	GLASSCOCK	COLORADO	FRESH	10	10	10	10	10	10
LIPAN AQUIFER	IRION	COLORADO	FRESH	13	13	13	13	13	13
LIPAN AQUIFER	RUNNELS	COLORADO	FRESH	45	45	45	45	45	45
LIPAN AQUIFER	STERLING	COLORADO	FRESH	50	50	50	50	50	50
LIPAN AQUIFER	TOM GREEN	COLORADO	FRESH	43,568	43,568	43,568	43,568	43,568	43,568
MARBLE FALLS AQUIFER	KIMBLE	COLORADO	FRESH	100	100	100	100	100	100
MARBLE FALLS AQUIFER	MASON	COLORADO	FRESH	100	100	100	100	100	100
MARBLE FALLS AQUIFER	MCCULLOCH	COLORADO	FRESH	50	50	50	50	50	50
OGALLALA AQUIFER	ANDREWS	COLORADO	FRESH	15,085	13,678	12,014	10,016	7,377	7,377
OGALLALA AQUIFER	ANDREWS	RIO GRANDE	FRESH	50	41	41	41	41	41
OGALLALA AQUIFER	BORDEN	BRAZOS	FRESH	292	292	292	292	292	292
OGALLALA AQUIFER	BORDEN	COLORADO	FRESH	107	107	107	107	107	107
OGALLALA AQUIFER	ECTOR	COLORADO	FRESH	8,026	7,730	7,171	7,135	6,727	6,727
OGALLALA AQUIFER	GLASSCOCK	COLORADO	FRESH	21,322	20,875	19,691	17,289	14,868	14,868
OGALLALA AQUIFER	HOWARD	COLORADO	FRESH	3,075	2,731	2,731	2,731	2,703	2,703
OGALLALA AQUIFER	MARTIN	COLORADO	FRESH	13,570	13,570	13,140	12,299	12,277	12,277
OGALLALA AQUIFER	MIDLAND	COLORADO	FRESH	38,388	36,824	34,623	32,693	31,325	31,325
OTHER AQUIFER	BORDEN	COLORADO	FRESH	1,410	1,410	1,410	1,410	1,410	1,410
OTHER AQUIFER	BROWN	COLORADO	FRESH	141	141	141	141	141	141
OTHER AQUIFER	COKE	COLORADO	FRESH	1,091	1,091	1,091	1,091	1,091	1,091
OTHER AQUIFER	COLEMAN	COLORADO	FRESH	179	179	179	179	179	179
OTHER AQUIFER	CONCHO	COLORADO	FRESH	3,234	3,234	3,234	3,234	3,234	3,234
OTHER AQUIFER	IRION	COLORADO	FRESH	928	928	928	928	928	928
OTHER AQUIFER	MCCULLOCH	COLORADO	FRESH	104	104	104	104	104	104
OTHER AQUIFER	MENARD	COLORADO	FRESH	52	52	52	52	52	52
OTHER AQUIFER	MITCHELL	COLORADO	FRESH	2	2	2	2	2	2
OTHER AQUIFER	PECOS	RIO GRANDE	FRESH	5	5	5	5	5	5

Source Availability

REGION F

GROUNDWATER	COUNTY	BASIN	SALINITY	SOURCE AVAILABILITY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
OTHER AQUIFER	RUNNELS	COLORADO	FRESH	2,656	2,656	2,656	2,656	2,656	2,656
OTHER AQUIFER	SCURRY	COLORADO	FRESH	314	314	314	314	314	314
OTHER AQUIFER	STERLING	COLORADO	FRESH	1,008	1,008	1,008	1,008	1,008	1,008
OTHER AQUIFER	TOM GREEN	COLORADO	FRESH	15,670	15,670	15,670	15,670	15,670	15,670
OTHER AQUIFER | QUARTERMASTER FORMATION	SCURRY	BRAZOS	BRACKISH	92	92	92	92	92	92
PECOS VALLEY AQUIFER	ANDREWS	RIO GRANDE	FRESH	1,000	1,000	1,000	1,000	1,000	1,000
PECOS VALLEY AQUIFER	CROCKETT	RIO GRANDE	FRESH	31	31	31	31	31	31
PECOS VALLEY AQUIFER	ECTOR	RIO GRANDE	FRESH	113	113	113	113	113	113
PECOS VALLEY AQUIFER	LOVING	RIO GRANDE	FRESH	2,984	2,984	2,984	2,984	2,984	2,984
PECOS VALLEY AQUIFER	UPTON	RIO GRANDE	FRESH	2	2	2	2	2	2
PECOS VALLEY AQUIFER	WARD	RIO GRANDE	FRESH	50,010	50,010	50,010	50,010	50,010	50,010
PECOS VALLEY AQUIFER | GMA 7	PECOS	RIO GRANDE	FRESH	1,448	1,448	1,448	1,448	1,448	1,448
PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER	CRANE	RIO GRANDE	FRESH	4,972	4,972	4,972	4,972	4,972	4,972
PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER	REEVES	RIO GRANDE	FRESH	186,722	186,722	186,722	186,722	186,722	186,722
PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER	WINKLER	RIO GRANDE	FRESH	39,984	39,984	39,984	39,984	39,984	39,984
PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | GMA 3	PECOS	RIO GRANDE	FRESH	122,734	122,734	122,734	122,734	122,734	122,734
RUSTLER AQUIFER	LOVING	RIO GRANDE	FRESH	1,183	1,183	1,183	1,183	1,183	1,183
RUSTLER AQUIFER	PECOS	RIO GRANDE	FRESH	10,508	10,508	10,508	10,508	10,508	10,508
RUSTLER AQUIFER	REEVES	RIO GRANDE	FRESH	1,976	1,976	1,976	1,976	1,976	1,976
RUSTLER AQUIFER	WARD	RIO GRANDE	FRESH	555	555	555	555	555	555
TRINITY AQUIFER	BROWN	BRAZOS	FRESH	28	28	28	28	28	28
TRINITY AQUIFER	BROWN	COLORADO	FRESH	2,017	2,017	2,017	2,017	2,017	2,017
	GROUNDWATER TOTAL SOURCE AVAILABILITY			**1,058,380**	**1,054,313**	**1,048,275**	**1,041,068**	**1,034,182**	**1,034,182**

REGION F

REUSE	COUNTY	BASIN	SALINITY	SOURCE AVAILABILITY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
DIRECT REUSE	ANDREWS	COLORADO	FRESH	560	560	560	560	560	560
DIRECT REUSE	CONCHO	COLORADO	FRESH	224	224	224	224	224	224
DIRECT REUSE	ECTOR	COLORADO	FRESH	6,720	6,720	6,720	6,720	7,000	7,000
DIRECT REUSE	MIDLAND	COLORADO	FRESH	5,987	5,987	5,987	5,987	5,987	5,987
DIRECT REUSE	RUNNELS	COLORADO	FRESH	218	218	218	218	218	218
DIRECT REUSE	SCURRY	COLORADO	FRESH	110	110	110	110	110	110
DIRECT REUSE	TOM GREEN	COLORADO	FRESH	8,300	8,300	8,300	8,300	8,300	8,300
DIRECT REUSE	WARD	RIO GRANDE	FRESH	670	670	670	670	670	670

Source Availability

REGION F

REUSE	COUNTY	BASIN	SALINITY	SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
DIRECT REUSE | CITY OF CRANE - GOLF COURSE IRRIGATION	CRANE	RIO GRANDE	FRESH	73	73	73	73	73	73
DIRECT REUSE | COLORADO CITY	MITCHELL	COLORADO	FRESH	552	552	552	552	552	552
DIRECT REUSE | CRMWD BIG SPRING PROJECT	HOWARD	COLORADO	FRESH	1,855	1,855	1,855	1,855	1,855	1,855
REUSE TOTAL SOURCE AVAILABILITY				**25,269**	**25,269**	**25,269**	**25,269**	**25,549**	**25,549**

REGION F

SURFACE WATER	COUNTY	BASIN	SALINITY	SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
BALLINGER/MOONEN LAKE/RESERVOIR	RESERVOIR	COLORADO	FRESH	0	0	0	0	0	0
BALMORHEA LAKE/RESERVOIR	RESERVOIR	RIO GRANDE	FRESH	21,844	21,844	21,844	21,844	21,844	21,844
BRADY CREEK LAKE/RESERVOIR	RESERVOIR	COLORADO	FRESH	0	0	0	0	0	0
BRAZOS LIVESTOCK LOCAL SUPPLY	BROWN	BRAZOS	FRESH	27	27	27	27	27	27
BRAZOS LIVESTOCK LOCAL SUPPLY	SCURRY	BRAZOS	FRESH	198	198	198	198	198	198
BRAZOS LIVESTOCK LOCAL SUPPLY | HISTORICAL USE	BORDEN	BRAZOS	FRESH	17	17	17	17	17	17
BROWNWOOD LAKE/RESERVOIR	RESERVOIR	COLORADO	FRESH	18,760	18,620	18,480	18,340	18,200	18,060
COLEMAN LAKE/RESERVOIR	RESERVOIR	COLORADO	FRESH	0	0	0	0	0	0
COLORADO CITY-CHAMPION LAKE/RESERVOIR SYSTEM	RESERVOIR	COLORADO	FRESH	0	0	0	0	0	0
COLORADO LIVESTOCK LOCAL SUPPLY	ANDREWS	COLORADO	FRESH	63	63	63	63	63	63
COLORADO LIVESTOCK LOCAL SUPPLY	BORDEN	COLORADO	FRESH	251	251	251	251	251	251
COLORADO LIVESTOCK LOCAL SUPPLY	BROWN	COLORADO	FRESH	1,296	1,296	1,296	1,296	1,296	1,296
COLORADO LIVESTOCK LOCAL SUPPLY	COKE	COLORADO	FRESH	370	370	370	370	370	370
COLORADO LIVESTOCK LOCAL SUPPLY	COLEMAN	COLORADO	FRESH	1,081	1,081	1,081	1,081	1,081	1,081
COLORADO LIVESTOCK LOCAL SUPPLY	CONCHO	COLORADO	FRESH	123	123	123	123	123	123
COLORADO LIVESTOCK LOCAL SUPPLY	CROCKETT	COLORADO	FRESH	11	11	11	11	11	11
COLORADO LIVESTOCK LOCAL SUPPLY	ECTOR	COLORADO	FRESH	11	11	11	11	11	11
COLORADO LIVESTOCK LOCAL SUPPLY	GLASSCOCK	COLORADO	FRESH	40	40	40	40	40	40
COLORADO LIVESTOCK LOCAL SUPPLY	HOWARD	COLORADO	FRESH	62	62	62	62	62	62
COLORADO LIVESTOCK LOCAL SUPPLY	IRION	COLORADO	FRESH	67	67	67	67	67	67
COLORADO LIVESTOCK LOCAL SUPPLY	KIMBLE	COLORADO	FRESH	89	89	89	89	89	89

Source Availability

REGION F									
				SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
SURFACE WATER	COUNTY	BASIN	SALINITY	2020	2030	2040	2050	2060	2070
COLORADO LIVESTOCK LOCAL SUPPLY	MARTIN	COLORADO	FRESH	67	67	67	67	67	67
COLORADO LIVESTOCK LOCAL SUPPLY	MASON	COLORADO	FRESH	984	984	984	984	984	984
COLORADO LIVESTOCK LOCAL SUPPLY	MCCULLOCH	COLORADO	FRESH	164	164	164	164	164	164
COLORADO LIVESTOCK LOCAL SUPPLY	MENARD	COLORADO	FRESH	86	86	86	86	86	86
COLORADO LIVESTOCK LOCAL SUPPLY	MIDLAND	COLORADO	FRESH	117	117	117	117	117	117
COLORADO LIVESTOCK LOCAL SUPPLY	MITCHELL	COLORADO	FRESH	381	381	381	381	381	381
COLORADO LIVESTOCK LOCAL SUPPLY	REAGAN	COLORADO	FRESH	41	41	41	41	41	41
COLORADO LIVESTOCK LOCAL SUPPLY	RUNNELS	COLORADO	FRESH	1,148	1,148	1,148	1,148	1,148	1,148
COLORADO LIVESTOCK LOCAL SUPPLY	SCHLEICHER	COLORADO	FRESH	83	83	83	83	83	83
COLORADO LIVESTOCK LOCAL SUPPLY	SCURRY	COLORADO	FRESH	336	336	336	336	336	336
COLORADO LIVESTOCK LOCAL SUPPLY	STERLING	COLORADO	FRESH	74	74	74	74	74	74
COLORADO LIVESTOCK LOCAL SUPPLY	SUTTON	COLORADO	FRESH	46	46	46	46	46	46
COLORADO LIVESTOCK LOCAL SUPPLY	TOM GREEN	COLORADO	FRESH	1,644	1,644	1,644	1,644	1,644	1,644
COLORADO LIVESTOCK LOCAL SUPPLY	UPTON	COLORADO	FRESH	13	13	13	13	13	13
COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	RESERVOIR	COLORADO	FRESH	18,153	17,637	17,124	16,611	16,095	15,582
COLORADO RUN-OF-RIVER	BROWN	COLORADO	FRESH	284	284	284	284	284	284
COLORADO RUN-OF-RIVER	COKE	COLORADO	FRESH	16	16	16	16	16	16
COLORADO RUN-OF-RIVER	COLEMAN	COLORADO	FRESH	27	27	27	27	27	27
COLORADO RUN-OF-RIVER	CONCHO	COLORADO	FRESH	37	37	37	37	37	37
COLORADO RUN-OF-RIVER	ECTOR	COLORADO	FRESH	0	0	0	0	0	0
COLORADO RUN-OF-RIVER	IRION	COLORADO	FRESH	221	221	221	221	221	221
COLORADO RUN-OF-RIVER	KIMBLE	COLORADO	FRESH	1,148	1,148	1,148	1,148	1,148	1,148
COLORADO RUN-OF-RIVER	MCCULLOCH	COLORADO	FRESH	69	69	69	69	69	69
COLORADO RUN-OF-RIVER	MENARD	COLORADO	FRESH	2,243	2,243	2,243	2,243	2,243	2,243
COLORADO RUN-OF-RIVER	MITCHELL	COLORADO	FRESH	14	14	14	14	14	14
COLORADO RUN-OF-RIVER	RUNNELS	COLORADO	FRESH	262	262	262	262	262	262
COLORADO RUN-OF-RIVER	SCURRY	COLORADO	FRESH	0	0	0	0	0	0
COLORADO RUN-OF-RIVER	STERLING	COLORADO	FRESH	30	30	30	30	30	30

Source Availability

REGION F									
				SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
SURFACE WATER	COUNTY	BASIN	SALINITY	2020	2030	2040	2050	2060	2070
COLORADO RUN-OF-RIVER	SUTTON	COLORADO	FRESH	2	2	2	2	2	2
COLORADO RUN-OF-RIVER	TOM GREEN	COLORADO	FRESH	1,969	1,969	1,969	1,969	1,969	1,969
CRMWD DIVERTED WATER SYSTEM	RESERVOIR	COLORADO	BRACKISH	5,760	5,760	5,760	5,760	5,760	5,760
EV SPENCE LAKE/RESERVOIR NON-SYSTEM PORTION	RESERVOIR	COLORADO	FRESH	0	0	0	0	0	0
HORDS CREEK LAKE/RESERVOIR	RESERVOIR	COLORADO	FRESH	0	0	0	0	0	0
MOUNTAIN CREEK LAKE/RESERVOIR	RESERVOIR	COLORADO	FRESH	0	0	0	0	0	0
OAK CREEK LAKE/RESERVOIR	RESERVOIR	COLORADO	FRESH	0	0	0	0	0	0
OH IVIE LAKE/RESERVOIR NON-SYSTEM PORTION	RESERVOIR	COLORADO	FRESH	17,877	17,373	16,866	16,359	15,855	15,348
RED BLUFF LAKE/RESERVOIR	RESERVOIR	RIO GRANDE	FRESH	33,600	33,600	33,600	33,600	33,600	33,600
RIO GRANDE LIVESTOCK LOCAL SUPPLY	ANDREWS	RIO GRANDE	FRESH	14	14	14	14	14	14
RIO GRANDE LIVESTOCK LOCAL SUPPLY	CRANE	RIO GRANDE	FRESH	21	21	21	21	21	21
RIO GRANDE LIVESTOCK LOCAL SUPPLY	CROCKETT	RIO GRANDE	FRESH	127	127	127	127	127	127
RIO GRANDE LIVESTOCK LOCAL SUPPLY	LOVING	RIO GRANDE	FRESH	10	10	10	10	10	10
RIO GRANDE LIVESTOCK LOCAL SUPPLY	PECOS	RIO GRANDE	FRESH	52	52	52	52	52	52
RIO GRANDE LIVESTOCK LOCAL SUPPLY	REAGAN	RIO GRANDE	FRESH	3	3	3	3	3	3
RIO GRANDE LIVESTOCK LOCAL SUPPLY	REEVES	RIO GRANDE	FRESH	68	68	68	68	68	68
RIO GRANDE LIVESTOCK LOCAL SUPPLY	SCHLEICHER	RIO GRANDE	FRESH	29	29	29	29	29	29
RIO GRANDE LIVESTOCK LOCAL SUPPLY	SUTTON	RIO GRANDE	FRESH	57	57	57	57	57	57
RIO GRANDE LIVESTOCK LOCAL SUPPLY	UPTON	RIO GRANDE	FRESH	23	23	23	23	23	23
RIO GRANDE LIVESTOCK LOCAL SUPPLY	WARD	RIO GRANDE	FRESH	5	5	5	5	5	5
RIO GRANDE LIVESTOCK LOCAL SUPPLY	WINKLER	RIO GRANDE	FRESH	7	7	7	7	7	7
RIO GRANDE RUN-OF-RIVER	PECOS	RIO GRANDE	FRESH	4,444	4,444	4,444	4,444	4,444	4,444
SAN ANGELO LAKES LAKE/RESERVOIR SYSTEM	RESERVOIR	COLORADO	FRESH	0	0	0	0	0	0
WINTERS LAKE/RESERVOIR	RESERVOIR	COLORADO	FRESH	0	0	0	0	0	0
SURFACE WATER TOTAL SOURCE AVAILABILITY				**136,066**	**134,906**	**133,746**	**132,586**	**131,426**	**130,266**
REGION F TOTAL SOURCE AVAILABILITY				**1,219,715**	**1,214,488**	**1,207,290**	**1,198,923**	**1,191,157**	**1,189,997**

Source Water Balance (Availability- WUG Supply)

REGION F

GROUNDWATER	COUNTY	BASIN	SALINITY	2020	2030	2040	2050	2060	2070
				SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
CAPITAN REEF COMPLEX AQUIFER	PECOS	RIO GRANDE	FRESH	11,122	11,122	11,122	11,122	11,122	11,122
CAPITAN REEF COMPLEX AQUIFER	REEVES	RIO GRANDE	FRESH	1,007	1,007	1,007	1,007	1,007	1,007
CAPITAN REEF COMPLEX AQUIFER	WARD	RIO GRANDE	FRESH	1,051	1,051	1,051	1,051	1,051	1,051
CAPITAN REEF COMPLEX AQUIFER	WINKLER	RIO GRANDE	FRESH	1,061	1,061	1,061	1,061	1,061	1,061
DOCKUM AQUIFER	ANDREWS	COLORADO	FRESH	693	693	693	693	693	693
DOCKUM AQUIFER	ANDREWS	RIO GRANDE	FRESH	135	135	135	135	135	135
DOCKUM AQUIFER	BORDEN	BRAZOS	FRESH	33	33	33	33	33	33
DOCKUM AQUIFER	BORDEN	COLORADO	FRESH	482	482	482	482	482	482
DOCKUM AQUIFER	CRANE	RIO GRANDE	FRESH	2,000	2,000	2,000	2,000	2,000	2,000
DOCKUM AQUIFER	CROCKETT	COLORADO	FRESH	80	80	80	80	80	80
DOCKUM AQUIFER	CROCKETT	RIO GRANDE	FRESH	2	2	2	2	2	2
DOCKUM AQUIFER	ECTOR	COLORADO	FRESH	13	13	13	13	13	13
DOCKUM AQUIFER	ECTOR	RIO GRANDE	FRESH	141	141	141	141	141	140
DOCKUM AQUIFER	GLASSCOCK	COLORADO	FRESH	900	900	900	900	900	900
DOCKUM AQUIFER	HOWARD	COLORADO	FRESH	424	424	424	424	424	424
DOCKUM AQUIFER	IRION	COLORADO	FRESH	150	150	150	150	150	150
DOCKUM AQUIFER	LOVING	RIO GRANDE	FRESH	978	978	978	978	978	978
DOCKUM AQUIFER	MARTIN	COLORADO	FRESH	500	500	500	500	500	500
DOCKUM AQUIFER	MIDLAND	COLORADO	FRESH	0	0	0	0	0	0
DOCKUM AQUIFER	MITCHELL	COLORADO	FRESH	239	15	163	342	496	614
DOCKUM AQUIFER	PECOS	RIO GRANDE	FRESH	13,965	13,965	13,965	13,965	13,965	13,965
DOCKUM AQUIFER	REAGAN	COLORADO	FRESH	1,827	1,827	1,827	1,827	1,827	1,827
DOCKUM AQUIFER	REAGAN	RIO GRANDE	FRESH	227	227	227	227	227	227
DOCKUM AQUIFER	REEVES	RIO GRANDE	FRESH	3,552	3,390	3,228	3,111	3,012	2,932
DOCKUM AQUIFER	SCURRY	BRAZOS	FRESH	0	0	0	0	0	0
DOCKUM AQUIFER	SCURRY	COLORADO	FRESH	1	0	1	2	1	3
DOCKUM AQUIFER	STERLING	COLORADO	FRESH	3	3	3	3	3	3
DOCKUM AQUIFER	UPTON	COLORADO	FRESH	0	0	0	0	0	0
DOCKUM AQUIFER	UPTON	RIO GRANDE	FRESH	219	219	219	219	219	219
DOCKUM AQUIFER	WARD	RIO GRANDE	FRESH	6,664	6,664	6,664	6,664	6,664	6,664
DOCKUM AQUIFER	WINKLER	COLORADO	FRESH	30	30	30	30	30	30
DOCKUM AQUIFER	WINKLER	RIO GRANDE	FRESH	8,582	8,395	8,486	8,595	8,701	8,773
EDWARDS-TRINITY-HIGH PLAINS AQUIFER	BORDEN	BRAZOS	FRESH	65	65	65	65	65	65
EDWARDS-TRINITY-HIGH PLAINS AQUIFER	BORDEN	COLORADO	FRESH	41	41	41	41	41	41
EDWARDS-TRINITY-PLATEAU AQUIFER	ANDREWS	COLORADO	FRESH	3,000	3,000	3,000	3,000	3,000	3,000
EDWARDS-TRINITY-PLATEAU AQUIFER	COKE	COLORADO	FRESH	914	914	914	914	914	914
EDWARDS-TRINITY-PLATEAU AQUIFER	CONCHO	COLORADO	FRESH	234	234	234	234	234	234

Source Water Balance (Availability- WUG Supply)

REGION F

GROUNDWATER	COUNTY	BASIN	SALINITY	SOURCE WATER BALANCE (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
EDWARDS-TRINITY-PLATEAU AQUIFER	CRANE	RIO GRANDE	FRESH	26	26	26	26	26	26
EDWARDS-TRINITY-PLATEAU AQUIFER	CROCKETT	COLORADO	FRESH	0	0	0	0	0	0
EDWARDS-TRINITY-PLATEAU AQUIFER	CROCKETT	RIO GRANDE	FRESH	2,279	2,187	2,184	2,174	2,521	2,671
EDWARDS-TRINITY-PLATEAU AQUIFER	ECTOR	COLORADO	FRESH	924	902	904	1,048	1,161	1,248
EDWARDS-TRINITY-PLATEAU AQUIFER	ECTOR	RIO GRANDE	FRESH	0	0	0	0	0	0
EDWARDS-TRINITY-PLATEAU AQUIFER	GLASSCOCK	COLORADO	FRESH	12,044	12,818	13,995	15,158	16,189	16,939
EDWARDS-TRINITY-PLATEAU AQUIFER	HOWARD	COLORADO	FRESH	0	0	0	0	0	0
EDWARDS-TRINITY-PLATEAU AQUIFER	IRION	COLORADO	FRESH	509	515	522	524	1,184	1,555
EDWARDS-TRINITY-PLATEAU AQUIFER	KIMBLE	COLORADO	FRESH	516	522	529	532	533	533
EDWARDS-TRINITY-PLATEAU AQUIFER	MARTIN	COLORADO	FRESH	1,500	1,500	1,500	1,500	1,500	1,500
EDWARDS-TRINITY-PLATEAU AQUIFER	MASON	COLORADO	FRESH	18	18	18	18	18	18
EDWARDS-TRINITY-PLATEAU AQUIFER	MCCULLOCH	COLORADO	FRESH	132	132	132	132	132	132
EDWARDS-TRINITY-PLATEAU AQUIFER	MENARD	COLORADO	FRESH	1,413	1,430	1,529	1,625	1,685	1,780
EDWARDS-TRINITY-PLATEAU AQUIFER	MIDLAND	COLORADO	FRESH	4,115	4,389	5,334	5,756	5,914	5,768
EDWARDS-TRINITY-PLATEAU AQUIFER	PECOS	RIO GRANDE	FRESH	34,460	33,800	33,428	33,241	33,060	32,876
EDWARDS-TRINITY-PLATEAU AQUIFER	REAGAN	COLORADO	FRESH	43,199	44,209	45,361	46,614	47,714	48,308
EDWARDS-TRINITY-PLATEAU AQUIFER	REAGAN	RIO GRANDE	FRESH	710	767	833	907	968	991
EDWARDS-TRINITY-PLATEAU AQUIFER	REEVES	RIO GRANDE	FRESH	2,906	2,884	2,866	2,852	2,842	2,833
EDWARDS-TRINITY-PLATEAU AQUIFER	SCHLEICHER	COLORADO	FRESH	3,938	3,837	3,977	4,124	4,254	4,341
EDWARDS-TRINITY-PLATEAU AQUIFER	SCHLEICHER	RIO GRANDE	FRESH	691	680	733	783	840	875
EDWARDS-TRINITY-PLATEAU AQUIFER	STERLING	COLORADO	FRESH	772	640	822	1,153	1,445	1,613
EDWARDS-TRINITY-PLATEAU AQUIFER	SUTTON	COLORADO	FRESH	839	790	787	830	873	903
EDWARDS-TRINITY-PLATEAU AQUIFER	SUTTON	RIO GRANDE	FRESH	1,560	1,287	1,258	1,419	1,579	1,699
EDWARDS-TRINITY-PLATEAU AQUIFER	TOM GREEN	COLORADO	FRESH	2,109	2,109	2,109	2,109	2,109	2,109
EDWARDS-TRINITY-PLATEAU AQUIFER	UPTON	COLORADO	FRESH	7,301	7,663	8,085	8,578	9,005	9,266
EDWARDS-TRINITY-PLATEAU AQUIFER	UPTON	RIO GRANDE	FRESH	69	376	822	1,373	1,832	2,033
ELLENBURGER-SAN SABA AQUIFER	BROWN	COLORADO	BRACKISH	4,000	4,000	4,000	4,000	4,000	4,000
ELLENBURGER-SAN SABA AQUIFER	BROWN	COLORADO	FRESH	131	131	131	131	131	131
ELLENBURGER-SAN SABA AQUIFER	CONCHO	COLORADO	FRESH	0	0	0	0	0	0

Source Water Balance (Availability- WUG Supply)

REGION F									
				SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
GROUNDWATER	COUNTY	BASIN	SALINITY	2020	2030	2040	2050	2060	2070
ELLENBURGER-SAN SABA AQUIFER	KIMBLE	COLORADO	FRESH	304	304	304	304	304	304
ELLENBURGER-SAN SABA AQUIFER	MASON	COLORADO	FRESH	5,669	5,678	5,678	5,678	5,678	5,678
ELLENBURGER-SAN SABA AQUIFER	MCCULLOCH	COLORADO	FRESH	131	131	131	131	412	1,016
ELLENBURGER-SAN SABA AQUIFER	MENARD	COLORADO	FRESH	480	481	503	534	584	584
HICKORY AQUIFER	BROWN	COLORADO	FRESH	12	12	12	12	12	12
HICKORY AQUIFER	BROWN	COLORADO	BRACKISH	2,000	2,000	2,000	2,000	2,000	2,000
HICKORY AQUIFER	COLEMAN	COLORADO	FRESH	500	500	500	500	500	500
HICKORY AQUIFER	CONCHO	COLORADO	FRESH	1,511	1,513	1,521	1,525	1,526	1,526
HICKORY AQUIFER	KIMBLE	COLORADO	FRESH	6	6	6	6	6	6
HICKORY AQUIFER	MASON	COLORADO	FRESH	2,170	2,370	2,729	2,991	3,219	3,424
HICKORY AQUIFER	MCCULLOCH	COLORADO	FRESH	602	603	609	611	613	615
HICKORY AQUIFER	MENARD	COLORADO	FRESH	1,016	1,016	1,016	1,016	1,016	1,016
LIPAN AQUIFER	CONCHO	COLORADO	FRESH	0	0	0	0	0	0
LIPAN AQUIFER	GLASSCOCK	COLORADO	FRESH	10	10	10	10	10	10
LIPAN AQUIFER	IRION	COLORADO	FRESH	13	13	13	13	13	13
LIPAN AQUIFER	RUNNELS	COLORADO	FRESH	19	19	19	19	19	19
LIPAN AQUIFER	STERLING	COLORADO	FRESH	50	50	50	50	50	50
LIPAN AQUIFER	TOM GREEN	COLORADO	FRESH	48	24	35	92	70	48
MARBLE FALLS AQUIFER	KIMBLE	COLORADO	FRESH	100	100	100	100	100	100
MARBLE FALLS AQUIFER	MASON	COLORADO	FRESH	64	64	64	64	64	64
MARBLE FALLS AQUIFER	MCCULLOCH	COLORADO	FRESH	35	35	35	35	35	35
OGALLALA AQUIFER	ANDREWS	COLORADO	FRESH	0	0	0	0	1	0
OGALLALA AQUIFER	ANDREWS	RIO GRANDE	FRESH	0	0	0	0	0	0
OGALLALA AQUIFER	BORDEN	BRAZOS	FRESH	13	13	11	11	11	11
OGALLALA AQUIFER	BORDEN	COLORADO	FRESH	0	0	0	0	0	0
OGALLALA AQUIFER	ECTOR	COLORADO	FRESH	7,188	6,643	6,061	6,025	5,617	5,617
OGALLALA AQUIFER	GLASSCOCK	COLORADO	FRESH	13,977	13,530	12,346	9,944	7,523	7,523
OGALLALA AQUIFER	HOWARD	COLORADO	FRESH	20	31	31	31	3	3
OGALLALA AQUIFER	MARTIN	COLORADO	FRESH	1	3	3	2	4	1
OGALLALA AQUIFER	MIDLAND	COLORADO	FRESH	15,110	13,560	11,580	9,866	8,795	8,989
OTHER AQUIFER	BORDEN	COLORADO	FRESH	254	6	149	439	689	812
OTHER AQUIFER	BROWN	COLORADO	FRESH	65	65	65	65	65	65
OTHER AQUIFER	COKE	COLORADO	FRESH	0	7	14	16	16	16
OTHER AQUIFER	COLEMAN	COLORADO	FRESH	0	0	0	0	0	0
OTHER AQUIFER	CONCHO	COLORADO	FRESH	2	3	4	6	6	6
OTHER AQUIFER	IRION	COLORADO	FRESH	34	66	99	131	163	194
OTHER AQUIFER	MCCULLOCH	COLORADO	FRESH	0	0	0	0	0	0
OTHER AQUIFER	MENARD	COLORADO	FRESH	0	0	1	1	1	1
OTHER AQUIFER	MITCHELL	COLORADO	FRESH	0	0	0	0	0	0
OTHER AQUIFER	PECOS	RIO GRANDE	FRESH	1	1	1	1	1	1

Source Water Balance (Availability- WUG Supply)

REGION F

GROUNDWATER	COUNTY	BASIN	SALINITY	SOURCE WATER BALANCE (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
OTHER AQUIFER	RUNNELS	COLORADO	FRESH	197	202	213	214	215	215
OTHER AQUIFER	SCURRY	COLORADO	FRESH	292	292	292	292	292	292
OTHER AQUIFER	STERLING	COLORADO	FRESH	402	396	397	397	397	397
OTHER AQUIFER	TOM GREEN	COLORADO	FRESH	5,532	5,532	5,532	5,532	5,532	5,532
OTHER AQUIFER | QUARTERMASTER FORMATION	SCURRY	BRAZOS	BRACKISH	92	92	92	92	92	92
PECOS VALLEY AQUIFER	ANDREWS	RIO GRANDE	FRESH	1,000	1,000	1,000	1,000	1,000	1,000
PECOS VALLEY AQUIFER	CROCKETT	RIO GRANDE	FRESH	31	31	31	31	31	31
PECOS VALLEY AQUIFER	ECTOR	RIO GRANDE	FRESH	62	63	65	67	69	69
PECOS VALLEY AQUIFER	LOVING	RIO GRANDE	FRESH	2,112	1,847	1,971	2,143	2,304	2,431
PECOS VALLEY AQUIFER	UPTON	RIO GRANDE	FRESH	2	2	2	2	2	2
PECOS VALLEY AQUIFER	WARD	RIO GRANDE	FRESH	31,935	31,623	31,651	31,737	31,837	31,895
PECOS VALLEY AQUIFER | GMA 7	PECOS	RIO GRANDE	FRESH	1,236	1,236	1,236	1,236	1,236	1,236
PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER	CRANE	RIO GRANDE	FRESH	3,058	2,743	2,649	2,740	2,834	2,900
PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER	REEVES	RIO GRANDE	FRESH	123,764	123,413	124,262	125,490	126,682	127,781
PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER	WINKLER	RIO GRANDE	FRESH	21,369	21,137	21,191	21,258	21,331	21,375
PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | GMA 3	PECOS	RIO GRANDE	FRESH	78,911	78,817	78,795	78,814	78,827	78,833
RUSTLER AQUIFER	LOVING	RIO GRANDE	FRESH	1,183	1,183	1,183	1,183	1,183	1,183
RUSTLER AQUIFER	PECOS	RIO GRANDE	FRESH	8,103	8,103	8,103	8,103	8,103	8,103
RUSTLER AQUIFER	REEVES	RIO GRANDE	FRESH	1,936	1,936	1,936	1,936	1,936	1,936
RUSTLER AQUIFER	WARD	RIO GRANDE	FRESH	555	555	555	555	555	555
TRINITY AQUIFER	BROWN	BRAZOS	FRESH	0	0	0	0	0	0
TRINITY AQUIFER	BROWN	COLORADO	FRESH	8	7	7	8	9	9
GROUNDWATER TOTAL SOURCE WATER BALANCE				**519,681**	**516,440**	**518,587**	**521,677**	**525,279**	**530,556**

REGION F

REUSE	COUNTY	BASIN	SALINITY	SOURCE WATER BALANCE (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
DIRECT REUSE	ANDREWS	COLORADO	FRESH	0	0	0	0	0	0
DIRECT REUSE	CONCHO	COLORADO	FRESH	224	224	224	224	224	224
DIRECT REUSE	ECTOR	COLORADO	FRESH	559	83	12	5	207	100
DIRECT REUSE	MIDLAND	COLORADO	FRESH	5,857	5,857	5,857	5,857	5,857	5,857
DIRECT REUSE	RUNNELS	COLORADO	FRESH	0	0	0	0	0	0
DIRECT REUSE	SCURRY	COLORADO	FRESH	110	110	110	110	110	110
DIRECT REUSE	TOM GREEN	COLORADO	FRESH	0	0	0	0	0	0
DIRECT REUSE	WARD	RIO GRANDE	FRESH	0	0	0	0	0	0

Source Water Balance (Availability- WUG Supply)

REGION F

REUSE	COUNTY	BASIN	SALINITY	SOURCE WATER BALANCE (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
DIRECT REUSE | CITY OF CRANE - GOLF COURSE IRRIGATION	CRANE	RIO GRANDE	FRESH	0	0	0	0	0	0
DIRECT REUSE | COLORADO CITY	MITCHELL	COLORADO	FRESH	0	0	0	0	0	0
DIRECT REUSE | CRMWD BIG SPRING PROJECT	HOWARD	COLORADO	FRESH	3	0	1	0	1	0
REUSE TOTAL SOURCE WATER BALANCE				**6,753**	**6,274**	**6,204**	**6,196**	**6,399**	**6,291**

REGION F

SURFACE WATER	COUNTY	BASIN	SALINITY	SOURCE WATER BALANCE (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
BALLINGER/MOONEN LAKE/RESERVOIR	RESERVOIR	COLORADO	FRESH	0	0	0	0	0	0
BALMORHEA LAKE/RESERVOIR	RESERVOIR	RIO GRANDE	FRESH	0	0	0	0	0	0
BRADY CREEK LAKE/RESERVOIR	RESERVOIR	COLORADO	FRESH	0	0	0	0	0	0
BRAZOS LIVESTOCK LOCAL SUPPLY	BROWN	BRAZOS	FRESH	0	0	0	0	0	0
BRAZOS LIVESTOCK LOCAL SUPPLY	SCURRY	BRAZOS	FRESH	60	60	59	59	59	58
BRAZOS LIVESTOCK LOCAL SUPPLY | HISTORICAL USE	BORDEN	BRAZOS	FRESH	0	0	0	0	0	0
BROWNWOOD LAKE/RESERVOIR	RESERVOIR	COLORADO	FRESH	6,761	6,595	6,538	6,428	6,237	6,025
COLEMAN LAKE/RESERVOIR	RESERVOIR	COLORADO	FRESH	0	0	0	0	0	0
COLORADO CITY-CHAMPION LAKE/RESERVOIR SYSTEM	RESERVOIR	COLORADO	FRESH	0	0	0	0	0	0
COLORADO LIVESTOCK LOCAL SUPPLY	ANDREWS	COLORADO	FRESH	0	0	0	0	0	0
COLORADO LIVESTOCK LOCAL SUPPLY	BORDEN	COLORADO	FRESH	18	18	18	18	18	18
COLORADO LIVESTOCK LOCAL SUPPLY	BROWN	COLORADO	FRESH	0	0	0	0	0	0
COLORADO LIVESTOCK LOCAL SUPPLY	COKE	COLORADO	FRESH	0	0	0	0	0	0
COLORADO LIVESTOCK LOCAL SUPPLY	COLEMAN	COLORADO	FRESH	138	138	138	138	138	138
COLORADO LIVESTOCK LOCAL SUPPLY	CONCHO	COLORADO	FRESH	0	0	0	0	0	0
COLORADO LIVESTOCK LOCAL SUPPLY	CROCKETT	COLORADO	FRESH	0	0	0	0	0	0
COLORADO LIVESTOCK LOCAL SUPPLY	ECTOR	COLORADO	FRESH	0	0	0	0	0	0
COLORADO LIVESTOCK LOCAL SUPPLY	GLASSCOCK	COLORADO	FRESH	0	0	0	0	0	0
COLORADO LIVESTOCK LOCAL SUPPLY	HOWARD	COLORADO	FRESH	0	0	0	0	0	0
COLORADO LIVESTOCK LOCAL SUPPLY	IRION	COLORADO	FRESH	10	10	10	10	10	10
COLORADO LIVESTOCK LOCAL SUPPLY	KIMBLE	COLORADO	FRESH	0	0	0	0	0	0

Source Water Balance (Availability- WUG Supply)

REGION F									
				SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
SURFACE WATER	COUNTY	BASIN	SALINITY	2020	2030	2040	2050	2060	2070
COLORADO LIVESTOCK LOCAL SUPPLY	MARTIN	COLORADO	FRESH	0	0	0	0	0	0
COLORADO LIVESTOCK LOCAL SUPPLY	MASON	COLORADO	FRESH	486	486	486	486	486	486
COLORADO LIVESTOCK LOCAL SUPPLY	MCCULLOCH	COLORADO	FRESH	0	0	0	0	0	0
COLORADO LIVESTOCK LOCAL SUPPLY	MENARD	COLORADO	FRESH	0	0	0	0	0	0
COLORADO LIVESTOCK LOCAL SUPPLY	MIDLAND	COLORADO	FRESH	0	0	0	0	0	0
COLORADO LIVESTOCK LOCAL SUPPLY	MITCHELL	COLORADO	FRESH	0	0	0	0	0	0
COLORADO LIVESTOCK LOCAL SUPPLY	REAGAN	COLORADO	FRESH	0	0	0	0	0	0
COLORADO LIVESTOCK LOCAL SUPPLY	RUNNELS	COLORADO	FRESH	596	596	596	596	596	596
COLORADO LIVESTOCK LOCAL SUPPLY	SCHLEICHER	COLORADO	FRESH	0	0	0	0	0	0
COLORADO LIVESTOCK LOCAL SUPPLY	SCURRY	COLORADO	FRESH	102	101	101	100	99	99
COLORADO LIVESTOCK LOCAL SUPPLY	STERLING	COLORADO	FRESH	48	48	48	48	48	48
COLORADO LIVESTOCK LOCAL SUPPLY	SUTTON	COLORADO	FRESH	0	0	0	0	0	0
COLORADO LIVESTOCK LOCAL SUPPLY	TOM GREEN	COLORADO	FRESH	0	0	0	0	0	0
COLORADO LIVESTOCK LOCAL SUPPLY	UPTON	COLORADO	FRESH	0	0	0	0	0	0
COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	RESERVOIR	COLORADO	FRESH	66	94	85	306	281	256
COLORADO RUN-OF-RIVER	BROWN	COLORADO	FRESH	0	0	0	0	0	0
COLORADO RUN-OF-RIVER	COKE	COLORADO	FRESH	5	5	5	5	5	5
COLORADO RUN-OF-RIVER	COLEMAN	COLORADO	FRESH	0	0	0	0	0	0
COLORADO RUN-OF-RIVER	CONCHO	COLORADO	FRESH	0	0	0	0	0	0
COLORADO RUN-OF-RIVER	ECTOR	COLORADO	FRESH	0	0	0	0	0	0
COLORADO RUN-OF-RIVER	IRION	COLORADO	FRESH	0	0	0	0	0	0
COLORADO RUN-OF-RIVER	KIMBLE	COLORADO	FRESH	0	0	0	0	0	0
COLORADO RUN-OF-RIVER	MCCULLOCH	COLORADO	FRESH	0	0	0	0	0	0
COLORADO RUN-OF-RIVER	MENARD	COLORADO	FRESH	0	0	0	0	0	0
COLORADO RUN-OF-RIVER	MITCHELL	COLORADO	FRESH	0	0	0	0	0	0
COLORADO RUN-OF-RIVER	RUNNELS	COLORADO	FRESH	65	65	65	65	65	65
COLORADO RUN-OF-RIVER	SCURRY	COLORADO	FRESH	0	0	0	0	0	0
COLORADO RUN-OF-RIVER	STERLING	COLORADO	FRESH	0	0	0	0	0	0

Source Water Balance (Availability- WUG Supply)

REGION F									
				SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
SURFACE WATER	**COUNTY**	**BASIN**	**SALINITY**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
COLORADO RUN-OF-RIVER	SUTTON	COLORADO	FRESH	0	0	0	0	0	0
COLORADO RUN-OF-RIVER	TOM GREEN	COLORADO	FRESH	0	0	0	0	0	0
CRMWD DIVERTED WATER SYSTEM	RESERVOIR	COLORADO	BRACKISH	5,760	5,760	5,760	5,760	5,760	5,760
EV SPENCE LAKE/RESERVOIR NON-SYSTEM PORTION	RESERVOIR	COLORADO	FRESH	0	0	0	0	0	0
HORDS CREEK LAKE/RESERVOIR	RESERVOIR	COLORADO	FRESH	0	0	0	0	0	0
MOUNTAIN CREEK LAKE/RESERVOIR	RESERVOIR	COLORADO	FRESH	0	0	0	0	0	0
OAK CREEK LAKE/RESERVOIR	RESERVOIR	COLORADO	FRESH	0	0	0	0	0	0
OH IVIE LAKE/RESERVOIR NON-SYSTEM PORTION	RESERVOIR	COLORADO	FRESH	1,148	1,123	1,097	1,070	1,045	1,019
RED BLUFF LAKE/RESERVOIR	RESERVOIR	RIO GRANDE	FRESH	17,923	17,922	17,921	17,920	17,919	17,918
RIO GRANDE LIVESTOCK LOCAL SUPPLY	ANDREWS	RIO GRANDE	FRESH	0	0	0	0	0	0
RIO GRANDE LIVESTOCK LOCAL SUPPLY	CRANE	RIO GRANDE	FRESH	0	0	0	0	0	0
RIO GRANDE LIVESTOCK LOCAL SUPPLY	CROCKETT	RIO GRANDE	FRESH	0	0	0	0	0	0
RIO GRANDE LIVESTOCK LOCAL SUPPLY	LOVING	RIO GRANDE	FRESH	0	0	0	0	0	0
RIO GRANDE LIVESTOCK LOCAL SUPPLY	PECOS	RIO GRANDE	FRESH	0	0	0	0	0	0
RIO GRANDE LIVESTOCK LOCAL SUPPLY	REAGAN	RIO GRANDE	FRESH	0	0	0	0	0	0
RIO GRANDE LIVESTOCK LOCAL SUPPLY	REEVES	RIO GRANDE	FRESH	2	2	2	2	2	2
RIO GRANDE LIVESTOCK LOCAL SUPPLY	SCHLEICHER	RIO GRANDE	FRESH	0	0	0	0	0	0
RIO GRANDE LIVESTOCK LOCAL SUPPLY	SUTTON	RIO GRANDE	FRESH	0	0	0	0	0	0
RIO GRANDE LIVESTOCK LOCAL SUPPLY	UPTON	RIO GRANDE	FRESH	23	23	23	23	23	23
RIO GRANDE LIVESTOCK LOCAL SUPPLY	WARD	RIO GRANDE	FRESH	0	0	0	0	0	0
RIO GRANDE LIVESTOCK LOCAL SUPPLY	WINKLER	RIO GRANDE	FRESH	0	0	0	0	0	0
RIO GRANDE RUN-OF-RIVER	PECOS	RIO GRANDE	FRESH	0	0	0	0	0	0
SAN ANGELO LAKES LAKE/RESERVOIR SYSTEM	RESERVOIR	COLORADO	FRESH	0	0	0	0	0	0
WINTERS LAKE/RESERVOIR	RESERVOIR	COLORADO	FRESH	0	0	0	0	0	0
SURFACE WATER TOTAL SOURCE WATER BALANCE				**33,211**	**33,046**	**32,952**	**33,034**	**32,791**	**32,526**
REGION F TOTAL SOURCE WATER BALANCE				**559,645**	**555,760**	**557,743**	**560,907**	**564,469**	**569,373**

Water User Group (WUG) Population

REGION F	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
ANDREWS COUNTY						
COLORADO BASIN						
ANDREWS	14,967	18,281	21,239	24,676	28,669	33,309
COUNTY-OTHER	4,109	4,550	4,989	5,414	5,833	6,238
COLORADO BASIN TOTAL POPULATION	**19,076**	**22,831**	**26,228**	**30,090**	**34,502**	**39,547**
RIO GRANDE BASIN						
COUNTY-OTHER	13	16	18	21	24	27
RIO GRANDE BASIN TOTAL POPULATION	**13**	**16**	**18**	**21**	**24**	**27**
ANDREWS COUNTY TOTAL POPULATION	**19,089**	**22,847**	**26,246**	**30,111**	**34,526**	**39,574**
BORDEN COUNTY						
BRAZOS BASIN						
COUNTY-OTHER	40	41	41	41	41	41
BRAZOS BASIN TOTAL POPULATION	**40**	**41**	**41**	**41**	**41**	**41**
COLORADO BASIN						
COUNTY-OTHER	619	630	630	630	630	630
COLORADO BASIN TOTAL POPULATION	**619**	**630**	**630**	**630**	**630**	**630**
BORDEN COUNTY TOTAL POPULATION	**659**	**671**	**671**	**671**	**671**	**671**
BROWN COUNTY						
BRAZOS BASIN						
COUNTY-OTHER	75	76	76	76	76	76
BRAZOS BASIN TOTAL POPULATION	**75**	**76**	**76**	**76**	**76**	**76**
COLORADO BASIN						
BANGS	1,673	1,713	1,713	1,713	1,713	1,713
BROOKESMITH SUD	7,947	8,138	8,138	8,138	8,138	8,138
BROWNWOOD	20,126	20,610	20,610	20,610	20,610	20,610
COLEMAN COUNTY SUD	130	133	133	133	133	133
EARLY	2,882	2,952	2,952	2,952	2,952	2,952
ZEPHYR WSC	4,606	4,706	4,706	4,706	4,706	4,706
COUNTY-OTHER	2,322	2,389	2,389	2,389	2,389	2,389
COLORADO BASIN TOTAL POPULATION	**39,686**	**40,641**	**40,641**	**40,641**	**40,641**	**40,641**
BROWN COUNTY TOTAL POPULATION	**39,761**	**40,717**	**40,717**	**40,717**	**40,717**	**40,717**
COKE COUNTY						
COLORADO BASIN						
BRONTE	1,000	1,000	1,000	1,000	1,000	1,000
ROBERT LEE	1,050	1,050	1,050	1,050	1,050	1,050
COUNTY-OTHER	1,270	1,270	1,270	1,270	1,270	1,270
COLORADO BASIN TOTAL POPULATION	**3,320**	**3,320**	**3,320**	**3,320**	**3,320**	**3,320**
COKE COUNTY TOTAL POPULATION	**3,320**	**3,320**	**3,320**	**3,320**	**3,320**	**3,320**
COLEMAN COUNTY						
COLORADO BASIN						
BROOKESMITH SUD	40	41	41	41	41	41
COLEMAN	4,820	4,928	4,928	4,928	4,928	4,928

Water User Group (WUG) Population

REGION F	WUG POPULATION					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
COLEMAN COUNTY						
COLORADO BASIN						
COLEMAN COUNTY SUD	2,925	2,991	2,991	2,991	2,991	2,991
SANTA ANNA	1,125	1,150	1,150	1,150	1,150	1,150
COUNTY-OTHER	193	197	197	197	197	197
COLORADO BASIN TOTAL POPULATION	**9,103**	**9,307**	**9,307**	**9,307**	**9,307**	**9,307**
COLEMAN COUNTY TOTAL POPULATION	**9,103**	**9,307**	**9,307**	**9,307**	**9,307**	**9,307**
CONCHO COUNTY						
COLORADO BASIN						
EDEN	2,937	2,985	2,985	2,985	2,985	2,985
MILLERSVIEW-DOOLE WSC	670	681	681	681	681	681
COUNTY-OTHER	732	744	744	744	744	744
COLORADO BASIN TOTAL POPULATION	**4,339**	**4,410**	**4,410**	**4,410**	**4,410**	**4,410**
CONCHO COUNTY TOTAL POPULATION	**4,339**	**4,410**	**4,410**	**4,410**	**4,410**	**4,410**
CRANE COUNTY						
RIO GRANDE BASIN						
CRANE	3,645	3,926	4,152	4,365	4,542	4,692
COUNTY-OTHER	1,411	1,787	2,089	2,372	2,609	2,809
RIO GRANDE BASIN TOTAL POPULATION	**5,056**	**5,713**	**6,241**	**6,737**	**7,151**	**7,501**
CRANE COUNTY TOTAL POPULATION	**5,056**	**5,713**	**6,241**	**6,737**	**7,151**	**7,501**
CROCKETT COUNTY						
RIO GRANDE BASIN						
CROCKETT COUNTY WCID #1	3,885	4,214	4,286	4,334	4,351	4,359
COUNTY-OTHER	226	172	160	152	149	147
RIO GRANDE BASIN TOTAL POPULATION	**4,111**	**4,386**	**4,446**	**4,486**	**4,500**	**4,506**
CROCKETT COUNTY TOTAL POPULATION	**4,111**	**4,386**	**4,446**	**4,486**	**4,500**	**4,506**
ECTOR COUNTY						
COLORADO BASIN						
ECTOR COUNTY UD	15,197	17,153	19,214	21,327	23,467	25,624
GREATER GARDENDALE WSC	1,974	2,229	2,496	2,771	3,049	3,329
ODESSA	112,479	126,955	142,211	157,849	173,688	189,651
COUNTY-OTHER	25,374	28,639	32,082	35,609	39,183	42,784
COLORADO BASIN TOTAL POPULATION	**155,024**	**174,976**	**196,003**	**217,556**	**239,387**	**261,388**
RIO GRANDE BASIN						
COUNTY-OTHER	1,933	2,181	2,443	2,712	2,984	3,258
RIO GRANDE BASIN TOTAL POPULATION	**1,933**	**2,181**	**2,443**	**2,712**	**2,984**	**3,258**
ECTOR COUNTY TOTAL POPULATION	**156,957**	**177,157**	**198,446**	**220,268**	**242,371**	**264,646**
GLASSCOCK COUNTY						
COLORADO BASIN						
COUNTY-OTHER	1,341	1,429	1,429	1,429	1,429	1,429

Water User Group (WUG) Population

REGION F	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
GLASSCOCK COUNTY						
COLORADO BASIN TOTAL POPULATION	**1,341**	**1,429**	**1,429**	**1,429**	**1,429**	**1,429**
GLASSCOCK COUNTY TOTAL POPULATION	**1,341**	**1,429**	**1,429**	**1,429**	**1,429**	**1,429**
HOWARD COUNTY						
COLORADO BASIN						
BIG SPRING	29,073	30,340	30,860	30,860	30,860	30,860
COAHOMA	871	909	925	925	925	925
COUNTY-OTHER	7,366	7,687	7,818	7,818	7,818	7,818
COLORADO BASIN TOTAL POPULATION	**37,310**	**38,936**	**39,603**	**39,603**	**39,603**	**39,603**
HOWARD COUNTY TOTAL POPULATION	**37,310**	**38,936**	**39,603**	**39,603**	**39,603**	**39,603**
IRION COUNTY						
COLORADO BASIN						
MERTZON	823	832	832	832	832	832
COUNTY-OTHER	861	870	870	870	870	870
COLORADO BASIN TOTAL POPULATION	**1,684**	**1,702**	**1,702**	**1,702**	**1,702**	**1,702**
IRION COUNTY TOTAL POPULATION	**1,684**	**1,702**	**1,702**	**1,702**	**1,702**	**1,702**
KIMBLE COUNTY						
COLORADO BASIN						
JUNCTION	2,632	2,657	2,657	2,657	2,657	2,657
COUNTY-OTHER	2,078	2,097	2,097	2,097	2,097	2,097
COLORADO BASIN TOTAL POPULATION	**4,710**	**4,754**	**4,754**	**4,754**	**4,754**	**4,754**
KIMBLE COUNTY TOTAL POPULATION	**4,710**	**4,754**	**4,754**	**4,754**	**4,754**	**4,754**
LOVING COUNTY						
RIO GRANDE BASIN						
COUNTY-OTHER	82	82	82	82	82	82
RIO GRANDE BASIN TOTAL POPULATION	**82**	**82**	**82**	**82**	**82**	**82**
LOVING COUNTY TOTAL POPULATION	**82**	**82**	**82**	**82**	**82**	**82**
MARTIN COUNTY						
COLORADO BASIN						
STANTON	2,822	3,109	3,315	3,498	3,635	3,742
COUNTY-OTHER	2,611	2,877	3,067	3,237	3,365	3,463
COLORADO BASIN TOTAL POPULATION	**5,433**	**5,986**	**6,382**	**6,735**	**7,000**	**7,205**
MARTIN COUNTY TOTAL POPULATION	**5,433**	**5,986**	**6,382**	**6,735**	**7,000**	**7,205**
MASON COUNTY						
COLORADO BASIN						
MASON	2,114	2,114	2,114	2,114	2,114	2,114
COUNTY-OTHER	1,898	1,898	1,898	1,898	1,898	1,898
COLORADO BASIN TOTAL POPULATION	**4,012**	**4,012**	**4,012**	**4,012**	**4,012**	**4,012**
MASON COUNTY TOTAL POPULATION	**4,012**	**4,012**	**4,012**	**4,012**	**4,012**	**4,012**

Water User Group (WUG) Population

REGION F	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
MCCULLOCH COUNTY						
COLORADO BASIN						
BRADY	5,763	6,007	6,027	6,090	6,108	6,117
MILLERSVIEW-DOOLE WSC	1,057	1,101	1,105	1,116	1,120	1,121
RICHLAND SUD	1,232	1,284	1,288	1,302	1,305	1,307
COUNTY-OTHER	583	608	610	617	619	620
COLORADO BASIN TOTAL POPULATION	**8,635**	**9,000**	**9,030**	**9,125**	**9,152**	**9,165**
MCCULLOCH COUNTY TOTAL POPULATION	**8,635**	**9,000**	**9,030**	**9,125**	**9,152**	**9,165**
MENARD COUNTY						
COLORADO BASIN						
MENARD	1,472	1,472	1,472	1,472	1,472	1,472
COUNTY-OTHER	770	770	770	770	770	770
COLORADO BASIN TOTAL POPULATION	**2,242**	**2,242**	**2,242**	**2,242**	**2,242**	**2,242**
MENARD COUNTY TOTAL POPULATION	**2,242**	**2,242**	**2,242**	**2,242**	**2,242**	**2,242**
MIDLAND COUNTY						
COLORADO BASIN						
GREATER GARDENDALE WSC	1,007	1,173	1,335	1,498	1,659	1,818
MIDLAND	130,267	139,416	153,566	167,838	181,927	195,734
ODESSA	2,207	2,770	3,321	3,876	4,424	4,961
COUNTY-OTHER	26,537	30,028	33,443	36,888	40,289	43,621
COLORADO BASIN TOTAL POPULATION	**160,018**	**173,387**	**191,665**	**210,100**	**228,299**	**246,134**
MIDLAND COUNTY TOTAL POPULATION	**160,018**	**173,387**	**191,665**	**210,100**	**228,299**	**246,134**
MITCHELL COUNTY						
COLORADO BASIN						
COLORADO CITY	5,064	5,686	5,801	5,859	5,918	5,978
LORAINE	627	647	661	670	677	682
COUNTY-OTHER	4,840	4,996	5,104	5,177	5,231	5,270
COLORADO BASIN TOTAL POPULATION	**10,531**	**11,329**	**11,566**	**11,706**	**11,826**	**11,930**
MITCHELL COUNTY TOTAL POPULATION	**10,531**	**11,329**	**11,566**	**11,706**	**11,826**	**11,930**
PECOS COUNTY						
RIO GRANDE BASIN						
FORT STOCKTON	9,074	9,752	10,414	11,024	11,568	12,059
IRAAN	1,347	1,447	1,546	1,636	1,717	1,790
PECOS COUNTY WCID #1	3,451	3,709	3,961	4,193	4,400	4,586
COUNTY-OTHER	3,115	3,349	3,574	3,784	3,972	4,141
RIO GRANDE BASIN TOTAL POPULATION	**16,987**	**18,257**	**19,495**	**20,637**	**21,657**	**22,576**
PECOS COUNTY TOTAL POPULATION	**16,987**	**18,257**	**19,495**	**20,637**	**21,657**	**22,576**
REAGAN COUNTY						
COLORADO BASIN						
BIG LAKE	3,360	3,753	3,986	4,197	4,343	4,449

Water User Group (WUG) Population

REGION F	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
REAGAN COUNTY						
COLORADO BASIN						
COUNTY-OTHER	493	550	585	615	637	653
COLORADO BASIN TOTAL POPULATION	**3,853**	**4,303**	**4,571**	**4,812**	**4,980**	**5,102**
REAGAN COUNTY TOTAL POPULATION	**3,853**	**4,303**	**4,571**	**4,812**	**4,980**	**5,102**
REEVES COUNTY						
RIO GRANDE BASIN						
MADERA VALLEY WSC	2,025	2,168	2,284	2,363	2,424	2,469
PECOS	9,635	10,316	10,866	11,244	11,534	11,749
COUNTY-OTHER	3,465	3,709	3,907	4,043	4,148	4,225
RIO GRANDE BASIN TOTAL POPULATION	**15,125**	**16,193**	**17,057**	**17,650**	**18,106**	**18,443**
REEVES COUNTY TOTAL POPULATION	**15,125**	**16,193**	**17,057**	**17,650**	**18,106**	**18,443**
RUNNELS COUNTY						
COLORADO BASIN						
BALLINGER	3,864	3,966	3,966	3,966	3,966	3,966
COLEMAN COUNTY SUD	110	113	113	113	113	113
MILES	963	1,119	1,119	1,119	1,119	1,119
MILLERSVIEW-DOOLE WSC	772	772	772	772	772	772
WINTERS	2,628	2,697	2,697	2,697	2,697	2,697
COUNTY-OTHER	2,546	2,633	2,633	2,633	2,633	2,633
COLORADO BASIN TOTAL POPULATION	**10,883**	**11,300**	**11,300**	**11,300**	**11,300**	**11,300**
RUNNELS COUNTY TOTAL POPULATION	**10,883**	**11,300**	**11,300**	**11,300**	**11,300**	**11,300**
SCHLEICHER COUNTY						
COLORADO BASIN						
ELDORADO	1,952	1,952	1,952	1,952	1,952	1,952
COUNTY-OTHER	1,648	1,927	2,072	2,158	2,210	2,243
COLORADO BASIN TOTAL POPULATION	**3,600**	**3,879**	**4,024**	**4,110**	**4,162**	**4,195**
RIO GRANDE BASIN						
COUNTY-OTHER	211	227	235	240	244	245
RIO GRANDE BASIN TOTAL POPULATION	**211**	**227**	**235**	**240**	**244**	**245**
SCHLEICHER COUNTY TOTAL POPULATION	**3,811**	**4,106**	**4,259**	**4,350**	**4,406**	**4,440**
SCURRY COUNTY						
BRAZOS BASIN						
COUNTY-OTHER	2,053	2,320	2,501	2,706	2,913	3,127
BRAZOS BASIN TOTAL POPULATION	**2,053**	**2,320**	**2,501**	**2,706**	**2,913**	**3,127**
COLORADO BASIN						
SNYDER	13,682	15,738	16,964	18,358	19,769	21,223
COUNTY-OTHER	4,176	4,439	4,784	5,172	5,564	5,972
COLORADO BASIN TOTAL POPULATION	**17,858**	**20,177**	**21,748**	**23,530**	**25,333**	**27,195**
SCURRY COUNTY TOTAL POPULATION	**19,911**	**22,497**	**24,249**	**26,236**	**28,246**	**30,322**

Water User Group (WUG) Population

REGION F	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
STERLING COUNTY						
COLORADO BASIN						
STERLING CITY	944	979	991	991	991	991
COUNTY-OTHER	271	281	284	284	284	284
COLORADO BASIN TOTAL POPULATION	**1,215**	**1,260**	**1,275**	**1,275**	**1,275**	**1,275**
STERLING COUNTY TOTAL POPULATION	**1,215**	**1,260**	**1,275**	**1,275**	**1,275**	**1,275**
SUTTON COUNTY						
COLORADO BASIN						
COUNTY-OTHER	189	203	209	213	215	216
COLORADO BASIN TOTAL POPULATION	**189**	**203**	**209**	**213**	**215**	**216**
RIO GRANDE BASIN						
SONORA	3,319	3,573	3,665	3,737	3,775	3,797
COUNTY-OTHER	1,018	1,096	1,124	1,146	1,158	1,165
RIO GRANDE BASIN TOTAL POPULATION	**4,337**	**4,669**	**4,789**	**4,883**	**4,933**	**4,962**
SUTTON COUNTY TOTAL POPULATION	**4,526**	**4,872**	**4,998**	**5,096**	**5,148**	**5,178**
TOM GREEN COUNTY						
COLORADO BASIN						
CONCHO RURAL WATER CORPORATION	6,116	6,469	6,766	7,027	7,273	7,496
MILLERSVIEW-DOOLE WSC	1,881	1,990	2,081	2,162	2,237	2,306
SAN ANGELO	105,083	118,480	125,807	133,586	141,847	150,618
COUNTY-OTHER	9,972	10,547	11,031	11,455	11,858	12,222
COLORADO BASIN TOTAL POPULATION	**123,052**	**137,486**	**145,685**	**154,230**	**163,215**	**172,642**
TOM GREEN COUNTY TOTAL POPULATION	**123,052**	**137,486**	**145,685**	**154,230**	**163,215**	**172,642**
UPTON COUNTY						
COLORADO BASIN						
COUNTY-OTHER	235	254	263	272	278	281
COLORADO BASIN TOTAL POPULATION	**235**	**254**	**263**	**272**	**278**	**281**
RIO GRANDE BASIN						
MCCAMEY	2,076	2,245	2,322	2,403	2,453	2,487
RANKIN	856	926	958	991	1,012	1,026
COUNTY-OTHER	523	565	585	606	617	627
RIO GRANDE BASIN TOTAL POPULATION	**3,455**	**3,736**	**3,865**	**4,000**	**4,082**	**4,140**
UPTON COUNTY TOTAL POPULATION	**3,690**	**3,990**	**4,128**	**4,272**	**4,360**	**4,421**
WARD COUNTY						
RIO GRANDE BASIN						
MONAHANS	7,473	7,923	8,243	8,500	8,696	8,845
COUNTY-OTHER	3,981	4,221	4,391	4,529	4,633	4,712
RIO GRANDE BASIN TOTAL POPULATION	**11,454**	**12,144**	**12,634**	**13,029**	**13,329**	**13,557**
WARD COUNTY TOTAL POPULATION	**11,454**	**12,144**	**12,634**	**13,029**	**13,329**	**13,557**

Water User Group (WUG) Population

REGION F	WUG POPULATION					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
WINKLER COUNTY						
RIO GRANDE BASIN						
KERMIT	5,796	5,871	5,933	5,999	6,052	6,098
WINK	1,063	1,166	1,251	1,342	1,415	1,479
COUNTY-OTHER	1,174	1,780	2,275	2,806	3,235	3,604
RIO GRANDE BASIN TOTAL POPULATION	**8,033**	**8,817**	**9,459**	**10,147**	**10,702**	**11,181**
WINKLER COUNTY TOTAL POPULATION	**8,033**	**8,817**	**9,459**	**10,147**	**10,702**	**11,181**
REGION F TOTAL POPULATION	**700,933**	**766,612**	**825,381**	**884,551**	**943,798**	**1,003,347**

Water User Group (WUG) Demand

REGION F	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
ANDREWS COUNTY						
COLORADO BASIN						
ANDREWS	4,270	5,131	5,906	6,832	7,930	9,210
COUNTY-OTHER	499	532	567	606	652	697
MANUFACTURING	49	52	55	58	62	66
MINING	3,682	3,450	2,955	2,333	1,794	1,379
LIVESTOCK	276	276	276	276	276	276
IRRIGATION	36,382	36,076	35,768	35,461	35,156	34,854
COLORADO BASIN TOTAL DEMAND	**45,158**	**45,517**	**45,527**	**45,566**	**45,870**	**46,482**
RIO GRANDE BASIN						
COUNTY-OTHER	2	2	2	3	3	3
MINING	277	260	222	176	135	104
LIVESTOCK	49	49	49	49	49	49
IRRIGATION	1,516	1,503	1,490	1,478	1,465	1,452
RIO GRANDE BASIN TOTAL DEMAND	**1,844**	**1,814**	**1,763**	**1,706**	**1,652**	**1,608**
ANDREWS COUNTY TOTAL DEMAND	**47,002**	**47,331**	**47,290**	**47,272**	**47,522**	**48,090**
BORDEN COUNTY						
BRAZOS BASIN						
COUNTY-OTHER	10	11	11	11	10	10
LIVESTOCK	17	17	17	17	17	17
IRRIGATION	1,120	1,118	1,117	1,115	1,114	1,114
BRAZOS BASIN TOTAL DEMAND	**1,147**	**1,146**	**1,145**	**1,143**	**1,141**	**1,141**
COLORADO BASIN						
COUNTY-OTHER	168	167	165	165	165	165
MINING	679	927	784	494	244	121
LIVESTOCK	233	233	233	233	233	233
IRRIGATION	2,880	2,875	2,873	2,868	2,866	2,863
COLORADO BASIN TOTAL DEMAND	**3,960**	**4,202**	**4,055**	**3,760**	**3,508**	**3,382**
BORDEN COUNTY TOTAL DEMAND	**5,107**	**5,348**	**5,200**	**4,903**	**4,649**	**4,523**
BROWN COUNTY						
BRAZOS BASIN						
COUNTY-OTHER	7	7	7	7	7	7
LIVESTOCK	14	14	14	14	14	14
IRRIGATION	466	464	463	461	459	458
BRAZOS BASIN TOTAL DEMAND	**487**	**485**	**484**	**482**	**480**	**479**
COLORADO BASIN						
BANGS	207	204	198	195	194	194
BROOKESMITH SUD	1,185	1,181	1,156	1,142	1,139	1,139
BROWNWOOD	3,755	3,750	3,677	3,636	3,629	3,629
COLEMAN COUNTY SUD	17	16	16	16	16	16
EARLY	290	285	275	269	268	268
ZEPHYR WSC	379	374	364	359	357	357
COUNTY-OTHER	197	199	198	197	196	196
MANUFACTURING	673	726	777	820	886	957
MINING	943	948	951	952	948	944
LIVESTOCK	1,339	1,339	1,339	1,339	1,339	1,339
IRRIGATION	8,969	8,939	8,908	8,877	8,847	8,817
COLORADO BASIN TOTAL DEMAND	**17,954**	**17,961**	**17,859**	**17,802**	**17,819**	**17,856**
BROWN COUNTY TOTAL DEMAND	**18,441**	**18,446**	**18,343**	**18,284**	**18,299**	**18,335**

Water User Group (WUG) Demand

REGION F	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
COKE COUNTY						
COLORADO BASIN						
BRONTE	252	248	244	242	242	242
ROBERT LEE	296	290	287	286	286	286
COUNTY-OTHER	127	120	115	113	113	113
MINING	488	482	430	376	328	286
STEAM ELECTRIC POWER	247	289	339	401	477	528
LIVESTOCK	431	431	431	431	431	431
IRRIGATION	965	963	962	962	962	962
COLORADO BASIN TOTAL DEMAND	**2,806**	**2,823**	**2,808**	**2,811**	**2,839**	**2,848**
COKE COUNTY TOTAL DEMAND	**2,806**	**2,823**	**2,808**	**2,811**	**2,839**	**2,848**
COLEMAN COUNTY						
COLORADO BASIN						
BROOKESMITH SUD	6	6	6	6	6	6
COLEMAN	822	815	796	794	792	792
COLEMAN COUNTY SUD	363	358	347	341	340	340
SANTA ANNA	157	155	150	150	149	149
COUNTY-OTHER	24	23	23	23	22	22
MANUFACTURING	9	9	9	9	9	9
MINING	108	107	97	86	77	69
LIVESTOCK	1,076	1,076	1,076	1,076	1,076	1,076
IRRIGATION	770	770	770	770	770	770
COLORADO BASIN TOTAL DEMAND	**3,335**	**3,319**	**3,274**	**3,255**	**3,241**	**3,233**
COLEMAN COUNTY TOTAL DEMAND	**3,335**	**3,319**	**3,274**	**3,255**	**3,241**	**3,233**
CONCHO COUNTY						
COLORADO BASIN						
EDEN	480	478	471	467	466	466
MILLERSVIEW-DOOLE WSC	97	96	94	93	92	92
COUNTY-OTHER	96	95	93	91	91	91
MINING	480	474	422	367	320	279
LIVESTOCK	699	699	699	699	699	699
IRRIGATION	9,734	9,693	9,654	9,618	9,582	9,546
COLORADO BASIN TOTAL DEMAND	**11,586**	**11,535**	**11,433**	**11,335**	**11,250**	**11,173**
CONCHO COUNTY TOTAL DEMAND	**11,586**	**11,535**	**11,433**	**11,335**	**11,250**	**11,173**
CRANE COUNTY						
RIO GRANDE BASIN						
CRANE	1,262	1,339	1,401	1,468	1,526	1,576
COUNTY-OTHER	170	208	238	268	294	317
MINING	617	840	861	692	531	407
LIVESTOCK	172	172	172	172	172	172
RIO GRANDE BASIN TOTAL DEMAND	**2,221**	**2,559**	**2,672**	**2,600**	**2,523**	**2,472**
CRANE COUNTY TOTAL DEMAND	**2,221**	**2,559**	**2,672**	**2,600**	**2,523**	**2,472**
CROCKETT COUNTY						
COLORADO BASIN						
LIVESTOCK	18	18	18	18	18	18
IRRIGATION	12	12	12	12	12	11
COLORADO BASIN TOTAL DEMAND	**30**	**30**	**30**	**30**	**30**	**29**

Water User Group (WUG) Demand

REGION F	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
CROCKETT COUNTY						
RIO GRANDE BASIN						
CROCKETT COUNTY WCID #1	1,533	1,642	1,655	1,672	1,678	1,681
COUNTY-OTHER	28	20	19	18	17	17
MINING	1,732	1,843	1,261	682	207	63
STEAM ELECTRIC POWER	776	907	1,067	1,262	1,500	1,662
LIVESTOCK	663	663	663	663	663	663
IRRIGATION	467	458	449	443	434	426
RIO GRANDE BASIN TOTAL DEMAND	**5,199**	**5,533**	**5,114**	**4,740**	**4,499**	**4,512**
CROCKETT COUNTY TOTAL DEMAND	**5,229**	**5,563**	**5,144**	**4,770**	**4,529**	**4,541**
ECTOR COUNTY						
COLORADO BASIN						
ECTOR COUNTY UD	1,856	2,058	2,284	2,521	2,766	3,018
GREATER GARDENDALE WSC	164	177	192	210	230	251
ODESSA	22,049	24,295	26,774	29,481	32,384	35,344
COUNTY-OTHER	3,206	3,549	3,932	4,336	4,758	5,191
MANUFACTURING	3,122	3,293	3,443	3,558	3,679	3,805
MINING	1,325	1,450	1,290	1,055	852	721
STEAM ELECTRIC POWER	9,436	11,031	12,976	15,347	18,237	21,672
LIVESTOCK	225	225	225	225	225	225
IRRIGATION	1,289	1,273	1,257	1,242	1,226	1,210
COLORADO BASIN TOTAL DEMAND	**42,672**	**47,351**	**52,373**	**57,975**	**64,357**	**71,437**
RIO GRANDE BASIN						
COUNTY-OTHER	245	271	300	331	363	396
MANUFACTURING	332	350	366	378	391	404
MINING	652	714	636	519	420	355
LIVESTOCK	40	40	40	40	40	40
IRRIGATION	143	142	140	138	136	135
RIO GRANDE BASIN TOTAL DEMAND	**1,412**	**1,517**	**1,482**	**1,406**	**1,350**	**1,330**
ECTOR COUNTY TOTAL DEMAND	**44,084**	**48,868**	**53,855**	**59,381**	**65,707**	**72,767**
GLASSCOCK COUNTY						
COLORADO BASIN						
COUNTY-OTHER	162	165	161	160	160	160
MINING	3,423	3,101	2,384	1,679	1,100	798
LIVESTOCK	262	262	262	262	262	262
IRRIGATION	56,707	56,252	55,796	55,339	54,887	54,439
COLORADO BASIN TOTAL DEMAND	**60,554**	**59,780**	**58,603**	**57,440**	**56,409**	**55,659**
GLASSCOCK COUNTY TOTAL DEMAND	**60,554**	**59,780**	**58,603**	**57,440**	**56,409**	**55,659**
HOWARD COUNTY						
COLORADO BASIN						
BIG SPRING	6,149	6,288	6,299	6,248	6,238	6,237
COAHOMA	183	186	188	187	187	187
COUNTY-OTHER	896	893	888	886	883	883
MANUFACTURING	2,748	2,872	2,994	3,097	3,290	3,495
MINING	2,491	2,747	1,940	1,138	476	199
LIVESTOCK	316	316	316	316	316	316
IRRIGATION	6,722	6,645	6,567	6,490	6,413	6,337

Water User Group (WUG) Demand

REGION F	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
HOWARD COUNTY						
COLORADO BASIN TOTAL DEMAND	**19,505**	**19,947**	**19,192**	**18,362**	**17,803**	**17,654**
HOWARD COUNTY TOTAL DEMAND	**19,505**	**19,947**	**19,192**	**18,362**	**17,803**	**17,654**
IRION COUNTY						
COLORADO BASIN						
MERTZON	102	99	96	95	95	95
COUNTY-OTHER	105	102	98	97	97	97
MINING	3,192	3,357	2,423	1,487	713	342
LIVESTOCK	268	268	268	268	268	268
IRRIGATION	1,467	1,435	1,402	1,370	1,338	1,307
COLORADO BASIN TOTAL DEMAND	**5,134**	**5,261**	**4,287**	**3,317**	**2,511**	**2,109**
IRION COUNTY TOTAL DEMAND	**5,134**	**5,261**	**4,287**	**3,317**	**2,511**	**2,109**
KIMBLE COUNTY						
COLORADO BASIN						
JUNCTION	627	620	610	605	604	604
COUNTY-OTHER	255	248	241	238	237	237
MANUFACTURING	701	752	804	852	916	985
MINING	19	19	19	19	19	19
LIVESTOCK	402	402	402	402	402	402
IRRIGATION	2,939	2,830	2,718	2,606	2,501	2,400
COLORADO BASIN TOTAL DEMAND	**4,943**	**4,871**	**4,794**	**4,722**	**4,679**	**4,647**
KIMBLE COUNTY TOTAL DEMAND	**4,943**	**4,871**	**4,794**	**4,722**	**4,679**	**4,647**
LOVING COUNTY						
RIO GRANDE BASIN						
COUNTY-OTHER	11	10	10	10	10	10
MINING	792	1,058	934	762	601	474
LIVESTOCK	101	101	101	101	101	101
RIO GRANDE BASIN TOTAL DEMAND	**904**	**1,169**	**1,045**	**873**	**712**	**585**
LOVING COUNTY TOTAL DEMAND	**904**	**1,169**	**1,045**	**873**	**712**	**585**
MARTIN COUNTY						
COLORADO BASIN						
STANTON	539	579	606	635	658	677
COUNTY-OTHER	342	363	376	392	406	418
MANUFACTURING	41	42	43	44	47	50
MINING	3,527	2,998	2,251	1,441	771	413
LIVESTOCK	128	128	128	128	128	128
IRRIGATION	36,322	35,674	35,026	34,381	33,746	33,123
COLORADO BASIN TOTAL DEMAND	**40,899**	**39,784**	**38,430**	**37,021**	**35,756**	**34,809**
MARTIN COUNTY TOTAL DEMAND	**40,899**	**39,784**	**38,430**	**37,021**	**35,756**	**34,809**
MASON COUNTY						
COLORADO BASIN						
MASON	694	684	676	671	671	671
COUNTY-OTHER	234	227	221	218	217	217
MINING	1,023	941	708	568	460	372
LIVESTOCK	1,248	1,248	1,248	1,248	1,248	1,248
IRRIGATION	8,294	8,174	8,054	7,935	7,816	7,699
COLORADO BASIN TOTAL DEMAND	**11,493**	**11,274**	**10,907**	**10,640**	**10,412**	**10,207**
MASON COUNTY TOTAL DEMAND	**11,493**	**11,274**	**10,907**	**10,640**	**10,412**	**10,207**

Water User Group (WUG) Demand

REGION F	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
MCCULLOCH COUNTY						
COLORADO BASIN						
BRADY	1,389	1,418	1,399	1,408	1,410	1,412
MILLERSVIEW-DOOLE WSC	153	155	152	151	151	152
RICHLAND SUD	176	178	176	176	176	176
COUNTY-OTHER	92	95	94	95	95	95
MANUFACTURING	500	540	578	611	663	719
MINING	8,927	8,347	6,641	5,627	4,836	4,201
LIVESTOCK	714	714	714	714	714	714
IRRIGATION	3,584	3,539	3,493	3,448	3,404	3,361
COLORADO BASIN TOTAL DEMAND	**15,535**	**14,986**	**13,247**	**12,230**	**11,449**	**10,830**
MCCULLOCH COUNTY TOTAL DEMAND	**15,535**	**14,986**	**13,247**	**12,230**	**11,449**	**10,830**
MENARD COUNTY						
COLORADO BASIN						
MENARD	346	338	332	331	331	331
COUNTY-OTHER	95	92	89	87	87	87
MANUFACTURING	3	3	3	3	3	3
MINING	1,086	1,071	952	827	717	622
LIVESTOCK	408	408	408	408	408	408
IRRIGATION	2,530	2,522	2,514	2,505	2,497	2,489
COLORADO BASIN TOTAL DEMAND	**4,468**	**4,434**	**4,298**	**4,161**	**4,043**	**3,940**
MENARD COUNTY TOTAL DEMAND	**4,468**	**4,434**	**4,298**	**4,161**	**4,043**	**3,940**
MIDLAND COUNTY						
COLORADO BASIN						
GREATER GARDENDALE WSC	84	93	103	114	125	137
MIDLAND	32,721	34,460	37,507	40,746	44,110	47,440
ODESSA	433	531	626	724	825	925
COUNTY-OTHER	4,232	4,641	5,058	5,520	6,016	6,510
MANUFACTURING	230	250	269	285	309	335
MINING	3,893	3,418	2,630	1,774	1,056	743
LIVESTOCK	394	394	394	394	394	394
IRRIGATION	33,276	33,016	32,756	32,495	32,237	31,981
COLORADO BASIN TOTAL DEMAND	**75,263**	**76,803**	**79,343**	**82,052**	**85,072**	**88,465**
MIDLAND COUNTY TOTAL DEMAND	**75,263**	**76,803**	**79,343**	**82,052**	**85,072**	**88,465**
MITCHELL COUNTY						
COLORADO BASIN						
COLORADO CITY	1,287	1,417	1,427	1,438	1,451	1,466
LORAINE	73	72	71	72	72	73
COUNTY-OTHER	843	852	857	861	868	875
MINING	593	738	632	493	375	290
STEAM ELECTRIC POWER	4,847	4,670	4,493	4,317	4,140	3,994
LIVESTOCK	413	413	413	413	413	413
IRRIGATION	11,519	11,460	11,404	11,348	11,292	11,236
COLORADO BASIN TOTAL DEMAND	**19,575**	**19,622**	**19,297**	**18,942**	**18,611**	**18,347**
MITCHELL COUNTY TOTAL DEMAND	**19,575**	**19,622**	**19,297**	**18,942**	**18,611**	**18,347**
PECOS COUNTY						
RIO GRANDE BASIN						
FORT STOCKTON	4,910	5,230	5,548	5,853	6,138	6,398

Water User Group (WUG) Demand

REGION F	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
PECOS COUNTY						
RIO GRANDE BASIN						
IRAAN	459	486	513	541	567	591
PECOS COUNTY WCID #1	439	456	475	496	519	540
COUNTY-OTHER	415	427	453	478	501	522
MANUFACTURING	103	103	103	103	103	103
MINING	690	1,068	1,072	861	672	524
LIVESTOCK	932	932	932	932	932	932
IRRIGATION	126,023	126,023	126,023	126,023	126,023	126,023
RIO GRANDE BASIN TOTAL DEMAND	**133,971**	**134,725**	**135,119**	**135,287**	**135,455**	**135,633**
PECOS COUNTY TOTAL DEMAND	**133,971**	**134,725**	**135,119**	**135,287**	**135,455**	**135,633**
REAGAN COUNTY						
COLORADO BASIN						
BIG LAKE	731	796	835	878	907	929
COUNTY-OTHER	70	76	79	82	85	87
MINING	3,916	3,157	2,285	1,308	492	185
LIVESTOCK	244	244	244	244	244	244
IRRIGATION	19,130	18,808	18,486	18,164	17,848	17,537
COLORADO BASIN TOTAL DEMAND	**24,091**	**23,081**	**21,929**	**20,676**	**19,576**	**18,982**
RIO GRANDE BASIN						
MINING	295	238	172	98	37	14
LIVESTOCK	11	11	11	11	11	11
RIO GRANDE BASIN TOTAL DEMAND	**306**	**249**	**183**	**109**	**48**	**25**
REAGAN COUNTY TOTAL DEMAND	**24,397**	**23,330**	**22,112**	**20,785**	**19,624**	**19,007**
REEVES COUNTY						
RIO GRANDE BASIN						
MADERA VALLEY WSC	586	616	644	665	682	694
PECOS	2,990	3,143	3,296	3,407	3,491	3,556
COUNTY-OTHER	503	530	553	570	583	594
MANUFACTURING	197	201	205	208	220	233
MINING	1,531	2,632	2,537	2,068	1,632	1,288
LIVESTOCK	862	862	862	862	862	862
IRRIGATION	91,357	90,577	89,795	89,015	88,242	87,475
RIO GRANDE BASIN TOTAL DEMAND	**98,026**	**98,561**	**97,892**	**96,795**	**95,712**	**94,702**
REEVES COUNTY TOTAL DEMAND	**98,026**	**98,561**	**97,892**	**96,795**	**95,712**	**94,702**
RUNNELS COUNTY						
COLORADO BASIN						
BALLINGER	690	688	671	669	668	668
COLEMAN COUNTY SUD	14	14	14	13	13	13
MILES	112	124	121	119	119	119
MILLERSVIEW-DOOLE WSC	112	109	106	105	105	105
WINTERS	216	207	197	196	195	195
COUNTY-OTHER	252	247	236	235	234	234
MANUFACTURING	48	52	56	59	64	69
MINING	272	269	240	210	184	161
LIVESTOCK	880	880	880	880	880	880
IRRIGATION	4,009	3,991	3,973	3,955	3,937	3,919

Water User Group (WUG) Demand

REGION F	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
RUNNELS COUNTY						
COLORADO BASIN TOTAL DEMAND	**6,605**	**6,581**	**6,494**	**6,441**	**6,399**	**6,363**
RUNNELS COUNTY TOTAL DEMAND	**6,605**	**6,581**	**6,494**	**6,441**	**6,399**	**6,363**
SCHLEICHER COUNTY						
COLORADO BASIN						
ELDORADO	614	605	597	594	593	593
COUNTY-OTHER	238	272	288	297	304	309
MINING	460	542	416	290	178	110
LIVESTOCK	403	403	403	403	403	403
IRRIGATION	904	885	867	848	830	812
COLORADO BASIN TOTAL DEMAND	**2,619**	**2,707**	**2,571**	**2,432**	**2,308**	**2,227**
RIO GRANDE BASIN						
COUNTY-OTHER	31	32	33	34	34	34
MINING	161	190	146	102	63	38
LIVESTOCK	132	132	132	132	132	132
IRRIGATION	510	500	489	479	468	458
RIO GRANDE BASIN TOTAL DEMAND	**834**	**854**	**800**	**747**	**697**	**662**
SCHLEICHER COUNTY TOTAL DEMAND	**3,453**	**3,561**	**3,371**	**3,179**	**3,005**	**2,889**
SCURRY COUNTY						
BRAZOS BASIN						
COUNTY-OTHER	252	273	286	305	327	351
MINING	78	128	135	102	69	47
LIVESTOCK	101	101	101	101	101	101
IRRIGATION	1,728	1,669	1,610	1,551	1,494	1,440
BRAZOS BASIN TOTAL DEMAND	**2,159**	**2,171**	**2,132**	**2,059**	**1,991**	**1,939**
COLORADO BASIN						
SNYDER	2,036	2,263	2,386	2,570	2,762	2,963
COUNTY-OTHER	511	523	547	582	625	670
MANUFACTURING	3	3	3	3	3	3
MINING	202	328	348	261	177	120
LIVESTOCK	403	403	403	403	403	403
IRRIGATION	5,577	5,387	5,196	5,006	4,824	4,648
COLORADO BASIN TOTAL DEMAND	**8,732**	**8,907**	**8,883**	**8,825**	**8,794**	**8,807**
SCURRY COUNTY TOTAL DEMAND	**10,891**	**11,078**	**11,015**	**10,884**	**10,785**	**10,746**
STERLING COUNTY						
COLORADO BASIN						
STERLING CITY	276	282	281	281	281	281
COUNTY-OTHER	33	33	33	33	33	33
MINING	780	953	812	522	270	140
LIVESTOCK	322	322	322	322	322	322
IRRIGATION	983	942	901	860	820	782
COLORADO BASIN TOTAL DEMAND	**2,394**	**2,532**	**2,349**	**2,018**	**1,726**	**1,558**
STERLING COUNTY TOTAL DEMAND	**2,394**	**2,532**	**2,349**	**2,018**	**1,726**	**1,558**
SUTTON COUNTY						
COLORADO BASIN						
COUNTY-OTHER	27	28	28	28	28	28
MINING	89	144	153	115	78	53
LIVESTOCK	214	214	214	214	214	214

Water User Group (WUG) Demand

REGION F	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
SUTTON COUNTY						
COLORADO BASIN						
IRRIGATION	292	286	280	275	269	264
COLORADO BASIN TOTAL DEMAND	**622**	**672**	**675**	**632**	**589**	**559**
RIO GRANDE BASIN						
SONORA	1,239	1,317	1,339	1,359	1,372	1,380
COUNTY-OTHER	140	145	146	148	150	151
MINING	357	576	610	458	311	211
LIVESTOCK	265	265	265	265	265	265
IRRIGATION	1,511	1,481	1,453	1,422	1,394	1,365
RIO GRANDE BASIN TOTAL DEMAND	**3,512**	**3,784**	**3,813**	**3,652**	**3,492**	**3,372**
SUTTON COUNTY TOTAL DEMAND	**4,134**	**4,456**	**4,488**	**4,284**	**4,081**	**3,931**
TOM GREEN COUNTY						
COLORADO BASIN						
CONCHO RURAL WATER CORPORATION	538	548	559	572	590	607
MILLERSVIEW-DOOLE WSC	272	279	285	293	302	311
SAN ANGELO	18,244	20,002	20,851	21,930	23,240	24,665
COUNTY-OTHER	1,306	1,323	1,379	1,428	1,474	1,518
MANUFACTURING	2,387	2,615	2,839	3,034	3,273	3,531
MINING	1,056	1,080	1,119	1,112	1,134	1,156
LIVESTOCK	1,688	1,688	1,688	1,688	1,688	1,688
IRRIGATION	93,579	93,350	93,121	92,889	92,660	92,432
COLORADO BASIN TOTAL DEMAND	**119,070**	**120,885**	**121,841**	**122,946**	**124,361**	**125,908**
TOM GREEN COUNTY TOTAL DEMAND	**119,070**	**120,885**	**121,841**	**122,946**	**124,361**	**125,908**
UPTON COUNTY						
COLORADO BASIN						
COUNTY-OTHER	28	30	30	30	31	31
MINING	1,610	1,381	1,092	732	437	305
LIVESTOCK	45	45	45	45	45	45
IRRIGATION	9,284	9,151	9,018	8,885	8,753	8,624
COLORADO BASIN TOTAL DEMAND	**10,967**	**10,607**	**10,185**	**9,692**	**9,266**	**9,005**
RIO GRANDE BASIN						
MCCAMEY	776	827	849	878	895	908
RANKIN	277	295	302	312	319	323
COUNTY-OTHER	64	66	67	68	69	70
MINING	2,627	2,253	1,781	1,194	713	498
LIVESTOCK	74	74	74	74	74	74
IRRIGATION	189	187	184	181	179	176
RIO GRANDE BASIN TOTAL DEMAND	**4,007**	**3,702**	**3,257**	**2,707**	**2,249**	**2,049**
UPTON COUNTY TOTAL DEMAND	**14,974**	**14,309**	**13,442**	**12,399**	**11,515**	**11,054**
WARD COUNTY						
RIO GRANDE BASIN						
MONAHANS	2,518	2,629	2,704	2,785	2,847	2,895
COUNTY-OTHER	749	772	786	809	826	840
MANUFACTURING	16	16	16	16	16	16
MINING	797	964	840	645	458	329
STEAM ELECTRIC POWER	3,779	4,418	5,196	6,145	7,303	8,269
LIVESTOCK	109	109	109	109	109	109

Water User Group (WUG) Demand

REGION F	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
WARD COUNTY						
RIO GRANDE BASIN						
IRRIGATION	5,613	5,543	5,473	5,403	5,334	5,266
RIO GRANDE BASIN TOTAL DEMAND	**13,581**	**14,451**	**15,124**	**15,912**	**16,893**	**17,724**
WARD COUNTY TOTAL DEMAND	**13,581**	**14,451**	**15,124**	**15,912**	**16,893**	**17,724**
WINKLER COUNTY						
COLORADO BASIN						
LIVESTOCK	3	3	3	3	3	3
COLORADO BASIN TOTAL DEMAND	**3**	**3**	**3**	**3**	**3**	**3**
RIO GRANDE BASIN						
KERMIT	1,774	1,766	1,762	1,780	1,793	1,807
WINK	360	389	414	443	467	488
COUNTY-OTHER	210	314	400	492	567	631
MINING	787	1,169	991	756	531	373
LIVESTOCK	348	348	348	348	348	348
IRRIGATION	4,912	4,912	4,912	4,912	4,912	4,912
RIO GRANDE BASIN TOTAL DEMAND	**8,391**	**8,898**	**8,827**	**8,731**	**8,618**	**8,559**
WINKLER COUNTY TOTAL DEMAND	**8,394**	**8,901**	**8,830**	**8,734**	**8,621**	**8,562**
REGION F TOTAL DEMAND	**837,974**	**847,093**	**845,539**	**844,035**	**846,193**	**853,311**

Water User Group (WUG) Existing Water Supply

REGION F	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
ANDREWS COUNTY							
COLORADO BASIN							
ANDREWS	F | OGALLALA AQUIFER | ANDREWS COUNTY	2,683	2,835	3,049	2,358	1,736	1,735
COUNTY-OTHER	F | OGALLALA AQUIFER | ANDREWS COUNTY	291	276	276	252	200	213
MANUFACTURING	F | OGALLALA AQUIFER | ANDREWS COUNTY	31	29	28	20	14	12
MINING	F | DOCKUM AQUIFER | ANDREWS COUNTY	13	13	13	13	13	13
MINING	F | OGALLALA AQUIFER | ANDREWS COUNTY	1,262	979	469	399	293	293
LIVESTOCK	F | COLORADO LIVESTOCK LOCAL SUPPLY	63	63	63	63	63	63
LIVESTOCK	F | DOCKUM AQUIFER | ANDREWS COUNTY	9	9	9	9	9	9
LIVESTOCK	F | OGALLALA AQUIFER | ANDREWS COUNTY	139	124	116	99	73	73
IRRIGATION	F | DIRECT REUSE	560	560	560	560	560	560
IRRIGATION	F | OGALLALA AQUIFER | ANDREWS COUNTY	8,870	7,901	7,414	6,323	4,643	4,636
COLORADO BASIN TOTAL EXISTING SUPPLY		**13,921**	**12,789**	**11,997**	**10,096**	**7,604**	**7,607**
RIO GRANDE BASIN							
COUNTY-OTHER	F | OGALLALA AQUIFER | ANDREWS COUNTY	2	2	2	1	1	1
MINING	F | OGALLALA AQUIFER | ANDREWS COUNTY	73	54	17	15	11	11
LIVESTOCK	F | RIO GRANDE LIVESTOCK LOCAL SUPPLY	14	14	14	14	14	14
IRRIGATION	F | OGALLALA AQUIFER | ANDREWS COUNTY	48	39	39	40	40	40
RIO GRANDE BASIN TOTAL EXISTING SUPPLY		**137**	**109**	**72**	**70**	**66**	**66**
ANDREWS COUNTY TOTAL EXISTING SUPPLY		**14,058**	**12,898**	**12,069**	**10,166**	**7,670**	**7,673**
BORDEN COUNTY							
BRAZOS BASIN							
COUNTY-OTHER	F | OGALLALA AQUIFER | BORDEN COUNTY	10	11	13	13	12	12
LIVESTOCK	F | BRAZOS LIVESTOCK LOCAL SUPPLY	17	17	17	17	17	17
IRRIGATION	F | OGALLALA AQUIFER | BORDEN COUNTY	259	259	261	261	261	261
BRAZOS BASIN TOTAL EXISTING SUPPLY		**286**	**287**	**291**	**291**	**290**	**290**
COLORADO BASIN							
COUNTY-OTHER	F | OGALLALA AQUIFER | BORDEN COUNTY	22	21	19	19	19	19
COUNTY-OTHER	F | OTHER AQUIFER | BORDEN COUNTY	74	74	74	74	74	74
COUNTY-OTHER	O | OGALLALA AQUIFER | DAWSON COUNTY	72	72	72	72	72	72
MINING	F | OTHER AQUIFER | BORDEN COUNTY	679	927	784	494	244	121
LIVESTOCK	F | COLORADO LIVESTOCK LOCAL SUPPLY	233	233	233	233	233	233
IRRIGATION	F | OGALLALA AQUIFER | BORDEN COUNTY	95	95	95	95	96	96
IRRIGATION	F | OTHER AQUIFER | BORDEN COUNTY	403	403	403	403	403	403
COLORADO BASIN TOTAL EXISTING SUPPLY		**1,578**	**1,825**	**1,680**	**1,390**	**1,141**	**1,018**
BORDEN COUNTY TOTAL EXISTING SUPPLY		**1,864**	**2,112**	**1,971**	**1,681**	**1,431**	**1,308**
BROWN COUNTY							
BRAZOS BASIN							
COUNTY-OTHER	F | TRINITY AQUIFER | BROWN COUNTY	7	7	7	7	7	7
LIVESTOCK	F | BRAZOS LIVESTOCK LOCAL SUPPLY	27	27	27	27	27	27
IRRIGATION	F | TRINITY AQUIFER | BROWN COUNTY	21	21	21	21	21	21
BRAZOS BASIN TOTAL EXISTING SUPPLY		**55**	**55**	**55**	**55**	**55**	**55**
COLORADO BASIN							
BANGS	F | BROWNWOOD LAKE/RESERVOIR	207	204	198	195	194	194

Water User Group (WUG) Existing Water Supply

REGION F	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
BROWN COUNTY							
COLORADO BASIN							
BROOKESMITH SUD	F | BROWNWOOD LAKE/RESERVOIR	1,185	1,181	1,156	1,142	1,139	1,139
BROWNWOOD	F | BROWNWOOD LAKE/RESERVOIR	3,755	3,750	3,677	3,636	3,629	3,629
EARLY	F | BROWNWOOD LAKE/RESERVOIR	290	285	275	269	268	268
ZEPHYR WSC	F | BROWNWOOD LAKE/RESERVOIR	379	374	364	359	357	357
COLEMAN COUNTY SUD	F | BROWNWOOD LAKE/RESERVOIR	9	8	8	8	8	8
COLEMAN COUNTY SUD	F | COLEMAN LAKE/RESERVOIR	0	0	0	0	0	0
COLEMAN COUNTY SUD	F | HORDS CREEK LAKE/RESERVOIR	0	0	0	0	0	0
COUNTY-OTHER	F | BROWNWOOD LAKE/RESERVOIR	125	125	125	125	125	125
COUNTY-OTHER	F | TRINITY AQUIFER | BROWN COUNTY	72	74	73	72	71	71
MANUFACTURING	F | BROWNWOOD LAKE/RESERVOIR	673	726	777	820	886	957
MINING	F | OTHER AQUIFER | BROWN COUNTY	31	31	31	31	31	31
MINING	F | TRINITY AQUIFER | BROWN COUNTY	912	917	920	921	917	913
LIVESTOCK	F | COLORADO LIVESTOCK LOCAL SUPPLY	1,296	1,296	1,296	1,296	1,296	1,296
LIVESTOCK	F | OTHER AQUIFER | BROWN COUNTY	45	45	45	45	45	45
IRRIGATION	F | BROWNWOOD LAKE/RESERVOIR	5,000	5,000	5,000	5,000	5,000	5,000
IRRIGATION	F | COLORADO RUN-OF-RIVER	284	284	284	284	284	284
IRRIGATION	F | TRINITY AQUIFER | BROWN COUNTY	1,025	1,019	1,017	1,016	1,020	1,024
COLORADO BASIN TOTAL EXISTING SUPPLY		**15,288**	**15,319**	**15,246**	**15,219**	**15,270**	**15,341**
BROWN COUNTY TOTAL EXISTING SUPPLY		**15,343**	**15,374**	**15,301**	**15,274**	**15,325**	**15,396**
COKE COUNTY							
COLORADO BASIN							
ROBERT LEE	F | EV SPENCE LAKE/RESERVOIR NON-SYSTEM PORTION	0	0	0	0	0	0
ROBERT LEE	F | OAK CREEK LAKE/RESERVOIR	0	0	0	0	0	0
ROBERT LEE	F | OTHER AQUIFER | COKE COUNTY	48	47	46	46	46	46
BRONTE	F | OAK CREEK LAKE/RESERVOIR	0	0	0	0	0	0
BRONTE	F | OTHER AQUIFER | COKE COUNTY	68	66	63	62	62	62
COUNTY-OTHER	F | EDWARDS-TRINITY-PLATEAU AQUIFER | COKE COUNTY	15	15	15	15	15	15
COUNTY-OTHER	F | OAK CREEK LAKE/RESERVOIR	0	0	0	0	0	0
COUNTY-OTHER	F | OTHER AQUIFER | COKE COUNTY	61	57	54	53	53	53
MINING	F | CRMWD DIVERTED WATER SYSTEM BRACKISH	0	0	0	0	0	0
MINING	F | OTHER AQUIFER | COKE COUNTY	170	170	170	170	170	170
STEAM ELECTRIC POWER		0	0	0	0	0	0
LIVESTOCK	F | COLORADO LIVESTOCK LOCAL SUPPLY	370	370	370	370	370	370
LIVESTOCK	F | EDWARDS-TRINITY-PLATEAU AQUIFER | COKE COUNTY	22	22	22	22	22	22
LIVESTOCK	F | OTHER AQUIFER | COKE COUNTY	39	39	39	39	39	39
IRRIGATION	F | COLORADO RUN-OF-RIVER	11	11	11	11	11	11
IRRIGATION	F | EDWARDS-TRINITY-PLATEAU AQUIFER | COKE COUNTY	47	47	47	47	47	47

Water User Group (WUG) Existing Water Supply

REGION F	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
COKE COUNTY							
COLORADO BASIN							
IRRIGATION	F | OTHER AQUIFER | COKE COUNTY	705	705	705	705	705	705
COLORADO BASIN TOTAL EXISTING SUPPLY		**1,556**	**1,549**	**1,542**	**1,540**	**1,540**	**1,540**
COKE COUNTY TOTAL EXISTING SUPPLY		**1,556**	**1,549**	**1,542**	**1,540**	**1,540**	**1,540**
COLEMAN COUNTY							
COLORADO BASIN							
BROOKESMITH SUD	F | BROWNWOOD LAKE/RESERVOIR	6	6	6	6	6	6
COLEMAN	F | COLEMAN LAKE/RESERVOIR	0	0	0	0	0	0
COLEMAN	F | HORDS CREEK LAKE/RESERVOIR	0	0	0	0	0	0
SANTA ANNA	F | BROWNWOOD LAKE/RESERVOIR	157	155	150	150	149	149
COLEMAN COUNTY SUD	F | BROWNWOOD LAKE/RESERVOIR	181	178	173	169	169	170
COLEMAN COUNTY SUD	F | COLEMAN LAKE/RESERVOIR	0	0	0	0	0	0
COLEMAN COUNTY SUD	F | HORDS CREEK LAKE/RESERVOIR	0	0	0	0	0	0
COUNTY-OTHER	F | COLEMAN LAKE/RESERVOIR	0	0	0	0	0	0
COUNTY-OTHER	F | HORDS CREEK LAKE/RESERVOIR	0	0	0	0	0	0
MANUFACTURING	F | COLEMAN LAKE/RESERVOIR	0	0	0	0	0	0
MANUFACTURING	F | HORDS CREEK LAKE/RESERVOIR	0	0	0	0	0	0
MINING	F | OTHER AQUIFER | COLEMAN COUNTY	46	46	46	46	46	46
LIVESTOCK	F | COLORADO LIVESTOCK LOCAL SUPPLY	943	943	943	943	943	943
LIVESTOCK	F | OTHER AQUIFER | COLEMAN COUNTY	133	133	133	133	133	133
IRRIGATION	F | COLEMAN LAKE/RESERVOIR	0	0	0	0	0	0
IRRIGATION	F | COLORADO RUN-OF-RIVER	27	27	27	27	27	27
COLORADO BASIN TOTAL EXISTING SUPPLY		**1,493**	**1,488**	**1,478**	**1,474**	**1,473**	**1,474**
COLEMAN COUNTY TOTAL EXISTING SUPPLY		**1,493**	**1,488**	**1,478**	**1,474**	**1,473**	**1,474**
CONCHO COUNTY							
COLORADO BASIN							
EDEN	F | HICKORY AQUIFER | CONCHO COUNTY	480	478	471	467	466	466
EDEN	F | OTHER AQUIFER | CONCHO COUNTY	0	0	0	0	0	0
MILLERSVIEW-DOOLE WSC	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	49	65	59	52	47	43
MILLERSVIEW-DOOLE WSC	F | HICKORY AQUIFER | MCCULLOCH COUNTY	63	61	60	59	58	57
COUNTY-OTHER	F | COLORADO RUN-OF-RIVER	37	37	37	37	37	37
COUNTY-OTHER	F | EDWARDS-TRINITY-PLATEAU AQUIFER | CONCHO COUNTY	40	40	40	40	40	40
COUNTY-OTHER	F | HICKORY AQUIFER | CONCHO COUNTY	10	10	9	9	9	9
COUNTY-OTHER	F | MOUNTAIN CREEK LAKE/RESERVOIR	0	0	0	0	0	0
COUNTY-OTHER	F | OTHER AQUIFER | CONCHO COUNTY	9	8	7	5	5	5
COUNTY-OTHER	F | SAN ANGELO LAKES LAKE/RESERVOIR SYSTEM	0	0	0	0	0	0
MINING	F | OTHER AQUIFER | CONCHO COUNTY	268	268	268	268	268	268
LIVESTOCK	F | COLORADO LIVESTOCK LOCAL SUPPLY	123	123	123	123	123	123
LIVESTOCK	F | EDWARDS-TRINITY-PLATEAU AQUIFER | CONCHO COUNTY	213	213	213	213	213	213

Water User Group (WUG) Existing Water Supply

REGION F	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
CONCHO COUNTY							
COLORADO BASIN							
LIVESTOCK	F | OTHER AQUIFER | CONCHO COUNTY	363	363	363	363	363	363
IRRIGATION	F | LIPAN AQUIFER | CONCHO COUNTY	1,893	1,893	1,893	1,893	1,893	1,893
IRRIGATION	F | OTHER AQUIFER | CONCHO COUNTY	2,592	2,592	2,592	2,592	2,592	2,592
COLORADO BASIN TOTAL EXISTING SUPPLY		**6,140**	**6,151**	**6,135**	**6,121**	**6,114**	**6,109**
CONCHO COUNTY TOTAL EXISTING SUPPLY		**6,140**	**6,151**	**6,135**	**6,121**	**6,114**	**6,109**
CRANE COUNTY							
RIO GRANDE BASIN							
CRANE	F | DIRECT REUSE	73	73	73	73	73	73
CRANE	F | PECOS VALLEY AQUIFER | WARD COUNTY	186	203	216	230	242	253
CRANE	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | CRANE COUNTY	1,003	1,063	1,112	1,165	1,211	1,250
COUNTY-OTHER	F | PECOS VALLEY AQUIFER | WARD COUNTY	27	33	39	44	49	53
COUNTY-OTHER	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | CRANE COUNTY	143	175	199	224	245	264
MINING	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | CRANE COUNTY	617	840	861	692	531	407
LIVESTOCK	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | CRANE COUNTY	151	151	151	151	151	151
LIVESTOCK	F | RIO GRANDE LIVESTOCK LOCAL SUPPLY	21	21	21	21	21	21
RIO GRANDE BASIN TOTAL EXISTING SUPPLY		**2,221**	**2,559**	**2,672**	**2,600**	**2,523**	**2,472**
CRANE COUNTY TOTAL EXISTING SUPPLY		**2,221**	**2,559**	**2,672**	**2,600**	**2,523**	**2,472**
CROCKETT COUNTY							
COLORADO BASIN							
LIVESTOCK	F | COLORADO LIVESTOCK LOCAL SUPPLY	11	11	11	11	11	11
LIVESTOCK	F | EDWARDS-TRINITY-PLATEAU AQUIFER | CROCKETT COUNTY	7	7	7	7	7	7
IRRIGATION	F | EDWARDS-TRINITY-PLATEAU AQUIFER | CROCKETT COUNTY	12	12	12	12	12	12
COLORADO BASIN TOTAL EXISTING SUPPLY		**30**	**30**	**30**	**30**	**30**	**30**
RIO GRANDE BASIN							
CROCKETT COUNTY WCID #1	F | EDWARDS-TRINITY-PLATEAU AQUIFER | CROCKETT COUNTY	1,533	1,642	1,655	1,672	1,678	1,681
COUNTY-OTHER	F | EDWARDS-TRINITY-PLATEAU AQUIFER | CROCKETT COUNTY	28	20	19	18	17	17
MINING	F | EDWARDS-TRINITY-PLATEAU AQUIFER | CROCKETT COUNTY	550	550	550	550	207	63
STEAM ELECTRIC POWER	F | EDWARDS-TRINITY-PLATEAU AQUIFER | PECOS COUNTY	0	0	0	0	0	0
LIVESTOCK	F | EDWARDS-TRINITY-PLATEAU AQUIFER | CROCKETT COUNTY	550	550	550	550	550	550
LIVESTOCK	F | RIO GRANDE LIVESTOCK LOCAL SUPPLY	127	127	127	127	127	127
IRRIGATION	F | EDWARDS-TRINITY-PLATEAU AQUIFER | CROCKETT COUNTY	467	458	449	443	434	425
RIO GRANDE BASIN TOTAL EXISTING SUPPLY		**3,255**	**3,347**	**3,350**	**3,360**	**3,013**	**2,863**
CROCKETT COUNTY TOTAL EXISTING SUPPLY		**3,285**	**3,377**	**3,380**	**3,390**	**3,043**	**2,893**
ECTOR COUNTY							
COLORADO BASIN							
ODESSA	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	6,625	9,818	9,783	9,739	9,654	9,530
ODESSA	F | DIRECT REUSE	1,964	2,476	2,645	2,830	3,030	3,245

Water User Group (WUG) Existing Water Supply

REGION F	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
ECTOR COUNTY							
COLORADO BASIN							
ODESSA	F | OGALLALA AQUIFER | MARTIN COUNTY	150	234	262	257	264	275
ODESSA	F | PECOS VALLEY AQUIFER | WARD COUNTY	3,551	5,475	5,610	5,748	5,871	5,978
ECTOR COUNTY UD	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	592	882	885	884	875	864
ECTOR COUNTY UD	F | DIRECT REUSE	62	97	100	103	105	107
ECTOR COUNTY UD	F | OGALLALA AQUIFER | MARTIN COUNTY	13	20	24	22	24	25
ECTOR COUNTY UD	F | PECOS VALLEY AQUIFER | WARD COUNTY	317	492	508	521	532	542
GREATER GARDENDALE WSC	F | EDWARDS-TRINITY-PLATEAU AQUIFER | ECTOR COUNTY	164	177	192	210	230	251
COUNTY-OTHER	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	365	541	542	541	539	539
COUNTY-OTHER	F | DIRECT REUSE	38	60	61	63	65	67
COUNTY-OTHER	F | EDWARDS-TRINITY-PLATEAU AQUIFER | ECTOR COUNTY	1,926	1,926	1,926	1,926	1,926	1,926
COUNTY-OTHER	F | OGALLALA AQUIFER | ANDREWS COUNTY	37	33	31	27	20	19
COUNTY-OTHER	F | OGALLALA AQUIFER | ECTOR COUNTY	428	677	700	700	700	700
COUNTY-OTHER	F | OGALLALA AQUIFER | MARTIN COUNTY	8	13	15	14	15	16
COUNTY-OTHER	F | PECOS VALLEY AQUIFER | WARD COUNTY	196	302	311	319	327	338
MANUFACTURING	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	212	284	278	252	227	201
MANUFACTURING	F | DIRECT REUSE	2,623	2,807	2,903	3,013	3,135	3,183
MANUFACTURING	F | EDWARDS-TRINITY-PLATEAU AQUIFER | ECTOR COUNTY	1,152	1,152	1,152	1,152	1,152	1,152
MANUFACTURING	F | OGALLALA AQUIFER | ANDREWS COUNTY	96	85	80	68	50	50
MANUFACTURING	F | OGALLALA AQUIFER | MARTIN COUNTY	5	7	7	7	6	6
MANUFACTURING	F | PECOS VALLEY AQUIFER | WARD COUNTY	114	158	159	149	138	127
MINING	F | DIRECT REUSE	1,060	1,195	1,144	993	806	675
MINING	F | EDWARDS-TRINITY-PLATEAU AQUIFER | ECTOR COUNTY	100	100	73	0	0	0
MINING	F | OGALLALA AQUIFER | ANDREWS COUNTY	218	155	73	62	46	46
STEAM ELECTRIC POWER	F | DIRECT REUSE	500	500	500	500	500	500
STEAM ELECTRIC POWER	F | OGALLALA AQUIFER | ANDREWS COUNTY	667	568	461	393	290	289
STEAM ELECTRIC POWER	O | OGALLALA AQUIFER | GAINES COUNTY	1,650	1,700	1,850	1,850	1,850	1,850
LIVESTOCK	F | COLORADO LIVESTOCK LOCAL SUPPLY	11	11	11	11	11	11
LIVESTOCK	F | EDWARDS-TRINITY-PLATEAU AQUIFER | ECTOR COUNTY	204	204	204	204	204	204
LIVESTOCK	F | OGALLALA AQUIFER | ECTOR COUNTY	10	10	10	10	10	10
IRRIGATION	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	127	171	155	140	126	115
IRRIGATION	F | DIRECT REUSE	13	19	18	16	15	14
IRRIGATION	F | EDWARDS-TRINITY-PLATEAU AQUIFER | ECTOR COUNTY	364	364	364	264	120	0
IRRIGATION	F | EV SPENCE LAKE/RESERVOIR NON-SYSTEM PORTION	0	0	0	0	0	0
IRRIGATION	F | OGALLALA AQUIFER | ECTOR COUNTY	400	400	400	400	400	400

Water User Group (WUG) Existing Water Supply

REGION F	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
ECTOR COUNTY							
COLORADO BASIN							
IRRIGATION	F | OGALLALA AQUIFER | MARTIN COUNTY	3	4	4	3	3	3
IRRIGATION	F | PECOS VALLEY AQUIFER | WARD COUNTY	68	96	89	83	77	72
COLORADO BASIN TOTAL EXISTING SUPPLY		**26,033**	**33,213**	**33,530**	**33,474**	**33,343**	**33,330**
RIO GRANDE BASIN							
COUNTY-OTHER	F | EDWARDS-TRINITY-PLATEAU AQUIFER | ECTOR COUNTY	250	250	250	250	250	250
MANUFACTURING	F | DIRECT REUSE	187	205	221	233	246	259
MANUFACTURING	F | DOCKUM AQUIFER | ECTOR COUNTY	8	8	8	8	8	8
MANUFACTURING	F | EDWARDS-TRINITY-PLATEAU AQUIFER | ECTOR COUNTY	118	118	118	118	118	118
MANUFACTURING	F | PECOS VALLEY AQUIFER | ECTOR COUNTY	19	19	19	19	19	19
MINING	F | DIRECT REUSE	522	536	397	266	212	186
MINING	F | DOCKUM AQUIFER | ECTOR COUNTY	348	348	348	348	348	349
LIVESTOCK	F | DOCKUM AQUIFER | ECTOR COUNTY	18	18	18	18	18	18
LIVESTOCK	F | PECOS VALLEY AQUIFER | ECTOR COUNTY	25	25	25	25	25	25
IRRIGATION	F | EDWARDS-TRINITY-PLATEAU AQUIFER | ECTOR COUNTY	136	136	136	136	136	136
IRRIGATION	F | PECOS VALLEY AQUIFER | ECTOR COUNTY	7	6	4	2	0	0
RIO GRANDE BASIN TOTAL EXISTING SUPPLY		**1,638**	**1,669**	**1,544**	**1,423**	**1,380**	**1,368**
ECTOR COUNTY TOTAL EXISTING SUPPLY		**27,671**	**34,882**	**35,074**	**34,897**	**34,723**	**34,698**
GLASSCOCK COUNTY							
COLORADO BASIN							
COUNTY-OTHER	F | EDWARDS-TRINITY-PLATEAU AQUIFER | GLASSCOCK COUNTY	160	163	159	158	158	158
COUNTY-OTHER	F | OGALLALA AQUIFER | GLASSCOCK COUNTY	2	2	2	2	2	2
MINING	F | EDWARDS-TRINITY-PLATEAU AQUIFER | GLASSCOCK COUNTY	3,423	3,101	2,384	1,679	1,100	798
LIVESTOCK	F | COLORADO LIVESTOCK LOCAL SUPPLY	40	40	40	40	40	40
LIVESTOCK	F | EDWARDS-TRINITY-PLATEAU AQUIFER | GLASSCOCK COUNTY	198	198	198	198	198	198
LIVESTOCK	F | OGALLALA AQUIFER | GLASSCOCK COUNTY	24	24	24	24	24	24
IRRIGATION	F | EDWARDS-TRINITY-PLATEAU AQUIFER | GLASSCOCK COUNTY	49,388	48,933	48,477	48,020	47,568	47,120
IRRIGATION	F | OGALLALA AQUIFER | GLASSCOCK COUNTY	7,319	7,319	7,319	7,319	7,319	7,319
COLORADO BASIN TOTAL EXISTING SUPPLY		**60,554**	**59,780**	**58,603**	**57,440**	**56,409**	**55,659**
GLASSCOCK COUNTY TOTAL EXISTING SUPPLY		**60,554**	**59,780**	**58,603**	**57,440**	**56,409**	**55,659**
HOWARD COUNTY							
COLORADO BASIN							
BIG SPRING	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	1,960	2,695	2,442	2,189	1,974	1,786
BIG SPRING	F | DIRECT REUSE	207	297	276	255	236	221
BIG SPRING	F | OGALLALA AQUIFER | MARTIN COUNTY	44	65	66	58	54	51
BIG SPRING	F | PECOS VALLEY AQUIFER | WARD COUNTY	1,051	1,503	1,400	1,292	1,199	1,121
COAHOMA	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	58	80	73	65	58	53
COAHOMA	F | DIRECT REUSE	6	9	8	8	7	7
COAHOMA	F | OGALLALA AQUIFER | MARTIN COUNTY	1	2	2	2	2	2

Water User Group (WUG) Existing Water Supply

REGION F	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
HOWARD COUNTY							
COLORADO BASIN							
COAHOMA	F | PECOS VALLEY AQUIFER | WARD COUNTY	31	45	42	38	36	33
COUNTY-OTHER	F | DOCKUM AQUIFER | HOWARD COUNTY	12	12	12	12	12	12
COUNTY-OTHER	F | EDWARDS-TRINITY-PLATEAU AQUIFER | HOWARD COUNTY	94	94	94	94	94	94
COUNTY-OTHER	F | OGALLALA AQUIFER | HOWARD COUNTY	341	302	302	302	302	302
MANUFACTURING	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	478	643	581	526	474	430
MANUFACTURING	F | DIRECT REUSE	50	71	66	61	57	52
MANUFACTURING	F | EDWARDS-TRINITY-PLATEAU AQUIFER | HOWARD COUNTY	334	334	334	334	334	334
MANUFACTURING	F | OGALLALA AQUIFER | HOWARD COUNTY	300	265	265	265	265	265
MANUFACTURING	F | OGALLALA AQUIFER | MARTIN COUNTY	11	15	16	14	13	12
MANUFACTURING	F | PECOS VALLEY AQUIFER | WARD COUNTY	256	359	333	310	288	270
MINING	F | CRMWD DIVERTED WATER SYSTEM BRACKISH	0	0	0	0	0	0
MINING	F | DOCKUM AQUIFER | HOWARD COUNTY	106	106	106	106	106	106
MINING	F | OGALLALA AQUIFER | HOWARD COUNTY	57	50	50	50	50	50
LIVESTOCK	F | COLORADO LIVESTOCK LOCAL SUPPLY	62	62	62	62	62	62
LIVESTOCK	F | DOCKUM AQUIFER | HOWARD COUNTY	9	9	9	9	9	9
LIVESTOCK	F | OGALLALA AQUIFER | HOWARD COUNTY	131	116	116	116	116	116
IRRIGATION	F | DOCKUM AQUIFER | HOWARD COUNTY	41	41	41	41	41	41
IRRIGATION	F | EDWARDS-TRINITY-PLATEAU AQUIFER | HOWARD COUNTY	1,222	1,222	1,222	1,222	1,222	1,222
IRRIGATION	F | OGALLALA AQUIFER | HOWARD COUNTY	2,226	1,967	1,967	1,967	1,967	1,967
COLORADO BASIN TOTAL EXISTING SUPPLY		**9,088**	**10,364**	**9,885**	**9,398**	**8,978**	**8,618**
HOWARD COUNTY TOTAL EXISTING SUPPLY		**9,088**	**10,364**	**9,885**	**9,398**	**8,978**	**8,618**
IRION COUNTY							
COLORADO BASIN							
MERTZON	F | EDWARDS-TRINITY-PLATEAU AQUIFER | IRION COUNTY	102	99	96	95	95	95
COUNTY-OTHER	F | EDWARDS-TRINITY-PLATEAU AQUIFER | IRION COUNTY	105	102	98	97	97	97
MINING	F | EDWARDS-TRINITY-PLATEAU AQUIFER | IRION COUNTY	1,373	1,373	1,373	1,373	713	342
LIVESTOCK	F | COLORADO LIVESTOCK LOCAL SUPPLY	57	57	57	57	57	57
LIVESTOCK	F | EDWARDS-TRINITY-PLATEAU AQUIFER | IRION COUNTY	204	204	204	204	204	204
LIVESTOCK	F | OTHER AQUIFER | IRION COUNTY	7	7	7	7	7	7
IRRIGATION	F | COLORADO RUN-OF-RIVER	221	221	221	221	221	221
IRRIGATION	F | OTHER AQUIFER | IRION COUNTY	887	855	822	790	758	727
COLORADO BASIN TOTAL EXISTING SUPPLY		**2,956**	**2,918**	**2,878**	**2,844**	**2,152**	**1,750**
IRION COUNTY TOTAL EXISTING SUPPLY		**2,956**	**2,918**	**2,878**	**2,844**	**2,152**	**1,750**
KIMBLE COUNTY							
COLORADO BASIN							
JUNCTION	F | COLORADO RUN-OF-RIVER	0	0	0	0	0	0
COUNTY-OTHER	F | COLORADO RUN-OF-RIVER	0	0	0	0	0	0
COUNTY-OTHER	F | EDWARDS-TRINITY-PLATEAU AQUIFER | KIMBLE COUNTY	242	236	229	226	225	225

Water User Group (WUG) Existing Water Supply

REGION F	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
KIMBLE COUNTY							
COLORADO BASIN							
MANUFACTURING	F | COLORADO RUN-OF-RIVER	0	0	0	0	0	0
MANUFACTURING	F | EDWARDS-TRINITY-PLATEAU AQUIFER | KIMBLE COUNTY	2	2	2	2	2	2
MINING	F | COLORADO RUN-OF-RIVER	14	14	14	14	14	14
MINING	F | EDWARDS-TRINITY-PLATEAU AQUIFER | KIMBLE COUNTY	5	5	5	5	5	5
LIVESTOCK	F | COLORADO LIVESTOCK LOCAL SUPPLY	89	89	89	89	89	89
LIVESTOCK	F | EDWARDS-TRINITY-PLATEAU AQUIFER | KIMBLE COUNTY	313	313	313	313	313	313
IRRIGATION	F | COLORADO RUN-OF-RIVER	1,134	1,134	1,134	1,134	1,134	1,134
IRRIGATION	F | EDWARDS-TRINITY-PLATEAU AQUIFER | KIMBLE COUNTY	309	309	309	309	309	309
COLORADO BASIN TOTAL EXISTING SUPPLY		**2,108**	**2,102**	**2,095**	**2,092**	**2,091**	**2,091**
KIMBLE COUNTY TOTAL EXISTING SUPPLY		**2,108**	**2,102**	**2,095**	**2,092**	**2,091**	**2,091**
LOVING COUNTY							
RIO GRANDE BASIN							
COUNTY-OTHER	F | PECOS VALLEY AQUIFER | LOVING COUNTY	11	10	10	10	10	10
MINING	F | PECOS VALLEY AQUIFER | LOVING COUNTY	792	1,058	934	762	601	474
LIVESTOCK	F | DOCKUM AQUIFER | LOVING COUNTY	22	22	22	22	22	22
LIVESTOCK	F | PECOS VALLEY AQUIFER | LOVING COUNTY	69	69	69	69	69	69
LIVESTOCK	F | RIO GRANDE LIVESTOCK LOCAL SUPPLY	10	10	10	10	10	10
RIO GRANDE BASIN TOTAL EXISTING SUPPLY		**904**	**1,169**	**1,045**	**873**	**712**	**585**
LOVING COUNTY TOTAL EXISTING SUPPLY		**904**	**1,169**	**1,045**	**873**	**712**	**585**
MARTIN COUNTY							
COLORADO BASIN							
STANTON	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	172	248	235	223	208	194
STANTON	F | DIRECT REUSE	18	27	27	26	25	24
STANTON	F | OGALLALA AQUIFER | MARTIN COUNTY	14	16	17	16	16	17
STANTON	F | PECOS VALLEY AQUIFER | WARD COUNTY	90	138	134	131	127	122
COUNTY-OTHER	F | OGALLALA AQUIFER | MARTIN COUNTY	131	141	160	159	167	175
MANUFACTURING	F | OGALLALA AQUIFER | MARTIN COUNTY	16	16	18	18	19	21
MINING	F | OGALLALA AQUIFER | MARTIN COUNTY	488	495	541	515	522	531
LIVESTOCK	F | COLORADO LIVESTOCK LOCAL SUPPLY	67	67	67	67	67	67
LIVESTOCK	F | OGALLALA AQUIFER | MARTIN COUNTY	23	24	26	25	25	26
IRRIGATION	F | OGALLALA AQUIFER | MARTIN COUNTY	11,165	11,122	11,942	11,150	11,106	11,079
COLORADO BASIN TOTAL EXISTING SUPPLY		**12,184**	**12,294**	**13,167**	**12,330**	**12,282**	**12,256**
MARTIN COUNTY TOTAL EXISTING SUPPLY		**12,184**	**12,294**	**13,167**	**12,330**	**12,282**	**12,256**
MASON COUNTY							
COLORADO BASIN							
MASON	F | HICKORY AQUIFER | MASON COUNTY	0	0	0	0	0	0
COUNTY-OTHER	F | ELLENBURGER-SAN SABA AQUIFER | MASON COUNTY	57	48	48	48	48	48
COUNTY-OTHER	F | HICKORY AQUIFER | MASON COUNTY	132	134	128	125	124	124
COUNTY-OTHER	F | MARBLE FALLS AQUIFER | MASON COUNTY	36	36	36	36	36	36
MINING	F | HICKORY AQUIFER | MASON COUNTY	1,023	941	708	568	460	372

Water User Group (WUG) Existing Water Supply

REGION F	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
MASON COUNTY							
COLORADO BASIN							
MINING	K | HIGHLAND LAKES LAKE/RESERVOIR SYSTEM	2	2	2	2	2	2
LIVESTOCK	F | COLORADO LIVESTOCK LOCAL SUPPLY	498	498	498	498	498	498
LIVESTOCK	F | ELLENBURGER-SAN SABA AQUIFER | MASON COUNTY	75	75	75	75	75	75
LIVESTOCK	F | HICKORY AQUIFER | MASON COUNTY	675	675	675	675	675	675
IRRIGATION	F | HICKORY AQUIFER | MASON COUNTY	8,294	8,174	8,054	7,935	7,816	7,699
IRRIGATION	K | HIGHLAND LAKES LAKE/RESERVOIR SYSTEM	59	59	59	59	59	59
COLORADO BASIN TOTAL EXISTING SUPPLY		**10,851**	**10,642**	**10,283**	**10,021**	**9,793**	**9,588**
MASON COUNTY TOTAL EXISTING SUPPLY		**10,851**	**10,642**	**10,283**	**10,021**	**9,793**	**9,588**
MCCULLOCH COUNTY							
COLORADO BASIN							
BRADY	F | BRADY CREEK LAKE/RESERVOIR	0	0	0	0	0	0
BRADY	F | HICKORY AQUIFER | MCCULLOCH COUNTY	0	0	0	0	0	0
MILLERSVIEW-DOOLE WSC	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	77	106	95	86	77	70
MILLERSVIEW-DOOLE WSC	F | HICKORY AQUIFER | MCCULLOCH COUNTY	97	98	97	96	95	94
RICHLAND SUD	K | ELLENBURGER-SAN SABA AQUIFER | SAN SABA COUNTY	117	116	117	118	117	116
RICHLAND SUD	K | MARBLE FALLS AQUIFER | SAN SABA COUNTY	196	195	195	198	196	194
COUNTY-OTHER	F | HICKORY AQUIFER | MCCULLOCH COUNTY	57	59	59	59	59	59
MANUFACTURING	F | HICKORY AQUIFER | MCCULLOCH COUNTY	299	323	348	370	402	435
MINING	F | ELLENBURGER-SAN SABA AQUIFER | MCCULLOCH COUNTY	4,883	4,883	4,883	4,883	4,602	3,998
MINING	F | HICKORY AQUIFER | MCCULLOCH COUNTY	426	398	320	272	234	203
LIVESTOCK	F | COLORADO LIVESTOCK LOCAL SUPPLY	164	164	164	164	164	164
LIVESTOCK	F | EDWARDS-TRINITY-PLATEAU AQUIFER | MCCULLOCH COUNTY	16	16	16	16	16	16
LIVESTOCK	F | ELLENBURGER-SAN SABA AQUIFER | MCCULLOCH COUNTY	355	355	355	355	355	355
LIVESTOCK	F | HICKORY AQUIFER | MCCULLOCH COUNTY	36	36	36	36	36	36
LIVESTOCK	F | MARBLE FALLS AQUIFER | MCCULLOCH COUNTY	15	15	15	15	15	15
LIVESTOCK	F | OTHER AQUIFER | MCCULLOCH COUNTY	104	104	104	104	104	104
IRRIGATION	F | COLORADO RUN-OF-RIVER	69	69	69	69	69	69
IRRIGATION	F | HICKORY AQUIFER | MCCULLOCH COUNTY	1,331	1,332	1,343	1,348	1,349	1,348
COLORADO BASIN TOTAL EXISTING SUPPLY		**8,242**	**8,269**	**8,216**	**8,189**	**7,890**	**7,276**
MCCULLOCH COUNTY TOTAL EXISTING SUPPLY		**8,242**	**8,269**	**8,216**	**8,189**	**7,890**	**7,276**
MENARD COUNTY							
COLORADO BASIN							
MENARD	F | COLORADO RUN-OF-RIVER	136	136	136	136	136	136
COUNTY-OTHER	F | EDWARDS-TRINITY-PLATEAU AQUIFER | MENARD COUNTY	72	70	70	69	69	69
COUNTY-OTHER	F | ELLENBURGER-SAN SABA AQUIFER | MENARD COUNTY	5	4	2	1	1	1
COUNTY-OTHER	F | OTHER AQUIFER | MENARD COUNTY	18	18	17	17	17	17
MANUFACTURING	F | COLORADO RUN-OF-RIVER	3	3	3	3	3	3

Water User Group (WUG) Existing Water Supply

REGION F	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
MENARD COUNTY							
COLORADO BASIN							
MINING	F | EDWARDS-TRINITY-PLATEAU AQUIFER | MENARD COUNTY	786	771	672	577	517	422
MINING	F | ELLENBURGER-SAN SABA AQUIFER | MENARD COUNTY	300	300	280	250	200	200
LIVESTOCK	F | COLORADO LIVESTOCK LOCAL SUPPLY	86	86	86	86	86	86
LIVESTOCK	F | EDWARDS-TRINITY-PLATEAU AQUIFER | MENARD COUNTY	300	300	300	300	300	300
LIVESTOCK	F | ELLENBURGER-SAN SABA AQUIFER | MENARD COUNTY	6	6	6	6	6	6
LIVESTOCK	F | OTHER AQUIFER | MENARD COUNTY	34	34	34	34	34	34
IRRIGATION	F | COLORADO RUN-OF-RIVER	2,104	2,104	2,104	2,104	2,104	2,104
COLORADO BASIN TOTAL EXISTING SUPPLY		**3,850**	**3,832**	**3,710**	**3,583**	**3,473**	**3,378**
MENARD COUNTY TOTAL EXISTING SUPPLY		**3,850**	**3,832**	**3,710**	**3,583**	**3,473**	**3,378**
MIDLAND COUNTY							
COLORADO BASIN							
ODESSA	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	130	215	229	239	246	249
ODESSA	F | DIRECT REUSE	39	54	62	70	77	85
ODESSA	F | OGALLALA AQUIFER | MARTIN COUNTY	3	5	6	6	7	7
ODESSA	F | PECOS VALLEY AQUIFER | WARD COUNTY	70	120	131	141	150	156
MIDLAND	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	5,991	0	0	0	0	0
MIDLAND	F | DIRECT REUSE	763	130	130	130	130	130
MIDLAND	F | EDWARDS-TRINITY-PLATEAU AQUIFER | MIDLAND COUNTY	560	560	0	0	0	0
MIDLAND	F | EV SPENCE LAKE/RESERVOIR NON-SYSTEM PORTION	0	0	0	0	0	0
MIDLAND	F | OGALLALA AQUIFER | ANDREWS COUNTY	718	639	0	0	0	0
MIDLAND	F | OGALLALA AQUIFER | MARTIN COUNTY	1,475	1,358	0	0	0	0
MIDLAND	F | OH IVIE LAKE/RESERVOIR NON-SYSTEM PORTION	5,905	5,755	5,592	5,424	5,257	5,089
MIDLAND	F | PECOS VALLEY AQUIFER | WARD COUNTY	3,212	0	0	0	0	0
MIDLAND	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | WINKLER COUNTY	11,200	11,200	11,200	11,200	11,200	11,200
GREATER GARDENDALE WSC	F | EDWARDS-TRINITY-PLATEAU AQUIFER | ECTOR COUNTY	84	93	103	114	125	137
COUNTY-OTHER	F | EDWARDS-TRINITY-PLATEAU AQUIFER | MIDLAND COUNTY	3,033	3,333	3,635	3,968	4,326	4,682
COUNTY-OTHER	F | OGALLALA AQUIFER | MIDLAND COUNTY	1,180	1,296	1,414	1,543	1,682	1,821
COUNTY-OTHER	F | OH IVIE LAKE/RESERVOIR NON-SYSTEM PORTION	19	12	9	9	8	7
MANUFACTURING	F | OGALLALA AQUIFER | MIDLAND COUNTY	195	226	248	265	289	315
MANUFACTURING	F | OH IVIE LAKE/RESERVOIR NON-SYSTEM PORTION	35	24	21	20	20	20
MINING	F | EDWARDS-TRINITY-PLATEAU AQUIFER | MIDLAND COUNTY	2,693	2,218	1,630	974	556	443
MINING	F | OGALLALA AQUIFER | MIDLAND COUNTY	1,200	1,200	1,000	800	500	300
LIVESTOCK	F | COLORADO LIVESTOCK LOCAL SUPPLY	117	117	117	117	117	117
LIVESTOCK	F | EDWARDS-TRINITY-PLATEAU AQUIFER | MIDLAND COUNTY	205	205	205	205	205	205
LIVESTOCK	F | OGALLALA AQUIFER | MIDLAND COUNTY	72	72	72	72	72	72

Water User Group (WUG) Existing Water Supply

REGION F	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
MIDLAND COUNTY							
COLORADO BASIN							
IRRIGATION	F | EDWARDS-TRINITY-PLATEAU AQUIFER | MIDLAND COUNTY	12,645	12,546	12,447	12,348	12,250	12,153
IRRIGATION	F | OGALLALA AQUIFER | MIDLAND COUNTY	20,631	20,470	20,309	20,147	19,987	19,828
COLORADO BASIN TOTAL EXISTING SUPPLY		**72,175**	**61,848**	**58,560**	**57,792**	**57,204**	**57,016**
MIDLAND COUNTY TOTAL EXISTING SUPPLY		**72,175**	**61,848**	**58,560**	**57,792**	**57,204**	**57,016**
MITCHELL COUNTY							
COLORADO BASIN							
COLORADO CITY	F | DOCKUM AQUIFER | MITCHELL COUNTY	1,287	1,417	1,427	1,438	1,451	1,466
LORAINE	F | DOCKUM AQUIFER | MITCHELL COUNTY	73	72	71	72	72	73
COUNTY-OTHER	F | DOCKUM AQUIFER | MITCHELL COUNTY	843	852	857	861	868	875
MINING	F | DOCKUM AQUIFER | MITCHELL COUNTY	593	738	632	493	375	290
STEAM ELECTRIC POWER	F | COLORADO CITY-CHAMPION LAKE/RESERVOIR SYSTEM	0	0	0	0	0	0
LIVESTOCK	F | COLORADO LIVESTOCK LOCAL SUPPLY	381	381	381	381	381	381
LIVESTOCK	F | DOCKUM AQUIFER | MITCHELL COUNTY	30	30	30	30	30	30
LIVESTOCK	F | OTHER AQUIFER | MITCHELL COUNTY	2	2	2	2	2	2
IRRIGATION	F | COLORADO RUN-OF-RIVER	14	14	14	14	14	14
IRRIGATION	F | DIRECT REUSE	552	552	552	552	552	552
IRRIGATION	F | DOCKUM AQUIFER | MITCHELL COUNTY	10,953	10,894	10,838	10,782	10,726	10,670
COLORADO BASIN TOTAL EXISTING SUPPLY		**14,728**	**14,952**	**14,804**	**14,625**	**14,471**	**14,353**
MITCHELL COUNTY TOTAL EXISTING SUPPLY		**14,728**	**14,952**	**14,804**	**14,625**	**14,471**	**14,353**
PECOS COUNTY							
RIO GRANDE BASIN							
FORT STOCKTON	F | EDWARDS-TRINITY-PLATEAU AQUIFER | PECOS COUNTY	4,910	5,230	5,548	5,853	6,138	6,398
IRAAN	F | EDWARDS-TRINITY-PLATEAU AQUIFER | PECOS COUNTY	459	486	513	541	567	591
PECOS COUNTY WCID #1	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | PECOS COUNTY	439	456	475	496	519	540
COUNTY-OTHER	F | EDWARDS-TRINITY-PLATEAU AQUIFER | PECOS COUNTY	378	389	412	435	456	475
COUNTY-OTHER	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | PECOS COUNTY	37	38	41	43	45	47
MANUFACTURING	F | EDWARDS-TRINITY-PLATEAU AQUIFER | PECOS COUNTY	103	103	103	103	103	103
MINING	F | EDWARDS-TRINITY-PLATEAU AQUIFER | PECOS COUNTY	552	854	858	689	538	419
MINING	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | PECOS COUNTY	138	214	214	172	134	105
LIVESTOCK	F | EDWARDS-TRINITY-PLATEAU AQUIFER | PECOS COUNTY	660	660	660	660	660	660
LIVESTOCK	F | OTHER AQUIFER | PECOS COUNTY	4	4	4	4	4	4
LIVESTOCK	F | PECOS VALLEY AQUIFER | PECOS COUNTY	212	212	212	212	212	212
LIVESTOCK	F | RIO GRANDE LIVESTOCK LOCAL SUPPLY	52	52	52	52	52	52
LIVESTOCK	F | RUSTLER AQUIFER | PECOS COUNTY	4	4	4	4	4	4
IRRIGATION	F | EDWARDS-TRINITY-PLATEAU AQUIFER | PECOS COUNTY	74,416	74,416	74,416	74,416	74,416	74,416
IRRIGATION	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | PECOS COUNTY	43,209	43,209	43,209	43,209	43,209	43,209
IRRIGATION	F | RED BLUFF LAKE/RESERVOIR	1,558	1,559	1,560	1,561	1,562	1,563

Water User Group (WUG) Existing Water Supply

REGION F	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
PECOS COUNTY							
RIO GRANDE BASIN							
IRRIGATION	F | RIO GRANDE RUN-OF-RIVER	4,444	4,444	4,444	4,444	4,444	4,444
IRRIGATION	F | RUSTLER AQUIFER | PECOS COUNTY	2,401	2,401	2,401	2,401	2,401	2,401
RIO GRANDE BASIN TOTAL EXISTING SUPPLY		**133,976**	**134,731**	**135,126**	**135,295**	**135,464**	**135,643**
PECOS COUNTY TOTAL EXISTING SUPPLY		**133,976**	**134,731**	**135,126**	**135,295**	**135,464**	**135,643**
REAGAN COUNTY							
COLORADO BASIN							
BIG LAKE	F | EDWARDS-TRINITY-PLATEAU AQUIFER | REAGAN COUNTY	731	796	835	878	907	929
COUNTY-OTHER	F | EDWARDS-TRINITY-PLATEAU AQUIFER | REAGAN COUNTY	70	76	79	82	85	87
MINING	F | EDWARDS-TRINITY-PLATEAU AQUIFER | REAGAN COUNTY	3,916	3,157	2,285	1,308	492	185
LIVESTOCK	F | COLORADO LIVESTOCK LOCAL SUPPLY	41	41	41	41	41	41
LIVESTOCK	F | DOCKUM AQUIFER | REAGAN COUNTY	10	10	10	10	10	10
LIVESTOCK	F | EDWARDS-TRINITY-PLATEAU AQUIFER | REAGAN COUNTY	204	204	204	204	204	204
IRRIGATION	F | EDWARDS-TRINITY-PLATEAU AQUIFER | REAGAN COUNTY	19,130	18,808	18,486	18,164	17,848	17,537
COLORADO BASIN TOTAL EXISTING SUPPLY		**24,102**	**23,092**	**21,940**	**20,687**	**19,587**	**18,993**
RIO GRANDE BASIN							
MINING	F | EDWARDS-TRINITY-PLATEAU AQUIFER | REAGAN COUNTY	310	253	187	113	52	29
LIVESTOCK	F | EDWARDS-TRINITY-PLATEAU AQUIFER | REAGAN COUNTY	8	8	8	8	8	8
LIVESTOCK	F | RIO GRANDE LIVESTOCK LOCAL SUPPLY	3	3	3	3	3	3
RIO GRANDE BASIN TOTAL EXISTING SUPPLY		**321**	**264**	**198**	**124**	**63**	**40**
REAGAN COUNTY TOTAL EXISTING SUPPLY		**24,423**	**23,356**	**22,138**	**20,811**	**19,650**	**19,033**
REEVES COUNTY							
RIO GRANDE BASIN							
MADERA VALLEY WSC	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | REEVES COUNTY	586	616	644	665	682	694
PECOS	F | DOCKUM AQUIFER | REEVES COUNTY	1,281	1,439	1,596	1,711	1,804	1,877
PECOS	F | PECOS VALLEY AQUIFER | WARD COUNTY	1,709	1,704	1,700	1,696	1,687	1,679
COUNTY-OTHER	E | EDWARDS-TRINITY-PLATEAU AQUIFER | JEFF DAVIS COUNTY	198	198	198	198	198	198
COUNTY-OTHER	E | RIO GRANDE OTHER LOCAL SUPPLY	0	0	0	0	0	0
COUNTY-OTHER	F | DOCKUM AQUIFER | REEVES COUNTY	43	45	48	49	50	51
COUNTY-OTHER	F | EDWARDS-TRINITY-PLATEAU AQUIFER | REEVES COUNTY	204	226	244	258	268	277
COUNTY-OTHER	F | PECOS VALLEY AQUIFER | WARD COUNTY	58	61	63	65	67	68
MANUFACTURING	F | DOCKUM AQUIFER | REEVES COUNTY	84	86	88	89	94	100
MANUFACTURING	F | PECOS VALLEY AQUIFER | WARD COUNTY	113	115	117	119	126	133
MINING	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | REEVES COUNTY	1,531	2,632	2,537	2,068	1,632	1,288
LIVESTOCK	F | DOCKUM AQUIFER | REEVES COUNTY	40	40	40	40	40	40
LIVESTOCK	F | EDWARDS-TRINITY-PLATEAU AQUIFER | REEVES COUNTY	279	279	279	279	279	279
LIVESTOCK	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | REEVES COUNTY	438	438	438	438	438	438
LIVESTOCK	F | RIO GRANDE LIVESTOCK LOCAL SUPPLY	66	66	66	66	66	66

Water User Group (WUG) Existing Water Supply

REGION F	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
REEVES COUNTY							
RIO GRANDE BASIN							
LIVESTOCK	F | RUSTLER AQUIFER | REEVES COUNTY	40	40	40	40	40	40
IRRIGATION	F | BALMORHEA LAKE/RESERVOIR	21,844	21,844	21,844	21,844	21,844	21,844
IRRIGATION	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | REEVES COUNTY	60,403	59,623	58,841	58,061	57,288	56,521
IRRIGATION	F | RED BLUFF LAKE/RESERVOIR	9,110	9,110	9,110	9,110	9,110	9,110
RIO GRANDE BASIN TOTAL EXISTING SUPPLY		**98,027**	**98,562**	**97,893**	**96,796**	**95,713**	**94,703**
REEVES COUNTY TOTAL EXISTING SUPPLY		**98,027**	**98,562**	**97,893**	**96,796**	**95,713**	**94,703**
RUNNELS COUNTY							
COLORADO BASIN							
BALLINGER	F | BALLINGER/MOONEN LAKE/RESERVOIR	0	0	0	0	0	0
BALLINGER	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	174	237	217	0	0	0
MILES	F | SAN ANGELO LAKES LAKE/RESERVOIR SYSTEM	0	0	0	0	0	0
MILLERSVIEW-DOOLE WSC	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	56	74	66	60	54	49
MILLERSVIEW-DOOLE WSC	F | HICKORY AQUIFER | MCCULLOCH COUNTY	71	69	68	67	66	65
WINTERS	F | WINTERS LAKE/RESERVOIR	0	0	0	0	0	0
COLEMAN COUNTY SUD	F | BROWNWOOD LAKE/RESERVOIR	7	7	7	7	7	7
COLEMAN COUNTY SUD	F | COLEMAN LAKE/RESERVOIR	0	0	0	0	0	0
COLEMAN COUNTY SUD	F | HORDS CREEK LAKE/RESERVOIR	0	0	0	0	0	0
COUNTY-OTHER	F | BALLINGER/MOONEN LAKE/RESERVOIR	0	0	0	0	0	0
COUNTY-OTHER	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	23	31	29	0	0	0
COUNTY-OTHER	F | OTHER AQUIFER | RUNNELS COUNTY	28	23	12	11	10	10
COUNTY-OTHER	F | WINTERS LAKE/RESERVOIR	0	0	0	0	0	0
MANUFACTURING	F | BALLINGER/MOONEN LAKE/RESERVOIR	0	0	0	0	0	0
MANUFACTURING	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	2	3	3	0	0	0
MANUFACTURING	F | WINTERS LAKE/RESERVOIR	0	0	0	0	0	0
MINING	F | OTHER AQUIFER | RUNNELS COUNTY	177	177	177	177	177	177
LIVESTOCK	F | COLORADO LIVESTOCK LOCAL SUPPLY	552	552	552	552	552	552
LIVESTOCK	F | LIPAN AQUIFER | RUNNELS COUNTY	26	26	26	26	26	26
LIVESTOCK	F | OTHER AQUIFER | RUNNELS COUNTY	302	302	302	302	302	302
IRRIGATION	F | COLORADO RUN-OF-RIVER	197	197	197	197	197	197
IRRIGATION	F | DIRECT REUSE	218	218	218	218	218	218
IRRIGATION	F | OTHER AQUIFER | RUNNELS COUNTY	1,952	1,952	1,952	1,952	1,952	1,952
COLORADO BASIN TOTAL EXISTING SUPPLY		**3,785**	**3,868**	**3,826**	**3,569**	**3,561**	**3,555**
RUNNELS COUNTY TOTAL EXISTING SUPPLY		**3,785**	**3,868**	**3,826**	**3,569**	**3,561**	**3,555**
SCHLEICHER COUNTY							
COLORADO BASIN							
ELDORADO	F | EDWARDS-TRINITY-PLATEAU AQUIFER | SCHLEICHER COUNTY	614	605	597	594	593	593
COUNTY-OTHER	F | EDWARDS-TRINITY-PLATEAU AQUIFER | SCHLEICHER COUNTY	252	291	310	321	329	334

Water User Group (WUG) Existing Water Supply

REGION F		EXISTING SUPPLY (ACRE-FEET PER YEAR)					
	SOURCE REGION | SOURCE NAME	2020	2030	2040	2050	2060	2070
SCHLEICHER COUNTY							
COLORADO BASIN							
MINING	F | EDWARDS-TRINITY-PLATEAU AQUIFER | SCHLEICHER COUNTY	494	583	448	312	192	118
LIVESTOCK	F | COLORADO LIVESTOCK LOCAL SUPPLY	83	83	83	83	83	83
LIVESTOCK	F | EDWARDS-TRINITY-PLATEAU AQUIFER | SCHLEICHER COUNTY	337	337	337	337	337	337
IRRIGATION	F | EDWARDS-TRINITY-PLATEAU AQUIFER | SCHLEICHER COUNTY	904	885	867	848	830	812
COLORADO BASIN TOTAL EXISTING SUPPLY		**2,684**	**2,784**	**2,642**	**2,495**	**2,364**	**2,277**
RIO GRANDE BASIN							
COUNTY-OTHER	F | EDWARDS-TRINITY-PLATEAU AQUIFER | SCHLEICHER COUNTY	40	39	39	39	39	39
MINING	F | EDWARDS-TRINITY-PLATEAU AQUIFER | SCHLEICHER COUNTY	167	190	150	110	65	40
LIVESTOCK	F | EDWARDS-TRINITY-PLATEAU AQUIFER | SCHLEICHER COUNTY	103	103	103	103	103	103
LIVESTOCK	F | RIO GRANDE LIVESTOCK LOCAL SUPPLY	29	29	29	29	29	29
IRRIGATION	F | EDWARDS-TRINITY-PLATEAU AQUIFER | SCHLEICHER COUNTY	510	500	489	479	468	458
RIO GRANDE BASIN TOTAL EXISTING SUPPLY		**849**	**861**	**810**	**760**	**704**	**669**
SCHLEICHER COUNTY TOTAL EXISTING SUPPLY		**3,533**	**3,645**	**3,452**	**3,255**	**3,068**	**2,946**
SCURRY COUNTY							
BRAZOS BASIN							
COUNTY-OTHER	F | DOCKUM AQUIFER | SCURRY COUNTY	34	36	38	42	46	50
MINING	F | DOCKUM AQUIFER | SCURRY COUNTY	12	12	12	12	12	12
LIVESTOCK	F | BRAZOS LIVESTOCK LOCAL SUPPLY	28	28	28	28	28	28
LIVESTOCK	F | COLORADO LIVESTOCK LOCAL SUPPLY	47	47	47	47	47	47
LIVESTOCK	F | DOCKUM AQUIFER | SCURRY COUNTY	8	8	8	8	8	7
IRRIGATION	F | DOCKUM AQUIFER | SCURRY COUNTY	249	247	245	241	238	234
BRAZOS BASIN TOTAL EXISTING SUPPLY		**378**	**378**	**378**	**378**	**379**	**378**
COLORADO BASIN							
SNYDER	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	708	1,058	1,009	980	953	926
SNYDER	F | DIRECT REUSE	75	117	114	114	114	113
SNYDER	F | OGALLALA AQUIFER | MARTIN COUNTY	16	25	27	26	26	27
SNYDER	F | PECOS VALLEY AQUIFER | WARD COUNTY	379	590	579	579	580	581
COUNTY-OTHER	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	96	129	115	105	95	86
COUNTY-OTHER	F | DIRECT REUSE	10	14	13	12	11	11
COUNTY-OTHER	F | DOCKUM AQUIFER | SCURRY COUNTY	99	106	113	123	135	148
COUNTY-OTHER	F | OGALLALA AQUIFER | MARTIN COUNTY	2	3	3	3	3	2
COUNTY-OTHER	F | OTHER AQUIFER | SCURRY COUNTY	22	22	22	22	22	22
COUNTY-OTHER	F | PECOS VALLEY AQUIFER | WARD COUNTY	51	72	67	62	58	54
MANUFACTURING	F | DOCKUM AQUIFER | SCURRY COUNTY	3	3	3	3	3	3
MINING	F | DOCKUM AQUIFER | SCURRY COUNTY	36	36	36	35	34	34
LIVESTOCK	F | BRAZOS LIVESTOCK LOCAL SUPPLY	110	110	111	111	111	112
LIVESTOCK	F | COLORADO LIVESTOCK LOCAL SUPPLY	187	188	188	189	190	190
LIVESTOCK	F | DOCKUM AQUIFER | SCURRY COUNTY	32	31	30	30	29	29

Water User Group (WUG) Existing Water Supply

REGION F	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
SCURRY COUNTY							
COLORADO BASIN							
IRRIGATION	F | COLORADO RUN-OF-RIVER	0	0	0	0	0	0
IRRIGATION	F | DOCKUM AQUIFER | SCURRY COUNTY	735	730	723	713	703	689
COLORADO BASIN TOTAL EXISTING SUPPLY		**2,561**	**3,234**	**3,153**	**3,107**	**3,067**	**3,027**
SCURRY COUNTY TOTAL EXISTING SUPPLY		**2,939**	**3,612**	**3,531**	**3,485**	**3,446**	**3,405**
STERLING COUNTY							
COLORADO BASIN							
STERLING CITY	F | OTHER AQUIFER | STERLING COUNTY	276	282	281	281	281	281
COUNTY-OTHER	F | EDWARDS-TRINITY-PLATEAU AQUIFER | STERLING COUNTY	33	33	33	33	33	33
MINING	F | EDWARDS-TRINITY-PLATEAU AQUIFER | STERLING COUNTY	780	953	812	522	270	140
LIVESTOCK	F | COLORADO LIVESTOCK LOCAL SUPPLY	26	26	26	26	26	26
LIVESTOCK	F | DOCKUM AQUIFER | STERLING COUNTY	7	7	7	7	7	7
LIVESTOCK	F | EDWARDS-TRINITY-PLATEAU AQUIFER | STERLING COUNTY	260	260	260	260	260	260
LIVESTOCK	F | OTHER AQUIFER | STERLING COUNTY	29	29	29	29	29	29
IRRIGATION	F | COLORADO RUN-OF-RIVER	30	30	30	30	30	30
IRRIGATION	F | EDWARDS-TRINITY-PLATEAU AQUIFER | STERLING COUNTY	652	611	570	529	489	451
IRRIGATION	F | OTHER AQUIFER | STERLING COUNTY	301	301	301	301	301	301
COLORADO BASIN TOTAL EXISTING SUPPLY		**2,394**	**2,532**	**2,349**	**2,018**	**1,726**	**1,558**
STERLING COUNTY TOTAL EXISTING SUPPLY		**2,394**	**2,532**	**2,349**	**2,018**	**1,726**	**1,558**
SUTTON COUNTY							
COLORADO BASIN							
COUNTY-OTHER	F | EDWARDS-TRINITY-PLATEAU AQUIFER | SUTTON COUNTY	27	28	28	28	28	28
MINING	F | EDWARDS-TRINITY-PLATEAU AQUIFER | SUTTON COUNTY	89	144	153	115	78	53
LIVESTOCK	F | COLORADO LIVESTOCK LOCAL SUPPLY	46	46	46	46	46	46
LIVESTOCK	F | EDWARDS-TRINITY-PLATEAU AQUIFER | SUTTON COUNTY	168	168	168	168	168	168
IRRIGATION	F | COLORADO RUN-OF-RIVER	2	2	2	2	2	2
IRRIGATION	F | EDWARDS-TRINITY-PLATEAU AQUIFER | SUTTON COUNTY	290	284	278	273	267	262
COLORADO BASIN TOTAL EXISTING SUPPLY		**622**	**672**	**675**	**632**	**589**	**559**
RIO GRANDE BASIN							
SONORA	F | EDWARDS-TRINITY-PLATEAU AQUIFER | SUTTON COUNTY	1,239	1,317	1,339	1,359	1,372	1,380
COUNTY-OTHER	F | EDWARDS-TRINITY-PLATEAU AQUIFER | SUTTON COUNTY	140	145	146	148	150	151
MINING	F | EDWARDS-TRINITY-PLATEAU AQUIFER | SUTTON COUNTY	357	576	610	458	311	211
LIVESTOCK	F | EDWARDS-TRINITY-PLATEAU AQUIFER | SUTTON COUNTY	218	218	218	218	218	218
LIVESTOCK	F | RIO GRANDE LIVESTOCK LOCAL SUPPLY	57	57	57	57	57	57
IRRIGATION	F | EDWARDS-TRINITY-PLATEAU AQUIFER | SUTTON COUNTY	1,511	1,481	1,453	1,422	1,394	1,365
RIO GRANDE BASIN TOTAL EXISTING SUPPLY		**3,522**	**3,794**	**3,823**	**3,662**	**3,502**	**3,382**
SUTTON COUNTY TOTAL EXISTING SUPPLY		**4,144**	**4,466**	**4,498**	**4,294**	**4,091**	**3,941**

Water User Group (WUG) Existing Water Supply

REGION F	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
TOM GREEN COUNTY							
COLORADO BASIN							
SAN ANGELO	F | COLORADO RUN-OF-RIVER	189	189	188	188	188	187
SAN ANGELO	F | HICKORY AQUIFER | MCCULLOCH COUNTY	3,535	3,535	3,547	3,555	3,550	3,540
SAN ANGELO	F | OH IVIE LAKE/RESERVOIR NON-SYSTEM PORTION	5,270	5,122	4,949	4,790	4,632	4,476
SAN ANGELO	F | SAN ANGELO LAKES LAKE/RESERVOIR SYSTEM	0	0	0	0	0	0
MILLERSVIEW-DOOLE WSC	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	136	190	179	166	155	144
MILLERSVIEW-DOOLE WSC	F | HICKORY AQUIFER | MCCULLOCH COUNTY	173	176	182	187	190	193
CONCHO RURAL WATER CORPORATION	F | EDWARDS-TRINITY-PLATEAU AQUIFER | TOM GREEN COUNTY	69	69	69	69	69	69
CONCHO RURAL WATER CORPORATION	F | LIPAN AQUIFER | TOM GREEN COUNTY	538	538	538	538	538	538
COUNTY-OTHER	F | EDWARDS-TRINITY-PLATEAU AQUIFER | TOM GREEN COUNTY	100	100	100	100	100	100
COUNTY-OTHER	F | LIPAN AQUIFER | TOM GREEN COUNTY	500	500	500	500	500	500
COUNTY-OTHER	F | MOUNTAIN CREEK LAKE/RESERVOIR	0	0	0	0	0	0
COUNTY-OTHER	F | OTHER AQUIFER | TOM GREEN COUNTY	150	150	150	150	150	150
COUNTY-OTHER	F | SAN ANGELO LAKES LAKE/RESERVOIR SYSTEM	0	0	0	0	0	0
MANUFACTURING	F | COLORADO RUN-OF-RIVER	25	25	26	26	26	27
MANUFACTURING	F | HICKORY AQUIFER | MCCULLOCH COUNTY	462	462	483	492	500	507
MANUFACTURING	F | OH IVIE LAKE/RESERVOIR NON-SYSTEM PORTION	689	669	673	663	653	640
MANUFACTURING	F | SAN ANGELO LAKES LAKE/RESERVOIR SYSTEM	0	0	0	0	0	0
MINING	F | LIPAN AQUIFER | TOM GREEN COUNTY	951	975	1,014	1,007	1,029	1,051
MINING	F | OTHER AQUIFER | TOM GREEN COUNTY	105	105	105	105	105	105
LIVESTOCK	F | COLORADO LIVESTOCK LOCAL SUPPLY	1,644	1,644	1,644	1,644	1,644	1,644
LIVESTOCK	F | LIPAN AQUIFER | TOM GREEN COUNTY	31	31	31	31	31	31
LIVESTOCK	F | OTHER AQUIFER | TOM GREEN COUNTY	30	30	30	30	30	30
IRRIGATION	F | COLORADO RUN-OF-RIVER	1,755	1,755	1,755	1,755	1,755	1,755
IRRIGATION	F | DIRECT REUSE	8,300	8,300	8,300	8,300	8,300	8,300
IRRIGATION	F | EDWARDS-TRINITY-PLATEAU AQUIFER | TOM GREEN COUNTY	520	520	520	520	520	520
IRRIGATION	F | LIPAN AQUIFER | TOM GREEN COUNTY	41,500	41,500	41,450	41,400	41,400	41,400
IRRIGATION	F | OTHER AQUIFER | TOM GREEN COUNTY	9,853	9,853	9,853	9,853	9,853	9,853
IRRIGATION	F | SAN ANGELO LAKES LAKE/RESERVOIR SYSTEM	0	0	0	0	0	0
COLORADO BASIN TOTAL EXISTING SUPPLY		**76,525**	**76,438**	**76,286**	**76,069**	**75,918**	**75,760**
TOM GREEN COUNTY TOTAL EXISTING SUPPLY		**76,525**	**76,438**	**76,286**	**76,069**	**75,918**	**75,760**
UPTON COUNTY							
COLORADO BASIN							
COUNTY-OTHER	F | EDWARDS-TRINITY-PLATEAU AQUIFER | UPTON COUNTY	40	41	40	40	40	40
MINING	F | EDWARDS-TRINITY-PLATEAU AQUIFER | UPTON COUNTY	1,610	1,381	1,092	732	437	305
LIVESTOCK	F | COLORADO LIVESTOCK LOCAL SUPPLY	13	13	13	13	13	13

Water User Group (WUG) Existing Water Supply

REGION F	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
UPTON COUNTY							
COLORADO BASIN							
LIVESTOCK	F | EDWARDS-TRINITY-PLATEAU AQUIFER | UPTON COUNTY	32	32	32	32	32	32
IRRIGATION	F | EDWARDS-TRINITY-PLATEAU AQUIFER | UPTON COUNTY	9,284	9,151	9,018	8,885	8,753	8,624
COLORADO BASIN TOTAL EXISTING SUPPLY		**10,979**	**10,618**	**10,195**	**9,702**	**9,275**	**9,014**
RIO GRANDE BASIN							
MCCAMEY	F | EDWARDS-TRINITY-PLATEAU AQUIFER | UPTON COUNTY	776	827	849	878	895	908
RANKIN	F | EDWARDS-TRINITY-PLATEAU AQUIFER | UPTON COUNTY	277	295	302	312	319	323
COUNTY-OTHER	F | EDWARDS-TRINITY-PLATEAU AQUIFER | UPTON COUNTY	100	99	100	100	100	100
MINING	F | EDWARDS-TRINITY-PLATEAU AQUIFER | UPTON COUNTY	2,627	2,253	1,781	1,194	713	498
LIVESTOCK	F | EDWARDS-TRINITY-PLATEAU AQUIFER | UPTON COUNTY	74	74	74	74	74	74
IRRIGATION	F | EDWARDS-TRINITY-PLATEAU AQUIFER | UPTON COUNTY	189	187	184	181	179	176
RIO GRANDE BASIN TOTAL EXISTING SUPPLY		**4,043**	**3,735**	**3,290**	**2,739**	**2,280**	**2,079**
UPTON COUNTY TOTAL EXISTING SUPPLY		**15,022**	**14,353**	**13,485**	**12,441**	**11,555**	**11,093**
WARD COUNTY							
RIO GRANDE BASIN							
MONAHANS	F | PECOS VALLEY AQUIFER | WARD COUNTY	2,164	2,259	2,322	2,391	2,444	2,485
MONAHANS	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | WINKLER COUNTY	354	370	382	394	403	410
COUNTY-OTHER	F | DOCKUM AQUIFER | WARD COUNTY	15	15	15	15	15	15
COUNTY-OTHER	F | PECOS VALLEY AQUIFER | WARD COUNTY	790	842	847	861	870	877
COUNTY-OTHER	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | WINKLER COUNTY	24	24	24	24	24	24
MANUFACTURING	F | PECOS VALLEY AQUIFER | WARD COUNTY	16	16	16	16	16	16
MINING	F | PECOS VALLEY AQUIFER | WARD COUNTY	797	964	840	645	458	329
STEAM ELECTRIC POWER	F | PECOS VALLEY AQUIFER | WARD COUNTY	2,700	2,700	2,700	2,700	2,700	2,700
LIVESTOCK	F | DOCKUM AQUIFER | WARD COUNTY	5	5	5	5	5	5
LIVESTOCK	F | PECOS VALLEY AQUIFER | WARD COUNTY	99	99	99	99	99	99
LIVESTOCK	F | RIO GRANDE LIVESTOCK LOCAL SUPPLY	5	5	5	5	5	5
IRRIGATION	F | DIRECT REUSE	670	670	670	670	670	670
IRRIGATION	F | DOCKUM AQUIFER | WARD COUNTY	316	316	316	316	316	316
IRRIGATION	F | RED BLUFF LAKE/RESERVOIR	5,009	5,009	5,009	5,009	5,009	5,009
RIO GRANDE BASIN TOTAL EXISTING SUPPLY		**12,964**	**13,294**	**13,250**	**13,150**	**13,034**	**12,960**
WARD COUNTY TOTAL EXISTING SUPPLY		**12,964**	**13,294**	**13,250**	**13,150**	**13,034**	**12,960**
WINKLER COUNTY							
COLORADO BASIN							
LIVESTOCK	F | DOCKUM AQUIFER | WINKLER COUNTY	3	3	3	3	3	3
COLORADO BASIN TOTAL EXISTING SUPPLY		**3**	**3**	**3**	**3**	**3**	**3**
RIO GRANDE BASIN							
KERMIT	F | DOCKUM AQUIFER | WINKLER COUNTY	887	883	881	890	896	903
KERMIT	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | WINKLER COUNTY	887	883	881	890	897	904

Water User Group (WUG) Existing Water Supply

REGION F	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
WINKLER COUNTY							
RIO GRANDE BASIN							
WINK	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | WINKLER COUNTY	360	389	414	443	467	488
COUNTY-OTHER	F | DOCKUM AQUIFER | WINKLER COUNTY	51	51	51	51	51	51
COUNTY-OTHER	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | WINKLER COUNTY	159	159	159	159	159	159
MINING	F | DOCKUM AQUIFER | WINKLER COUNTY	394	585	496	378	266	187
MINING	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | WINKLER COUNTY	393	584	495	378	265	186
LIVESTOCK	F | DOCKUM AQUIFER | WINKLER COUNTY	53	53	53	53	53	53
LIVESTOCK	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | WINKLER COUNTY	326	326	326	326	326	326
LIVESTOCK	F | RIO GRANDE LIVESTOCK LOCAL SUPPLY	7	7	7	7	7	7
IRRIGATION	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | WINKLER COUNTY	4,912	4,912	4,912	4,912	4,912	4,912
RIO GRANDE BASIN TOTAL EXISTING SUPPLY		**8,429**	**8,832**	**8,675**	**8,487**	**8,299**	**8,176**
WINKLER COUNTY TOTAL EXISTING SUPPLY		**8,432**	**8,835**	**8,678**	**8,490**	**8,302**	**8,179**
REGION F TOTAL EXISTING SUPPLY		**657,435**	**656,252**	**647,380**	**636,003**	**624,825**	**618,909**

Water User Group (WUG) Needs/Surplus

REGION F	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
ANDREWS COUNTY						
COLORADO BASIN						
ANDREWS	(1,587)	(2,296)	(2,857)	(4,474)	(6,194)	(7,475)
COUNTY-OTHER	(208)	(256)	(291)	(354)	(452)	(484)
MANUFACTURING	(18)	(23)	(27)	(38)	(48)	(54)
MINING	(2,407)	(2,458)	(2,473)	(1,921)	(1,488)	(1,073)
LIVESTOCK	(65)	(80)	(88)	(105)	(131)	(131)
IRRIGATION	(26,952)	(27,615)	(27,794)	(28,578)	(29,953)	(29,658)
RIO GRANDE BASIN						
COUNTY-OTHER	0	0	0	(2)	(2)	(2)
MINING	(204)	(206)	(205)	(161)	(124)	(93)
LIVESTOCK	(35)	(35)	(35)	(35)	(35)	(35)
IRRIGATION	(1,468)	(1,464)	(1,451)	(1,438)	(1,425)	(1,412)
BORDEN COUNTY						
BRAZOS BASIN						
COUNTY-OTHER	0	0	2	2	2	2
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	(861)	(859)	(856)	(854)	(853)	(853)
COLORADO BASIN						
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	(2,382)	(2,377)	(2,375)	(2,370)	(2,367)	(2,364)
BROWN COUNTY						
BRAZOS BASIN						
COUNTY-OTHER	0	0	0	0	0	0
LIVESTOCK	13	13	13	13	13	13
IRRIGATION	(445)	(443)	(442)	(440)	(438)	(437)
COLORADO BASIN						
BANGS	0	0	0	0	0	0
BROOKESMITH SUD	0	0	0	0	0	0
BROWNWOOD	0	0	0	0	0	0
COLEMAN COUNTY SUD	(8)	(8)	(8)	(8)	(8)	(8)
EARLY	0	0	0	0	0	0
ZEPHYR WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	2	2	2	2	2	2
IRRIGATION	(2,660)	(2,636)	(2,607)	(2,577)	(2,543)	(2,509)
COKE COUNTY						
COLORADO BASIN						
BRONTE	(184)	(182)	(181)	(180)	(180)	(180)
ROBERT LEE	(248)	(243)	(241)	(240)	(240)	(240)
COUNTY-OTHER	(51)	(48)	(46)	(45)	(45)	(45)
MINING	(318)	(312)	(260)	(206)	(158)	(116)
STEAM ELECTRIC POWER	(247)	(289)	(339)	(401)	(477)	(528)
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	(202)	(200)	(199)	(199)	(199)	(199)

Water User Group (WUG) Needs/Surplus

REGION F	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
COLEMAN COUNTY						
COLORADO BASIN						
BROOKESMITH SUD	0	0	0	0	0	0
COLEMAN	(822)	(815)	(796)	(794)	(792)	(792)
COLEMAN COUNTY SUD	(182)	(180)	(174)	(172)	(171)	(170)
SANTA ANNA	0	0	0	0	0	0
COUNTY-OTHER	(24)	(23)	(23)	(23)	(22)	(22)
MANUFACTURING	(9)	(9)	(9)	(9)	(9)	(9)
MINING	(62)	(61)	(51)	(40)	(31)	(23)
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	(743)	(743)	(743)	(743)	(743)	(743)
CONCHO COUNTY						
COLORADO BASIN						
EDEN	0	0	0	0	0	0
MILLERSVIEW-DOOLE WSC	15	30	25	18	13	8
COUNTY-OTHER	0	0	0	0	0	0
MINING	(212)	(206)	(154)	(99)	(52)	(11)
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	(5,249)	(5,208)	(5,169)	(5,133)	(5,097)	(5,061)
CRANE COUNTY						
RIO GRANDE BASIN						
CRANE	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
CROCKETT COUNTY						
COLORADO BASIN						
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	1
RIO GRANDE BASIN						
CROCKETT COUNTY WCID #1	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	(1,182)	(1,293)	(711)	(132)	0	0
STEAM ELECTRIC POWER	(776)	(907)	(1,067)	(1,262)	(1,500)	(1,662)
LIVESTOCK	14	14	14	14	14	14
IRRIGATION	0	0	0	0	0	(1)
ECTOR COUNTY						
COLORADO BASIN						
ECTOR COUNTY UD	(872)	(567)	(767)	(991)	(1,230)	(1,480)
GREATER GARDENDALE WSC	0	0	0	0	0	0
ODESSA	(9,759)	(6,292)	(8,474)	(10,907)	(13,565)	(16,316)
COUNTY-OTHER	(208)	3	(346)	(746)	(1,166)	(1,586)
MANUFACTURING	1,080	1,200	1,136	1,083	1,029	914
MINING	53	0	0	0	0	0
STEAM ELECTRIC POWER	(6,619)	(8,263)	(10,165)	(12,604)	(15,597)	(19,033)
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	(314)	(219)	(227)	(336)	(485)	(606)
RIO GRANDE BASIN						
COUNTY-OTHER	5	(21)	(50)	(81)	(113)	(146)

Water User Group (WUG) Needs/Surplus

REGION F	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
ECTOR COUNTY						
RIO GRANDE BASIN						
MANUFACTURING	0	0	0	0	0	0
MINING	218	170	109	95	140	180
LIVESTOCK	3	3	3	3	3	3
IRRIGATION	0	0	0	0	0	1
GLASSCOCK COUNTY						
COLORADO BASIN						
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
HOWARD COUNTY						
COLORADO BASIN						
BIG SPRING	(2,887)	(1,728)	(2,115)	(2,454)	(2,775)	(3,058)
COAHOMA	(87)	(50)	(63)	(74)	(84)	(92)
COUNTY-OTHER	(449)	(485)	(480)	(478)	(475)	(475)
MANUFACTURING	(1,319)	(1,185)	(1,399)	(1,587)	(1,859)	(2,132)
MINING	(2,328)	(2,591)	(1,784)	(982)	(320)	(43)
LIVESTOCK	(114)	(129)	(129)	(129)	(129)	(129)
IRRIGATION	(3,233)	(3,415)	(3,337)	(3,260)	(3,183)	(3,107)
IRION COUNTY						
COLORADO BASIN						
MERTZON	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	(1,819)	(1,984)	(1,050)	(114)	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	(359)	(359)	(359)	(359)	(359)	(359)
KIMBLE COUNTY						
COLORADO BASIN						
JUNCTION	(627)	(620)	(610)	(605)	(604)	(604)
COUNTY-OTHER	(13)	(12)	(12)	(12)	(12)	(12)
MANUFACTURING	(699)	(750)	(802)	(850)	(914)	(983)
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	(1,496)	(1,387)	(1,275)	(1,163)	(1,058)	(957)
LOVING COUNTY						
RIO GRANDE BASIN						
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
MARTIN COUNTY						
COLORADO BASIN						
STANTON	(245)	(150)	(193)	(239)	(282)	(320)
COUNTY-OTHER	(211)	(222)	(216)	(233)	(239)	(243)
MANUFACTURING	(25)	(26)	(25)	(26)	(28)	(29)
MINING	(3,039)	(2,503)	(1,710)	(926)	(249)	118
LIVESTOCK	(38)	(37)	(35)	(36)	(36)	(35)
IRRIGATION	(25,157)	(24,552)	(23,084)	(23,231)	(22,640)	(22,044)

Water User Group (WUG) Needs/Surplus

REGION F	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
MASON COUNTY						
COLORADO BASIN						
MASON	(694)	(684)	(676)	(671)	(671)	(671)
COUNTY-OTHER	(9)	(9)	(9)	(9)	(9)	(9)
MINING	2	2	2	2	2	2
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	59	59	59	59	59	59
MCCULLOCH COUNTY						
COLORADO BASIN						
BRADY	(1,389)	(1,418)	(1,399)	(1,408)	(1,410)	(1,412)
MILLERSVIEW-DOOLE WSC	21	49	40	31	21	12
RICHLAND SUD	137	133	136	140	137	134
COUNTY-OTHER	(35)	(36)	(35)	(36)	(36)	(36)
MANUFACTURING	(201)	(217)	(230)	(241)	(261)	(284)
MINING	(3,618)	(3,066)	(1,438)	(472)	0	0
LIVESTOCK	(24)	(24)	(24)	(24)	(24)	(24)
IRRIGATION	(2,184)	(2,138)	(2,081)	(2,031)	(1,986)	(1,944)
MENARD COUNTY						
COLORADO BASIN						
MENARD	(210)	(202)	(196)	(195)	(195)	(195)
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	18	18	18	18	18	18
IRRIGATION	(426)	(418)	(410)	(401)	(393)	(385)
MIDLAND COUNTY						
COLORADO BASIN						
GREATER GARDENDALE WSC	0	0	0	0	0	0
MIDLAND	(2,897)	(14,818)	(20,585)	(23,992)	(27,523)	(31,021)
ODESSA	(191)	(137)	(198)	(268)	(345)	(428)
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
MITCHELL COUNTY						
COLORADO BASIN						
COLORADO CITY	0	0	0	0	0	0
LORAINE	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
STEAM ELECTRIC POWER	(4,847)	(4,670)	(4,493)	(4,317)	(4,140)	(3,994)
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
PECOS COUNTY						
RIO GRANDE BASIN						
FORT STOCKTON	0	0	0	0	0	0
IRAAN	0	0	0	0	0	0
PECOS COUNTY WCID #1	0	0	0	0	0	0

Water User Group (WUG) Needs/Surplus

REGION F	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
PECOS COUNTY						
RIO GRANDE BASIN						
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	5	6	7	8	9	10
REAGAN COUNTY						
COLORADO BASIN						
BIG LAKE	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	11	11	11	11	11	11
IRRIGATION	0	0	0	0	0	0
RIO GRANDE BASIN						
MINING	15	15	15	15	15	15
LIVESTOCK	0	0	0	0	0	0
REEVES COUNTY						
RIO GRANDE BASIN						
MADERA VALLEY WSC	0	0	0	0	0	0
PECOS	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	1	1	1	1	1	1
IRRIGATION	0	0	0	0	0	0
RUNNELS COUNTY						
COLORADO BASIN						
BALLINGER	(516)	(451)	(454)	(669)	(668)	(668)
COLEMAN COUNTY SUD	(7)	(7)	(7)	(6)	(6)	(6)
MILES	(112)	(124)	(121)	(119)	(119)	(119)
MILLERSVIEW-DOOLE WSC	15	34	28	22	15	9
WINTERS	(216)	(207)	(197)	(196)	(195)	(195)
COUNTY-OTHER	(201)	(193)	(195)	(224)	(224)	(224)
MANUFACTURING	(46)	(49)	(53)	(59)	(64)	(69)
MINING	(95)	(92)	(63)	(33)	(7)	16
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	(1,642)	(1,624)	(1,606)	(1,588)	(1,570)	(1,552)
SCHLEICHER COUNTY						
COLORADO BASIN						
ELDORADO	0	0	0	0	0	0
COUNTY-OTHER	14	19	22	24	25	25
MINING	34	41	32	22	14	8
LIVESTOCK	17	17	17	17	17	17
IRRIGATION	0	0	0	0	0	0
RIO GRANDE BASIN						
COUNTY-OTHER	9	7	6	5	5	5
MINING	6	0	4	8	2	2
LIVESTOCK	0	0	0	0	0	0

Water User Group (WUG) Needs/Surplus

REGION F	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
SCHLEICHER COUNTY						
RIO GRANDE BASIN						
IRRIGATION	0	0	0	0	0	0
SCURRY COUNTY						
BRAZOS BASIN						
COUNTY-OTHER	(218)	(237)	(248)	(263)	(281)	(301)
MINING	(66)	(116)	(123)	(90)	(57)	(35)
LIVESTOCK	(18)	(18)	(18)	(18)	(18)	(19)
IRRIGATION	(1,479)	(1,422)	(1,365)	(1,310)	(1,256)	(1,206)
COLORADO BASIN						
SNYDER	(858)	(473)	(657)	(871)	(1,089)	(1,316)
COUNTY-OTHER	(231)	(177)	(214)	(255)	(301)	(347)
MANUFACTURING	0	0	0	0	0	0
MINING	(166)	(292)	(312)	(226)	(143)	(86)
LIVESTOCK	(74)	(74)	(74)	(73)	(73)	(72)
IRRIGATION	(4,842)	(4,657)	(4,473)	(4,293)	(4,121)	(3,959)
STERLING COUNTY						
COLORADO BASIN						
STERLING CITY	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
SUTTON COUNTY						
COLORADO BASIN						
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
RIO GRANDE BASIN						
SONORA	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	10	10	10	10	10	10
IRRIGATION	0	0	0	0	0	0
TOM GREEN COUNTY						
COLORADO BASIN						
CONCHO RURAL WATER CORPORATION	69	59	48	35	17	0
MILLERSVIEW-DOOLE WSC	37	87	76	60	43	26
SAN ANGELO	(9,250)	(11,156)	(12,167)	(13,397)	(14,870)	(16,462)
COUNTY-OTHER	(556)	(573)	(629)	(678)	(724)	(768)
MANUFACTURING	(1,211)	(1,459)	(1,657)	(1,853)	(2,094)	(2,357)
MINING	0	0	0	0	0	0
LIVESTOCK	17	17	17	17	17	17
IRRIGATION	(31,651)	(31,422)	(31,243)	(31,061)	(30,832)	(30,604)
UPTON COUNTY						
COLORADO BASIN						
COUNTY-OTHER	12	11	10	10	9	9
MINING	0	0	0	0	0	0

Water User Group (WUG) Needs/Surplus

REGION F	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
UPTON COUNTY						
COLORADO BASIN						
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
RIO GRANDE BASIN						
MCCAMEY	0	0	0	0	0	0
RANKIN	0	0	0	0	0	0
COUNTY-OTHER	36	33	33	32	31	30
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
WARD COUNTY						
RIO GRANDE BASIN						
MONAHANS	0	0	0	0	0	0
COUNTY-OTHER	80	109	100	91	83	76
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
STEAM ELECTRIC POWER	(1,079)	(1,718)	(2,496)	(3,445)	(4,603)	(5,569)
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	382	452	522	592	661	729
WINKLER COUNTY						
COLORADO BASIN						
LIVESTOCK	0	0	0	0	0	0
RIO GRANDE BASIN						
KERMIT	0	0	0	0	0	0
WINK	0	0	0	0	0	0
COUNTY-OTHER	0	(104)	(190)	(282)	(357)	(421)
MINING	0	0	0	0	0	0
LIVESTOCK	38	38	38	38	38	38
IRRIGATION	0	0	0	0	0	0

Water User Group (WUG) Category Summary

REGION F	2020	2030	2040	2050	2060	2070
MUNICIPAL						
POPULATION	578,579	632,477	680,612	729,379	778,602	828,449
DEMANDS (acre-feet per year)	124,579	133,087	141,310	150,520	160,459	170,668
EXISTING SUPPLIES (acre-feet per year)	91,025	90,671	88,527	87,896	87,489	87,629
NEEDS (acre-feet per year)*	(33,848)	(42,808)	(53,136)	(62,930)	(73,216)	(83,228)
COUNTY-OTHER						
POPULATION	122,354	134,135	144,769	155,172	165,196	174,898
DEMANDS (acre-feet per year)	16,875	17,983	19,107	20,352	21,638	22,917
EXISTING SUPPLIES (acre-feet per year)	14,617	15,769	16,296	16,795	17,335	17,943
NEEDS (acre-feet per year)*	(2,414)	(2,396)	(2,984)	(3,721)	(4,458)	(5,121)
MANUFACTURING						
DEMANDS (acre-feet per year)	11,162	11,879	12,563	13,138	13,934	14,783
EXISTING SUPPLIES (acre-feet per year)	8,714	9,361	9,497	9,558	9,686	9,780
NEEDS (acre-feet per year)*	(3,528)	(3,718)	(4,202)	(4,663)	(5,277)	(5,917)
MINING						
DEMANDS (acre-feet per year)	55,657	56,362	46,172	34,381	24,416	18,753
EXISTING SUPPLIES (acre-feet per year)	40,469	41,410	36,000	29,121	21,960	17,614
NEEDS (acre-feet per year)*	(15,516)	(15,180)	(10,334)	(5,402)	(2,629)	(1,480)
STEAM ELECTRIC POWER						
DEMANDS (acre-feet per year)	19,085	21,315	24,071	27,472	31,657	36,125
EXISTING SUPPLIES (acre-feet per year)	5,517	5,468	5,511	5,443	5,340	5,339
NEEDS (acre-feet per year)*	(13,568)	(15,847)	(18,560)	(22,029)	(26,317)	(30,786)
LIVESTOCK						
DEMANDS (acre-feet per year)	16,942	16,942	16,942	16,942	16,942	16,942
EXISTING SUPPLIES (acre-feet per year)	16,718	16,689	16,683	16,666	16,640	16,641
NEEDS (acre-feet per year)*	(368)	(397)	(403)	(420)	(446)	(445)
IRRIGATION						
DEMANDS (acre-feet per year)	593,674	589,525	585,374	581,230	577,147	573,123
EXISTING SUPPLIES (acre-feet per year)	480,375	476,884	474,866	470,524	466,375	463,963
NEEDS (acre-feet per year)*	(113,745)	(113,158)	(111,096)	(111,365)	(111,501)	(109,960)
REGION TOTALS						
POPULATION	700,933	766,612	825,381	884,551	943,798	1,003,347
DEMANDS (acre-feet per year)	837,974	847,093	845,539	844,035	846,193	853,311
EXISTING SUPPLIES (acre-feet per year)	657,435	656,252	647,380	636,003	624,825	618,909
NEEDS (acre-feet per year)*	(182,987)	(193,504)	(200,715)	(210,530)	(223,844)	(236,937)

*WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. The needs shown in the WUG Category Summary report are calculated by first deducting the WUG split's projected demand from its total existing water supply volume. If the WUG split has a greater existing supply volume than projected demand in any given decade, this amount is considered a surplus volume. Before aggregating the difference between supplies and demands to the WUG category level, calculated surpluses are updated to zero so that only the WUGs with needs in the decade are included with the Needs totals.

Water User Group (WUG) Second-Tier Identified Water Need

REGION F	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
ANDREWS COUNTY						
COLORADO BASIN						
ANDREWS	1,505	2,197	2,721	4,317	6,011	7,262
COUNTY-OTHER	208	256	291	354	452	484
MANUFACTURING	18	23	27	38	48	54
MINING	0	0	0	0	0	0
LIVESTOCK	65	80	88	105	131	131
IRRIGATION	25,133	24,007	24,217	25,001	26,376	26,081
RIO GRANDE BASIN						
COUNTY-OTHER	0	0	0	2	2	2
MINING	0	0	0	0	0	0
LIVESTOCK	35	35	35	35	35	35
IRRIGATION	1,392	1,314	1,302	1,289	1,276	1,263
BORDEN COUNTY						
BRAZOS BASIN						
COUNTY-OTHER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	805	747	744	742	741	741
COLORADO BASIN						
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	2,238	2,090	2,088	2,083	2,080	2,077
BROWN COUNTY						
BRAZOS BASIN						
COUNTY-OTHER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	422	406	405	403	401	400
COLORADO BASIN						
BANGS	0	0	0	0	0	0
BROOKESMITH SUD	0	0	0	0	0	0
BROWNWOOD	0	0	0	0	0	0
COLEMAN COUNTY SUD	7	7	7	7	7	7
EARLY	0	0	0	0	0	0
ZEPHYR WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	2,211	1,921	1,894	1,864	1,830	1,796
COKE COUNTY						
COLORADO BASIN						
BRONTE	167	165	165	164	164	164
ROBERT LEE	242	237	235	234	234	234
COUNTY-OTHER	51	48	46	45	45	45
MINING	284	278	230	180	135	96
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	154	104	84	84	84	84

Water User Group (WUG) Second-Tier Identified Water Need

REGION F	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
COLEMAN COUNTY						
COLORADO BASIN						
BROOKESMITH SUD	0	0	0	0	0	0
COLEMAN	796	788	769	767	765	765
COLEMAN COUNTY SUD	167	165	159	157	156	155
SANTA ANNA	0	0	0	0	0	0
COUNTY-OTHER	24	23	23	23	22	22
MANUFACTURING	9	9	9	9	9	9
MINING	54	54	44	34	26	18
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	704	666	666	666	666	666
CONCHO COUNTY						
COLORADO BASIN						
EDEN	0	0	0	0	0	0
MILLERSVIEW-DOOLE WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	178	173	124	73	30	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	4,762	4,239	4,107	4,071	4,035	3,999
CRANE COUNTY						
RIO GRANDE BASIN						
CRANE	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
CROCKETT COUNTY						
COLORADO BASIN						
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
RIO GRANDE BASIN						
CROCKETT COUNTY WCID #1	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	986	1,089	548	9	0	0
STEAM ELECTRIC POWER	776	907	1,067	1,262	1,500	1,662
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
ECTOR COUNTY						
COLORADO BASIN						
ECTOR COUNTY UD	789	473	665	856	1,081	1,318
GREATER GARDENDALE WSC	0	0	0	0	0	0
ODESSA	9,057	5,485	7,571	9,906	12,465	15,116
COUNTY-OTHER	208	0	346	746	1,166	1,586
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
STEAM ELECTRIC POWER	3,333	4,000	4,000	4,000	4,000	4,000
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	249	91	38	147	296	417
RIO GRANDE BASIN						
COUNTY-OTHER	0	21	50	81	113	146
MANUFACTURING	0	0	0	0	0	0

Water User Group (WUG) Second-Tier Identified Water Need

REGION F	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
ECTOR COUNTY						
RIO GRANDE BASIN						
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
GLASSCOCK COUNTY						
COLORADO BASIN						
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
HOWARD COUNTY						
COLORADO BASIN						
BIG SPRING	2,706	1,537	1,922	2,261	2,582	2,865
COAHOMA	73	36	49	60	70	78
COUNTY-OTHER	449	485	480	478	475	475
MANUFACTURING	1,319	1,185	1,399	1,587	1,859	2,132
MINING	2,154	2,399	1,648	902	287	29
LIVESTOCK	114	129	129	129	129	129
IRRIGATION	2,897	2,750	2,615	2,538	2,461	2,385
IRION COUNTY						
COLORADO BASIN						
MERTZON	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	1,596	1,749	880	10	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	286	215	149	149	149	149
KIMBLE COUNTY						
COLORADO BASIN						
JUNCTION	582	574	564	560	559	559
COUNTY-OTHER	13	12	12	12	12	12
MANUFACTURING	699	750	802	850	914	983
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	1,349	1,104	949	837	732	631
LOVING COUNTY						
RIO GRANDE BASIN						
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
MARTIN COUNTY						
COLORADO BASIN						
STANTON	230	133	175	220	262	300
COUNTY-OTHER	211	222	216	233	239	243
MANUFACTURING	25	26	25	26	28	29
MINING	1,292	1,093	952	325	195	0
LIVESTOCK	38	37	35	36	36	35
IRRIGATION	23,341	20,985	17,830	17,977	17,386	16,790

Water User Group (WUG) Second-Tier Identified Water Need

REGION F	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
MASON COUNTY						
COLORADO BASIN						
MASON	656	646	638	634	634	634
COUNTY-OTHER	9	9	9	9	9	9
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
MCCULLOCH COUNTY						
COLORADO BASIN						
BRADY	1,357	1,385	1,366	1,375	1,377	1,379
MILLERSVIEW-DOOLE WSC	0	0	0	0	0	0
RICHLAND SUD	0	0	0	0	0	0
COUNTY-OTHER	32	33	32	33	33	33
MANUFACTURING	201	217	230	241	261	284
MINING	2,993	2,482	973	78	0	0
LIVESTOCK	24	24	24	24	24	24
IRRIGATION	2,005	1,784	1,557	1,507	1,462	1,420
MENARD COUNTY						
COLORADO BASIN						
MENARD	118	110	104	104	104	104
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	299	166	33	24	16	8
MIDLAND COUNTY						
COLORADO BASIN						
GREATER GARDENDALE WSC	0	0	0	0	0	0
MIDLAND	2,084	13,939	19,612	22,930	26,373	29,785
ODESSA	177	119	177	243	317	397
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
MITCHELL COUNTY						
COLORADO BASIN						
COLORADO CITY	0	0	0	0	0	0
LORAINE	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
STEAM ELECTRIC POWER	3,720	3,640	3,560	3,480	3,400	3,320
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
PECOS COUNTY						
RIO GRANDE BASIN						
FORT STOCKTON	0	0	0	0	0	0
IRAAN	0	0	0	0	0	0
PECOS COUNTY WCID #1	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0

Water User Group (WUG) Second-Tier Identified Water Need

REGION F	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
PECOS COUNTY						
RIO GRANDE BASIN						
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
REAGAN COUNTY						
COLORADO BASIN						
BIG LAKE	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
RIO GRANDE BASIN						
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
REEVES COUNTY						
RIO GRANDE BASIN						
MADERA VALLEY WSC	0	0	0	0	0	0
PECOS	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
RUNNELS COUNTY						
COLORADO BASIN						
BALLINGER	458	392	396	611	610	610
COLEMAN COUNTY SUD	6	6	6	5	5	5
MILES	107	118	115	113	113	113
MILLERSVIEW-DOOLE WSC	0	0	0	0	0	0
WINTERS	151	142	133	132	131	131
COUNTY-OTHER	169	160	161	190	190	190
MANUFACTURING	46	49	53	59	64	69
MINING	76	73	46	18	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	1,552	1,335	1,239	1,221	1,203	1,185
SCHLEICHER COUNTY						
COLORADO BASIN						
ELDORADO	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
RIO GRANDE BASIN						
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0

Water User Group (WUG) Second-Tier Identified Water Need

REGION F	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
SCURRY COUNTY						
BRAZOS BASIN						
COUNTY-OTHER	218	237	248	263	281	301
MINING	60	107	113	83	52	32
LIVESTOCK	18	18	18	18	18	19
IRRIGATION	1,393	1,255	1,156	1,101	1,047	997
COLORADO BASIN						
SNYDER	783	387	564	771	985	1,182
COUNTY-OTHER	231	177	214	255	301	347
MANUFACTURING	0	0	0	0	0	0
MINING	152	269	288	208	131	77
LIVESTOCK	74	74	74	73	73	72
IRRIGATION	4,563	4,118	3,797	3,617	3,445	3,283
STERLING COUNTY						
COLORADO BASIN						
STERLING CITY	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
SUTTON COUNTY						
COLORADO BASIN						
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
RIO GRANDE BASIN						
SONORA	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
TOM GREEN COUNTY						
COLORADO BASIN						
CONCHO RURAL WATER CORPORATION	0	0	0	0	0	0
MILLERSVIEW-DOOLE WSC	0	0	0	0	0	0
SAN ANGELO	3,362	6,370	6,745	7,089	9,122	9,963
COUNTY-OTHER	266	399	427	499	527	554
MANUFACTURING	526	931	1,026	1,271	1,411	1,563
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	35,272	30,387	28,368	28,186	27,957	27,729
UPTON COUNTY						
COLORADO BASIN						
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
RIO GRANDE BASIN						
MCCAMEY	0	0	0	0	0	0

Water User Group (WUG) Second-Tier Identified Water Need

REGION F	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
UPTON COUNTY						
RIO GRANDE BASIN						
RANKIN	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
WARD COUNTY						
RIO GRANDE BASIN						
MONAHANS	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
WINKLER COUNTY						
COLORADO BASIN						
LIVESTOCK	0	0	0	0	0	0
RIO GRANDE BASIN						
KERMIT	0	0	0	0	0	0
WINK	0	0	0	0	0	0
COUNTY-OTHER	0	78	158	242	311	369
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0

***Second-tier needs are WUG split needs adjusted to include the implementation of recommended demand reduction and direct reuse water management strategies.**

Water User Group (WUG) Second-Tier Identified Water Need Summary

REGION F

	2020	2030	2040	2050	2060	2070
MUNICIPAL	25,580	35,411	44,858	53,516	64,127	73,126
COUNTY-OTHER	2,089	2,160	2,713	3,465	4,178	4,818
MANUFACTURING	2,843	3,190	3,571	4,081	4,594	5,123
MINING	9,825	9,766	5,846	1,920	856	252
STEAM ELECTRIC POWER	7,829	8,547	8,627	8,742	8,900	8,982
LIVESTOCK	368	397	403	420	446	445
IRRIGATION	111,027	99,684	93,238	93,507	93,643	92,101

*Second-tier needs are WUG split needs adjusted to include the implementation of recommended demand reduction and direct reuse water management strategies.

Recommended Water User Group (WUG) Water Management Strategies (WMS)

WUG Entity Primary Region: F

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
ANDREWS	F	MUNICIPAL CONSERVATION - ANDREWS	DEMAND REDUCTION	82	99	136	157	183	213	$533	$423
BALLINGER	F	MUNICIPAL CONSERVATION - BALLINGER	DEMAND REDUCTION	21	22	22	22	22	22	$621	$618
BALLINGER	F	SUBORDINATION - BALLINGER/MOONEN LAKE	F | BALLINGER/MOONEN LAKE/RESERVOIR	486	482	477	498	494	490	$0	$0
BALLINGER	F	SUBORDINATION - CRMWD SYSTEM	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	235	137	168	196	222	245	$0	$0
BALLINGER	F	VOLUNTARY TRANSFER FROM CLYDE - FORT PHANTOM HILL SUPPLIES	G | FORT PHANTOM HILL LAKE/RESERVOIR	888	857	816	748	708	668	$4848	$868
BALLINGER	F	WATER AUDITS AND LEAK - BALLINGER	DEMAND REDUCTION	37	37	36	36	36	36	$1164	$1231
BANGS	F	MUNICIPAL CONSERVATION - BANGS	DEMAND REDUCTION	9	9	9	9	9	9	$776	$769
BANGS	F	REUSE - BANGS, DIRECT NON-POTABLE	F | DIRECT REUSE	25	25	25	25	25	25	$1560	$160
BIG LAKE	F	MUNICIPAL CONSERVATION - BIG LAKE	DEMAND REDUCTION	18	21	22	23	24	24	$638	$605
BIG LAKE	F	WATER AUDITS AND LEAK - BIG LAKE	DEMAND REDUCTION	29	32	33	35	36	37	$1320	$1332
BIG SPRING	F	ASR OF EXISTING SURFACE WATER SUPPLIES IN WARD COUNTY WELL FIELD - CRMWD	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	0	64	58	64	71	77	N/A	$480
BIG SPRING	F	CRMWD - DESALINATION OF BRACKISH SURFACE WATER	F | CRMWD DIVERTED WATER SYSTEM BRACKISH	0	0	39	43	48	52	N/A	$977
BIG SPRING	F	MUNICIPAL CONSERVATION - BIG SPRING	DEMAND REDUCTION	181	191	193	193	193	193	$448	$422
BIG SPRING	F	SUBORDINATION - CRMWD SYSTEM	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	2,887	1,727	2,115	2,453	2,773	3,058	$0	$0
BIG SPRING	F	WARD COUNTY WELL FIELD EXPANSION AND DEVELOPMENT OF WINKLER COUNTY WELL FIELD - CRMWD	F | PECOS VALLEY AQUIFER | WARD COUNTY	74	57	52	58	63	69	$1265	$219
BIG SPRING	F	WARD COUNTY WELL FIELD EXPANSION AND DEVELOPMENT OF WINKLER COUNTY WELL FIELD - CRMWD	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | WINKLER COUNTY	112	85	79	87	95	104	$1265	$219
BRADY	F	ADVANCED GROUNDWATER TREATMENT - BRADY	F | HICKORY AQUIFER | MCCULLOCH COUNTY	400	385	377	368	349	325	$3013	$246
BRADY	F	MUNICIPAL CONSERVATION - BRADY	DEMAND REDUCTION	32	33	33	33	33	33	$555	$523
BRADY	F	SUBORDINATION - BRADY CREEK RESERVOIR	F | BRADY CREEK LAKE/RESERVOIR	1,892	1,854	1,816	1,778	1,740	1,700	$0	$0
BRONTE	F	DEVELOP GROUNDWATER FROM EDWARDS-TRINITY PLATEAU IN NOLAN COUNTY - BRONTE	G | EDWARDS-TRINITY-PLATEAU AQUIFER | NOLAN COUNTY	78	78	78	78	78	78	$8885	$1000
BRONTE	F	MUNICIPAL CONSERVATION - BRONTE	DEMAND REDUCTION	5	5	5	5	5	5	$959	$959
BRONTE	F	SUBORDINATION - OAK CREEK RESERVOIR	F | OAK CREEK LAKE/RESERVOIR	280	276	272	270	270	270	$0	$0
BRONTE	F	WATER AUDITS AND LEAK - BRONTE	DEMAND REDUCTION	12	12	11	11	11	11	$1283	$1336
BROOKESMITH SUD	F	MUNICIPAL CONSERVATION - BROOKESMITH SUD	DEMAND REDUCTION	44	45	45	45	45	45	$398	$388
BROWN COUNTY WID #1 - UNASSIGNED WATER VOLUMES	F	BRUSH CONTROL - BCWID	F | BROWNWOOD LAKE/RESERVOIR	350	350	350	350	350	350	$857	$857

Recommended Water User Group (WUG) Water Management Strategies (WMS)

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
BROWN COUNTY WID #1 - UNASSIGNED WATER VOLUMES	F	SUBORDINATION - LAKE BROWNWOOD	F | BROWNWOOD LAKE/RESERVOIR	6,981	6,553	6,125	5,697	5,269	4,840	$0	$0
BROWNWOOD	F	MUNICIPAL CONSERVATION - BROWNWOOD	DEMAND REDUCTION	126	129	129	129	129	129	$448	$522
BROWNWOOD	F	REUSE - BROWNWOOD, DIRECT POTABLE	F | DIRECT REUSE	841	841	841	841	841	841	$1940	$696
COAHOMA	F	MUNICIPAL CONSERVATION - COAHOMA	DEMAND REDUCTION	5	5	5	5	5	5	$1027	$996
COAHOMA	F	SUBORDINATION - CRMWD SYSTEM	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	86	51	63	73	83	92	$0	$0
COAHOMA	F	WATER AUDITS AND LEAK - COAHOMA	DEMAND REDUCTION	9	9	9	9	9	9	$1498	$1524
COLEMAN	F	MUNICIPAL CONSERVATION - COLEMAN	DEMAND REDUCTION	26	27	27	27	27	27	$597	$595
COLEMAN	F	SUBORDINATION - HORDS CREEK LAKE	F | HORDS CREEK LAKE/RESERVOIR	358	346	334	322	310	300	$0	$0
COLEMAN	F	SUBORDINATION - LAKE COLEMAN	F | COLEMAN LAKE/RESERVOIR	1,925	1,894	1,864	1,833	1,799	1,763	$0	$0
COLEMAN COUNTY SUD	F	MUNICIPAL CONSERVATION - COLEMAN COUNTY SUD	DEMAND REDUCTION	19	19	19	19	19	19	$636	$632
COLEMAN COUNTY SUD	F	SUBORDINATION - LAKE COLEMAN	F | COLEMAN LAKE/RESERVOIR	214	211	206	202	202	203	$0	$0
COLORADO CITY	F	MUNICIPAL CONSERVATION - COLORADO CITY	DEMAND REDUCTION	28	31	32	32	32	33	$593	$535
COLORADO RIVER MWD - UNASSIGNED WATER VOLUMES	F	CRMWD - DESALINATION OF BRACKISH SURFACE WATER	F | CRMWD DIVERTED WATER SYSTEM BRACKISH	4,484	4,484	1,051	1,200	1,715	1,843	$1844	$977
COLORADO RIVER MWD - WATER LOSS	F	CRMWD - DESALINATION OF BRACKISH SURFACE WATER	F | CRMWD DIVERTED WATER SYSTEM BRACKISH	0	0	1,280	1,280	1,280	1,280	N/A	$0
CONCHO RURAL WATER CORPORATION	F	DESALINATION OF OTHER AQUIFER SUPPLIES IN TOM GREEN COUNTY - CONCHO RURAL WSC	F | OTHER AQUIFER | TOM GREEN COUNTY	150	150	150	150	150	150	$3505	$1360
CONCHO RURAL WATER CORPORATION	F	MUNICIPAL CONSERVATION - CONCHO RURAL WSC	DEMAND REDUCTION	33	35	37	38	40	41	$523	$427
CONCHO RURAL WATER CORPORATION - WATER LOSS	F	DESALINATION OF OTHER AQUIFER SUPPLIES IN TOM GREEN COUNTY - CONCHO RURAL WSC	F | OTHER AQUIFER | TOM GREEN COUNTY	50	50	50	50	50	50	$0	$0
COUNTY-OTHER, ANDREWS	F	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - ANDREWS COUNTY OTHER	F | EDWARDS-TRINITY-PLATEAU AQUIFER | ANDREWS COUNTY	500	500	500	500	500	500	$696	$108
COUNTY-OTHER, BORDEN	F	MUNICIPAL CONSERVATION - BORDEN COUNTY OTHER	DEMAND REDUCTION	4	4	4	4	4	4	$1196	$1183
COUNTY-OTHER, BORDEN	F	WATER AUDITS AND LEAK - BORDEN COUNTY OTHER	DEMAND REDUCTION	9	9	9	9	9	9	$1302	$1338
COUNTY-OTHER, COKE	F	SUBORDINATION - OAK CREEK RESERVOIR	F | OAK CREEK LAKE/RESERVOIR	29	28	28	27	27	27	$0	$0
COUNTY-OTHER, COKE	F	VOLUNTARY TRANSFER FROM IRRIGATION - COKE COUNTY OTHER	F | OTHER AQUIFER | COKE COUNTY	22	20	18	18	18	18	$500	$0
COUNTY-OTHER, COLEMAN	F	SUBORDINATION - LAKE COLEMAN	F | COLEMAN LAKE/RESERVOIR	24	23	23	23	22	22	$0	$0
COUNTY-OTHER, ECTOR	F	ASR OF EXISTING SURFACE WATER SUPPLIES IN WARD COUNTY WELL FIELD - CRMWD	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	0	0	0	56	133	207	N/A	$480
COUNTY-OTHER, ECTOR	F	CRMWD - DESALINATION OF BRACKISH SURFACE WATER	F | CRMWD DIVERTED WATER SYSTEM BRACKISH	0	0	0	38	89	139	N/A	$977
COUNTY-OTHER, ECTOR	F	SUBORDINATION - CRMWD SYSTEM	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	538	348	469	606	759	923	$0	$0

Recommended Water User Group (WUG) Water Management Strategies (WMS)

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
COUNTY-OTHER, ECTOR	F	WARD COUNTY WELL FIELD EXPANSION AND DEVELOPMENT OF WINKLER COUNTY WELL FIELD - CRMWD	F | PECOS VALLEY AQUIFER | WARD COUNTY	0	0	0	51	119	185	N/A	$219
COUNTY-OTHER, ECTOR	F	WARD COUNTY WELL FIELD EXPANSION AND DEVELOPMENT OF WINKLER COUNTY WELL FIELD - CRMWD	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | WINKLER COUNTY	0	0	0	76	179	278	N/A	$219
COUNTY-OTHER, HOWARD	F	ASR OF EXISTING SURFACE WATER SUPPLIES IN WARD COUNTY WELL FIELD - CRMWD	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	0	150	123	122	121	121	N/A	$480
COUNTY-OTHER, HOWARD	F	CRMWD - DESALINATION OF BRACKISH SURFACE WATER	F | CRMWD DIVERTED WATER SYSTEM BRACKISH	0	0	82	82	82	82	N/A	$977
COUNTY-OTHER, HOWARD	F	WARD COUNTY WELL FIELD EXPANSION AND DEVELOPMENT OF WINKLER COUNTY WELL FIELD - CRMWD	F | PECOS VALLEY AQUIFER | WARD COUNTY	180	134	110	110	109	109	$1265	$219
COUNTY-OTHER, HOWARD	F	WARD COUNTY WELL FIELD EXPANSION AND DEVELOPMENT OF WINKLER COUNTY WELL FIELD - CRMWD	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | WINKLER COUNTY	269	201	165	164	164	164	$1265	$219
COUNTY-OTHER, KIMBLE	F	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - JUNCTION	F | EDWARDS-TRINITY-PLATEAU AQUIFER | KIMBLE COUNTY	13	12	12	12	12	12	$1655	$305
COUNTY-OTHER, MARTIN	F	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - MARTIN COUNTY OTHER	F | DOCKUM AQUIFER | MARTIN COUNTY	250	250	250	250	250	250	$1636	$224
COUNTY-OTHER, MASON	F	ADDITIONAL WATER TREATMENT - MASON	F | HICKORY AQUIFER | MASON COUNTY	9	9	9	9	9	9	$240	$141
COUNTY-OTHER, MCCULLOCH	F	MUNICIPAL CONSERVATION - MCCULLOCH COUNTY OTHER	DEMAND REDUCTION	3	3	3	3	3	3	$1286	$1239
COUNTY-OTHER, MCCULLOCH	F	VOLUNTARY TRANSFER FROM MILLERSVIEW DOOLE - MCCULLOCH COUNTY-OTHER	F | HICKORY AQUIFER | MCCULLOCH COUNTY	35	35	35	35	35	35	$1543	$714
COUNTY-OTHER, MIDLAND	F	DEVELOP ADDITIONAL PECOS VALLEY AQUIFER SUPPLIES - MIDLAND COUNTY OTHER	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | WINKLER COUNTY	0	1,000	1,000	1,000	1,000	1,000	N/A	$151
COUNTY-OTHER, MIDLAND	F	MUNICIPAL CONSERVATION - MIDLAND COUNTY OTHER	DEMAND REDUCTION	145	164	183	202	220	239	$398	$371
COUNTY-OTHER, MITCHELL	F	MUNICIPAL CONSERVATION - MITCHELL COUNTY OTHER	DEMAND REDUCTION	26	27	28	28	29	29	$597	$589
COUNTY-OTHER, MITCHELL	F	WATER AUDITS AND LEAK - MITCHELL COUNTY OTHER	DEMAND REDUCTION	42	43	43	43	43	44	$1267	$1319
COUNTY-OTHER, REEVES	F	MUNICIPAL CONSERVATION - REEVES COUNTY OTHER	DEMAND REDUCTION	19	20	22	23	24	25	$634	$611
COUNTY-OTHER, RUNNELS	F	REUSE- WINTERS, DIRECT POTABLE	F | DIRECT REUSE	32	33	34	34	34	34	$5091	$1685
COUNTY-OTHER, RUNNELS	F	SUBORDINATION - BALLINGER/MOONEN LAKE	F | BALLINGER/MOONEN LAKE/RESERVOIR	90	90	90	67	67	66	$0	$0
COUNTY-OTHER, RUNNELS	F	SUBORDINATION - WINTERS LAKE	F | WINTERS LAKE/RESERVOIR	72	72	73	71	70	68	$0	$0
COUNTY-OTHER, RUNNELS	F	VOLUNTARY TRANSFER - WINTERS - PURCHASE FROM ABILENE	F | OH IVIE LAKE/RESERVOIR NON-SYSTEM PORTION	38	39	40	41	41	41	$950	$370
COUNTY-OTHER, RUNNELS	F	VOLUNTARY TRANSFER FROM CLYDE - FORT PHANTOM HILL SUPPLIES	G | FORT PHANTOM HILL LAKE/RESERVOIR	67	59	61	90	90	90	$4848	$868
COUNTY-OTHER, SCURRY	F	ASR OF EXISTING SURFACE WATER SUPPLIES IN WARD COUNTY WELL FIELD - CRMWD	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	0	56	54	64	76	90	N/A	$480
COUNTY-OTHER, SCURRY	F	CRMWD - DESALINATION OF BRACKISH SURFACE WATER	F | CRMWD DIVERTED WATER SYSTEM BRACKISH	0	0	36	43	51	60	N/A	$977

Recommended Water User Group (WUG) Water Management Strategies (WMS)

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
COUNTY-OTHER, SCURRY	F	SUBORDINATION - CRMWD SYSTEM	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	141	82	102	118	133	147	$0	$0
COUNTY-OTHER, SCURRY	F	VOLUNTARY TRANSFER FROM IRRIGATION - SCURRY COUNTY-OTHER	F | DOCKUM AQUIFER | SCURRY COUNTY	150	150	150	150	150	150	$500	$0
COUNTY-OTHER, SCURRY	F	WARD COUNTY WELL FIELD EXPANSION AND DEVELOPMENT OF WINKLER COUNTY WELL FIELD - CRMWD	F | PECOS VALLEY AQUIFER | WARD COUNTY	63	50	48	57	69	80	$1265	$219
COUNTY-OTHER, SCURRY	F	WARD COUNTY WELL FIELD EXPANSION AND DEVELOPMENT OF WINKLER COUNTY WELL FIELD - CRMWD	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | WINKLER COUNTY	95	76	72	86	103	121	$1265	$219
COUNTY-OTHER, TOM GREEN	F	BRUSH CONTROL - SAN ANGELO	F | SAN ANGELO LAKES LAKE/RESERVOIR SYSTEM	41	25	29	26	28	31	$857	$857
COUNTY-OTHER, TOM GREEN	F	DESALINATION OF OTHER AQUIFER SUPPLIES IN TOM GREEN COUNTY - SAN ANGELO	F | OTHER AQUIFER | TOM GREEN COUNTY	0	0	0	96	105	115	N/A	$691
COUNTY-OTHER, TOM GREEN	F	REUSE - SAN ANGELO	F | DIRECT REUSE	290	174	202	179	197	214	$2826	$1033
COUNTY-OTHER, TOM GREEN	F	SUBORDINATION - SAN ANGELO SYSTEM	F | SAN ANGELO LAKES LAKE/RESERVOIR SYSTEM	225	225	225	225	225	225	$0	$0
COUNTY-OTHER, TOM GREEN	G	ABILENE REDUCTION FOR WEST TEXAS WATER PARTNERSHIP	G | FORT PHANTOM HILL LAKE/RESERVOIR	0	60	69	61	68	73	N/A	$710
COUNTY-OTHER, TOM GREEN	G	CEDAR RIDGE RESERVOIR	G | CEDAR RIDGE LAKE/RESERVOIR	0	89	104	92	101	110	N/A	$710
COUNTY-OTHER, WARD	F	MUNICIPAL CONSERVATION - WARD COUNTY OTHER	DEMAND REDUCTION	22	23	24	25	25	26	$617	$599
COUNTY-OTHER, WARD	F	SUBORDINATION - CRMWD SYSTEM	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	70	41	50	59	67	74	$0	$0
COUNTY-OTHER, WARD	F	WATER AUDITS AND LEAK - WARD COUNTY OTHER	DEMAND REDUCTION	37	39	39	40	41	42	$1197	$1241
COUNTY-OTHER, WINKLER	F	DEVELOP ADDITIONAL PECOS VALLEY AQUIFER SUPPLIES - WINKLER COUNTY OTHER	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | WINKLER COUNTY	500	500	500	500	500	500	$398	$79
COUNTY-OTHER, WINKLER	F	MUNICIPAL CONSERVATION - WINKLER COUNTY OTHER	DEMAND REDUCTION	6	10	12	15	18	20	$892	$629
COUNTY-OTHER, WINKLER	F	WATER AUDITS AND LEAK - WINKLER COUNTY OTHER	DEMAND REDUCTION	11	16	20	25	28	32	$1594	$1301
CRANE	F	MUNICIPAL CONSERVATION - CRANE	DEMAND REDUCTION	20	21	23	24	25	26	$628	$600
CROCKETT COUNTY WCID #1	F	MUNICIPAL CONSERVATION - CROCKETT COUNTY WCID	DEMAND REDUCTION	21	23	23	24	24	24	$620	$607
EARLY	F	MUNICIPAL CONSERVATION - EARLY	DEMAND REDUCTION	16	16	16	16	16	16	$661	$657
ECTOR COUNTY UD	F	MUNICIPAL CONSERVATION - ECTOR COUNTY UD	DEMAND REDUCTION	83	94	102	135	149	162	$533	$470
ECTOR COUNTY UD	F	SUBORDINATION - CRMWD SYSTEM	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	871	565	767	990	1,230	1,480	$0	$0
EDEN	F	MUNICIPAL CONSERVATION - EDEN	DEMAND REDUCTION	16	16	16	16	16	16	$658	$656
EDEN	F	REUSE - EDEN, DIRECT NON-POTABLE	F | DIRECT REUSE	50	50	50	50	50	50	$902	$89
ELDORADO	F	MUNICIPAL CONSERVATION - EL DORADO	DEMAND REDUCTION	11	11	11	11	11	11	$736	$736
ELDORADO	F	WATER AUDITS AND LEAK - EL DORADO	DEMAND REDUCTION	25	24	24	24	24	24	$991	$1026

Recommended Water User Group (WUG) Water Management Strategies (WMS)

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
FORT STOCKTON	F	MUNICIPAL CONSERVATION - FORT STOCKTON	DEMAND REDUCTION	50	53	57	60	63	66	$352	$265
GREATER GARDENDALE WSC	F	MUNICIPAL CONSERVATION - GREATER GARDENDALE WSC	DEMAND REDUCTION	16	19	21	23	26	28	$656	$591
IRAAN	F	MUNICIPAL CONSERVATION - IRAAN	DEMAND REDUCTION	7	8	8	9	9	10	$842	$758
IRRIGATION, ANDREWS	F	IRRIGATION CONSERVATION - ANDREWS COUNTY	DEMAND REDUCTION	1,895	3,758	3,726	3,726	3,726	3,726	$51	$0
IRRIGATION, BORDEN	F	IRRIGATION CONSERVATION - BORDEN COUNTY	DEMAND REDUCTION	200	399	399	399	399	399	$51	$0
IRRIGATION, BROWN	F	IRRIGATION CONSERVATION - BROWN COUNTY	DEMAND REDUCTION	472	752	750	750	750	750	$51	$0
IRRIGATION, COKE	F	IRRIGATION CONSERVATION - COKE COUNTY	DEMAND REDUCTION	48	96	115	115	115	115	$51	$0
IRRIGATION, COLEMAN	F	IRRIGATION CONSERVATION - COLEMAN COUNTY	DEMAND REDUCTION	39	77	77	77	77	77	$51	$0
IRRIGATION, COLEMAN	F	SUBORDINATION - LAKE COLEMAN	F | COLEMAN LAKE/RESERVOIR	743	743	743	743	743	743	$0	$0
IRRIGATION, CONCHO	F	IRRIGATION CONSERVATION - CONCHO COUNTY	DEMAND REDUCTION	487	969	1,062	1,062	1,062	1,062	$51	$0
IRRIGATION, CROCKETT	F	IRRIGATION CONSERVATION - CROCKETT COUNTY	DEMAND REDUCTION	24	47	69	69	69	69	$51	$0
IRRIGATION, CROCKETT	F	WEATHER MODIFICATION	F | WEATHER MODIFICATION	9	9	9	9	9	9	$1	$1
IRRIGATION, ECTOR	F	IRRIGATION CONSERVATION - ECTOR COUNTY	DEMAND REDUCTION	72	142	210	210	210	210	$51	$0
IRRIGATION, ECTOR	F	SUBORDINATION - CRMWD SYSTEM	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	188	110	134	157	178	196	$0	$0
IRRIGATION, GLASSCOCK	F	IRRIGATION CONSERVATION - GLASSCOCK COUNTY	DEMAND REDUCTION	2,268	2,250	2,232	2,232	2,232	2,232	$51	$0
IRRIGATION, HOWARD	F	IRRIGATION CONSERVATION - HOWARD COUNTY	DEMAND REDUCTION	336	665	722	722	722	722	$51	$0
IRRIGATION, IRION	F	IRRIGATION CONSERVATION - IRION COUNTY	DEMAND REDUCTION	73	144	210	210	210	210	$51	$0
IRRIGATION, IRION	F	WEATHER MODIFICATION	F | WEATHER MODIFICATION	110	110	110	110	110	110	$1	$1
IRRIGATION, KIMBLE	F	IRRIGATION CONSERVATION - KIMBLE COUNTY	DEMAND REDUCTION	147	283	326	326	326	326	$51	$0
IRRIGATION, MARTIN	F	IRRIGATION CONSERVATION - MARTIN COUNTY	DEMAND REDUCTION	1,816	3,567	5,254	5,254	5,254	5,254	$51	$0
IRRIGATION, MASON	F	IRRIGATION CONSERVATION - MASON COUNTY	DEMAND REDUCTION	415	817	1,208	1,208	1,208	1,208	$51	$0
IRRIGATION, MCCULLOCH	F	IRRIGATION CONSERVATION - MCCULLOCH COUNTY	DEMAND REDUCTION	179	354	524	524	524	524	$51	$0
IRRIGATION, MENARD	F	IRRIGATION CONSERVATION - MENARD COUNTY	DEMAND REDUCTION	127	252	377	377	377	377	$51	$0
IRRIGATION, MIDLAND	F	IRRIGATION CONSERVATION - MIDLAND COUNTY	DEMAND REDUCTION	1,664	3,302	4,913	4,913	4,913	4,913	$51	$0
IRRIGATION, MITCHELL	F	IRRIGATION CONSERVATION - MITCHELL COUNTY	DEMAND REDUCTION	230	229	228	228	228	228	$51	$0
IRRIGATION, PECOS	F	IRRIGATION CONSERVATION - PECOS COUNTY	DEMAND REDUCTION	6,301	12,602	18,903	18,903	18,903	18,903	$51	$0
IRRIGATION, PECOS	F	WEATHER MODIFICATION	F | WEATHER MODIFICATION	264	264	264	264	264	264	$4	$4
IRRIGATION, REAGAN	F	IRRIGATION CONSERVATION - REAGAN COUNTY	DEMAND REDUCTION	957	1,881	2,773	2,773	2,773	2,773	$51	$0
IRRIGATION, REAGAN	F	WEATHER MODIFICATION	F | WEATHER MODIFICATION	1,469	1,469	1,469	1,469	1,469	1,469	$1	$1
IRRIGATION, REEVES	F	IRRIGATION CONSERVATION - REEVES COUNTY	DEMAND REDUCTION	4,568	9,058	13,469	13,469	13,469	13,469	$51	$0
IRRIGATION, REEVES	F	WEATHER MODIFICATION	F | WEATHER MODIFICATION	240	240	240	240	240	240	$3	$3
IRRIGATION, RUNNELS	F	IRRIGATION CONSERVATION - RUNNELS COUNTY	DEMAND REDUCTION	200	399	477	477	477	477	$51	$0

Recommended Water User Group (WUG) Water Management Strategies (WMS)

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
IRRIGATION, SCHLEICHER	F	IRRIGATION CONSERVATION - SCHLEICHER COUNTY	DEMAND REDUCTION	71	83	81	81	81	81	$51	$0
IRRIGATION, SCHLEICHER	F	WEATHER MODIFICATION	F | WEATHER MODIFICATION	102	102	102	102	102	102	$1	$1
IRRIGATION, SCURRY	F	IRRIGATION CONSERVATION - SCURRY COUNTY	DEMAND REDUCTION	365	706	885	885	885	885	$51	$0
IRRIGATION, STERLING	F	IRRIGATION CONSERVATION - STERLING COUNTY	DEMAND REDUCTION	49	94	135	135	135	135	$51	$0
IRRIGATION, STERLING	F	WEATHER MODIFICATION	F | WEATHER MODIFICATION	25	25	25	25	25	25	$1	$1
IRRIGATION, SUTTON	F	IRRIGATION CONSERVATION - SUTTON COUNTY	DEMAND REDUCTION	90	177	260	260	260	260	$51	$0
IRRIGATION, SUTTON	F	WEATHER MODIFICATION	F | WEATHER MODIFICATION	34	34	34	34	34	34	$1	$1
IRRIGATION, TOM GREEN	F	IRRIGATION CONSERVATION - TOM GREEN COUNTY	DEMAND REDUCTION	4,679	9,335	11,175	11,175	11,175	11,175	$51	$0
IRRIGATION, TOM GREEN	F	WEATHER MODIFICATION	F | WEATHER MODIFICATION	4,945	4,945	4,945	4,945	4,945	4,945	$1	$1
IRRIGATION, UPTON	F	IRRIGATION CONSERVATION - UPTON COUNTY	DEMAND REDUCTION	474	934	1,380	1,380	1,380	1,380	$51	$0
IRRIGATION, WARD	F	IRRIGATION CONSERVATION - WARD COUNTY	DEMAND REDUCTION	281	554	821	821	821	821	$51	$0
IRRIGATION, WARD	F	WEATHER MODIFICATION	F | WEATHER MODIFICATION	46	46	46	46	46	46	$1	$1
IRRIGATION, WINKLER	F	IRRIGATION CONSERVATION - WINKLER COUNTY	DEMAND REDUCTION	246	491	737	737	737	737	$51	$0
JUNCTION	F	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - JUNCTION	F | EDWARDS-TRINITY-PLATEAU AQUIFER | KIMBLE COUNTY	203	208	208	208	208	208	$1655	$305
JUNCTION	F	MUNICIPAL CONSERVATION - JUNCTION	DEMAND REDUCTION	14	15	15	15	15	15	$676	$674
JUNCTION	F	SUBORDINATION - KIMBLE COUNTY ROR	F | COLORADO RUN-OF-RIVER	412	412	412	412	412	412	$0	$0
JUNCTION	F	WATER AUDITS AND LEAK - JUNCTION	DEMAND REDUCTION	31	31	31	30	30	30	$999	$1045
KERMIT	F	MUNICIPAL CONSERVATION - KERMIT	DEMAND REDUCTION	32	32	32	33	33	33	$552	$524
LIVESTOCK, ANDREWS	F	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - ANDREWS COUNTY LIVESTOCK	F | EDWARDS-TRINITY-PLATEAU AQUIFER | ANDREWS COUNTY	150	150	150	150	150	150	$193	$60
LIVESTOCK, ANDREWS	F	DEVELOP ADDITIONAL PECOS VALLEY AQUIFER SUPPLIES - ANDREWS COUNTY LIVESTOCK	F | PECOS VALLEY AQUIFER | ANDREWS COUNTY	50	50	50	50	50	50	$160	$40
LIVESTOCK, HOWARD	F	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - HOWARD COUNTY LIVESTOCK	F | DOCKUM AQUIFER | HOWARD COUNTY	150	150	150	150	150	150	$367	$80
LIVESTOCK, MARTIN	F	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - MARTIN COUNTY LIVESTOCK	F | DOCKUM AQUIFER | MARTIN COUNTY	40	40	40	40	40	40	$800	$100
LIVESTOCK, MCCULLOCH	F	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - MCCULLOCH COUNTY LIVESTOCK	F | EDWARDS-TRINITY-PLATEAU AQUIFER | MCCULLOCH COUNTY	30	30	30	30	30	30	$200	$33
LIVESTOCK, SCURRY	F	NEW GROUNDWATER FROM LOCAL ALLUVIUM AQUIFER - SCURRY COUNTY LIVESTOCK	F | OTHER AQUIFER | SCURRY COUNTY	92	92	92	92	92	92	$185	$54
LORAINE	F	MUNICIPAL CONSERVATION - LORAINE	DEMAND REDUCTION	3	4	4	4	4	4	$1231	$1172
MADERA VALLEY WSC	F	MUNICIPAL CONSERVATION - MADERA VALLEY WSC	DEMAND REDUCTION	11	12	12	13	13	14	$728	$687
MADERA VALLEY WSC	F	WATER AUDITS AND LEAK - MADERA VALLEY WSC	DEMAND REDUCTION	69	73	76	78	80	82	$365	$363
MANUFACTURING, COLEMAN	F	SUBORDINATION - LAKE COLEMAN	F | COLEMAN LAKE/RESERVOIR	9	9	9	9	9	9	$0	$0

Recommended Water User Group (WUG) Water Management Strategies (WMS)

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
MANUFACTURING, ECTOR	F	SUBORDINATION - CRMWD SYSTEM	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	312	182	240	282	318	345	$0	$0
MANUFACTURING, HOWARD	F	ASR OF EXISTING SURFACE WATER SUPPLIES IN WARD COUNTY WELL FIELD - CRMWD	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	0	239	229	255	304	357	N/A	$480
MANUFACTURING, HOWARD	F	CRMWD - DESALINATION OF BRACKISH SURFACE WATER	F | CRMWD DIVERTED WATER SYSTEM BRACKISH	0	0	154	171	205	240	N/A	$977
MANUFACTURING, HOWARD	F	SUBORDINATION - CRMWD SYSTEM	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	705	412	504	589	668	736	$0	$0
MANUFACTURING, HOWARD	F	WARD COUNTY WELL FIELD EXPANSION AND DEVELOPMENT OF WINKLER COUNTY WELL FIELD - CRMWD	F | PECOS VALLEY AQUIFER | WARD COUNTY	246	214	205	229	273	320	$1265	$219
MANUFACTURING, HOWARD	F	WARD COUNTY WELL FIELD EXPANSION AND DEVELOPMENT OF WINKLER COUNTY WELL FIELD - CRMWD	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | WINKLER COUNTY	368	320	307	343	409	479	$1265	$219
MANUFACTURING, KIMBLE	F	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - KIMBLE COUNTY MANUFACTURING	F | EDWARDS-TRINITY-PLATEAU AQUIFER | KIMBLE COUNTY	300	300	300	300	300	300	$140	$53
MANUFACTURING, MARTIN	F	VOLUNTARY TRANSFER FROM IRRIGATION - MARTIN COUNTY MANUFACTURING	F | OGALLALA AQUIFER | MARTIN COUNTY	25	26	25	26	28	29	$500	$0
MANUFACTURING, MCCULLOCH	F	ADVANCED GROUNDWATER TREATMENT - BRADY	F | HICKORY AQUIFER | MCCULLOCH COUNTY	201	217	230	241	261	284	$500	$0
MANUFACTURING, RUNNELS	F	SUBORDINATION - BALLINGER/MOONEN LAKE	F | BALLINGER/MOONEN LAKE/RESERVOIR	8	8	8	6	6	6	$0	$0
MANUFACTURING, RUNNELS	F	SUBORDINATION - WINTERS LAKE	F | WINTERS LAKE/RESERVOIR	5	5	5	5	5	5	$0	$0
MANUFACTURING, RUNNELS	F	VOLUNTARY TRANSFER FROM CLYDE - FORT PHANTOM HILL SUPPLIES	G | FORT PHANTOM HILL LAKE/RESERVOIR	35	39	43	48	53	58	$4848	$868
MANUFACTURING, TOM GREEN	F	BRUSH CONTROL - SAN ANGELO	F | SAN ANGELO LAKES LAKE/RESERVOIR SYSTEM	98	75	90	83	98	113	$857	$857
MANUFACTURING, TOM GREEN	F	DESALINATION OF OTHER AQUIFER SUPPLIES IN TOM GREEN COUNTY - SAN ANGELO	F | OTHER AQUIFER | TOM GREEN COUNTY	0	0	0	312	366	425	N/A	$691
MANUFACTURING, TOM GREEN	F	REUSE - SAN ANGELO	F | DIRECT REUSE	685	528	631	582	683	794	$2826	$1033
MANUFACTURING, TOM GREEN	F	SUBORDINATION - SAN ANGELO SYSTEM	F | SAN ANGELO LAKES LAKE/RESERVOIR SYSTEM	428	404	396	378	361	343	$0	$0
MANUFACTURING, TOM GREEN	G	ABILENE REDUCTION FOR WEST TEXAS WATER PARTNERSHIP	G | FORT PHANTOM HILL LAKE/RESERVOIR	0	181	216	200	235	273	N/A	$710
MANUFACTURING, TOM GREEN	G	CEDAR RIDGE RESERVOIR	G | CEDAR RIDGE LAKE/RESERVOIR	0	271	324	299	351	409	N/A	$710
MASON	F	ADDITIONAL WATER TREATMENT - MASON	F | HICKORY AQUIFER | MASON COUNTY	694	684	676	671	671	671	$240	$141
MASON	F	MUNICIPAL CONSERVATION - MASON	DEMAND REDUCTION	12	12	12	12	12	12	$719	$719
MASON	F	WATER AUDITS AND LEAK - MASON	DEMAND REDUCTION	26	26	26	25	25	25	$991	$1025
MCCAMEY	F	MUNICIPAL CONSERVATION - MCCAMEY	DEMAND REDUCTION	11	12	13	13	13	14	$723	$686
MCCAMEY	F	WATER AUDITS AND LEAK - MCCAMEY	DEMAND REDUCTION	39	41	42	44	45	45	$664	$658

Recommended Water User Group (WUG) Water Management Strategies (WMS)

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
MENARD	F	DEVELOP ADDITIONAL HICKORY AQUIFER SUPPLIES - MENARD	F | HICKORY AQUIFER | MENARD COUNTY	500	500	500	500	500	500	$1366	$342
MENARD	F	MUNICIPAL CONSERVATION - MENARD	DEMAND REDUCTION	8	8	8	8	8	8	$813	$813
MENARD	F	REUSE - MENARD, DIRECT NON-POTABLE	F | DIRECT REUSE - MENARD	67	67	67	67	67	67	$1775	$165
MENARD	F	WATER AUDITS AND LEAK - MENARD	DEMAND REDUCTION	17	17	17	16	16	16	$1144	$1195
MERTZON	F	MUNICIPAL CONSERVATION - MERTZON	DEMAND REDUCTION	5	5	5	5	5	5	$1058	$1052
MIDLAND	F	ADDITIONAL T-BAR RANCH SUPPLIES WITH TREATMENT - MIDLAND	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | WINKLER COUNTY	0	10,000	10,000	10,000	10,000	10,000	N/A	$432
MIDLAND	F	ASR OF EXISTING SURFACE WATER SUPPLIES IN WARD COUNTY WELL FIELD - CRMWD	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	0	1,235	1,022	1,022	1,022	1,022	N/A	$480
MIDLAND	F	CRMWD - DESALINATION OF BRACKISH SURFACE WATER	F | CRMWD DIVERTED WATER SYSTEM BRACKISH	0	0	687	687	687	687	N/A	$977
MIDLAND	F	MUNICIPAL CONSERVATION - MIDLAND	DEMAND REDUCTION	813	879	973	1,062	1,150	1,236	$313	$309
MIDLAND	F	SUBORDINATION - CRMWD SYSTEM	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	8,826	0	0	0	0	0	$0	N/A
MIDLAND	F	WARD COUNTY WELL FIELD EXPANSION AND DEVELOPMENT OF WINKLER COUNTY WELL FIELD - CRMWD	F | PECOS VALLEY AQUIFER | WARD COUNTY	0	1,106	916	916	916	916	N/A	$219
MIDLAND	F	WARD COUNTY WELL FIELD EXPANSION AND DEVELOPMENT OF WINKLER COUNTY WELL FIELD - CRMWD	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | WINKLER COUNTY	0	1,659	1,375	1,375	1,375	1,375	N/A	$219
MIDLAND	G	ABILENE REDUCTION FOR WEST TEXAS WATER PARTNERSHIP	G | FORT PHANTOM HILL LAKE/RESERVOIR	0	1,600	1,600	1,600	1,600	1,600	N/A	$710
MIDLAND	G	CEDAR RIDGE RESERVOIR	G | CEDAR RIDGE LAKE/RESERVOIR	0	2,400	2,400	2,400	2,400	2,400	N/A	$710
MILES	F	MUNICIPAL CONSERVATION - MILES	DEMAND REDUCTION	5	6	6	6	6	6	$977	$911
MILES	F	SUBORDINATION - SAN ANGELO SYSTEM	F | SAN ANGELO LAKES LAKE/RESERVOIR SYSTEM	112	124	121	119	119	119	$0	$0
MILLERSVIEW-DOOLE WSC	F	MUNICIPAL CONSERVATION - MILLERSVIEW-DOOLE WSC	DEMAND REDUCTION	24	25	25	26	26	27	$607	$596
MILLERSVIEW-DOOLE WSC	F	SUBORDINATION - CRMWD SYSTEM	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	247	130	166	201	232	259	$0	$0
MINING, ANDREWS	F	MINING CONSERVATION - ANDREWS COUNTY	DEMAND REDUCTION	277	260	222	176	135	104	$124	$0
MINING, ANDREWS	F	REUSE - MIDLAND DIRECT NON-POTABLE SALES TO MINING	F | DIRECT REUSE	2,500	2,500	2,500	2,500	2,500	2,500	$1141	$197
MINING, BORDEN	F	MINING CONSERVATION - BORDEN COUNTY	DEMAND REDUCTION	48	65	55	35	17	8	$716	$0
MINING, BROWN	F	MINING CONSERVATION - BROWN COUNTY	DEMAND REDUCTION	66	66	67	67	66	66	$149	$0
MINING, COKE	F	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER - COKE COUNTY MINING	F | EDWARDS-TRINITY-PLATEAU AQUIFER | COKE COUNTY	250	250	250	250	250	250	$295	$67
MINING, COKE	F	MINING CONSERVATION - COKE COUNTY	DEMAND REDUCTION	34	34	30	26	23	20	$124	$0

Recommended Water User Group (WUG) Water Management Strategies (WMS)

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
MINING, COKE	F	SUBORDINATION - CRMWD BRACKISH WATER SYSTEM	F | CRMWD DIVERTED WATER SYSTEM BRACKISH	38	36	34	32	30	28	$0	$0
MINING, COLEMAN	F	DEVELOP ADDITIONAL HICKORY AQUIFER SUPPLIES - COLEMAN COUNTY MINING	F | HICKORY AQUIFER | COLEMAN COUNTY	65	65	65	65	65	65	$1200	$154
MINING, COLEMAN	F	MINING CONSERVATION - COLEMAN COUNTY	DEMAND REDUCTION	8	7	7	6	5	5	$124	$0
MINING, CONCHO	F	DEVELOP ADDITIONAL HICKORY AQUIFER SUPPLIES - CONCHO COUNTY MINING	F | HICKORY AQUIFER | CONCHO COUNTY	200	200	200	200	200	200	$800	$120
MINING, CONCHO	F	MINING CONSERVATION - CONCHO COUNTY	DEMAND REDUCTION	34	33	30	26	22	20	$124	$0
MINING, CRANE	F	MINING CONSERVATION - CRANE COUNTY	DEMAND REDUCTION	43	59	60	48	37	28	$785	$0
MINING, CROCKETT	F	MINING CONSERVATION - CROCKETT COUNTY	DEMAND REDUCTION	121	129	88	48	14	4	$234	$0
MINING, CROCKETT	F	REUSE - MINING, CROCKETT - SALES FROM CROCKETT WCID #1	F | DIRECT REUSE	75	75	75	75	75	75	$0	$0
MINING, ECTOR	F	MINING CONSERVATION - ECTOR COUNTY	DEMAND REDUCTION	138	151	135	110	89	75	$281	$0
MINING, GLASSCOCK	F	MINING CONSERVATION - GLASSCOCK COUNTY	DEMAND REDUCTION	240	217	167	118	77	56	$124	$0
MINING, HOWARD	F	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - HOWARD COUNTY MINING	F | DOCKUM AQUIFER | HOWARD COUNTY	274	274	274	274	274	274	$383	$82
MINING, HOWARD	F	DEVELOP ADDITIONAL OGALLALA AQUIFER SUPPLIES - HOWARD COUNTY MINING	F | OGALLALA AQUIFER | HOWARD COUNTY	20	31	31	31	3	3	$419	$67
MINING, HOWARD	F	MINING CONSERVATION - HOWARD COUNTY	DEMAND REDUCTION	174	192	136	80	33	14	$297	$0
MINING, HOWARD	F	SUBORDINATION - CRMWD BRACKISH WATER SYSTEM	F | CRMWD DIVERTED WATER SYSTEM BRACKISH	1,238	1,240	1,242	982	320	43	$0	$0
MINING, IRION	F	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - IRION COUNTY MINING	F | DOCKUM AQUIFER | IRION COUNTY	150	150	150	50	0	0	$353	N/A
MINING, IRION	F	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - IRION COUNTY MINING	F | EDWARDS-TRINITY-PLATEAU AQUIFER | IRION COUNTY	500	500	500	100	0	0	$296	N/A
MINING, IRION	F	MINING CONSERVATION - IRION COUNTY	DEMAND REDUCTION	223	235	170	104	50	24	$214	$0
MINING, KIMBLE	F	MINING CONSERVATION - KIMBLE COUNTY	DEMAND REDUCTION	1	1	1	1	1	1	$124	$0
MINING, LOVING	F	MINING CONSERVATION - LOVING COUNTY	DEMAND REDUCTION	55	74	65	53	42	33	$702	$0
MINING, MARTIN	F	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - MARTIN COUNTY MINING	F | DOCKUM AQUIFER | MARTIN COUNTY	210	210	210	210	210	210	$348	$76
MINING, MARTIN	F	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - MARTIN COUNTY MINING	F | EDWARDS-TRINITY-PLATEAU AQUIFER | MARTIN COUNTY	1,500	1,500	1,000	1,000	500	500	$188	$57
MINING, MARTIN	F	MINING CONSERVATION - MARTIN COUNTY	DEMAND REDUCTION	247	210	158	101	54	29	$124	$0
MINING, MARTIN	F	REUSE - MIDLAND DIRECT NON-POTABLE SALES TO MINING	F | DIRECT REUSE	1,500	1,200	600	500	0	0	$1187	N/A
MINING, MASON	F	MINING CONSERVATION - MASON COUNTY	DEMAND REDUCTION	72	66	50	40	32	26	$124	$0
MINING, MCCULLOCH	F	MINING CONSERVATION - MCCULLOCH COUNTY	DEMAND REDUCTION	625	584	465	394	339	294	$124	$0
MINING, MENARD	F	MINING CONSERVATION - MENARD COUNTY	DEMAND REDUCTION	76	75	67	58	50	44	$124	$0
MINING, MIDLAND	F	MINING CONSERVATION - MIDLAND COUNTY	DEMAND REDUCTION	273	239	184	124	74	52	$124	$0

Recommended Water User Group (WUG) Water Management Strategies (WMS)

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
MINING, MIDLAND	F	REUSE - MIDLAND DIRECT NON-POTABLE SALES TO MINING	F | DIRECT REUSE	500	500	500	500	500	500	$664	$104
MINING, MITCHELL	F	MINING CONSERVATION - MITCHELL COUNTY	DEMAND REDUCTION	42	52	44	35	26	20	$522	$0
MINING, MITCHELL	F	REUSE - MITCHELL COUNTY MINING, DIRECT NON-POTABLE SALES FROM COLORADO CITY	F | DIRECT REUSE	250	250	250	250	250	250	$368	$56
MINING, PECOS	F	MINING CONSERVATION - PECOS COUNTY	DEMAND REDUCTION	48	75	75	60	47	37	$1065	$0
MINING, REAGAN	F	MINING CONSERVATION - REAGAN COUNTY	DEMAND REDUCTION	295	238	172	98	37	14	$124	$0
MINING, REEVES	F	MINING CONSERVATION - REEVES COUNTY	DEMAND REDUCTION	107	184	178	145	114	90	$1328	$0
MINING, RUNNELS	F	DEVELOP OTHER AQUIFER SUPPLIES - RUNNELS COUNTY MINING	F | OTHER AQUIFER | RUNNELS COUNTY	76	73	46	18	0	0	$211	N/A
MINING, RUNNELS	F	MINING CONSERVATION - RUNNELS COUNTY	DEMAND REDUCTION	19	19	17	15	13	11	$124	$0
MINING, SCHLEICHER	F	MINING CONSERVATION - SCHLEICHER COUNTY	DEMAND REDUCTION	43	51	39	27	17	10	$435	$0
MINING, SCURRY	F	DEVELOP LOCAL ALLUVIUM AQUIFER SUPPLIES - SCURRY COUNTY MINING	F | OTHER AQUIFER | SCURRY COUNTY	80	80	80	80	80	80	$200	$53
MINING, SCURRY	F	MINING CONSERVATION - SCURRY COUNTY	DEMAND REDUCTION	20	32	34	25	17	12	$1295	$0
MINING, STERLING	F	MINING CONSERVATION - STERLING COUNTY	DEMAND REDUCTION	55	67	57	37	19	10	$489	$0
MINING, SUTTON	F	MINING CONSERVATION - SUTTON COUNTY	DEMAND REDUCTION	31	50	53	40	27	18	$1311	$0
MINING, TOM GREEN	F	MINING CONSERVATION - TOM GREEN COUNTY	DEMAND REDUCTION	74	76	78	78	79	81	$282	$0
MINING, UPTON	F	MINING CONSERVATION - UPTON COUNTY	DEMAND REDUCTION	297	254	201	135	81	56	$124	$0
MINING, WARD	F	MINING CONSERVATION - WARD COUNTY	DEMAND REDUCTION	56	67	59	45	32	23	$452	$0
MINING, WINKLER	F	MINING CONSERVATION - WINKLER COUNTY	DEMAND REDUCTION	55	82	69	53	37	26	$945	$0
MONAHANS	F	MUNICIPAL CONSERVATION - MONAHANS	DEMAND REDUCTION	41	43	45	47	48	48	$428	$362
ODESSA	F	ASR OF EXISTING SURFACE WATER SUPPLIES IN WARD COUNTY WELL FIELD - CRMWD	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	0	722	660	728	800	873	N/A	$480
ODESSA	F	CRMWD - DESALINATION OF BRACKISH SURFACE WATER	F | CRMWD DIVERTED WATER SYSTEM BRACKISH	0	0	444	489	537	587	N/A	$977
ODESSA	F	MUNICIPAL CONSERVATION - ODESSA	DEMAND REDUCTION	716	825	924	1,026	1,128	1,231	$316	$309
ODESSA	F	SUBORDINATION - CRMWD SYSTEM	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	7,450	3,928	6,170	8,675	11,408	14,243	$0	$0
ODESSA	F	WARD COUNTY WELL FIELD EXPANSION AND DEVELOPMENT OF WINKLER COUNTY WELL FIELD - CRMWD	F | PECOS VALLEY AQUIFER | WARD COUNTY	848	647	592	652	717	782	$1265	$219
ODESSA	F	WARD COUNTY WELL FIELD EXPANSION AND DEVELOPMENT OF WINKLER COUNTY WELL FIELD - CRMWD	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | WINKLER COUNTY	1,271	971	887	978	1,075	1,173	$1265	$219
ODESSA - WATER LOSS	F	SUBORDINATION - CRMWD SYSTEM	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	2,500	2,500	2,500	2,500	2,500	2,500	$0	$0
PECOS	F	MUNICIPAL CONSERVATION - PECOS	DEMAND REDUCTION	53	56	59	62	63	64	$332	$272
PECOS	F	WATER AUDITS AND LEAK - PECOS	DEMAND REDUCTION	157	165	173	178	183	186	$647	$658

Recommended Water User Group (WUG) Water Management Strategies (WMS)

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
PECOS COUNTY WCID #1	F	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - PECOS COUNTY WCID #1	F | EDWARDS-TRINITY-PLATEAU AQUIFER | PECOS COUNTY	250	250	250	250	250	250	$988	$164
PECOS COUNTY WCID #1	F	MUNICIPAL CONSERVATION - PECOS WCID	DEMAND REDUCTION	19	20	22	23	24	25	$635	$602
RANKIN	F	MUNICIPAL CONSERVATION - RANKIN	DEMAND REDUCTION	5	5	5	5	6	6	$1036	$948
RANKIN	F	WATER AUDITS AND LEAK - RANKIN	DEMAND REDUCTION	14	15	15	16	16	16	$979	$945
RICHLAND SUD	F	MUNICIPAL CONSERVATION - RICHLAND SUD	DEMAND REDUCTION	13	14	14	14	14	14	$692	$679
RICHLAND SUD	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	25	26	25	25	25	26	$50	$50
ROBERT LEE	F	MUNICIPAL CONSERVATION - ROBERT LEE	DEMAND REDUCTION	6	6	6	6	6	6	$938	$938
ROBERT LEE	F	SUBORDINATION - OAK CREEK RESERVOIR	F | OAK CREEK LAKE/RESERVOIR	242	237	235	234	234	234	$0	$0
SAN ANGELO	F	BRUSH CONTROL - SAN ANGELO	F | SAN ANGELO LAKES LAKE/RESERVOIR SYSTEM	747	576	661	781	693	793	$857	$857
SAN ANGELO	F	DESALINATION OF OTHER AQUIFER SUPPLIES IN TOM GREEN COUNTY - SAN ANGELO	F | OTHER AQUIFER | TOM GREEN COUNTY	0	0	0	2,928	2,600	2,973	N/A	$691
SAN ANGELO	F	HICKORY WELL FIELD EXPANSION IN MCCULLOCH COUNTY - SAN ANGELO	F | HICKORY AQUIFER | MCCULLOCH COUNTY	0	0	0	0	0	0	N/A	N/A
SAN ANGELO	F	MUNICIPAL CONSERVATION - SAN ANGELO	DEMAND REDUCTION	656	753	793	842	894	949	$319	$317
SAN ANGELO	F	REUSE - SAN ANGELO	F | DIRECT REUSE	5,232	4,033	4,629	5,466	4,854	5,550	$2826	$1033
SAN ANGELO	F	SUBORDINATION - SAN ANGELO SYSTEM	F | SAN ANGELO LAKES LAKE/RESERVOIR SYSTEM	3,570	3,389	3,207	3,034	2,858	2,685	$0	$0
SAN ANGELO	G	ABILENE REDUCTION FOR WEST TEXAS WATER PARTNERSHIP	G | FORT PHANTOM HILL LAKE/RESERVOIR	0	1,383	1,587	1,875	1,664	1,903	N/A	$710
SAN ANGELO	G	CEDAR RIDGE RESERVOIR	G | CEDAR RIDGE LAKE/RESERVOIR	0	2,074	2,381	2,810	2,497	2,854	N/A	$710
SAN ANGELO - UNASSIGNED WATER VOLUMES	F	BRUSH CONTROL - SAN ANGELO	F | SAN ANGELO LAKES LAKE/RESERVOIR SYSTEM	114	324	220	110	181	63	$857	$857
SAN ANGELO - UNASSIGNED WATER VOLUMES	F	DESALINATION OF OTHER AQUIFER SUPPLIES IN TOM GREEN COUNTY - SAN ANGELO	F | OTHER AQUIFER | TOM GREEN COUNTY	0	0	0	414	679	237	N/A	$691
SAN ANGELO - UNASSIGNED WATER VOLUMES	F	REUSE - SAN ANGELO	F | DIRECT REUSE	793	2,265	1,538	773	1,266	442	$2826	$1033
SAN ANGELO - UNASSIGNED WATER VOLUMES	F	SUBORDINATION - EV SPENCE NON SYSTEM PORTION	F | EV SPENCE LAKE/RESERVOIR NON-SYSTEM PORTION	1,475	1,474	1,472	1,470	1,469	1,467	$0	$0
SAN ANGELO - UNASSIGNED WATER VOLUMES	G	ABILENE REDUCTION FOR WEST TEXAS WATER PARTNERSHIP	G | FORT PHANTOM HILL LAKE/RESERVOIR	0	776	528	264	433	151	N/A	$710
SAN ANGELO - UNASSIGNED WATER VOLUMES	G	CEDAR RIDGE RESERVOIR	G | CEDAR RIDGE LAKE/RESERVOIR	0	1,166	791	399	651	227	N/A	$710
SAN ANGELO - WATER LOSS	F	DESALINATION OF OTHER AQUIFER SUPPLIES IN TOM GREEN COUNTY - SAN ANGELO	F | OTHER AQUIFER | TOM GREEN COUNTY	0	0	0	1,250	1,250	1,250	N/A	$0
SAN ANGELO - WATER LOSS	F	REUSE - SAN ANGELO	F | DIRECT REUSE	1,300	1,300	1,300	1,300	1,300	1,300	$0	$0
SANTA ANNA	F	MUNICIPAL CONSERVATION - SANTA ANNA	DEMAND REDUCTION	6	6	6	6	6	6	$909	$900
SNYDER	F	ASR OF EXISTING SURFACE WATER SUPPLIES IN WARD COUNTY WELL FIELD - CRMWD	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	0	39	36	39	43	48	N/A	$480

Recommended Water User Group (WUG) Water Management Strategies (WMS)

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
SNYDER	F	CRMWD - DESALINATION OF BRACKISH SURFACE WATER	F | CRMWD DIVERTED WATER SYSTEM BRACKISH	0	0	24	26	29	32	N/A	$977
SNYDER	F	MUNICIPAL CONSERVATION - SNYDER	DEMAND REDUCTION	75	86	93	100	104	134	$536	$509
SNYDER	F	SUBORDINATION - CRMWD SYSTEM	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	1,043	678	874	1,098	1,339	1,585	$0	$0
SNYDER	F	WARD COUNTY WELL FIELD EXPANSION AND DEVELOPMENT OF WINKLER COUNTY WELL FIELD - CRMWD	F | PECOS VALLEY AQUIFER | WARD COUNTY	46	35	32	36	39	43	$1265	$219
SNYDER	F	WARD COUNTY WELL FIELD EXPANSION AND DEVELOPMENT OF WINKLER COUNTY WELL FIELD - CRMWD	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | WINKLER COUNTY	69	52	48	53	59	65	$1265	$219
SONORA	F	MUNICIPAL CONSERVATION - SONORA	DEMAND REDUCTION	18	20	20	20	21	21	$640	$623
SONORA	F	REUSE - SONORA, DIRECT NON-POTABLE	F | DIRECT REUSE	62	62	62	62	62	62	$748	$79
SONORA	F	WATER AUDITS AND LEAK - SONORA	DEMAND REDUCTION	77	82	83	85	86	86	$495	$500
STANTON	F	MUNICIPAL CONSERVATION - STANTON	DEMAND REDUCTION	15	17	18	19	20	20	$664	$625
STANTON	F	SUBORDINATION - CRMWD SYSTEM	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	253	159	203	249	292	332	$0	$0
STEAM ELECTRIC POWER, COKE	F	SEP CONSERVATION - ALTERNATIVE COOLING TECHNOLOGIES - COKE COUNTY	DEMAND REDUCTION	247	289	339	401	477	528	$7409	$5057
STEAM ELECTRIC POWER, CROCKETT	F	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - CROCKETT COUNTY SEP	F | EDWARDS-TRINITY-PLATEAU AQUIFER | CROCKETT COUNTY	776	907	1,067	1,262	1,500	1,662	$0	$0
STEAM ELECTRIC POWER, ECTOR	F	ASR OF EXISTING SURFACE WATER SUPPLIES IN WARD COUNTY WELL FIELD - CRMWD	F | COLORADO RIVER MWD LAKE/RESERVOIR SYSTEM	0	1,235	1,022	1,022	1,022	1,022	N/A	$480
STEAM ELECTRIC POWER, ECTOR	F	CRMWD - DESALINATION OF BRACKISH SURFACE WATER	F | CRMWD DIVERTED WATER SYSTEM BRACKISH	0	0	687	687	687	687	N/A	$977
STEAM ELECTRIC POWER, ECTOR	F	SEP CONSERVATION - ALTERNATIVE COOLING TECHNOLOGIES - ECTOR COUNTY	DEMAND REDUCTION	3,286	4,263	6,165	8,604	11,597	15,033	$836	$541
STEAM ELECTRIC POWER, ECTOR	F	WARD COUNTY WELL FIELD EXPANSION AND DEVELOPMENT OF WINKLER COUNTY WELL FIELD - CRMWD	F | PECOS VALLEY AQUIFER | WARD COUNTY	1,600	1,106	916	916	916	916	$1265	$219
STEAM ELECTRIC POWER, ECTOR	F	WARD COUNTY WELL FIELD EXPANSION AND DEVELOPMENT OF WINKLER COUNTY WELL FIELD - CRMWD	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | WINKLER COUNTY	2,400	1,659	1,375	1,375	1,375	1,375	$1265	$219
STEAM ELECTRIC POWER, MITCHELL	F	SEP CONSERVATION - ALTERNATIVE COOLING TECHNOLOGIES - MITCHELL COUNTY	DEMAND REDUCTION	1,127	1,030	933	837	740	674	$378	$105
STEAM ELECTRIC POWER, MITCHELL	F	SUBORDINATION - LAKE COLORADO CITY AND CHAMPION LAKE SYSTEM	F | COLORADO CITY-CHAMPION LAKE/RESERVOIR SYSTEM	3,720	3,640	3,560	3,480	3,400	3,320	$0	$0
STEAM ELECTRIC POWER, WARD	F	DEVELOP ADDITIONAL PECOS VALLEY AQUIFER SUPPLIES - WARD SEP	F | PECOS VALLEY AQUIFER | WARD COUNTY	5,600	5,600	5,600	5,600	5,600	5,600	$89	$49
STEAM ELECTRIC POWER, WARD	F	SEP WARD COUNTY - CONSERVATION - ALT COOLING TECHNOLOGY	DEMAND REDUCTION	1,079	1,718	2,496	3,445	4,603	5,569	$0	$0

Recommended Water User Group (WUG) Water Management Strategies (WMS)

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
STERLING CITY	F	MUNICIPAL CONSERVATION - STERLING CITY	DEMAND REDUCTION	5	5	5	5	5	5	$986	$963
WINK	F	MUNICIPAL CONSERVATION - WINK	DEMAND REDUCTION	6	6	7	7	8	8	$932	$811
WINTERS	F	MUNICIPAL CONSERVATION - WINTERS	DEMAND REDUCTION	14	15	15	15	15	15	$676	$672
WINTERS	F	REUSE- WINTERS, DIRECT POTABLE	F | DIRECT REUSE	51	50	49	49	49	49	$5091	$1685
WINTERS	F	SUBORDINATION - WINTERS LAKE	F | WINTERS LAKE/RESERVOIR	114	110	105	103	100	97	$0	$0
WINTERS	F	VOLUNTARY TRANSFER - WINTERS - PURCHASE FROM ABILENE	F | OH IVIE LAKE/RESERVOIR NON-SYSTEM PORTION	62	61	60	59	59	59	$950	$370
WINTERS - WATER LOSS	F	REUSE- WINTERS, DIRECT POTABLE	F | DIRECT REUSE	27	27	27	27	27	27	$0	$0
ZEPHYR WSC	F	MUNICIPAL CONSERVATION - ZEPHYR WSC	DEMAND REDUCTION	25	26	26	26	26	26	$602	$600
Region F Total RecommendedWMS Supplies				144,454	181,290	202,577	213,471	220,123	228,549		

Recommended Projects Associated with Water Management Strategies

Project Sponosr Region: F

Sponsor Name	Is Sponsor a WWP?	Project Name	Project Description	Capital Cost	Online Decade
BALLINGER	N	VOLUNTARY TRANSFER (PURCHASE) - BALLINGER	CONVEYANCE/TRANSMISSION PIPELINE	$47,093,000	2020
BALLINGER	N	WATER AUDITS AND LEAK - BALLINGER	WATER LOSS CONTROL	$2,669,400	2020
BANGS	N	DIRECT NON-POTABLE REUSE FOR PUBLIC PARKS IRRIGATION (TYPE I) - BANGS	CONVEYANCE/TRANSMISSION PIPELINE	$422,000	2020
BIG LAKE	N	WATER AUDITS AND LEAK - BIG LAKE	WATER LOSS CONTROL	$2,708,800	2020
BIG SPRING	N	WATER TREATMENT PLANT EXPANSION - BIG SPRING	WATER TREATMENT PLANT EXPANSION	$16,930,000	2020
BRADY	N	ADVANCED GROUNDWATER TREATMENT - BRADY	NEW WATER TREATMENT PLANT	$20,398,000	2020
BRONTE	N	DEVELOP EDWARDS-TRINITY AQUIFER SUPPLIES IN NOLAN COUNTY - BRONTE	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; PUMP STATION	$7,350,000	2020
BRONTE	N	REHABILITATION OF OAK CREEK PIPELINE - BRONTE	CONVEYANCE/TRANSMISSION PIPELINE	$1,499,000	2020
BRONTE	N	WATER AUDITS AND LEAK - BRONTE	WATER LOSS CONTROL	$900,000	2020
BRONTE	N	WATER TREATMENT PLANT EXPANSION - BRONTE	WATER TREATMENT PLANT EXPANSION	$6,768,000	2020
BROWNWOOD	N	DIRECT POTABLE REUSE - BROWNWOOD	NEW WATER TREATMENT PLANT	$8,500,000	2020
COAHOMA	N	WATER AUDITS AND LEAK - COAHOMA	WATER LOSS CONTROL	$848,000	2020
COLORADO RIVER MWD	Y	ASR OF EXISTING SURFACE WATER SUPPLIES IN WARD COUNTY WELL FIELD - CRMWD	CONVEYANCE/TRANSMISSION PIPELINE; INJECTION WELL; PUMP STATION	$10,184,000	2030
COLORADO RIVER MWD	Y	DESALINATION OF BRACKISH SURFACE WATER (CRMWD DIVERTED WATER SYSTEM) - CRMWD	CONVEYANCE/TRANSMISSION PIPELINE; NEW SURFACE WATER INTAKE; PUMP STATION; WATER TREATMENT PLANT EXPANSION	$34,819,000	2040
COLORADO RIVER MWD	Y	WARD COUNTY WELL FIELD EXPANSION AND DEVELOPMENT OF WINKLER COUNTY WELL FIELD - CRMWD	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$139,916,000	2020
CONCHO RURAL WATER CORPORATION	N	DESALINATION OF OTHER AQUIFER SUPPLIES IN TOM GREEN COUNTY - CONCHO RURAL WSC	CONVEYANCE/TRANSMISSION PIPELINE; EVAPORATIVE POND; MULTIPLE WELLS/WELL FIELD; NEW WATER TREATMENT PLANT; PUMP STATION	$5,131,000	2020
COUNTY-OTHER, ANDREWS	N	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - ANDREWS COUNTY OTHER	MULTIPLE WELLS/WELL FIELD	$3,515,000	2020
COUNTY-OTHER, BORDEN	N	WATER AUDITS AND LEAK - BORDEN COUNTY OTHER	WATER LOSS CONTROL	$701,400	2020
COUNTY-OTHER, COKE	N	VOLUNTARY TRANSFER (PURCHASE) - COKE COUNTY OTHER	WATER RIGHT/PERMIT LEASE OR PURCHASE	$11,000	2020
COUNTY-OTHER, HOWARD	N	VOLUNTARY TRANSFER (PURCHASE) - HOWARD COUNTY OTHER	CONVEYANCE/TRANSMISSION PIPELINE	$1,833,000	2020
COUNTY-OTHER, MARTIN	N	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - MARTIN COUNTY OTHER	MULTIPLE WELLS/WELL FIELD	$4,219,000	2020
COUNTY-OTHER, MCCULLOCH	N	VOLUNTARY TRANSFER (PURCHASE) - MCCULLOCH COUNTY OTHER	CONVEYANCE/TRANSMISSION PIPELINE	$347,000	2020
COUNTY-OTHER, MIDLAND	N	DEVELOP PECOS VALLEY AQUIFER SUPPLIES - MIDLAND COUNTY OTHER	MULTIPLE WELLS/WELL FIELD	$62,699,000	2030
COUNTY-OTHER, MITCHELL	N	WATER AUDITS AND LEAK - MITCHELL COUNTY OTHER	WATER LOSS CONTROL	$3,361,800	2020
COUNTY-OTHER, SCURRY	N	VOLUNTARY TRANSFER (PURCHASE) - SCURRY COUNTY OTHER	CONVEYANCE/TRANSMISSION PIPELINE	$75,000	2020
COUNTY-OTHER, WARD	N	WATER AUDITS AND LEAK - WARD COUNTY OTHER	WATER LOSS CONTROL	$2,946,700	2020
COUNTY-OTHER, WINKLER	N	DEVELOP PECOS VALLEY AQUIFER SUPPLIES - WINKLER COUNTY OTHER	MULTIPLE WELLS/WELL FIELD	$1,908,000	2020
COUNTY-OTHER, WINKLER	N	WATER AUDITS AND LEAK - WINKLER COUNTY OTHER	WATER LOSS CONTROL	$1,787,400	2020
EDEN	N	DIRECT NON-POTABLE REUSE FOR GOLF COURSE IRRIGATION (TYPE I) - EDEN	CONVEYANCE/TRANSMISSION PIPELINE	$485,700	2020
ELDORADO	N	WATER AUDITS AND LEAK - EL DORADO	WATER LOSS CONTROL	$1,471,200	2020
IRRIGATION, ANDREWS	N	IRRIGATION CONSERVATION - ANDREWS COUNTY	ON FARM IRRIGATION CONSERVATION	$2,442,635	2020

Recommended Projects Associated with Water Management Strategies

Sponsor Name	Is Sponsor a WWP?	Project Name	Project Description	Capital Cost	Online Decade
IRRIGATION, BORDEN	N	IRRIGATION CONSERVATION - BORDEN COUNTY	ON FARM IRRIGATION CONSERVATION	$259,545	2020
IRRIGATION, BROWN	N	IRRIGATION CONSERVATION - BROWN COUNTY	ON FARM IRRIGATION CONSERVATION	$488,956	2020
IRRIGATION, COKE	N	IRRIGATION CONSERVATION - COKE COUNTY	ON FARM IRRIGATION CONSERVATION	$75,036	2020
IRRIGATION, COLEMAN	N	IRRIGATION CONSERVATION - COLEMAN COUNTY	ON FARM IRRIGATION CONSERVATION	$50,050	2020
IRRIGATION, CONCHO	N	IRRIGATION CONSERVATION - CONCHO COUNTY	ON FARM IRRIGATION CONSERVATION	$690,261	2020
IRRIGATION, CROCKETT	N	IRRIGATION CONSERVATION - CROCKETT COUNTY	ON FARM IRRIGATION CONSERVATION	$44,948	2020
IRRIGATION, ECTOR	N	IRRIGATION CONSERVATION - ECTOR COUNTY	ON FARM IRRIGATION CONSERVATION	$136,208	2020
IRRIGATION, GLASSCOCK	N	IRRIGATION CONSERVATION - GLASSCOCK COUNTY	ON FARM IRRIGATION CONSERVATION	$1,474,382	2020
IRRIGATION, HOWARD	N	IRRIGATION CONSERVATION - HOWARD COUNTY	ON FARM IRRIGATION CONSERVATION	$469,541	2020
IRRIGATION, IRION	N	IRRIGATION CONSERVATION - IRION COUNTY	ON FARM IRRIGATION CONSERVATION	$136,695	2020
IRRIGATION, KIMBLE	N	IRRIGATION CONSERVATION - KIMBLE COUNTY	ON FARM IRRIGATION CONSERVATION	$212,004	2020
IRRIGATION, MARTIN	N	IRRIGATION CONSERVATION - MARTIN COUNTY	ON FARM IRRIGATION CONSERVATION	$3,415,035	2020
IRRIGATION, MASON	N	IRRIGATION CONSERVATION - MASON COUNTY	ON FARM IRRIGATION CONSERVATION	$785,265	2020
IRRIGATION, MCCULLOCH	N	IRRIGATION CONSERVATION - MCCULLOCH COUNTY	ON FARM IRRIGATION CONSERVATION	$340,568	2020
IRRIGATION, MENARD	N	IRRIGATION CONSERVATION - MENARD COUNTY	ON FARM IRRIGATION CONSERVATION	$245,115	2020
IRRIGATION, MIDLAND	N	IRRIGATION CONSERVATION - MIDLAND COUNTY	ON FARM IRRIGATION CONSERVATION	$3,193,710	2020
IRRIGATION, MITCHELL	N	IRRIGATION CONSERVATION - MITCHELL COUNTY	ON FARM IRRIGATION CONSERVATION	$149,747	2020
IRRIGATION, PECOS	N	IRRIGATION CONSERVATION - PECOS COUNTY	ON FARM IRRIGATION CONSERVATION	$12,287,243	2020
IRRIGATION, REAGAN	N	IRRIGATION CONSERVATION - REAGAN COUNTY	ON FARM IRRIGATION CONSERVATION	$1,802,385	2020
IRRIGATION, REEVES	N	IRRIGATION CONSERVATION - REEVES COUNTY	ON FARM IRRIGATION CONSERVATION	$8,755,013	2020
IRRIGATION, RUNNELS	N	IRRIGATION CONSERVATION - RUNNELS COUNTY	ON FARM IRRIGATION CONSERVATION	$309,894	2020
IRRIGATION, SCHLEICHER	N	IRRIGATION CONSERVATION - SCHLEICHER COUNTY	ON FARM IRRIGATION CONSERVATION	$54,015	2020
IRRIGATION, SCURRY	N	IRRIGATION CONSERVATION - SCURRY COUNTY	ON FARM IRRIGATION CONSERVATION	$575,107	2020
IRRIGATION, STERLING	N	IRRIGATION CONSERVATION - STERLING COUNTY	ON FARM IRRIGATION CONSERVATION	$87,848	2020
IRRIGATION, SUTTON	N	IRRIGATION CONSERVATION - SUTTON COUNTY	ON FARM IRRIGATION CONSERVATION	$168,968	2020
IRRIGATION, TOM GREEN	N	IRRIGATION CONSERVATION - TOM GREEN COUNTY	ON FARM IRRIGATION CONSERVATION	$7,263,438	2020
IRRIGATION, UPTON	N	IRRIGATION CONSERVATION - UPTON COUNTY	ON FARM IRRIGATION CONSERVATION	$897,195	2020
IRRIGATION, WARD	N	IRRIGATION CONSERVATION - WARD COUNTY	ON FARM IRRIGATION CONSERVATION	$533,618	2020
IRRIGATION, WINKLER	N	IRRIGATION CONSERVATION - WINKLER COUNTY	ON FARM IRRIGATION CONSERVATION	$478,920	2020
JUNCTION	N	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - JUNCTION	MULTIPLE WELLS/WELL FIELD	$3,555,000	2020
JUNCTION	N	DREDGE RIVER INTAKE - JUNCTION	DREDGE TO RECOVER CAPACITY	$4,268,000	2020
JUNCTION	N	WATER AUDITS AND LEAK - JUNCTION	WATER LOSS CONTROL	$1,891,700	2020
LIVESTOCK, ANDREWS	N	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - ANDREWS COUNTY LIVESTOCK	MULTIPLE WELLS/WELL FIELD	$238,000	2020
LIVESTOCK, ANDREWS	N	DEVELOP PECOS VALLEY AQUIFER SUPPLIES - ANDREWS COUNTY LIVESTOCK	MULTIPLE WELLS/WELL FIELD	$68,000	2020
LIVESTOCK, HOWARD	N	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - HOWARD COUNTY LIVESTOCK	MULTIPLE WELLS/WELL FIELD	$512,000	2020
LIVESTOCK, MARTIN	N	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - MARTIN COUNTY LIVESTOCK	MULTIPLE WELLS/WELL FIELD	$339,000	2020
LIVESTOCK, MCCULLOCH	N	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - MCCULLOCH COUNTY LIVESTOCK	MULTIPLE WELLS/WELL FIELD	$62,000	2020

Recommended Projects Associated with Water Management Strategies

Sponsor Name	Is Sponsor a WWP?	Project Name	Project Description	Capital Cost	Online Decade
LIVESTOCK, SCURRY	N	NEW GROUNDWATER FROM LOCAL ALLUVIUM AQUIFER - SCURRY COUNTY LIVESTOCK	MULTIPLE WELLS/WELL FIELD	$143,000	2020
MADERA VALLEY WSC	N	WATER AUDITS AND LEAK - MADERA VALLEY WSC	WATER LOSS CONTROL	$1,673,300	2020
MANUFACTURING, KIMBLE	N	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - KIMBLE COUNTY MANUFACTURING	MULTIPLE WELLS/WELL FIELD	$305,000	2020
MANUFACTURING, MARTIN	N	VOLUNTARY TRANSFER (PURCHASE) - MARTIN COUNTY MANUFACTURING	WATER RIGHT/PERMIT LEASE OR PURCHASE	$14,500	2020
MANUFACTURING, MCCULLOCH	N	VOLUNTARY TRANSFER (PURCHASE) - MCCULLOCH COUNTY MANUFACTURING	CONVEYANCE/TRANSMISSION PIPELINE	$142,000	2020
MASON	N	ADDITIONAL TREATMENT - MASON	NEW WATER TREATMENT PLANT	$838,000	2020
MASON	N	WATER AUDITS AND LEAK - MASON	WATER LOSS CONTROL	$1,568,400	2020
MCCAMEY	N	WATER AUDITS AND LEAK - MCCAMEY	WATER LOSS CONTROL	$1,698,600	2020
MENARD	N	DEVELOP ADDITIONAL HICKORY AQUIFER SUPPLIES - MENARD	MULTIPLE WELLS/WELL FIELD	$6,120,000	2020
MENARD	N	DIRECT NON-POTABLE REUSE FOR IRRIGATION OF CITY FARMS (TYPE I) - MENARD	CONVEYANCE/TRANSMISSION PIPELINE	$1,288,800	2020
MENARD	N	WATER AUDITS AND LEAK - MENARD	WATER LOSS CONTROL	$1,183,200	2020
MIDLAND	N	ADDITIONAL T-BAR RANCH SUPPLIES WITH TREATMENT - MIDLAND	INJECTION WELL; MULTIPLE WELLS/WELL FIELD; NEW WATER TREATMENT PLANT; PUMP STATION	$52,199,000	2030
MIDLAND	N	WEST TEXAS WATER PARTNERSHIP - MIDLAND	CONVEYANCE/TRANSMISSION PIPELINE	$26,116,800	2030
MINING, ANDREWS	N	DIRECT NON-POTABLE REUSE WATER FROM CITY OF MIDLAND - ANDREWS COUNTY MINING	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION	$28,197,000	2020
MINING, ANDREWS	N	MINING CONSERVATION - ANDREWS COUNTY	MINING CONSERVATION CAPITAL COST	$5,540,000	2020
MINING, BORDEN	N	MINING CONSERVATION - BORDEN COUNTY	MINING CONSERVATION CAPITAL COST	$1,300,000	2020
MINING, BROWN	N	MINING CONSERVATION - BROWN COUNTY	MINING CONSERVATION CAPITAL COST	$1,340,000	2020
MINING, COKE	N	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - COKE COUNTY MINING	MULTIPLE WELLS/WELL FIELD	$678,000	2020
MINING, COKE	N	MINING CONSERVATION - COKE COUNTY	MINING CONSERVATION CAPITAL COST	$680,000	2020
MINING, COLEMAN	N	DEVELOP ADDITIONAL HICKORY AQUIFER SUPPLIES - COLEMAN COUNTY MINING	MULTIPLE WELLS/WELL FIELD	$814,000	2020
MINING, COLEMAN	N	MINING CONSERVATION - COLEMAN COUNTY	MINING CONSERVATION CAPITAL COST	$160,000	2020
MINING, CONCHO	N	DEVELOP ADDITIONAL HICKORY AQUIFER SUPPLIES - CONCHO COUNTY MINING	MULTIPLE WELLS/WELL FIELD	$1,626,000	2020
MINING, CONCHO	N	MINING CONSERVATION - CONCHO COUNTY	MINING CONSERVATION CAPITAL COST	$680,000	2020
MINING, CRANE	N	MINING CONSERVATION - CRANE COUNTY	MINING CONSERVATION CAPITAL COST	$1,200,000	2020
MINING, CROCKETT	N	MINING CONSERVATION - CROCKETT COUNTY	MINING CONSERVATION CAPITAL COST	$2,580,000	2020
MINING, ECTOR	N	MINING CONSERVATION - ECTOR COUNTY	MINING CONSERVATION CAPITAL COST	$3,020,000	2020
MINING, GLASSCOCK	N	MINING CONSERVATION - GLASSCOCK COUNTY	MINING CONSERVATION CAPITAL COST	$4,800,000	2020
MINING, HOWARD	N	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - HOWARD COUNTY MINING	MULTIPLE WELLS/WELL FIELD	$989,000	2020
MINING, HOWARD	N	DEVELOP ADDITIONAL OGALLALA AQUIFER SUPPLIES - HOWARD COUNTY MINING	MULTIPLE WELLS/WELL FIELD	$127,000	2020
MINING, HOWARD	N	MINING CONSERVATION - HOWARD COUNTY	MINING CONSERVATION CAPITAL COST	$3,840,000	2020
MINING, IRION	N	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - IRION COUNTY MINING	MULTIPLE WELLS/WELL FIELD	$782,000	2020
MINING, IRION	N	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - IRION COUNTY MINING	MULTIPLE WELLS/WELL FIELD	$2,057,000	2020
MINING, IRION	N	MINING CONSERVATION - IRION COUNTY	MINING CONSERVATION CAPITAL COST	$4,700,000	2020
MINING, KIMBLE	N	MINING CONSERVATION - KIMBLE COUNTY	MINING CONSERVATION CAPITAL COST	$20,000	2020
MINING, LOVING	N	MINING CONSERVATION - LOVING COUNTY	MINING CONSERVATION CAPITAL COST	$1,480,000	2020

Recommended Projects Associated with Water Management Strategies

Sponsor Name	Is Sponsor a WWP?	Project Name	Project Description	Capital Cost	Online Decade
MINING, MARTIN	N	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - MARTIN COUNTY MINING	MULTIPLE WELLS/WELL FIELD	$677,000	2020
MINING, MARTIN	N	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - MARTIN COUNTY MINING	MULTIPLE WELLS/WELL FIELD	$2,356,000	2020
MINING, MARTIN	N	DIRECT NON-POTABLE REUSE WATER FROM CITY OF MIDLAND - MARTIN COUNTY MINING	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION	$17,827,000	2020
MINING, MARTIN	N	MINING CONSERVATION - MARTIN COUNTY	MINING CONSERVATION CAPITAL COST	$4,940,000	2020
MINING, MASON	N	MINING CONSERVATION - MASON COUNTY	MINING CONSERVATION CAPITAL COST	$1,440,000	2020
MINING, MCCULLOCH	N	MINING CONSERVATION - MCCULLOCH COUNTY	MINING CONSERVATION CAPITAL COST	$12,500,000	2020
MINING, MENARD	N	MINING CONSERVATION - MENARD COUNTY	MINING CONSERVATION CAPITAL COST	$1,520,000	2020
MINING, MIDLAND	N	DIRECT NON-POTABLE REUSE WATER FROM CITY OF MIDLAND - MIDLAND COUNTY MINING	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION	$3,349,000	2020
MINING, MIDLAND	N	MINING CONSERVATION - MIDLAND COUNTY	MINING CONSERVATION CAPITAL COST	$5,460,000	2020
MINING, MITCHELL	N	DIRECT NON-POTABLE REUSE FOR SALES FROM COLORADO CITY (TYPE II) - MITCHELL COUNTY MINING	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION	$932,000	2020
MINING, MITCHELL	N	MINING CONSERVATION - MITCHELL COUNTY	MINING CONSERVATION CAPITAL COST	$1,040,000	2020
MINING, PECOS	N	MINING CONSERVATION - PECOS COUNTY	MINING CONSERVATION CAPITAL COST	$1,500,000	2020
MINING, REAGAN	N	MINING CONSERVATION - REAGAN COUNTY	MINING CONSERVATION CAPITAL COST	$5,900,000	2020
MINING, REEVES	N	MINING CONSERVATION - REEVES COUNTY	MINING CONSERVATION CAPITAL COST	$3,680,000	2020
MINING, RUNNELS	N	DEVELOP OTHER AQUIFER SUPPLIES - RUNNELS COUNTY MINING	MULTIPLE WELLS/WELL FIELD	$140,000	2020
MINING, RUNNELS	N	MINING CONSERVATION - RUNNELS COUNTY	MINING CONSERVATION CAPITAL COST	$380,000	2020
MINING, SCHLEICHER	N	MINING CONSERVATION - SCHLEICHER COUNTY	MINING CONSERVATION CAPITAL COST	$1,020,000	2020
MINING, SCURRY	N	DEVELOP LOCAL ALLUVIUM AQUIFER SUPPLIES - SCURRY COUNTY MINING	MULTIPLE WELLS/WELL FIELD	$140,000	2020
MINING, SCURRY	N	MINING CONSERVATION - SCURRY COUNTY	MINING CONSERVATION CAPITAL COST	$680,000	2020
MINING, STERLING	N	MINING CONSERVATION - STERLING COUNTY	MINING CONSERVATION CAPITAL COST	$1,340,000	2020
MINING, SUTTON	N	MINING CONSERVATION - SUTTON COUNTY	MINING CONSERVATION CAPITAL COST	$1,060,000	2020
MINING, TOM GREEN	N	MINING CONSERVATION - TOM GREEN COUNTY	MINING CONSERVATION CAPITAL COST	$1,620,000	2020
MINING, UPTON	N	MINING CONSERVATION - UPTON COUNTY	MINING CONSERVATION CAPITAL COST	$5,940,000	2020
MINING, WARD	N	MINING CONSERVATION - WARD COUNTY	MINING CONSERVATION CAPITAL COST	$1,340,000	2020
MINING, WINKLER	N	MINING CONSERVATION - WINKLER COUNTY	MINING CONSERVATION CAPITAL COST	$1,640,000	2020
ODESSA	Y	RO TREATMENT OF EXISTING SUPPLIES - ODESSA	INJECTION WELL; NEW WATER TREATMENT PLANT	$62,309,000	2020
PECOS	N	WATER AUDITS AND LEAK - PECOS	WATER LOSS CONTROL	$6,834,400	2020
PECOS COUNTY WCID #1	N	DEVELOP EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - PECOS COUNTY WCID #1	MULTIPLE WELLS/WELL FIELD	$2,456,000	2020
RANKIN	N	WATER AUDITS AND LEAK - RANKIN	WATER LOSS CONTROL	$876,900	2020
SAN ANGELO	Y	DESALINATION OF OTHER AQUIFER SUPPLIES IN TOM GREEN COUNTY - SAN ANGELO	CONVEYANCE/TRANSMISSION PIPELINE; INJECTION WELL; MULTIPLE WELLS/WELL FIELD; NEW WATER TREATMENT PLANT; PUMP STATION	$57,967,000	2050
SAN ANGELO	Y	DIRECT AND/OR INDIRECT REUSE FOR MUNICIPAL USE - SAN ANGELO	INJECTION WELL; NEW WATER TREATMENT PLANT	$150,000,000	2020
SAN ANGELO	Y	HICKORY WELL FIELD EXPANSION IN MCCULLOCH COUNTY - SAN ANGELO	MULTIPLE WELLS/WELL FIELD; NEW WATER TREATMENT PLANT; PUMP STATION	$27,104,000	2020
SAN ANGELO	Y	WEST TEXAS WATER PARTNERSHIP - SAN ANGELO	CONVEYANCE/TRANSMISSION PIPELINE	$39,175,200	2030
SONORA	N	DIRECT NON-POTABLE REUSE FOR IRRIGATION OF INDUSTRIAL AND MUNICIPAL PARKS (TYPE I) - SONORA	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION	$495,800	2020
SONORA	N	WATER AUDITS AND LEAK - SONORA	WATER LOSS CONTROL	$2,486,600	2020

Recommended Projects Associated with Water Management Strategies

Sponsor Name	Is Sponsor a WWP?	Project Name	Project Description	Capital Cost	Online Decade
STEAM ELECTRIC POWER, COKE	N	STEAM ELECTRIC POWER CONSERVATION - COKE COUNTY SEP	STEAM ELECTRIC POWER CONSERVATION CAPITAL COST	$50,490,000	2020
STEAM ELECTRIC POWER, ECTOR	N	STEAM ELECTRIC POWER CONSERVATION - ECTOR COUNTY SEP	STEAM ELECTRIC POWER CONSERVATION CAPITAL COST	$56,090,000	2020
STEAM ELECTRIC POWER, MITCHELL	N	STEAM ELECTRIC POWER CONSERVATION - MITCHELL COUNTY SEP	STEAM ELECTRIC POWER CONSERVATION CAPITAL COST	$16,830,000	2020
STEAM ELECTRIC POWER, WARD	N	DEVELOP PECOS VALLEY AQUIFER SUPPLIES - WARD COUNTY STEAM ELECTRIC POWER	MULTIPLE WELLS/WELL FIELD	$2,682,000	2020
UPPER COLORADO RIVER AUTHORITY	Y	VOLUNTARY TRANSFER (PURCHASE) - UCRA	CONVEYANCE/TRANSMISSION PIPELINE	$32,233,000	2020
WINTERS	N	DIRECT POTABLE REUSE - WINTERS	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION	$3,354,000	2020
WINTERS	N	VOLUNTARY TRANSFER (PURCHASE) - WINTERS	CONVEYANCE/TRANSMISSION PIPELINE	$696,000	2020

Region F Total Recommended Capital Cost	**$1,200,655,945**

***Projects with a capital cost of zero are excluded from the report list.**

Water User Group (WUG) Management Supply Factor

REGION F	WUG MANAGEMENT SUPPLY FACTOR					
	2020	2030	2040	2050	2060	2070
ANDREWS	0.6	0.6	0.5	0.4	0.2	0.2
BALLINGER	2.7	2.6	2.6	2.2	2.2	2.2
BANGS	1.2	1.2	1.2	1.2	1.2	1.2
BIG LAKE	1.1	1.1	1.1	1.1	1.1	1.1
BIG SPRING	1.1	1.1	1.1	1.1	1.1	1.1
BRADY	1.7	1.6	1.6	1.5	1.5	1.5
BRONTE	1.8	1.8	1.8	1.8	1.8	1.8
BROOKESMITH SUD	1.0	1.0	1.0	1.0	1.0	1.0
BROWNWOOD	1.3	1.3	1.3	1.3	1.3	1.3
COAHOMA	1.1	1.1	1.1	1.1	1.1	1.1
COLEMAN	2.8	2.8	2.8	2.7	2.7	2.6
COLEMAN COUNTY SUD	1.0	1.0	1.0	1.0	1.0	1.0
COLORADO CITY	1.0	1.0	1.0	1.0	1.0	1.0
CONCHO RURAL WATER CORPORATION	1.5	1.4	1.4	1.4	1.4	1.3
COUNTY-OTHER, ANDREWS	1.6	1.5	1.4	1.2	1.1	1.0
COUNTY-OTHER, BORDEN	1.1	1.1	1.1	1.1	1.1	1.1
COUNTY-OTHER, BROWN	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, COKE	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, COLEMAN	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, CONCHO	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, CRANE	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, CROCKETT	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, ECTOR	1.1	1.1	1.0	1.0	1.0	1.0
COUNTY-OTHER, GLASSCOCK	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, HOWARD	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, IRION	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, KIMBLE	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, LOVING	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, MARTIN	1.1	1.1	1.1	1.0	1.0	1.0
COUNTY-OTHER, MASON	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, MCCULLOCH	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, MENARD	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, MIDLAND	1.0	1.3	1.2	1.2	1.2	1.2
COUNTY-OTHER, MITCHELL	1.1	1.1	1.1	1.1	1.1	1.1
COUNTY-OTHER, PECOS	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, REAGAN	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, REEVES	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, RUNNELS	1.4	1.4	1.4	1.3	1.3	1.3
COUNTY-OTHER, SCHLEICHER	1.1	1.1	1.1	1.1	1.1	1.1
COUNTY-OTHER, SCURRY	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, STERLING	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, SUTTON	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, TOM GREEN	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, UPTON	1.5	1.5	1.4	1.4	1.4	1.4
COUNTY-OTHER, WARD	1.3	1.3	1.3	1.3	1.3	1.3
COUNTY-OTHER, WINKLER	3.5	2.3	1.9	1.5	1.3	1.2
CRANE	1.0	1.0	1.0	1.0	1.0	1.0
CROCKETT COUNTY WCID #1	1.0	1.0	1.0	1.0	1.0	1.0
EARLY	1.1	1.1	1.1	1.1	1.1	1.1
ECTOR COUNTY UD	1.0	1.0	1.0	1.1	1.1	1.1

Water User Group (WUG) Management Supply Factor

REGION F	WUG MANAGEMENT SUPPLY FACTOR					
	2020	2030	2040	2050	2060	2070
EDEN	1.1	1.1	1.1	1.1	1.1	1.1
ELDORADO	1.1	1.1	1.1	1.1	1.1	1.1
FORT STOCKTON	1.0	1.0	1.0	1.0	1.0	1.0
GREATER GARDENDALE WSC	1.1	1.1	1.1	1.1	1.1	1.1
IRAAN	1.0	1.0	1.0	1.0	1.0	1.0
IRRIGATION, ANDREWS	0.3	0.3	0.3	0.3	0.2	0.2
IRRIGATION, BORDEN	0.2	0.3	0.3	0.3	0.3	0.3
IRRIGATION, BROWN	0.7	0.8	0.8	0.8	0.8	0.8
IRRIGATION, COKE	0.8	0.9	0.9	0.9	0.9	0.9
IRRIGATION, COLEMAN	1.1	1.1	1.1	1.1	1.1	1.1
IRRIGATION, CONCHO	0.5	0.6	0.6	0.6	0.6	0.6
IRRIGATION, CROCKETT	1.1	1.1	1.2	1.2	1.2	1.2
IRRIGATION, ECTOR	1.0	1.0	1.1	1.0	0.9	0.9
IRRIGATION, GLASSCOCK	1.0	1.0	1.0	1.0	1.0	1.0
IRRIGATION, HOWARD	0.6	0.6	0.6	0.6	0.6	0.6
IRRIGATION, IRION	0.9	0.9	1.0	1.0	1.0	1.0
IRRIGATION, KIMBLE	0.5	0.6	0.7	0.7	0.7	0.7
IRRIGATION, MARTIN	0.4	0.4	0.5	0.5	0.5	0.5
IRRIGATION, MASON	1.1	1.1	1.2	1.2	1.2	1.2
IRRIGATION, MCCULLOCH	0.4	0.5	0.6	0.6	0.6	0.6
IRRIGATION, MENARD	0.9	0.9	1.0	1.0	1.0	1.0
IRRIGATION, MIDLAND	1.1	1.1	1.1	1.2	1.2	1.2
IRRIGATION, MITCHELL	1.0	1.0	1.0	1.0	1.0	1.0
IRRIGATION, PECOS	1.1	1.1	1.2	1.2	1.2	1.2
IRRIGATION, REAGAN	1.1	1.2	1.2	1.2	1.2	1.2
IRRIGATION, REEVES	1.1	1.1	1.2	1.2	1.2	1.2
IRRIGATION, RUNNELS	0.6	0.7	0.7	0.7	0.7	0.7
IRRIGATION, SCHLEICHER	1.1	1.1	1.1	1.1	1.1	1.1
IRRIGATION, SCURRY	0.2	0.2	0.3	0.3	0.3	0.3
IRRIGATION, STERLING	1.1	1.1	1.2	1.2	1.2	1.2
IRRIGATION, SUTTON	1.1	1.1	1.2	1.2	1.2	1.2
IRRIGATION, TOM GREEN	0.7	0.7	0.7	0.7	0.8	0.8
IRRIGATION, UPTON	1.1	1.1	1.1	1.2	1.2	1.2
IRRIGATION, WARD	1.1	1.2	1.3	1.3	1.3	1.3
IRRIGATION, WINKLER	1.1	1.1	1.2	1.2	1.2	1.2
JUNCTION	1.1	1.1	1.1	1.1	1.1	1.1
KERMIT	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, ANDREWS	1.3	1.3	1.2	1.2	1.1	1.1
LIVESTOCK, BORDEN	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, BROWN	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, COKE	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, COLEMAN	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, CONCHO	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, CRANE	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, CROCKETT	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, ECTOR	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, GLASSCOCK	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, HOWARD	1.1	1.1	1.1	1.1	1.1	1.1
LIVESTOCK, IRION	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, KIMBLE	1.0	1.0	1.0	1.0	1.0	1.0

Water User Group (WUG) Management Supply Factor

REGION F	WUG MANAGEMENT SUPPLY FACTOR					
	2020	2030	2040	2050	2060	2070
LIVESTOCK, LOVING	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, MARTIN	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, MASON	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, MCCULLOCH	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, MENARD	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, MIDLAND	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, MITCHELL	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, PECOS	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, REAGAN	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, REEVES	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, RUNNELS	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, SCHLEICHER	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, SCURRY	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, STERLING	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, SUTTON	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, TOM GREEN	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, UPTON	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, WARD	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, WINKLER	1.1	1.1	1.1	1.1	1.1	1.1
LORAINE	1.0	1.1	1.1	1.1	1.1	1.1
MADERA VALLEY WSC	1.1	1.1	1.1	1.1	1.1	1.1
MANUFACTURING, ANDREWS	0.6	0.6	0.5	0.3	0.2	0.2
MANUFACTURING, BROWN	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, COLEMAN	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, ECTOR	1.4	1.4	1.4	1.3	1.3	1.3
MANUFACTURING, HOWARD	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, KIMBLE	0.4	0.4	0.4	0.4	0.3	0.3
MANUFACTURING, MARTIN	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, MCCULLOCH	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, MENARD	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, MIDLAND	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, PECOS	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, REEVES	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, RUNNELS	1.0	1.1	1.1	1.0	1.0	1.0
MANUFACTURING, SCURRY	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, TOM GREEN	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, WARD	1.0	1.0	1.0	1.0	1.0	1.0
MASON	1.1	1.1	1.1	1.1	1.1	1.1
MCCAMEY	1.1	1.1	1.1	1.1	1.1	1.1
MENARD	2.1	2.2	2.2	2.2	2.2	2.2
MERTZON	1.0	1.1	1.1	1.1	1.1	1.1
MIDLAND	1.2	1.1	0.9	0.9	0.8	0.7
MILES	1.0	1.0	1.0	1.1	1.1	1.1
MILLERSVIEW-DOOLE WSC	1.5	1.5	1.5	1.5	1.5	1.5
MINING, ANDREWS	1.0	1.0	1.0	1.2	1.5	2.0
MINING, BORDEN	1.1	1.1	1.1	1.1	1.1	1.1
MINING, BROWN	1.1	1.1	1.1	1.1	1.1	1.1
MINING, COKE	1.0	1.0	1.1	1.3	1.4	1.6
MINING, COLEMAN	1.1	1.1	1.2	1.4	1.5	1.7
MINING, CONCHO	1.0	1.1	1.2	1.3	1.5	1.7

Water User Group (WUG) Management Supply Factor

REGION F	WUG MANAGEMENT SUPPLY FACTOR					
	2020	2030	2040	2050	2060	2070
MINING, CRANE	1.1	1.1	1.1	1.1	1.1	1.1
MINING, CROCKETT	0.4	0.4	0.6	1.0	1.4	2.3
MINING, ECTOR	1.2	1.1	1.1	1.1	1.2	1.2
MINING, GLASSCOCK	1.1	1.1	1.1	1.1	1.1	1.1
MINING, HOWARD	0.8	0.7	0.9	1.3	1.7	2.5
MINING, IRION	0.7	0.7	0.9	1.1	1.1	1.1
MINING, KIMBLE	1.1	1.1	1.1	1.1	1.1	1.1
MINING, LOVING	1.1	1.1	1.1	1.1	1.1	1.1
MINING, MARTIN	1.1	1.2	1.1	1.6	1.7	3.1
MINING, MASON	1.1	1.1	1.1	1.1	1.1	1.1
MINING, MCCULLOCH	0.7	0.7	0.9	1.0	1.1	1.1
MINING, MENARD	1.1	1.1	1.1	1.1	1.1	1.1
MINING, MIDLAND	1.2	1.2	1.3	1.4	1.5	1.7
MINING, MITCHELL	1.5	1.4	1.5	1.6	1.7	1.9
MINING, PECOS	1.1	1.1	1.1	1.1	1.1	1.1
MINING, REAGAN	1.1	1.1	1.1	1.1	1.1	1.1
MINING, REEVES	1.1	1.1	1.1	1.1	1.1	1.1
MINING, RUNNELS	1.0	1.0	1.0	1.0	1.0	1.2
MINING, SCHLEICHER	1.1	1.1	1.1	1.1	1.1	1.1
MINING, SCURRY	0.5	0.4	0.3	0.4	0.6	0.8
MINING, STERLING	1.1	1.1	1.1	1.1	1.1	1.1
MINING, SUTTON	1.1	1.1	1.1	1.1	1.1	1.1
MINING, TOM GREEN	1.1	1.1	1.1	1.1	1.1	1.1
MINING, UPTON	1.1	1.1	1.1	1.1	1.1	1.1
MINING, WARD	1.1	1.1	1.1	1.1	1.1	1.1
MINING, WINKLER	1.1	1.1	1.1	1.1	1.1	1.1
MONAHANS	1.0	1.0	1.0	1.0	1.0	1.0
ODESSA	1.0	1.0	1.0	1.0	1.1	1.1
PECOS	1.1	1.1	1.1	1.1	1.1	1.1
PECOS COUNTY WCID #1	1.6	1.6	1.6	1.6	1.5	1.5
RANKIN	1.1	1.1	1.1	1.1	1.1	1.1
RICHLAND SUD	1.9	1.9	1.9	1.9	1.9	1.9
ROBERT LEE	1.0	1.0	1.0	1.0	1.0	1.0
SAN ANGELO	1.0	1.0	1.0	1.2	1.0	1.0
SANTA ANNA	1.0	1.0	1.0	1.0	1.0	1.0
SNYDER	1.2	1.2	1.2	1.2	1.2	1.2
SONORA	1.1	1.1	1.1	1.1	1.1	1.1
STANTON	1.0	1.0	1.0	1.0	1.0	1.0
STEAM ELECTRIC POWER, COKE	1.0	1.0	1.0	1.0	1.0	1.0
STEAM ELECTRIC POWER, CROCKETT	1.0	1.0	1.0	1.0	1.0	1.0
STEAM ELECTRIC POWER, ECTOR	1.1	1.0	1.0	1.0	1.0	1.0
STEAM ELECTRIC POWER, MITCHELL	1.0	1.0	1.0	1.0	1.0	1.0
STEAM ELECTRIC POWER, WARD	2.5	2.3	2.1	1.9	1.8	1.7
STERLING CITY	1.0	1.0	1.0	1.0	1.0	1.0
WINK	1.0	1.0	1.0	1.0	1.0	1.0
WINTERS	1.1	1.1	1.2	1.2	1.1	1.1
ZEPHYR WSC	1.1	1.1	1.1	1.1	1.1	1.1

*WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. To calculate the Management Supply Factor for each WUG as a whole, not split by region-county-basin the combined total of existing and future supply is divided by the total projected demand.

Water User Group (WUG) Unmet Needs

REGION F	WUG UNMET NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
ANDREWS COUNTY						
COLORADO BASIN						
ANDREWS	1,505	2,197	2,721	4,317	6,011	7,262
MANUFACTURING	18	23	27	38	48	54
IRRIGATION	25,133	24,007	24,217	25,001	26,376	26,081
RIO GRANDE BASIN						
IRRIGATION	1,392	1,314	1,302	1,289	1,276	1,263
BORDEN COUNTY						
BRAZOS BASIN						
IRRIGATION	805	747	744	742	741	741
COLORADO BASIN						
IRRIGATION	2,238	2,090	2,088	2,083	2,080	2,077
BROWN COUNTY						
BRAZOS BASIN						
IRRIGATION	422	406	405	403	401	400
COLORADO BASIN						
IRRIGATION	2,211	1,921	1,894	1,864	1,830	1,796
COKE COUNTY						
COLORADO BASIN						
IRRIGATION	176	124	102	102	102	102
CONCHO COUNTY						
COLORADO BASIN						
IRRIGATION	4,762	4,239	4,107	4,071	4,035	3,999
CROCKETT COUNTY						
RIO GRANDE BASIN						
MINING	986	1,089	548	9	0	0
ECTOR COUNTY						
COLORADO BASIN						
IRRIGATION	80	0	0	6	136	241
HOWARD COUNTY						
COLORADO BASIN						
MINING	622	854	101	0	0	0
IRRIGATION	2,897	2,750	2,615	2,538	2,461	2,385
IRION COUNTY						
COLORADO BASIN						
MINING	946	1,099	230	0	0	0
IRRIGATION	176	105	39	39	39	39
KIMBLE COUNTY						
COLORADO BASIN						
MANUFACTURING	399	450	502	550	614	683
IRRIGATION	1,349	1,104	949	837	732	631
MARTIN COUNTY						
COLORADO BASIN						
IRRIGATION	23,366	21,011	17,855	18,003	17,414	16,819
MCCULLOCH COUNTY						
COLORADO BASIN						
MINING	2,993	2,482	973	78	0	0
IRRIGATION	2,005	1,784	1,557	1,507	1,462	1,420

Water User Group (WUG) Unmet Needs

REGION F	WUG UNMET NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
MENARD COUNTY						
COLORADO BASIN						
IRRIGATION	299	166	33	24	16	8
MIDLAND COUNTY						
COLORADO BASIN						
MIDLAND	0	0	1,910	5,227	8,670	12,081
RUNNELS COUNTY						
COLORADO BASIN						
IRRIGATION	1,552	1,335	1,239	1,221	1,203	1,185
SCURRY COUNTY						
BRAZOS BASIN						
MINING	38	85	91	61	30	9
IRRIGATION	1,393	1,255	1,156	1,101	1,047	997
COLORADO BASIN						
MINING	94	211	230	150	73	20
IRRIGATION	4,713	4,268	3,947	3,767	3,595	3,433
TOM GREEN COUNTY						
COLORADO BASIN						
IRRIGATION	30,327	25,442	23,423	23,241	23,012	22,784

*WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. The unmet needs shown in the WUG Unmet Needs report are calculated by first deducting the WUG split's projected demand from the sum of its total existing water supply volume and all associated recommended water management strategy water volumes. If the WUG split has a greater future supply volume than projected demand in any given decade, this amount is considered a surplus volume. In order to display only unmet needs associated with the WUG split, these surplus volumes are updated to a zero and the unmet needs water volumes are shown as absolute values.

Water User Group (WUG) Unmet Needs Summary

REGION F

	2020	2030	2040	2050	2060	2070
MUNICIPAL	1,505	2,197	4,631	9,544	14,681	19,343
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	417	473	529	588	662	737
MINING	5,679	5,820	2,173	298	103	29
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	105,296	94,068	87,672	87,839	87,958	86,401

*WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. The unmet needs shown in the WUG Unmet Needs Summary report are calculated by first deducting the WUG split's projected demand from the sum of its total existing water supply volume and all associated recommended water management strategy water volumes. If the WUG split has a greater future supply volume than projected demand in any given decade, this amount is considered a surplus volume. Before aggregating the difference between supplies and demands to the WUG category level, calculated surpluses are updated to zero so that only the WUGs with unmet needs in the decade are included with the Needs totals. Unmet needs water volumes are shown as absolute values.

Alternative Water User Group (WUG) Water Management Strategies (WMS)

WUG Entity Primary Region: F

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
ANDREWS - UNASSIGNED WATER VOLUMES	F	ANDREWS - DEVELOP OGALLALA AQUIFER SUPPLIES	F | OGALLALA AQUIFER | ANDREWS COUNTY	4,300	4,300	4,300	4,300	4,300	4,300	$806	$184
BALLINGER - UNASSIGNED WATER VOLUMES	F	REGIONAL SYSTEM - VOLUNTARY TRANSFER FROM CLYDE - FORT PHANTOM HILL SUPPLIES	G | FORT PHANTOM HILL LAKE/RESERVOIR	500	500	500	500	500	500	$4697	$815
BRONTE - UNASSIGNED WATER VOLUMES	F	BRONTE - DIRECT POTABLE REUSE	F | DIRECT REUSE	94	94	94	94	94	94	$4213	$1397
BRONTE - UNASSIGNED WATER VOLUMES	F	BRONTE - NEW GROUNDWATER AT OAK CREEK RESERVOIR	F | OTHER AQUIFER | COKE COUNTY	150	150	150	150	150	150	$1780	$340
BRONTE - UNASSIGNED WATER VOLUMES	F	BRONTE - NEW GROUNDWATER SOUTHEAST OF BRONTE	F | OTHER AQUIFER | COKE COUNTY	200	200	200	200	200	200	$4860	$1735
BRONTE - UNASSIGNED WATER VOLUMES	F	REGIONAL SYSTEM - VOLUNTARY TRANSFER FROM CLYDE - FORT PHANTOM HILL SUPPLIES	G | FORT PHANTOM HILL LAKE/RESERVOIR	350	350	350	350	350	350	$4697	$815
BRONTE - UNASSIGNED WATER VOLUMES	F	REGIONAL SYSTEM FROM LAKE BROWNWOOD	F | BROWNWOOD LAKE/RESERVOIR	2,802	2,802	2,802	2,802	2,802	2,802	$2707	$821
BRONTE - UNASSIGNED WATER VOLUMES	F	SUBORDINATION - SAN ANGELO SYSTEM	F | SAN ANGELO LAKES LAKE/RESERVOIR SYSTEM	250	250	250	250	250	250	$2730	$940
BROWN COUNTY WID #1 - UNASSIGNED WATER VOLUMES	F	BCWID - GROUNDWATER DEVELOPMENT IN BROWN COUNTY	F | TRINITY AQUIFER | BROWN COUNTY	1,680	1,680	1,680	1,680	1,680	1,680	$580	$160
COLORADO CITY - UNASSIGNED WATER VOLUMES	F	COLORADO CITY - DEVELOP ADDITIONAL AQUIFER SUPPLIES	F | DOCKUM AQUIFER | MITCHELL COUNTY	2,240	2,240	2,240	2,240	2,240	2,240	$333	$104
COLORADO RIVER MWD - UNASSIGNED WATER VOLUMES	F	CRMWD - GROUNDWATER, TRANSMISSION, DESAL AND ASR FROM WESTERN REGION F COUNTIES	F | EDWARDS-TRINITY-PLATEAU AQUIFER | PECOS COUNTY	5,000	5,000	5,000	5,000	5,000	5,000	$2374	$951
COLORADO RIVER MWD - UNASSIGNED WATER VOLUMES	F	CRMWD - GROUNDWATER, TRANSMISSION, DESAL AND ASR FROM WESTERN REGION F COUNTIES	F | PECOS VALLEY AQUIFER | WARD COUNTY	4,000	4,000	4,000	4,000	4,000	4,000	$2374	$951
COLORADO RIVER MWD - UNASSIGNED WATER VOLUMES	F	CRMWD - GROUNDWATER, TRANSMISSION, DESAL AND ASR FROM WESTERN REGION F COUNTIES	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | PECOS COUNTY	5,000	5,000	5,000	5,000	5,000	5,000	$2374	$951
COLORADO RIVER MWD - UNASSIGNED WATER VOLUMES	F	CRMWD - GROUNDWATER, TRANSMISSION, DESAL AND ASR FROM WESTERN REGION F COUNTIES	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | REEVES COUNTY	5,000	5,000	5,000	5,000	5,000	5,000	$2374	$951
COLORADO RIVER MWD - UNASSIGNED WATER VOLUMES	F	CRMWD - GROUNDWATER, TRANSMISSION, DESAL AND ASR FROM WESTERN REGION F COUNTIES	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | WINKLER COUNTY	5,000	5,000	5,000	5,000	5,000	5,000	$2374	$951
COLORADO RIVER MWD - UNASSIGNED WATER VOLUMES	F	CRMWD - GROUNDWATER, TRANSMISSION, DESAL AND ASR FROM WESTERN REGION F COUNTIES	F | RUSTLER AQUIFER | PECOS COUNTY	3,500	3,500	3,500	3,500	3,500	3,500	$2374	$951
COLORADO RIVER MWD - UNASSIGNED WATER VOLUMES	F	CRMWD - GROUNDWATER, TRANSMISSION, DESAL AND ASR FROM WESTERN REGION F COUNTIES	F | RUSTLER AQUIFER | REEVES COUNTY	1,500	1,500	1,500	1,500	1,500	1,500	$2374	$951
COLORADO RIVER MWD - UNASSIGNED WATER VOLUMES	F	CRMWD - GROUNDWATER, TRANSMISSION, DESAL AND ASR FROM WESTERN REGION F COUNTIES	F | RUSTLER AQUIFER | WARD COUNTY	500	500	500	500	500	500	$2374	$951

Alternative Water User Group (WUG) Water Management Strategies (WMS)

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
CONCHO RURAL WATER CORPORATION	F	CONCHO RURAL WC - DEVELOP ADDITONAL LIPAN AQUIFER SUPPLIES	F | LIPAN AQUIFER | TOM GREEN COUNTY	200	200	200	200	200	200	$285	$100
COUNTY-OTHER, COKE	F	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES, COKE CO. - ROBERT LEE	F | EDWARDS-TRINITY-PLATEAU AQUIFER | COKE COUNTY	24	22	20	20	20	20	$2832	$811
MIDLAND - UNASSIGNED WATER VOLUMES	F	MIDLAND - DEVELOPMENT OF GROUNDWATER IN MIDLAND COUNTY (PREVIOUSLY USED FOR MINING)	F | DOCKUM AQUIFER | MIDLAND COUNTY	3,000	3,000	3,000	3,000	3,000	3,000	$2086	$649
ODESSA - UNASSIGNED WATER VOLUMES	F	ODESSA - DEVELOP CAPITAN REEF COMPLEX AQUIFER SUPPLIES IN WARD COUNTY	F | CAPITAN REEF COMPLEX AQUIFER | WARD COUNTY	8,400	8,400	8,400	8,400	8,400	8,400	$1801	$465
ODESSA - UNASSIGNED WATER VOLUMES	F	ODESSA - DEVELOP EDWARDS-TRINITY AND CAPITAN REEF COMPLEX AQUIFER SUPPLIES IN PECOS COUNTY - I & II	F | CAPITAN REEF COMPLEX AQUIFER | PECOS COUNTY	5,600	14,000	14,000	14,000	14,000	14,000	$3615	$1445
ODESSA - UNASSIGNED WATER VOLUMES	F	ODESSA - DEVELOP EDWARDS-TRINITY AND CAPITAN REEF COMPLEX AQUIFER SUPPLIES IN PECOS COUNTY - I & II	F | EDWARDS-TRINITY-PLATEAU AQUIFER | PECOS COUNTY	5,600	14,000	14,000	14,000	14,000	14,000	$3615	$1445
ROBERT LEE	F	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES, COKE CO. - ROBERT LEE	F | EDWARDS-TRINITY-PLATEAU AQUIFER | COKE COUNTY	197	199	199	200	200	200	$2832	$811
ROBERT LEE - UNASSIGNED WATER VOLUMES	F	REGIONAL SYSTEM - VOLUNTARY TRANSFER FROM CLYDE - FORT PHANTOM HILL SUPPLIES	G | FORT PHANTOM HILL LAKE/RESERVOIR	130	130	130	130	130	130	$4697	$815
ROBERT LEE - UNASSIGNED WATER VOLUMES	F	SUBORDINATION - EV SPENCE NON SYSTEM PORTION	F | EV SPENCE LAKE/RESERVOIR NON-SYSTEM PORTION	500	500	500	500	500	500	$1666	$484
ROBERT LEE - UNASSIGNED WATER VOLUMES	F	SUBORDINATION - SAN ANGELO SYSTEM	F | SAN ANGELO LAKES LAKE/RESERVOIR SYSTEM	250	250	250	250	250	250	$2730	$940
SAN ANGELO - UNASSIGNED WATER VOLUMES	F	HICKORY WELL FIELD EXPANSION IN MCCULOCH COUNTY - SAN ANGELO (ALTERNATIVE)	F | HICKORY AQUIFER | MCCULLOCH COUNTY	2,703	6,003	7,970	7,953	7,950	7,953	$1016	$468
SAN ANGELO - UNASSIGNED WATER VOLUMES	F	SAN ANGELO - DEVELOPMENT OF CAPITAN REEF COMPLEX AQUIFER SUPPLIES IN PECOS COUNTY	F | CAPITAN REEF COMPLEX AQUIFER | PECOS COUNTY	11,100	11,100	11,100	11,100	11,100	11,100	$3360	$427
SAN ANGELO - UNASSIGNED WATER VOLUMES	F	SAN ANGELO - DEVELOPMENT OF EDWARDS-TRINITY AQUIFER SUPPLIES IN SCHLEICHER COUNTY	F | EDWARDS-TRINITY-PLATEAU AQUIFER | SCHLEICHER COUNTY	4,500	4,500	4,500	4,500	4,500	4,500	$1140	$175
SAN ANGELO - UNASSIGNED WATER VOLUMES	F	SAN ANGELO - DEVELOPMENT OF PECOS VALLEY-EDWARDS TRINITY PLATEAU AQUIFER SUPPLIES IN PECOS COUNTY	F | PECOS VALLEY/EDWARDS-TRINITY (PLATEAU) AQUIFER | PECOS COUNTY	12,000	12,000	12,000	12,000	12,000	12,000	$2109	$277
SAN ANGELO - UNASSIGNED WATER VOLUMES	F	SAN ANGELO - RED ARROYO OCR	F | COLORADO RUN-OF-RIVER	1,400	1,400	1,400	1,400	1,400	1,400	$1791	$389
WINTERS - UNASSIGNED WATER VOLUMES	F	REGIONAL SYSTEM - VOLUNTARY TRANSFER FROM CLYDE - FORT PHANTOM HILL SUPPLIES	G | FORT PHANTOM HILL LAKE/RESERVOIR	175	175	175	175	175	175	$4697	$815
Region F Total Alternative WMS Supplies				97,845	117,945	119,910	119,894	119,891	119,894		

Alternative Projects Associated with Water Management Strategies

Project Sponsor Region: F

Sponsor Name	Is Sponsor a WWP?	Project Name	Project Description	Capital Cost	Online Decade
ANDREWS	N	ANDREWS - DEVELOP OGALLALA AQUIFER SUPPLIES	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; PUMP STATION	$31,938,000	2020
BALLINGER	N	REGIONAL SYSTEM FROM LAKE BROWNWOOD	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION	$30,321,000	2020
BALLINGER	N	REGIONAL SYSTEM FROM LAKE FORT PHANTOM HILL	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION	$53,591,000	2020
BRONTE	N	BRONTE - DIRECT POTABLE REUSE	NEW WATER TREATMENT PLANT	$3,159,000	2020
BRONTE	N	BRONTE - NEW GROUNDWATER AT OAK CREEK RESERVOIR	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; PUMP STATION	$2,576,000	2020
BRONTE	N	BRONTE - NEW GROUNDWATER SE OF BRONTE	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; PUMP STATION	$7,468,000	2020
BRONTE	N	BRONTE & ROBERT LEE - PURCHASE WATER FROM UCRA	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION	$10,691,000	2020
BRONTE	N	REGIONAL SYSTEM FROM LAKE BROWNWOOD	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION	$6,312,000	2020
BROWN COUNTY WID #1	Y	BCWID - GROUNDWATER DEVELOPMENT IN BROWN COUNTY	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; PUMP STATION	$8,436,000	2020
COLORADO CITY	N	COLORADO CITY - DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; PUMP STATION	$6,124,000	2020
COLORADO RIVER MWD	Y	CRMWD - ASR OF BRACKISH GROUNDWATER	INJECTION WELL	$17,362,900	2020
COLORADO RIVER MWD	Y	CRMWD - DESALINATION OF BRACKISH GROUNDWATER	NEW WATER TREATMENT PLANT	$656,161,366	2020
COLORADO RIVER MWD	Y	CRMWD - DEVELOP ADDITIONAL GROUNDWATER SUPPLIES FROM WESTERN REGION F COUNTIES	MULTIPLE WELLS/WELL FIELD	$62,668,000	2020
COLORADO RIVER MWD	Y	CRMWD - TRANSMISSION OF ADDITIONAL GROUNDWATER SUPPLIES FROM WESTERN REGION F COUNTIES	CONVEYANCE/TRANSMISSION PIPELINE	$226,748,000	2020
CONCHO RURAL WATER CORPORATION	N	CONCHO RURAL WC - DEVELOP ADDITIONAL LIPAN AQUIFER SUPPLIES	MULTIPLE WELLS/WELL FIELD	$448,000	2020
MIDLAND	N	MIDLAND - DEVELOPMENT OF GROUNDWATER IN MIDLAND COUNTY (PREVIOUSLY USED FOR MINING)	CONVEYANCE/TRANSMISSION PIPELINE; INJECTION WELL; MULTIPLE WELLS/WELL FIELD; NEW WATER TREATMENT PLANT; PUMP STATION	$51,501,000	2020
ODESSA	Y	ODESSA - DEVELOP CAPITAN REEF COMPLEX AQUIFER SUPPLIES IN WARD COUNTY	CONVEYANCE/TRANSMISSION PIPELINE; INJECTION WELL; MULTIPLE WELLS/WELL FIELD; NEW WATER TREATMENT PLANT	$134,120,000	2020
ODESSA	Y	ODESSA - DEVELOP EDWARDS TRINITY & CAPITAN REEF COMPLEX AQUIFER SUPPLIES IN PECOS COUNTY - PHASE I	CONVEYANCE/TRANSMISSION PIPELINE; INJECTION WELL; MULTIPLE WELLS/WELL FIELD; NEW WATER TREATMENT PLANT; PUMP STATION	$356,203,000	2020
ODESSA	Y	ODESSA - DEVELOP EDWARDS TRINITY & CAPITAN REEF COMPLEX AQUIFER SUPPLIES IN PECOS COUNTY - PHASE II	INJECTION WELL; MULTIPLE WELLS/WELL FIELD; PUMP STATION; WATER TREATMENT PLANT EXPANSION	$259,476,000	2030
ROBERT LEE	N	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - ROBERT LEE	MULTIPLE WELLS/WELL FIELD	$5,800,000	2020
ROBERT LEE	N	REGIONAL SYSTEM FROM LAKE BROWNWOOD	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION	$10,099,000	2020
ROBERT LEE	N	ROBERT LEE - NEW WATER TREATMENT PLANT	NEW WATER TREATMENT PLANT	$7,065,000	2020
SAN ANGELO	Y	SAN ANGELO - DESALINATION OF BRACKISH GROUNDWATER	INJECTION WELL; NEW WATER TREATMENT PLANT	$66,978,000	2020
SAN ANGELO	Y	SAN ANGELO - DEVELOPMENT OF CAPITAN REEF COMPLEX AQUIFER SUPPLIES IN PECOS COUNTY	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; PUMP STATION	$389,092,000	2020
SAN ANGELO	Y	SAN ANGELO - DEVELOPMENT OF EDWARDS-TRINITY AQUIFER SUPPLIES IN SCHLEICHER COUNTY	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; PUMP STATION	$51,891,000	2020
SAN ANGELO	Y	SAN ANGELO - DEVELOPMENT OF PECOS VALLEY - EDWARDS TRINITY PLATEAU AQUIFER SUPPLIES IN PECOS COUNTY	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; NEW WATER TREATMENT PLANT	$262,726,000	2020
SAN ANGELO	Y	SAN ANGELO - HICKORY WELL FIELD EXPANSION IN MCCULLOCH COUNTY	MULTIPLE WELLS/WELL FIELD; PUMP STATION; WATER TREATMENT PLANT EXPANSION	$27,104,000	2020
SAN ANGELO	Y	SAN ANGELO - RED ARROYO OCR	RESERVOIR CONSTRUCTION	$23,475,000	2020

Alternative Projects Associated with Water Management Strategies

Sponsor Name	Is Sponsor a WWP?	Project Name	Project Description	Capital Cost	Online Decade
STEAM ELECTRIC POWER, WARD	N	SEP WARD COUNTY - CONSERVATION - ALT COOLING TECHNOLOGY	INDUSTRIAL CONSERVATION	$56,090,000	2020
WINTERS	N	REGIONAL SYSTEM FROM LAKE BROWNWOOD	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION	$16,434,000	2020

Region F Total Alternative Capital Cost	**$2,842,058,266**

***Projects with a capital cost of zero are excluded from the report list.**

WWP DEMAND

BROWN COUNTY WCID #1									
WUG Name	**Description**	**County**	**Basin**	**WWP Demand (acre-feet per year)**					
				2020	**2030**	**2040**	**2050**	**2060**	**2070**
Bangs	Member City	Brown	Colorado	207	204	198	195	194	194
Brookesmith SUD		Brown	Colorado	1,185	1,181	1,156	1,142	1,139	1,139
Brookesmith SUD		Coleman	Colorado	6	6	6	6	6	6
Brookesmith SUD		Mills	Colorado	8	8	8	8	8	8
Santa Anna	Sales from Brookesmith SUD	Coleman	Colorado	157	155	150	150	149	149
Coleman County SUD	Sales from Brookesmith SUD	Brown	Colorado	9	9	9	9	9	9
Coleman County SUD	Sales from Brookesmith SUD	Coleman	Colorado	197	195	189	186	186	187
Coleman County SUD	Sales from Brookesmith SUD	Runnels	Colorado	8	7	8	7	7	7
Brownwood	Member City	Brown	Colorado	3,755	3,750	3,677	3,636	3,629	3,629
County-Other		Brown	Colorado	125	125	125	125	125	125
Early		Brown	Colorado	290	285	275	269	268	268
Zephyr WSC		Brown	Colorado	379	374	364	359	357	357
Manufacturing	Brown County Manufacturing	Brown	Colorado	673	726	777	820	886	957
Irrigation	Member	Brown	Colorado	5,000	5,000	5,000	5,000	5,000	5,000
BROWN COUNTY WCID #1 TOTAL DEMAND				**11,999**	**12,025**	**11,942**	**11,912**	**11,963**	**12,035**

GREAT PLAINS WATER SYSTEM INC.									
WUG Name	**Description**	**County**	**Basin**	**WWP Demand (acre-feet per year)**					
				2020	**2030**	**2040**	**2050**	**2060**	**2070**
County-Other	Ector County Municipal (City of Goldsmith)	Ector	Colorado	64	64	64	64	64	64
Steam Electric Power	Odessa Power Generation Facility	Ector	Colorado	2,800	2,800	2,800	2,800	2,800	2,800
Ector Manufacturing	Manufacturing (Refinery)	Ector	Colorado	165	165	165	165	165	165
Gaines Mining	Mining	Gaines	Colorado	350	300	150	150	150	150
Andrews Mining	Mining	Andrews	Colorado	1,674	1,395	465	465	465	465
Andrews Mining	Mining	Andrews	Rio Grande	126	105	35	35	35	35
Ector Mining	Mining	Ector	Colorado	375	300	150	150	150	150
GREAT PLAINS WATER SYSTEM INC. TOTAL DEMAND				**5,554**	**5,129**	**3,829**	**3,829**	**3,829**	**3,829**

COLORADO RIVER MWD									
WUG Name	**Description**	**County**	**Basin**	**WWP Demand (acre-feet per year)**					
				2020	**2030**	**2040**	**2050**	**2060**	**2070**
Odessa	Member City	Ector	Colorado	20,759	22,870	25,200	27,742	30,463	33,222
Odessa	Member City	Midland	Colorado	433	531	626	724	825	925
Ector County UD	Odessa Sales	Ector	Colorado	1,856	2,058	2,284	2,521	2,766	3,018
Ector County Other	Odessa Sales	Ector	Colorado	1,145	1,265	1,397	1,543	1,705	1,883
Manufacturing	Odessa Sales	Ector	Colorado	665	662	716	719	716	704
Big Spring	Member City	Howard	Colorado	6,149	6,288	6,299	6,248	6,238	6,237
Coahoma	Big Spring Sales	Howard	Colorado	183	186	188	187	187	187
Manufacturing	Big Spring Sales	Howard	Colorado	1,500	1,500	1,500	1,500	1,500	1,500
Snyder	Member City	Scurry	Colorado	2,222	2,468	2,603	2,797	3,012	3,233
County-Other	Snyder Sales	Scurry	Colorado	300	300	300	300	300	300
Rotan	Snyder Sales (Reg G)	Fisher	Brazos	178	170	165	164	163	163
Abilene	Region G	Jones	Brazos	238	232	225	218	211	205
Abilene	Region G	Taylor	Brazos	5,721	5,559	5,397	5,235	5,074	4,911
County-Other	Pyote Et. Al.	Ward	Rio Grande	150	150	150	150	150	150
Midland	Total	Midland	Colorado	24,757	5,791	5,622	5,453	5,285	5,116
Midland	Ivie Contract	Midland	Colorado	5,959	5,791	5,622	5,453	5,285	5,116
Midland	1966 Contract	Midland	Colorado	18,798	0	0	0	0	0
Millersview-Doole WSC		Concho	Colorado	90	90	90	90	90	90
Millersview-Doole WSC		McCulloch	Colorado	144	144	144	144	144	144
Millersview-Doole WSC		Runnels	Colorado	102	102	102	102	102	102
Millersview-Doole WSC		Tom Green	Colorado	264	264	264	264	264	264
Ballinger		Runnels	Colorado	500	500	500	500	500	500
Robert Lee	From Spence	Coke	Colorado	296	291	287	287	286	286
County-Other	Robert Lee Sales	Coke	Colorado	76	72	69	68	68	68
San Angelo	Ivie Contract	Tom Green	Colorado	5,959	5,791	5,622	5,453	5,285	5,116
Stanton		Martin	Colorado	539	579	606	635	658	677
Irrigation	"Rural Customers"	Ector	Colorado	400	400	400	400	400	400
Mining/Brackish		Coke	Colorado	38	36	34	32	30	28
Mining/ Brackish water		Howard	Colorado	1,000	1,000	1,000	982	320	43
COLORADO RIVER MWD TOTAL DEMAND				**75,664**	**59,299**	**61,790**	**64,458**	**66,742**	**69,472**

ODESSA									
WUG Name	**Description**	**County**	**Basin**	**WWP Demand (acre-feet per year)**					
				2020	**2030**	**2040**	**2050**	**2060**	**2070**
Odessa	City of Odessa	Ector	Colorado	20,759	22,870	25,200	27,742	30,463	33,222
Odessa	City of Odessa	Midland	Colorado	433	531	626	724	825	925
Ector County UD	Odessa Sales	Ector	Colorado	1,856	2,058	2,284	2,521	2,766	3,018
Ector County Other	Odessa Sales	Ector	Colorado	1,145	1,265	1,397	1,543	1,705	1,883
Manufacturing	Odessa Sales	Ector	Colorado	665	662	716	719	716	704
SUBTOTAL TREATED WATER DEMAND				**24,858**	**27,386**	**30,223**	**33,249**	**36,475**	**39,752**
Steam Electric (Reuse)	Odessa Sales		Colorado	500	500	500	500	500	500
Manufacturing (Reuse)	Odessa Sales	Ector	Colorado	2,602	2,776	2,872	2,984	3,108	3,246
Manufacturing (Reuse)	Odessa Sales	Ector	Rio Grande	187	205	221	233	246	259
Irrigation (Reuse) - Municipal	Odessa Sales	Ector	Colorado	1,290	1,425	1,574	1,739	1,921	2,122
Future Mining (Reuse)	Future Sales	Ector	Colorado	1,060	1,195	1,144	993	806	675
Future Mining (Reuse)	Future Sales	Ector	Rio Grande	522	536	397	266	212	186
SUBTOTAL REUSE WATER DEMAND				**6,161**	**6,637**	**6,708**	**6,715**	**6,793**	**6,988**
ODESSA TOTAL DEMAND				**31,019**	**34,023**	**36,931**	**39,964**	**43,268**	**46,740**

SAN ANGELO									
WUG Name	Description	County	Basin	WWP Demand (acre-feet per year)					
				2020	2030	2040	2050	2060	2070
San Angelo	City of San Angelo	Tom Green	Colorado	18,244	20,002	20,851	21,930	23,240	24,665
Manufacturing		Tom Green	Colorado	2,387	2,615	2,839	3,034	3,273	3,531
Irrigation	Tom Green County WCID #1 Total	Tom Green	Colorado	20,500	20,500	20,500	20,500	20,500	20,500
Irrigation	Tom Green County WCID #1 Twin Buttes	Tom Green	Colorado	12,000	12,000	12,000	12,000	12,000	12,000
Irrigation	Tom Green County WCID #1 Reuse	Tom Green	Colorado	8,500	8,500	8,500	8,500	8,500	8,500
SAN ANGELO TOTAL TREATED DEMAND				**20,631**	**22,617**	**23,690**	**24,964**	**26,513**	**28,196**
SAN ANGELO TOTAL RAW DEMAND				**20,500**	**20,500**	**20,500**	**20,500**	**20,500**	**20,500**

UPPER COLORADO RIVER AUTHORITY									
WUG Name	Description	County	Basin	WWP Demand (acre-feet per year)					
				2020	2030	2040	2050	2060	2070
Miles	Municipal	Runnels	Colorado	112	124	121	119	119	119
Tom Green County-Other (Red Creek MUD & Concho Rural Water Supply)	Municipal	Tom Green	Colorado	200	200	200	200	200	200
Concho County-Other (Paint Rock) - Raw Water	Municipal	Concho	Colorado	25	25	25	25	25	25
UPPER COLORADO RIVER AUTHORITY TOTAL DEMAND				**337**	**349**	**346**	**344**	**344**	**344**

UNIVERSITY LANDS									
WUG Name	Description	County	Basin	WWP Demand (acre-feet per year)					
				2020	2030	2040	2050	2060	2070
CRMWD	Well Field	Howard	Colorado	5,200	5,200	5,200	5,200	5,200	5,200
Midland	Well Field	Midland	Colorado	4,722	4,722	0	0	0	0
Andrews	Well Field	Andrews	Colorado	854	1,026	1,181	1,366	1,586	1,842
Upton County Water District (County-Other)	Well Field	Upton	Rio Grande	40	41	40	40	40	40
Upton County Water District (County-Other)	Well Field	Upton	Colorado	90	89	90	90	90	90
UNIVERSITY LANDS TOTAL DEMAND				**10,816**	**10,989**	**6,421**	**6,606**	**6,826**	**7,082**

WWP (NEEDS)/SURPLUS

BROWN COUNTY WCID #1									
WUG Name	**Description**	**County**	**Basin**	**WWP (Needs)/Surplus (acre-feet per year)**					
				2020	**2030**	**2040**	**2050**	**2060**	**2070**
Bangs	Member City	Brown	Colorado	0	0	0	0	0	0
Brookesmith SUD		Brown	Colorado	0	0	0	0	0	0
Brookesmith SUD		Coleman	Colorado	0	0	0	0	0	0
Brookesmith SUD		Mills	Colorado	0	0	0	0	0	0
Santa Anna	Sales from Brookesmith SUD	Coleman	Colorado	0	0	0	0	0	0
Coleman County SUD	Sales from Brookesmith SUD	Brown	Colorado	0	0	0	0	0	0
Coleman County SUD	Sales from Brookesmith SUD	Coleman	Colorado	0	0	0	0	0	0
Coleman County SUD	Sales from Brookesmith SUD	Runnels	Colorado	0	0	0	0	0	0
Brownwood	Member City	Brown	Colorado	0	0	0	0	0	0
County-Other		Brown	Colorado	0	0	0	0	0	0
Early		Brown	Colorado	0	0	0	0	0	0
Zephyr WSC		Brown	Colorado	0	0	0	0	0	0
Manufacturing	Brown County Manufacturing	Brown	Colorado	0	0	0	0	0	0
Irrigation	Member	Brown	Colorado	0	0	0	0	0	0
BROWN COUNTY WCID #1 TOTAL (NEEDS)/SURPLUS				**0**	**0**	**0**	**0**	**0**	**0**

GREAT PLAINS WATER SYSTEM INC.									
WUG Name	**Description**	**County**	**Basin**	**WWP (Needs)/Surplus (acre-feet per year)**					
				2020	**2030**	**2040**	**2050**	**2060**	**2070**
County-Other	Ector County Municipal (City of Goldsmith)	Ector	Colorado	(27)	(31)	(33)	(37)	(44)	(45)
Steam Electric Power	Ector Co. SEP - Odessa Power Generation Facility	Ector	Colorado	(483)	(532)	(489)	(557)	(660)	(661)
Ector Manufacturing	Ector County Manufacturing	Ector	Colorado	(69)	(80)	(85)	(97)	(115)	(115)
Gaines Mining	Gaines County Mining	Gaines	Colorado	0	0	0	0	0	0
Andrews Mining	Andrews Co. Mining	Andrews	Colorado	(702)	(674)	(239)	(273)	(324)	(324)
Andrews Mining	Andrews Co. Mining	Andrews	Rio Grande	(53)	(51)	(18)	(20)	(24)	(24)
Ector Mining	Ector Co. Mining	Ector	Colorado	(157)	(145)	(77)	(88)	(104)	(104)
GREAT PLAINS WATER SYSTEM INC. TOTAL (NEEDS)/SURPLUS				**(1,491)**	**(1,513)**	**(941)**	**(1,072)**	**(1,271)**	**(1,273)**

COLORADO RIVER MWD									
WUG Name	Description	County	Basin	WWP (Needs)/Surplus (acre-feet per year)					
				2020	2030	2040	2050	2060	2070
Odessa	Member City	Ector	Colorado	(9,734)	(6,262)	(8,438)	(10,865)	(13,517)	(16,262)
Odessa	Member City	Midland	Colorado	(216)	(167)	(234)	(310)	(393)	(482)
Ector County UD	Odessa Sales	Ector	Colorado	(872)	(567)	(767)	(991)	(1,230)	(1,480)
Ector County Other	Odessa Sales	Ector	Colorado	(538)	(349)	(468)	(606)	(759)	(923)
Manufacturing	Odessa Sales	Ector	Colorado	(313)	(182)	(241)	(282)	(318)	(433)
Big Spring	Member City	Howard	Colorado	(2,887)	(1,728)	(2,115)	(2,454)	(2,775)	(3,058)
Coahoma	Big Spring Sales	Howard	Colorado	(87)	(50)	(63)	(74)	(84)	(92)
Manufacturing	Big Spring Sales	Howard	Colorado	(705)	(412)	(504)	(589)	(668)	(736)
Snyder	Member City	Scurry	Colorado	(1,044)	(678)	(874)	(1,098)	(1,339)	(1,586)
County-Other	Snyder Sales	Scurry	Colorado	(141)	(82)	(102)	(118)	(133)	(147)
Rotan	Snyder Sales (Reg G)	Fisher	Brazos	(89)	(50)	(60)	(67)	(76)	(84)
Abilene	Region G	Jones	Brazos	0	0	0	0	0	0
Abilene	Region G	Taylor	Brazos	0	0	0	0	0	0
County-Other	Pyote Et. Al.	Ward	Rio Grande	(70)	(41)	(50)	(59)	(67)	(74)
Midland	Total	Midland	Colorado	(8,880)	(36)	(30)	(29)	(28)	(27)
Midland	Ivie Contract	Midland	Colorado	(5,959)	(5,791)	(5,622)	(5,453)	(5,285)	(5,116)
Midland	1966 Contract	Midland	Colorado	(18,798)	0	0	0	0	0
Millersview-Doole WSC		Concho	Colorado	(41)	(25)	(31)	(38)	(43)	(47)
Millersview-Doole WSC		McCulloch	Colorado	(67)	(38)	(49)	(58)	(67)	(74)
Millersview-Doole WSC		Runnels	Colorado	(46)	(28)	(36)	(42)	(48)	(53)
Millersview-Doole WSC		Tom Green	Colorado	(128)	(74)	(85)	(98)	(109)	(120)
Ballinger		Runnels	Colorado	(326)	(263)	(283)	(500)	(500)	(500)
Robert Lee	From Spence	Coke	Colorado	(296)	(291)	(287)	(287)	(286)	(286)
County-Other	Robert Lee Sales	Coke	Colorado	(76)	(72)	(69)	(68)	(68)	(68)
San Angelo	Ivie Contract	Tom Green	Colorado	0	0	0	0	0	0
Stanton		Martin	Colorado	(255)	(160)	(204)	(249)	(292)	(331)
Irrigation	"Rural Customers"	Ector	Colorado	(189)	(110)	(134)	(158)	(179)	(196)
Mining/Brackish		Coke	Colorado	(38)	(36)	(34)	(32)	(30)	(28)
Mining/ Brackish water		Howard	Colorado	(1,000)	(1,000)	(1,000)	(982)	(320)	(43)
COLORADO RIVER MWD TOTAL (NEEDS)/SURPLUS				**(43,915)**	**(18,456)**	**(21,750)**	**(25,478)**	**(28,586)**	**(32,219)**

ODESSA									
WUG Name	Description	County	Basin	WWP (Needs)/Surplus (acre-feet per year)					
				2020	2030	2040	2050	2060	2070
Odessa	City of Odessa	Ector	Colorado	(9,734)	(6,262)	(8,438)	(10,865)	(13,517)	(16,262)
Odessa	City of Odessa	Midland	Colorado	(216)	(167)	(234)	(310)	(393)	(482)
Ector County UD	Odessa Sales	Ector	Colorado	(872)	(567)	(767)	(991)	(1,230)	(1,480)
Ector County Other	Odessa Sales	Ector	Colorado	(538)	(349)	(468)	(606)	(759)	(923)
Manufacturing	Odessa Sales	Ector	Colorado	(313)	(182)	(241)	(282)	(318)	(433)
SUBTOTAL TREATED WATER (NEEDS)/SURPLUS				**(11,673)**	**(7,527)**	**(10,148)**	**(13,054)**	**(16,217)**	**(19,580)**
Steam Electric (Reuse)	Odessa Sales		Colorado	0	0	0	0	0	0
Manufacturing (Reuse)	Odessa Sales	Ector	Colorado	0	0	0	0	0	0
Manufacturing (Reuse)	Odessa Sales	Ector	Rio Grande	0	0	0	0	0	0
Irrigation (Reuse) - Municipal	Odessa Sales	Ector	Colorado	0	0	0	0	0	0
Future Mining (Reuse)	Future Sales	Ector	Colorado	0	0	0	0	0	0
Future Mining (Reuse)	Future Sales	Ector	Rio Grande	0	0	0	0	0	0
SUBTOTAL REUSE (NEEDS)/SURPLUS				**0**	**0**	**0**	**0**	**0**	**0**
ODESSA TOTAL (NEEDS)/SURPLUS				**(11,673)**	**(7,527)**	**(10,148)**	**(13,054)**	**(16,217)**	**(19,580)**

SAN ANGELO									
WUG Name	Description	County	Basin	WWP (Needs)/Surplus (acre-feet per year)					
				2020	2030	2040	2050	2060	2070
San Angelo	City of San Angelo	Tom Green	Colorado	(5,716)	(7,621)	(8,620)	(9,842)	(11,320)	(12,922)
Manufacturing		Tom Green	Colorado	(748)	(997)	(1,174)	(1,361)	(1,594)	(1,850)
Irrigation	Tom Green County WCID #1 Total	Tom Green	Colorado	(12,000)	(12,000)	(12,000)	(12,000)	(12,000)	(12,000)
SAN ANGELO TOTAL (NEEDS)/SURPLUS				**(18,464)**	**(20,618)**	**(21,794)**	**(23,203)**	**(24,914)**	**(26,772)**

UPPER COLORADO RIVER AUTHORITY									
WUG Name	Description	County	Basin	WWP (Needs)/Surplus (acre-feet per year)					
				2020	2030	2040	2050	2060	2070
Miles	Municipal	Runnels	Colorado	(112)	(124)	(121)	(119)	(119)	(119)
Tom Green County-Other	Municipal	Tom Green	Colorado	(200)	(200)	(200)	(200)	(200)	(200)
Concho County-Other (Paint Rock)	Municipal	Concho	Colorado	(25)	(25)	(25)	(25)	(25)	(25)
UPPER COLORADO RIVER AUTHORITY TOTAL (NEEDS)/SURPLUS				**(337)**	**(349)**	**(346)**	**(344)**	**(344)**	**(344)**

UNIVERSITY LANDS									
WUG Name	Description	County	Basin	WWP (Needs)/Surplus (acre-feet per year)					
				2020	2030	2040	2050	2060	2070
CRMWD	Well Field	Howard	Colorado	(5,200)	(5,200)	(5,200)	(5,200)	(5,200)	(5,200)
Midland	Well Field	Midland	Colorado	(2,665)	(2,725)	0	0	0	0
Andrews	Well Field	Andrews	Colorado	(364)	(647)	(825)	(1,062)	(1,362)	(1,619)
Upton County Water District (County-Other)	Well Field	Upton	Rio Grande	0	0	0	0	0	0
Upton County Water District (County-Other)	Well Field	Upton	Colorado	0	0	0	0	0	0
UNIVERSITY LANDS (NEEDS)/SURPLUS				**(8,229)**	**(8,572)**	**(6,025)**	**(6,262)**	**(6,562)**	**(6,819)**

Appendix K

Public Comments

Public Comments

Public Comments were received from the Tom Green County Commissioner, Rick Bacon and the Lower Colorado River Authority (LCRA). Their comments and the Region F WPG's responses are included in this appendix.

Tom Green County Commissioner, Rick Bacon. Email, received July 14, 2015:

I appreciate the recommendation in Chapter 8 Paragraph 8.4.4 to 'Allow Waivers of Plan Amendments for Entities with Small Strategies'. Until the recommendation is adopted I believe an additional strategy should be added to the plan.

I recommend the following changes/additions to the IPP. This is a collaborative response from the Concho Rural Water Corporation and small water districts in Tom Green County.

5A.1 Identification of Potentially Feasible Strategies

- New Supply Development
  - Atmospheric water generation

Atmospheric Water Generation

Atmospheric water generation is a proven science which extracts water from the air. While this is not a feasible strategy for large water users it could be a potential strategy for small users. This system could supplement small water systems and in some cases replace their reliance on ground water. Further research is needed to bring the cost down.

5A.1.2 Potentially Feasible Strategies in Region F

Water Quality Improvements

There is an abundance of production water from oil wells that should be considered as a feasible strategy under Water Quality Improvements. Much like the reuse of affluent water from treatment plants this should not be ruled out as a possible source of water.

5E.29 Tom Green County

Concho Rural Water Corporation (CRWC) has projected water shortages.

Concho Rural Water Corporation (CRWC)

CRWC's Pecan Creek allocation of water from the Upper Colorado River Authority (UCRA)/City of San Angelo (COSA) is currently tapped out. There is no longer any water available from these resources. Increased housing developments in western and southern Tom Green County are creating issues with the small WSC and FWSDs being able to supply the water needed. Due to the extensive drought CRWC and other small FWSDs are experiencing difficulty in maintaining the required storage requirements set by TCEQ. Efforts through Community Development Block Grants (CDBG) from the Texas Department of Agriculture have not produced the amount of water needed to meet demand. Housing developments in the area along with requests for connection due to personal wells going dry continue to put a strain on the system. We cannot continue to use developing Lipan Aquifer Supplies as the only strategy. We need to include alternative strategies that may become available as a result of research and development. Strategies such as atmospheric water generation, small desal systems or the possible use of treatable oil well production water should be included as alternatives.

Potentially Feasible Water Management Strategies Considered for Concho Rural Water Corporation:

- Municipal Conservation
- Atmospheric Water Generation
- Direct Reuse for Municipal Irrigation
- Other resources that may become available through research

Tom Green County Other
Even with the additional rainfall we are experiencing the UCRA reservoirs have not seen a substantial increase from these rains. It is not feasible to continue to rely on the UCRA. We realize over the course of the plan this could change.
Potentially Feasible Water Management Strategies Considered for Tom Green County Other:

- Purchase water through UCRA
- Atmospheric water generation
- Other resources that may become available through research

Thank you for allowing public comment on the water plan.
Please contact Rick Bacon, Commissioner, Pct. 3 Tom Green County if you have any questions.

Rick Bacon
Email: rick.bacon@co.tom-green.tx.us
Phone: 325 234-4261

Response:

For Region F, strategies were only considered potentially feasible if the strategy:

- *Is appropriate for regional planning;*
- *Utilizes proven technology;*
- *Has an identifiable sponsor;*
- *Could meet the intended purpose for the end user considering water quality, economic feasibility, geographic constraints, and other factors, as appropriate; and*
- *Meets existing regulations.*

Commissioner Bacon has requested the inclusion of several strategies that the Region F RWPG has determined do not meet one or more of the above criterion to be considered potentially feasible. A brief discussion of the requested technologies is presented below.

Atmospheric Water Generation:
Atmospheric water generation is a technology that is still being developed. Current technologies that are available to individual and/or commercial users extract water from the air through condensation or exposing the air to desiccants. For this technology to be feasible, the relative humidity must be greater than 30% to 35% and the temperature should be greater than 65° F. This limits its usefulness for indoor spaces and also limits the general development in Tom Green County and other areas in Region F. The relative humidity in San Angelo averages 45% (http://www.san-angelo.climatemps.com/humidity.php),

which is in the lower range of feasibility. The amount of water generated is small and is typically used only for indoor water use. The technology is also very energy intensive, such that the implementation of a large scale program could require the development of more water for energy generation. Considering these factors, atmospheric water generation is not a technically proven strategy for use in Region F and is not considered a feasible strategy in Chapter 5. However, Region F acknowledges the desire of the community to explore new and innovative technologies for water supply. A statement supporting the research and development of new technologies was added to Chapter 5A.

Water Quality Improvements:
The flow back water generated from mining activities was considered as part of the mining conservation strategy. The amount assumed for recycling is approximately 3,900 acre-feet in 2020, which is a reasonable estimate based on the expected water quantity and quality of the flow back, treatment processes and costs. The use of this water for municipal use would likely be economically infeasible due to the relative small quantities, required treatment and transportation from the mining areas to municipal users. No changes to the Region F Initially Prepared Plan were made based on this comment.

Concho Rural WC
In consultation with Concho Rural WSC, the WSC requested the inclusion of a brackish groundwater desalination project. The project would generate 150 acre-feet per year of treated water from an undefined aquifer in Tom Green County. This project was evaluated and recommended for Concho Rural WSC. A description of the strategy is summarized in Chapter 5E and detailed in Appendices C and D.

Tom Green County-Other
The strategies identified in the Region F water plan rely in part on new water sources developed by San Angelo and UCRA. Atmospheric water generation is not technically feasible for Tom Green County-Other. No changes to the Region F Initially Prepared Plan were made based on this comment.

Lower Colorado River Authority, received August 6, 2015 by mail:

August 6, 2015

Mr. John Grant, Chairman
Region F Water Planning Group Chair
c/o Colorado River MWD
P.O. Box 869
Big Spring, TX 78721

Re: Comments on the Region F 2016 Initially Prepared Plan

Dear Mr. Grant:

The Lower Colorado River Authority (LCRA) respectfully submits the following comments on the Region F 2016 Initially Prepared Plan (IPP).

In Section 1.6.3, Assessment of Current Preparations for Drought in Region F, the statement is made that "In March 2015, LCRA announced that the current drought surpassed the historic drought-of-record from the 1950s based on inflow to the Highland Lakes. This is an important declaration for Region F because ... " LCRA comments that the analysis of the severity of the current drought is based on preliminary evaporation and inflow data for 2014 and the LCRA announcement earlier this year states that the hydrologic data available is preliminary. Until final data is available for 2014 and the analysis can be confirmed, LCRA requests that the statement attributed to LCRA be modified to state that the conclusions are not yet final. LCRA suggests that the statement be rewritten to read: "In early 2015, the Lower Colorado River Authority (LCRA) announced that preliminary information indicates that the current drought has likely surpassed the historic drought-of-record from the 1950s for LCRA's Highland
Lakes and the lower river basin. This is significant for Region F because ... "

Regarding the water availability modeling performed to estimate surface water available in Region F, the IPP acknowledges that only with a subordination strategy assumption is surface water available to a number of entities in Region F (Section 3.2.2, 5C.1). The IPP states that the subordination strategy modeling was performed for water planning purposes only and does not imply that senior water right holders have agreed to the subordination assumptions (Section 5C. 1). Further, the IPP states that subordination agreements with senior downstream water right holders may have costs associated with them, however, no costs are attributed to this strategy in the IPP. The need for subordination agreements between some entities in Region F and senior downstream water right holders, including LCRA, is an unresolved issue and LCRA requests that it be stated in the IPP that this is an unresolved issue. Additionally, LCRA requests information be provided in the IPP that a more reasonable assumption on cost of a subordination agreement would be the LCRA system rate applied to the net loss of water to the senior downstream water right holder. LCRA's system rate is currently $175 per acre-foot.

LCRA appreciates the opportunity to submit these comments on the Region F IPP.

Karen Bondy
Sr. Vice President
Water Resources

Response:
The wording in Section 1.6.3 has been updated to match the preliminary status of the declaration. The wording provided by LCRA was used.

Regarding the water availability modeling used for the subordination strategy, Region F has added a statement to clarify that the need for subordination agreements between water right holders is an unresolved issue. Region F acknowledges that there likely will be a cost associated with reaching these agreements. However, this amount would be a privately negotiated rate determined between two individual parties and cannot be properly estimated by the Region F Water Planning Group. Additionally, it is unclear what the net loss to the downstream water right holder is based on the use of subordinated supplies in the upper basin. Further study would be required to establish this relationship. Such a study is outside the scope of regional water planning. Therefore, Region F has not adopted a cost for the subordination strategy in the Region F Plan. However, additional discussion on the type of costs that would likely be required to reach a subordination agreement was included in Chapter 5C and Appendix C.

Appendix L

Agency Comments

TWDB Comments on Initially Prepared 2016 Region F Water Plan

Level 1: Comments and questions must be satisfactorily addressed in order to meet statutory, agency rule, and/or contract requirements.

1. Pages 5E-61 and 5E-63: The plan includes an unmet need for the City of Midland beginning in either the 2030 or 2040 decade (unmet need of Midland as percent of demand in the 2040 decade is 5 percent). Please provide an explanation as to whether drought management strategies were considered for this unmet need as required and how the health and safety of the public, including sanitation and fire protection, will be maintained under drought conditions in the final, adopted regional water plan. *[31 Texas Administrative Code (TAC) §357.34(/)(1), Texas Water Code § 16.053(a)]*

Response: *As discussed in Chapter 5A, drought management was considered for Region F entities and determined not appropriate for long-range water supply planning. The protection of health and safety for Midland is discussed in Chapter 6. In Chapter 6, the IPP states that the West Texas Water Partnership "is actively pursuing the study of potential options for future water supplies. However, the study is not complete and specific sources of supply have not been explicitly identified and therefore cannot be included in the Plan at this time. However, the needs of the City of Midland are expected to be fully met through this Partnership before an unmet need arises. The public health and safety of the residents of Midland will not be compromised." A similar statement regarding future supplies from the West Texas Water Partnership has been added to the discussion of strategies for Midland in Chapter 5E. The Partnership has also provided a letter to Region F to that effect. A copy of the letter can be found in this appendix.*

2. Please describe how publicly available plans for major agricultural, manufacturing and commercial water users were considered in the final, adopted regional water plan. *[31 TAC §357.22(a)(4)]*

Response: *There are no known publicly available plans for agricultural, manufacturing and commercial water users in Region F. To the extent these types of plans are known, they are considered by the Region F Water Planning Group in the development of the Regional Water Plan. Page 1-51 in Chapter 1 has been updated to reflect this statement.*

3. Please provide a statement regarding any water availability requirements promulgated by a county commissioners court pursuant to Texas Water Code §35.019, which in Region F applies to the Reagan, Upton, and Midland Counties Priority Groundwater Management Areas. *[31 TAC §357.22(a)(6)]*

Response: *A discussion of Priority Groundwater Management Areas (PGMA) was added to Chapter 1 (Section 1.3.2). At this time, no county commissioner's court has promulgated groundwater regulations or availability values for areas within a PGMA that have no GCD.*

4. The plan in some instances, does not appear to include a quantitative reporting of impacts to agricultural resources. For example, page C-52 Vol. II (in Appendix C) provides a qualitative assessment of "may" impact but does not appear to include quantification of the non-zero impact. Additionally, page C-15 (in Appendix C) indicates that dryland conversion may not be a viable strategy for all agricultural producers but does not quantify the potential impact of such conversion being

implemented. Please include quantitative reporting of impacts to agricultural resources in the final, adopted regional water plan. *[31 TAC §357.34(d)(3)(C)]*

Response: *Region F updated Appendix E to include a quantitative evaluation of impacts to agricultural resources. This quantitative reporting is based on potential permanent impacts to irrigated acreages. Strategy evaluations were updated accordingly.*

5. Pages 5E-33, 5E-34, 5E-46, and 5E-52: The plan does not appear to consider conservation as a potentially feasible WMS for some water user groups (WUGs) with identified water supply needs, including Howard County-Other, Howard County Manufacturing, Martin County Manufacturing, and McCulloch County Manufacturing. Please document the reason why conservation strategies were not recommended for these entities in the final, adopted regional water plan. *[31 TAC §357.34(f)(2)(B)].*

Response: *Howard County-Other per capita usage is below 140 gpcd state goal, and therefore conservation was not considered to meet their need. Conservation was not considered a viable strategy for manufacturing users in Region F due to a lack of detail necessary to develop a meaningful conservation measures. This is addressed in the Conservation section of Chapter 5A.*

6. Pages 1-49 and 5B- 18: The plan does not appear to include a copy of the model water conservation plans and the referenced online link to the model plan does not appear to be a link to the referenced document at the time of plan review. Please ensure an operational link to the model conservation plan if the model plan is to be included only by online reference.*[31 TAC §357.34(g)]*

Response: *This link was corrected in Chapters 1 and 5B.*

7. Please clarify whether the plan development was guided by the principal that the designated water quality and related water uses as shown in the state water quality management plan shall be improved or maintained. *[31 TAC §358.3(19)]*

Response: *The plan was developed using the guiding principal that the water quality should be maintained or improved wherever possible. Section 1.7.1 was updated to reflect the use of this guiding principal.*

8. Pages 3-43, Table 3-7: Please clarify how the run-of-river availabilities were calculated for municipal water users to ensure that all monthly demands are fully met for the entire simulation of the unmodified WAM Run 3 in the final, adopted regional water plan. *[Contract Exhibit* 'C', *Section 3.4]*

Response: *There is a fundamental difference in how Region F calculates run-of-river supplies and the TWDB approach. TWDB approach underestimates the available supply to users of run-of-river sources. Since all municipal users with supplies under Run 3, except Menard, have multiple sources of water, the run-of-river supplies would be used conjunctively with these sources and a monthly analysis is not appropriate. For Menard, new strategies are recommended to secure additional water to meet its monthly needs. Additional documentation as to how Region F calculates run-of-river supplies was added to Appendix B.*

9. Please clearly summarize which, if any, recommended water management strategies rely on or mutually exclude another recommended strategy. If such relationships exist, please summarize how the

strategy interactions impact the estimated water availability and yield associated with each associated water management strategy in the final, adopted regional water plan. *[Contract Exhibit* 'C', *Section 3.4.2]*

Response: *There are no mutually exclusive recommended water management strategies in Region F. This fact has been reflected in Chapter 5A. Strategies which rely on the subordination strategy include the City of Junction's dredging project and the construction of water treatment plants for several entities.*

10. The technical evaluations of the water management strategies do not appear to estimate water losses from the associated strategies. Please include an estimate of water losses in the final, adopted regional water plan, for example as an estimated percent loss. *[31 TAC §357.34(d)(3)(A); Contract Exhibit* 'C', *Section 5.1.1]*

Response: *Water losses from reverse osmosis (RO) treatment for both desalination and direct potable reuse projects have been included in the Region F water plan. Other losses associated with transmission will be small and were assumed to be negligible. This was further documented in Section 5A.2.*

11. Pages 5E-17, 5E-33, and 5E-41: The plan appears to include water management strategies, including treatment infrastructure, that appear to not increase the volume of supply to water user groups. For example, the Odessa Reverse Osmosis Treatment Facility, the Big Spring Water Treatment Plant Expansion, and the Junction Dredge River Intake strategies appear to include improvement of water quality only and maintenance of the existing City of Junction intake. Regional water plans must not include any strategies or costs that are associated with simply maintaining existing water supplies, improving water treatment processes or replacing infrastructure. Plans may include only infrastructure costs that are associated with volumetric increases of treated water supplies delivered to water user groups or that result in more efficient use of existing supplies (e.g., conservation). Please revise as appropriate throughout the final, adopted regional water plan. *[Contract Exhibit* 'C', *Sections 5.1.2.2 and 5.1.2.3)*

Response: *These strategies are necessary to fully utilize the surface water supplies from the subordination strategy. Additional treatment capacity will be needed for Big Spring and Odessa. Due to elevated total dissolved solids in the upper Colorado River reservoirs, advanced treatment is warranted. The City of Junction requires dredging to physically access the run-of-river water that becomes available under subordination. This is discussed in more detail in Chapters 5D and 5E. The database was updated to reflect the connection of these projects to the subordination supplies.*

Level 2: Comments and suggestions for consideration that may improve the readability and overall understanding of the regional water plan.

1. Page C-34: For this and all direct potable reuse strategies, please consider providing the recovery rate (e.g., as percent) of the reverse osmosis (RO) system assumed for strategy yield calculations. The water management strategy evaluation alludes to RO losses but does not specify the recovery rate.

Response: *For all strategies utilizing RO treatment, a 25% loss was assumed. This is now documented under Section 5A.2.*

2. Section 3.1: Please consider including the Edwards-Trinity (High Plains) Aquifer in the aquifer summaries presented in the existing groundwater supplies section in the final, adopted regional water plan.

Response: *Section 3.1 was updated to include discussion on the Edwards-Trinity (High Plains) Aquifer.*

3. Section 5B.2: Please consider providing further documentation of assumptions used to estimate the unit costs for the irrigation conservation savings presented in the final, adopted regional water plan.

Response: *Further documentation of the assumptions used for irrigation conservation costs are documented in Appendix C and the costs are summarized in Chapter 5B.*

MIDLAND
Utilities Department

October 13, 2015

John Grant
Region F Chairman
Region F Water Planning Group
400 E. 24th Street
Big Spring, Texas 79720

Re: City of Midland Water Needs in 2016 Region F Water Plan

Dear Mr. Grant,

The City of Midland currently shows an unmet water need in the 2016 Region F Water Plan beginning in 2040. The City of Midland is currently pursuing additional water supplies through a joint study with the cities of San Angelo and Abilene. These efforts have been deemed the West Texas Water Partnership (the Partnership). The Partnership is currently evaluating a variety of sources, including new groundwater and reuse. The specific sources of supply are confidential and are unable to be officially included in the 2016 Region F Water Plan at this time. However, the City of Midland will develop adequate supplies through a variety of strategies prior to the projected water need in 2040.

Sincerely,

Laura R. Wilson

Laura R. Wilson, P.E.
Director of Utilities

300 N. Loraine, P.O. Box 1152, Midland TX 79702-1152 • 432-685-7260 • fax 432-685-5056

Texas Parks and Wildlife Comments on Initially Prepared 2016 Region F Water Plan, Received August 7, 2015

Re: 2016 Region F Initially Prepared Regional Water Plan

Dear Mr. Grant:

Thank you for seeking review and comment from the Texas Parks and Wildlife Department ("TPWD") on the 2016 Initially Prepared Regional Water Plan for Region F (IPP). As you know, water impacts every aspect of TPWD' s mission to manage and conserve the natural and cultural resources of Texas. As the agency charged with primary responsibility for protecting the state's fish and wildlife resources, TPWD is positioned to provide technical assistance during the water planning process. Although TPWD has limited regulatory authority over the use of state waters, TPWD is committed to working with stakeholders and others to provide science-based information during the water planning process intended to avoid or minimize impacts to state fish and wildlife resources.

TPWD understands that regional water planning groups are guided by 31 TAC §357 when preparing regional water plans. These water planning rules spell out requirements related to natural resource and environmental protection. Accordingly, TPWD staff reviewed the IPP with a focus on the following questions:

- Does the IPP include a quantitative reporting of environmental factors including the effects on environmental water needs and habitat?
- Does the IPP include a description of natural resources and threats to natural resources due to water quantity or quality problems?
- Does the IPP discuss how these threats will be addressed?
- Does the IPP describe how it is consistent with long-term protection of natural resources?
- Does the IPP include water conservation as a water management strategy?
- Does the IPP include Drought Contingency Plans?
- Does the IPP recommend any stream segments be nominated as ecologically unique?
- If the IPP includes strategies identified in the 2010 regional water plan, does it address concerns raised by TPWD in connection with the 2010 Water Plan.

Relative to the 2011 Region F Regional Water Plan, the 2016 IPP proposes significant changes.
A new drought of record combined with increased water demands have led to an IPP that includes over 70 new water management strategies. Water Conservation comprises 54 percent of the recommended strategies. Other strategies include new groundwater development including brackish groundwater desalination, water reuse and subordination of senior water rights.

According to the Region F IPP the most significant water management strategy is subordination of senior water rights developed in conjunction with the Lower Colorado Region (Region K), which reserves over 52,000 acre-feet of surface water for use in Region Fin 2070. As noted in Appendix E, the subordination of downstream water rights may have an environmental impact because water will be used upstream and will decrease the amount of water that is available downstream.

Chapter 1 includes a description of natural resources in the region. The Region F IPP recognizes the importance of natural resources, especially aquatic resources likes springs and streams, as well as water-oriented recreation. The IPP identifies major springs in the region that are important for water supply or other natural resources protection. These major springs include: San Solomon, Giffin, Sandia, Comanche, Diamond Y, Spring Creek, Dove Creek, Rocky Creek, Anson, Lipan, Kickapoo, Clear Creek, and San Saba Springs. Figure 1-15 also includes Santa Rosa Springs as a major spring. The IPP includes descriptions of these springs and acknowledges the importance of Diamond Y Springs and the Balmorhea Spring complex as important habitat for endangered species. Table 1-12 lists 37 species identified by the state as threatened or endangered that are known to, or may potentially occur in Region F.

The IPP includes a discussion of water-related threats to natural resources. According to the IPP, reservoir development and invasion by brush have altered natural stream flow patterns in Region F. In addition, spring flows in Region F have greatly diminished or disappeared due to groundwater development, the spread of high water use plant species, or the loss of native grasses and other plant cover. These threats have also combined to reduce reliable flows for many tributary streams. Reservoir development has altered natural hydrology by diminishing flood flows and capturing low flows. The IPP acknowledges that any future reservoir would be managed to provide instream flows.

The IPP addresses consistency with protection of natural resources. According to the IPP, none of the recommended water management strategies are expected to impact threatened or endangered species but some strategies may require site-specific studies to verify that no impacts will occur. In addition, seven state parks (Lake Brownwood, Big Spring, Lake Colorado City, Monahans Sandhills, San Angelo, Balmorhea and South Llano River) and one state wildlife management area (Mason Mountain) located in Region F are not expected to be impacted by the recommended strategies.

Approximately 82 percent of the water used in Region F is projected to be supplied by groundwater. TWDB planning rules now require that groundwater supplies not exceed the Modeled Available Groundwater (MAG) values that were determined to meet the desired future conditions (DFCs) of the groundwater source. By not exceeding the MAG, long-term effects on groundwater and surface water interrelationships were minimized since these complex relationships are considered by the Groundwater Management Area (GMA) when selecting the DFCs. While the Region F IPP does not recommend strategies that exceed the MAG, several water providers are planning to develop strategies in counties without groundwater districts that would ultimately exceed the MAGs. One GMA in Region F has set a DFC that addresses maintenance of spring flows. In GMA7, average drawdown is projected to be 7 feet except within Kinney County GCD. Kinney County drawdown will be consistent with maintaining annual average flow of23.9 cubic feet per second and median flow of 24.4 cubic feet per second at Los Moras Springs. Ultimately TPWD would like to see other GMAs adopt additional DFCs designed to protect other springs.

The IPP includes a description of natural resources and threats to natural resources due to water quantity or quality problems. Each of the water management strategies discussed in Chapter 5 has a short description of associated environmental issues. Potential impacts to sensitive environmental factors including wetlands, threatened and endangered species, unique wildlife habitats, and cultural resources. According to the IPP, in most cases, a detailed evaluation could not be completed because previous studies have not been conducted or the specific location of the new source (such as a groundwater well field) was not identified. Therefore, a more detailed environmental assessment will be required before a strategy is implemented. Appendix E includes a Strategy Evaluation Matrix and Quantified Environmental Impact Matrix. Environmental categories including number of habitat acres impacted, environmental water needs, threatened and endangered species, water quality and cultural resources are quantitatively assessed and assigned a ranking from 1 to 5, with 1 being most impact and 5 being least or positive impact. All strategies scored either low or no environmental impact.

Subchapter 5B discusses water conservation which comprises 54 percent of the recommended strategies in the IPP. Average per capita water use for Region F is expected to decline from 160 gallons per capita per day (gpcd) in 2020 to 152 gpcd in 2070, a reduction of 10 percent. This compares to the statewide average of 153 gpcd for the year 2011 declining to 137 gpcd by 2070. The IPP includes water conservation measures for municipal, agricultural, mining and steam electric power users that if implemented could save over 96,000 acre-feet of water by 2070 in Region F.

According to the IPP treated wastewater effluent has been used for agricultural irrigation and some industrial purposes in Region F for many years. There is also increasingly widespread use of reuse water for non-potable uses such as irrigation of parks, golf courses, and landscaping. Although there is still some public resistance to the direct reuse of wastewater effluent for potable water supply, acceptance is growing. The City of Big Spring recently became one of the first municipalities to implement direct potable reuse. The Big Spring reuse project utilizes advanced treatment systems to reclaim Big Spring's effluent. After advanced treatment, the water is mixed with other raw water supplies and treated again before distribution to customers.

TPWD concurs with the Region F IPP that disposal of brine concentrate from brackish water desalination discharged to surface water may have unacceptable environmental impacts in some cases. Disposal of concentrate by deep well injection is one preferred approach to minimize impacts to fish and wildlife resources.

Model drought contingency plans were developed for Region F. Each plan identifies four drought stages: mild, moderate, severe and emergency. The recommended responses range from notification of drought conditions and voluntary reductions in the "mild" stage to mandatory restrictions during an "emergency" stage. Entities using the model plan can select the trigger conditions for the different stages and appropriate responses for each stage. Appendix H includes drought triggers and actions for each water provider in Region F.

The Region F IPP does not include recommendations for designation of ecologically unique stream segments. The IPP acknowledges that although the legislature has clarified that protection afforded by the designation is limited, concerns remain that there is an implication of some level of protection beyond prevention of reservoir development. TPWD appreciates the inclusion of this statement in the IPP:
"The Region F Water Planning Group recognizes the ecological benefits of major springs, which are discussed in Chapter 1, and the benefits of possible protection for these important resources. Several of the potential ecologically significant streams identified by TPWD are springs or springfed streams. The list includes springs that provide water to water supply reservoirs and/or ecologically sensitive species. The South Llano River in Kimble County, which is springfed, is an important water supply source for the City of Junction and Kimble County water users and may warrant additional protections. Other important stream segments include the South Concho River and Dove Creek. Both are springfed streams that flow into Twin Buttes Reservoir, which is a major water source for the City of San Angelo. The Region F Water Planning Group will reconsider the possible designation of unique streams for the 2021 water plan."

TPWD acknowledges Region F's environmental policy recommendations as discussed in Section 8.1. We concur with the Region's belief that good stewardship of land resources will also protect water resources and that water development must be balanced with protection of environmental values.

While the IPP does not recommend nomination of any stream segments as ecologically unique until TPWD completes comprehensive studies, the IPP does acknowledge the importance of these resources. TPWD looks forward to future discussions with you regarding coordination of stakeholder-based efforts to identify and quantify priority environmental values to be protected.

We appreciate the opportunity to provide these comments. While TPWD values and appreciates the need to meet future water supply demands, we must do so in a thoughtful and sound manner that ensures the ecological health of our state's aquatic and natural resources. If you have any questions, or if we can be of any assistance, please feel to contact Cindy Loeffler at 512-389- 8715. Thank you.

Sincerely,
Ross Melinchuk
Deputy Executive Director, Natural Resources

cc: Craig Bonds, Division Director, Inland Fisheries Division, TPWD
Clayton Wolf, Division Director, Wildlife Division, TPWD
Nathan Rains, Wildlife Division, TPWD.

Response: *Region F acknowledges and appreciates your comments on the Region F IPP. No changes were made to the plan. Region F appreciates the TPWD's offer of assistance.*

Appendix M

Infrastructure Financing Report Survey Responses

Sponsor Entity Name	ProjectName	IFR Element Name	IFR Element Value	Year Of Need
BALLINGER	VOLUNTARY TRANSFER (PURCHASE) - BALLINGER	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
BALLINGER	VOLUNTARY TRANSFER (PURCHASE) - BALLINGER	CONSTRUCTION FUNDING		
BALLINGER	VOLUNTARY TRANSFER (PURCHASE) - BALLINGER	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
BALLINGER	WATER AUDITS AND LEAK - BALLINGER	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
BALLINGER	WATER AUDITS AND LEAK - BALLINGER	CONSTRUCTION FUNDING		
BALLINGER	WATER AUDITS AND LEAK - BALLINGER	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
BANGS	DIRECT NON-POTABLE REUSE FOR PUBLIC PARKS IRRIGATION (TYPE I) - BANGS	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
BANGS	DIRECT NON-POTABLE REUSE FOR PUBLIC PARKS IRRIGATION (TYPE I) - BANGS	CONSTRUCTION FUNDING		
BANGS	DIRECT NON-POTABLE REUSE FOR PUBLIC PARKS IRRIGATION (TYPE I) - BANGS	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
BIG LAKE	WATER AUDITS AND LEAK - BIG LAKE	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
BIG LAKE	WATER AUDITS AND LEAK - BIG LAKE	CONSTRUCTION FUNDING		
BIG LAKE	WATER AUDITS AND LEAK - BIG LAKE	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
BIG SPRING	WATER TREATMENT PLANT EXPANSION - BIG SPRING	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
BIG SPRING	WATER TREATMENT PLANT EXPANSION - BIG SPRING	CONSTRUCTION FUNDING		
BIG SPRING	WATER TREATMENT PLANT EXPANSION - BIG SPRING	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
BRADY	ADVANCED GROUNDWATER TREATMENT - BRADY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
BRADY	ADVANCED GROUNDWATER TREATMENT - BRADY	CONSTRUCTION FUNDING	$17,338,000	2016
BRADY	ADVANCED GROUNDWATER TREATMENT - BRADY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
BRONTE	REHABILITATION OF OAK CREEK PIPELINE - BRONTE	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$499,000	2016
BRONTE	REHABILITATION OF OAK CREEK PIPELINE - BRONTE	CONSTRUCTION FUNDING	$1,000,000	2017
BRONTE	REHABILITATION OF OAK CREEK PIPELINE - BRONTE	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
BRONTE	WATER AUDITS AND LEAK - BRONTE	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$100,000	2016
BRONTE	WATER AUDITS AND LEAK - BRONTE	CONSTRUCTION FUNDING	$800,000	2017
BRONTE	WATER AUDITS AND LEAK - BRONTE	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
BRONTE	DEVELOP EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES IN NOLAN COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$2,000,000	2016
BRONTE	DEVELOP EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES IN NOLAN COUNTY	CONSTRUCTION FUNDING	$5,350,000	2017
BRONTE	DEVELOP EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES IN NOLAN COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
BROWNWOOD	DIRECT POTABLE REUSE - BROWNWOOD	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$0.00	
BROWNWOOD	DIRECT POTABLE REUSE - BROWNWOOD	CONSTRUCTION FUNDING	$0.00	
BROWNWOOD	DIRECT POTABLE REUSE - BROWNWOOD	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
COAHOMA	WATER AUDITS AND LEAK - COAHOMA	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		

Sponsor Entity Name	ProjectName	IFR Element Name	IFR Element Value	Year Of Need
COAHOMA	WATER AUDITS AND LEAK - COAHOMA	CONSTRUCTION FUNDING		
COAHOMA	WATER AUDITS AND LEAK - COAHOMA	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
COLORADO RIVER MWD	ASR OF EXISTING SURFACE WATER SUPPLIES IN WARD COUNTY WELL FIELD - CRMWD	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$10,184,000	2030
COLORADO RIVER MWD	ASR OF EXISTING SURFACE WATER SUPPLIES IN WARD COUNTY WELL FIELD - CRMWD	CONSTRUCTION FUNDING		
COLORADO RIVER MWD	ASR OF EXISTING SURFACE WATER SUPPLIES IN WARD COUNTY WELL FIELD - CRMWD	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
COLORADO RIVER MWD	DESALINATION OF BRACKISH SURFACE WATER (CRMWD DIVERTED WATER SYSTEM) - CRMWD	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$34,819,000	2020
COLORADO RIVER MWD	DESALINATION OF BRACKISH SURFACE WATER (CRMWD DIVERTED WATER SYSTEM) - CRMWD	CONSTRUCTION FUNDING		
COLORADO RIVER MWD	DESALINATION OF BRACKISH SURFACE WATER (CRMWD DIVERTED WATER SYSTEM) - CRMWD	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
COLORADO RIVER MWD	WARD COUNTY WELL FIELD EXPANSION AND DEVELOPMENT OF WINKLER COUNTY WELL FIELD - CRMWD	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$139,916,000	2040
COLORADO RIVER MWD	WARD COUNTY WELL FIELD EXPANSION AND DEVELOPMENT OF WINKLER COUNTY WELL FIELD - CRMWD	CONSTRUCTION FUNDING		
COLORADO RIVER MWD	WARD COUNTY WELL FIELD EXPANSION AND DEVELOPMENT OF WINKLER COUNTY WELL FIELD - CRMWD	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
COUNTY-OTHER, ANDREWS	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - ANDREWS COUNTY OTHER	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
COUNTY-OTHER, ANDREWS	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - ANDREWS COUNTY OTHER	CONSTRUCTION FUNDING		
COUNTY-OTHER, ANDREWS	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - ANDREWS COUNTY OTHER	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
COUNTY-OTHER, BORDEN	WATER AUDITS AND LEAK - BORDEN COUNTY OTHER	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
COUNTY-OTHER, BORDEN	WATER AUDITS AND LEAK - BORDEN COUNTY OTHER	CONSTRUCTION FUNDING		
COUNTY-OTHER, BORDEN	WATER AUDITS AND LEAK - BORDEN COUNTY OTHER	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
COUNTY-OTHER, COKE	VOLUNTARY TRANSFER (PURCHASE) - COKE COUNTY OTHER	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
COUNTY-OTHER, COKE	VOLUNTARY TRANSFER (PURCHASE) - COKE COUNTY OTHER	CONSTRUCTION FUNDING		

Sponsor Entity Name	ProjectName	IFR Element Name	IFR Element Value	Year Of Need
COUNTY-OTHER, COKE	VOLUNTARY TRANSFER (PURCHASE) - COKE COUNTY OTHER	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
COUNTY-OTHER, HOWARD	VOLUNTARY TRANSFER (PURCHASE) - HOWARD COUNTY OTHER	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
COUNTY-OTHER, HOWARD	VOLUNTARY TRANSFER (PURCHASE) - HOWARD COUNTY OTHER	CONSTRUCTION FUNDING		
COUNTY-OTHER, HOWARD	VOLUNTARY TRANSFER (PURCHASE) - HOWARD COUNTY OTHER	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
COUNTY-OTHER, MARTIN	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - MARTIN COUNTY OTHER	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
COUNTY-OTHER, MARTIN	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - MARTIN COUNTY OTHER	CONSTRUCTION FUNDING		
COUNTY-OTHER, MARTIN	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - MARTIN COUNTY OTHER	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
COUNTY-OTHER, MCCULLOCH	VOLUNTARY TRANSFER (PURCHASE) - MCCULLOCH COUNTY OTHER	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
COUNTY-OTHER, MCCULLOCH	VOLUNTARY TRANSFER (PURCHASE) - MCCULLOCH COUNTY OTHER	CONSTRUCTION FUNDING		
COUNTY-OTHER, MCCULLOCH	VOLUNTARY TRANSFER (PURCHASE) - MCCULLOCH COUNTY OTHER	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
COUNTY-OTHER, MIDLAND	DEVELOP PECOS VALLEY AQUIFER SUPPLIES - MIDLAND COUNTY OTHER	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$6,000,000	2016
COUNTY-OTHER, MIDLAND	DEVELOP PECOS VALLEY AQUIFER SUPPLIES - MIDLAND COUNTY OTHER	CONSTRUCTION FUNDING	$56,699,000	2016
COUNTY-OTHER, MIDLAND	DEVELOP PECOS VALLEY AQUIFER SUPPLIES - MIDLAND COUNTY OTHER	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
COUNTY-OTHER, MITCHELL	WATER AUDITS AND LEAK - MITCHELL COUNTY OTHER	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
COUNTY-OTHER, MITCHELL	WATER AUDITS AND LEAK - MITCHELL COUNTY OTHER	CONSTRUCTION FUNDING		
COUNTY-OTHER, MITCHELL	WATER AUDITS AND LEAK - MITCHELL COUNTY OTHER	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
COUNTY-OTHER, SCURRY	VOLUNTARY TRANSFER (PURCHASE) - SCURRY COUNTY OTHER	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
COUNTY-OTHER, SCURRY	VOLUNTARY TRANSFER (PURCHASE) - SCURRY COUNTY OTHER	CONSTRUCTION FUNDING		
COUNTY-OTHER, SCURRY	VOLUNTARY TRANSFER (PURCHASE) - SCURRY COUNTY OTHER	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
COUNTY-OTHER, WARD	WATER AUDITS AND LEAK - WARD COUNTY OTHER	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
COUNTY-OTHER, WARD	WATER AUDITS AND LEAK - WARD COUNTY OTHER	CONSTRUCTION FUNDING		

Sponsor Entity Name	ProjectName	IFR Element Name	IFR Element Value	Year Of Need
COUNTY-OTHER, WARD	WATER AUDITS AND LEAK - WARD COUNTY OTHER	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
COUNTY-OTHER, WINKLER	DEVELOP PECOS VALLEY AQUIFER SUPPLIES - WINKLER COUNTY OTHER	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
COUNTY-OTHER, WINKLER	DEVELOP PECOS VALLEY AQUIFER SUPPLIES - WINKLER COUNTY OTHER	CONSTRUCTION FUNDING		
COUNTY-OTHER, WINKLER	DEVELOP PECOS VALLEY AQUIFER SUPPLIES - WINKLER COUNTY OTHER	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
COUNTY-OTHER, WINKLER	WATER AUDITS AND LEAK - WINKLER COUNTY OTHER	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
COUNTY-OTHER, WINKLER	WATER AUDITS AND LEAK - WINKLER COUNTY OTHER	CONSTRUCTION FUNDING		
COUNTY-OTHER, WINKLER	WATER AUDITS AND LEAK - WINKLER COUNTY OTHER	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
EDEN	DIRECT NON-POTABLE REUSE FOR GOLF COURSE IRRIGATION (TYPE I) - EDEN	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
EDEN	DIRECT NON-POTABLE REUSE FOR GOLF COURSE IRRIGATION (TYPE I) - EDEN	CONSTRUCTION FUNDING		
EDEN	DIRECT NON-POTABLE REUSE FOR GOLF COURSE IRRIGATION (TYPE I) - EDEN	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
ELDORADO	WATER AUDITS AND LEAK - EL DORADO	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
ELDORADO	WATER AUDITS AND LEAK - EL DORADO	CONSTRUCTION FUNDING		
ELDORADO	WATER AUDITS AND LEAK - EL DORADO	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, ANDREWS	IRRIGATION CONSERVATION - ANDREWS COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, ANDREWS	IRRIGATION CONSERVATION - ANDREWS COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, ANDREWS	IRRIGATION CONSERVATION - ANDREWS COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, BORDEN	IRRIGATION CONSERVATION - BORDEN COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, BORDEN	IRRIGATION CONSERVATION - BORDEN COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, BORDEN	IRRIGATION CONSERVATION - BORDEN COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, BROWN	IRRIGATION CONSERVATION - BROWN COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, BROWN	IRRIGATION CONSERVATION - BROWN COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, BROWN	IRRIGATION CONSERVATION - BROWN COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, COKE	IRRIGATION CONSERVATION - COKE COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, COKE	IRRIGATION CONSERVATION - COKE COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, COKE	IRRIGATION CONSERVATION - COKE COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, COLEMAN	IRRIGATION CONSERVATION - COLEMAN COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, COLEMAN	IRRIGATION CONSERVATION - COLEMAN COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, COLEMAN	IRRIGATION CONSERVATION - COLEMAN COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, CONCHO	IRRIGATION CONSERVATION - CONCHO COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, CONCHO	IRRIGATION CONSERVATION - CONCHO COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, CONCHO	IRRIGATION CONSERVATION - CONCHO COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		

Sponsor Entity Name	ProjectName	IFR Element Name	IFR Element Value	Year Of Need
IRRIGATION, CROCKETT	IRRIGATION CONSERVATION - CROCKETT COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, CROCKETT	IRRIGATION CONSERVATION - CROCKETT COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, CROCKETT	IRRIGATION CONSERVATION - CROCKETT COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, ECTOR	IRRIGATION CONSERVATION - ECTOR COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, ECTOR	IRRIGATION CONSERVATION - ECTOR COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, ECTOR	IRRIGATION CONSERVATION - ECTOR COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, GLASSCOCK	IRRIGATION CONSERVATION - GLASSCOCK COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, GLASSCOCK	IRRIGATION CONSERVATION - GLASSCOCK COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, GLASSCOCK	IRRIGATION CONSERVATION - GLASSCOCK COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, HOWARD	IRRIGATION CONSERVATION - HOWARD COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, HOWARD	IRRIGATION CONSERVATION - HOWARD COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, HOWARD	IRRIGATION CONSERVATION - HOWARD COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, IRION	IRRIGATION CONSERVATION - IRION COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, IRION	IRRIGATION CONSERVATION - IRION COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, IRION	IRRIGATION CONSERVATION - IRION COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, KIMBLE	IRRIGATION CONSERVATION - KIMBLE COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, KIMBLE	IRRIGATION CONSERVATION - KIMBLE COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, KIMBLE	IRRIGATION CONSERVATION - KIMBLE COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, MARTIN	IRRIGATION CONSERVATION - MARTIN COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, MARTIN	IRRIGATION CONSERVATION - MARTIN COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, MARTIN	IRRIGATION CONSERVATION - MARTIN COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, MASON	IRRIGATION CONSERVATION - MASON COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, MASON	IRRIGATION CONSERVATION - MASON COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, MASON	IRRIGATION CONSERVATION - MASON COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, MCCULLOCH	IRRIGATION CONSERVATION - MCCULLOCH COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, MCCULLOCH	IRRIGATION CONSERVATION - MCCULLOCH COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, MCCULLOCH	IRRIGATION CONSERVATION - MCCULLOCH COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, MENARD	IRRIGATION CONSERVATION - MENARD COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, MENARD	IRRIGATION CONSERVATION - MENARD COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, MENARD	IRRIGATION CONSERVATION - MENARD COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, MIDLAND	IRRIGATION CONSERVATION - MIDLAND COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, MIDLAND	IRRIGATION CONSERVATION - MIDLAND COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, MIDLAND	IRRIGATION CONSERVATION - MIDLAND COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, MITCHELL	IRRIGATION CONSERVATION - MITCHELL COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, MITCHELL	IRRIGATION CONSERVATION - MITCHELL COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, MITCHELL	IRRIGATION CONSERVATION - MITCHELL COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, PECOS	IRRIGATION CONSERVATION - PECOS COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		

Sponsor Entity Name	ProjectName	IFR Element Name	IFR Element Value	Year Of Need
IRRIGATION, PECOS	IRRIGATION CONSERVATION - PECOS COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, PECOS	IRRIGATION CONSERVATION - PECOS COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, PECOS	IRRIGATION CONSERVATION - REAGAN COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, PECOS	IRRIGATION CONSERVATION - REAGAN COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, PECOS	IRRIGATION CONSERVATION - REAGAN COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, REEVES	IRRIGATION CONSERVATION - REEVES COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, REEVES	IRRIGATION CONSERVATION - REEVES COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, REEVES	IRRIGATION CONSERVATION - REEVES COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, RUNNELS	IRRIGATION CONSERVATION - RUNNELS COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, RUNNELS	IRRIGATION CONSERVATION - RUNNELS COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, RUNNELS	IRRIGATION CONSERVATION - RUNNELS COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, SCHLEICHER	IRRIGATION CONSERVATION - SCHLEICHER COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, SCHLEICHER	IRRIGATION CONSERVATION - SCHLEICHER COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, SCHLEICHER	IRRIGATION CONSERVATION - SCHLEICHER COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, SCURRY	IRRIGATION CONSERVATION - SCURRY COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, SCURRY	IRRIGATION CONSERVATION - SCURRY COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, SCURRY	IRRIGATION CONSERVATION - SCURRY COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, STERLING	IRRIGATION CONSERVATION - STERLING COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, STERLING	IRRIGATION CONSERVATION - STERLING COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, STERLING	IRRIGATION CONSERVATION - STERLING COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, SUTTON	IRRIGATION CONSERVATION - SUTTON COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, SUTTON	IRRIGATION CONSERVATION - SUTTON COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, SUTTON	IRRIGATION CONSERVATION - SUTTON COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, TOM GREEN	IRRIGATION CONSERVATION - TOM GREEN COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, TOM GREEN	IRRIGATION CONSERVATION - TOM GREEN COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, TOM GREEN	IRRIGATION CONSERVATION - TOM GREEN COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, UPTON	IRRIGATION CONSERVATION - UPTON COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, UPTON	IRRIGATION CONSERVATION - UPTON COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, UPTON	IRRIGATION CONSERVATION - UPTON COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, WARD	IRRIGATION CONSERVATION - WARD COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, WARD	IRRIGATION CONSERVATION - WARD COUNTY	CONSTRUCTION FUNDING		
IRRIGATION, WARD	IRRIGATION CONSERVATION - WARD COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, WINKLER	IRRIGATION CONSERVATION - WINKLER COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, WINKLER	IRRIGATION CONSERVATION - WINKLER COUNTY	CONSTRUCTION FUNDING		

Sponsor Entity Name	ProjectName	IFR Element Name	IFR Element Value	Year Of Need
IRRIGATION, WINKLER	IRRIGATION CONSERVATION - WINKLER COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
JUNCTION	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - JUNCTION	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
JUNCTION	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - JUNCTION	CONSTRUCTION FUNDING		
JUNCTION	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - JUNCTION	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
JUNCTION	DREDGE RIVER INTAKE - JUNCTION	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
JUNCTION	DREDGE RIVER INTAKE - JUNCTION	CONSTRUCTION FUNDING		
JUNCTION	DREDGE RIVER INTAKE - JUNCTION	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
JUNCTION	WATER AUDITS AND LEAK - JUNCTION	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
JUNCTION	WATER AUDITS AND LEAK - JUNCTION	CONSTRUCTION FUNDING		
JUNCTION	WATER AUDITS AND LEAK - JUNCTION	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
LIVESTOCK, ANDREWS	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - ANDREWS COUNTY LIVESTOCK	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
LIVESTOCK, ANDREWS	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - ANDREWS COUNTY LIVESTOCK	CONSTRUCTION FUNDING		
LIVESTOCK, ANDREWS	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - ANDREWS COUNTY LIVESTOCK	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
LIVESTOCK, ANDREWS	DEVELOP PECOS VALLEY AQUIFER SUPPLIES - ANDREWS COUNTY LIVESTOCK	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
LIVESTOCK, ANDREWS	DEVELOP PECOS VALLEY AQUIFER SUPPLIES - ANDREWS COUNTY LIVESTOCK	CONSTRUCTION FUNDING		
LIVESTOCK, ANDREWS	DEVELOP PECOS VALLEY AQUIFER SUPPLIES - ANDREWS COUNTY LIVESTOCK	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
LIVESTOCK, HOWARD	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - HOWARD COUNTY LIVESTOCK	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
LIVESTOCK, HOWARD	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - HOWARD COUNTY LIVESTOCK	CONSTRUCTION FUNDING		
LIVESTOCK, HOWARD	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - HOWARD COUNTY LIVESTOCK	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
LIVESTOCK, MARTIN	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - MARTIN COUNTY LIVESTOCK	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
LIVESTOCK, MARTIN	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - MARTIN COUNTY LIVESTOCK	CONSTRUCTION FUNDING		
LIVESTOCK, MARTIN	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - MARTIN COUNTY LIVESTOCK	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
LIVESTOCK, MCCULLOCH	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - MCCULLOCH COUNTY LIVESTOCK	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		

Sponsor Entity Name	ProjectName	IFR Element Name	IFR Element Value	Year Of Need
LIVESTOCK, MCCULLOCH	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - MCCULLOCH COUNTY LIVESTOCK	CONSTRUCTION FUNDING		
LIVESTOCK, MCCULLOCH	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - MCCULLOCH COUNTY LIVESTOCK	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
LIVESTOCK, SCURRY	NEW GROUNDWATER FROM LOCAL ALLUVIUM AQUIFER - SCURRY COUNTY LIVESTOCK	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
LIVESTOCK, SCURRY	NEW GROUNDWATER FROM LOCAL ALLUVIUM AQUIFER - SCURRY COUNTY LIVESTOCK	CONSTRUCTION FUNDING		
LIVESTOCK, SCURRY	NEW GROUNDWATER FROM LOCAL ALLUVIUM AQUIFER - SCURRY COUNTY LIVESTOCK	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MADERA VALLEY WSC	WATER AUDITS AND LEAK - MADERA VALLEY WSC	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MADERA VALLEY WSC	WATER AUDITS AND LEAK - MADERA VALLEY WSC	CONSTRUCTION FUNDING		
MADERA VALLEY WSC	WATER AUDITS AND LEAK - MADERA VALLEY WSC	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MANUFACTURING, KIMBLE	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - KIMBLE COUNTY MANUFACTURING	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MANUFACTURING, KIMBLE	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - KIMBLE COUNTY MANUFACTURING	CONSTRUCTION FUNDING		
MANUFACTURING, KIMBLE	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - KIMBLE COUNTY MANUFACTURING	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MANUFACTURING, MARTIN	VOLUNTARY TRANSFER (PURCHASE) - MARTIN COUNTY MANUFACTURING	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MANUFACTURING, MARTIN	VOLUNTARY TRANSFER (PURCHASE) - MARTIN COUNTY MANUFACTURING	CONSTRUCTION FUNDING		
MANUFACTURING, MARTIN	VOLUNTARY TRANSFER (PURCHASE) - MARTIN COUNTY MANUFACTURING	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MANUFACTURING, MCCULLOCH	VOLUNTARY TRANSFER (PURCHASE) - MCCULLOCH COUNTY MANUFACTURING	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MANUFACTURING, MCCULLOCH	VOLUNTARY TRANSFER (PURCHASE) - MCCULLOCH COUNTY MANUFACTURING	CONSTRUCTION FUNDING		
MANUFACTURING, MCCULLOCH	VOLUNTARY TRANSFER (PURCHASE) - MCCULLOCH COUNTY MANUFACTURING	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MASON	WATER AUDITS AND LEAK - MASON	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MASON	WATER AUDITS AND LEAK - MASON	CONSTRUCTION FUNDING		
MASON	WATER AUDITS AND LEAK - MASON	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MCCAMEY	WATER AUDITS AND LEAK - MCCAMEY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		

Sponsor Entity Name	ProjectName	IFR Element Name	IFR Element Value	Year Of Need
MCCAMEY	WATER AUDITS AND LEAK - MCCAMEY	CONSTRUCTION FUNDING		
MCCAMEY	WATER AUDITS AND LEAK - MCCAMEY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MENARD	DEVELOP ADDITIONAL HICKORY AQUIFER SUPPLIES - MENARD	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MENARD	DEVELOP ADDITIONAL HICKORY AQUIFER SUPPLIES - MENARD	CONSTRUCTION FUNDING		
MENARD	DEVELOP ADDITIONAL HICKORY AQUIFER SUPPLIES - MENARD	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MENARD	DIRECT NON-POTABLE REUSE FOR IRRIGATION OF CITY FARMS (TYPE I) - MENARD	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MENARD	DIRECT NON-POTABLE REUSE FOR IRRIGATION OF CITY FARMS (TYPE I) - MENARD	CONSTRUCTION FUNDING		
MENARD	DIRECT NON-POTABLE REUSE FOR IRRIGATION OF CITY FARMS (TYPE I) - MENARD	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MENARD	WATER AUDITS AND LEAK - MENARD	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MENARD	WATER AUDITS AND LEAK - MENARD	CONSTRUCTION FUNDING		
MENARD	WATER AUDITS AND LEAK - MENARD	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MIDLAND	ADDITIONAL T-BAR RANCH SUPPLIES WITH TREATMENT - MIDLAND	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MIDLAND	ADDITIONAL T-BAR RANCH SUPPLIES WITH TREATMENT - MIDLAND	CONSTRUCTION FUNDING		
MIDLAND	ADDITIONAL T-BAR RANCH SUPPLIES WITH TREATMENT - MIDLAND	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MIDLAND	WEST TEXAS WATER PARTNERSHIP - MIDLAND	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MIDLAND	WEST TEXAS WATER PARTNERSHIP - MIDLAND	CONSTRUCTION FUNDING		
MIDLAND	WEST TEXAS WATER PARTNERSHIP - MIDLAND	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, ANDREWS	DIRECT NON-POTABLE REUSE WATER FROM CITY OF MIDLAND - ANDREWS COUNTY MINING	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, ANDREWS	DIRECT NON-POTABLE REUSE WATER FROM CITY OF MIDLAND - ANDREWS COUNTY MINING	CONSTRUCTION FUNDING		
MINING, ANDREWS	DIRECT NON-POTABLE REUSE WATER FROM CITY OF MIDLAND - ANDREWS COUNTY MINING	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, ANDREWS	MINING CONSERVATION - ANDREWS COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, ANDREWS	MINING CONSERVATION - ANDREWS COUNTY	CONSTRUCTION FUNDING		
MINING, ANDREWS	MINING CONSERVATION - ANDREWS COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, BORDEN	MINING CONSERVATION - BORDEN COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, BORDEN	MINING CONSERVATION - BORDEN COUNTY	CONSTRUCTION FUNDING		
MINING, BORDEN	MINING CONSERVATION - BORDEN COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, BROWN	MINING CONSERVATION - BROWN COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, BROWN	MINING CONSERVATION - BROWN COUNTY	CONSTRUCTION FUNDING		

Sponsor Entity Name	ProjectName	IFR Element Name	IFR Element Value	Year Of Need
MINING, BROWN	MINING CONSERVATION - BROWN COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, COKE	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - COKE COUNTY MINING	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, COKE	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - COKE COUNTY MINING	CONSTRUCTION FUNDING		
MINING, COKE	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - COKE COUNTY MINING	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, COKE	MINING CONSERVATION - COKE COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, COKE	MINING CONSERVATION - COKE COUNTY	CONSTRUCTION FUNDING		
MINING, COKE	MINING CONSERVATION - COKE COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, COLEMAN	DEVELOP ADDITIONAL HICKORY AQUIFER SUPPLIES - COLEMAN COUNTY MINING	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, COLEMAN	DEVELOP ADDITIONAL HICKORY AQUIFER SUPPLIES - COLEMAN COUNTY MINING	CONSTRUCTION FUNDING		
MINING, COLEMAN	DEVELOP ADDITIONAL HICKORY AQUIFER SUPPLIES - COLEMAN COUNTY MINING	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, COLEMAN	MINING CONSERVATION - COLEMAN COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, COLEMAN	MINING CONSERVATION - COLEMAN COUNTY	CONSTRUCTION FUNDING		
MINING, COLEMAN	MINING CONSERVATION - COLEMAN COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, CONCHO	DEVELOP ADDITIONAL HICKORY AQUIFER SUPPLIES - CONCHO COUNTY MINING	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, CONCHO	DEVELOP ADDITIONAL HICKORY AQUIFER SUPPLIES - CONCHO COUNTY MINING	CONSTRUCTION FUNDING		
MINING, CONCHO	DEVELOP ADDITIONAL HICKORY AQUIFER SUPPLIES - CONCHO COUNTY MINING	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, CONCHO	MINING CONSERVATION - CONCHO COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, CONCHO	MINING CONSERVATION - CONCHO COUNTY	CONSTRUCTION FUNDING		
MINING, CONCHO	MINING CONSERVATION - CONCHO COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, CRANE	MINING CONSERVATION - CRANE COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, CRANE	MINING CONSERVATION - CRANE COUNTY	CONSTRUCTION FUNDING		
MINING, CRANE	MINING CONSERVATION - CRANE COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, CROCKETT	MINING CONSERVATION - CROCKETT COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, CROCKETT	MINING CONSERVATION - CROCKETT COUNTY	CONSTRUCTION FUNDING		
MINING, CROCKETT	MINING CONSERVATION - CROCKETT COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, ECTOR	MINING CONSERVATION - ECTOR COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, ECTOR	MINING CONSERVATION - ECTOR COUNTY	CONSTRUCTION FUNDING		
MINING, ECTOR	MINING CONSERVATION - ECTOR COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, GLASSCOCK	MINING CONSERVATION - GLASSCOCK COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, GLASSCOCK	MINING CONSERVATION - GLASSCOCK COUNTY	CONSTRUCTION FUNDING		
MINING, GLASSCOCK	MINING CONSERVATION - GLASSCOCK COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		

Sponsor Entity Name	ProjectName	IFR Element Name	IFR Element Value	Year Of Need
MINING, HOWARD	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - HOWARD COUNTY MINING	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, HOWARD	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - HOWARD COUNTY MINING	CONSTRUCTION FUNDING		
MINING, HOWARD	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - HOWARD COUNTY MINING	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, HOWARD	DEVELOP ADDITIONAL OGALLALA AQUIFER SUPPLIES - HOWARD COUNTY MINING	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, HOWARD	DEVELOP ADDITIONAL OGALLALA AQUIFER SUPPLIES - HOWARD COUNTY MINING	CONSTRUCTION FUNDING		
MINING, HOWARD	DEVELOP ADDITIONAL OGALLALA AQUIFER SUPPLIES - HOWARD COUNTY MINING	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, HOWARD	MINING CONSERVATION - HOWARD COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, HOWARD	MINING CONSERVATION - HOWARD COUNTY	CONSTRUCTION FUNDING		
MINING, HOWARD	MINING CONSERVATION - HOWARD COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, IRION	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - IRION COUNTY MINING	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, IRION	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - IRION COUNTY MINING	CONSTRUCTION FUNDING		
MINING, IRION	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - IRION COUNTY MINING	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, IRION	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - IRION COUNTY MINING	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, IRION	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - IRION COUNTY MINING	CONSTRUCTION FUNDING		
MINING, IRION	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - IRION COUNTY MINING	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, IRION	MINING CONSERVATION - IRION COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, IRION	MINING CONSERVATION - IRION COUNTY	CONSTRUCTION FUNDING		
MINING, IRION	MINING CONSERVATION - IRION COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, KIMBLE	MINING CONSERVATION - KIMBLE COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, KIMBLE	MINING CONSERVATION - KIMBLE COUNTY	CONSTRUCTION FUNDING		
MINING, KIMBLE	MINING CONSERVATION - KIMBLE COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, LOVING	MINING CONSERVATION - LOVING COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, LOVING	MINING CONSERVATION - LOVING COUNTY	CONSTRUCTION FUNDING		
MINING, LOVING	MINING CONSERVATION - LOVING COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, MARTIN	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - MARTIN COUNTY MINING	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, MARTIN	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - MARTIN COUNTY MINING	CONSTRUCTION FUNDING		

Sponsor Entity Name	ProjectName	IFR Element Name	IFR Element Value	Year Of Need
MINING, MARTIN	DEVELOP ADDITIONAL DOCKUM AQUIFER SUPPLIES - MARTIN COUNTY MINING	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, MARTIN	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - MARTIN COUNTY MINING	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, MARTIN	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - MARTIN COUNTY MINING	CONSTRUCTION FUNDING		
MINING, MARTIN	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - MARTIN COUNTY MINING	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, MARTIN	DIRECT NON-POTABLE REUSE WATER FROM CITY OF MIDLAND - MARTIN COUNTY MINING	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, MARTIN	DIRECT NON-POTABLE REUSE WATER FROM CITY OF MIDLAND - MARTIN COUNTY MINING	CONSTRUCTION FUNDING		
MINING, MARTIN	DIRECT NON-POTABLE REUSE WATER FROM CITY OF MIDLAND - MARTIN COUNTY MINING	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, MARTIN	MINING CONSERVATION - MARTIN COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, MARTIN	MINING CONSERVATION - MARTIN COUNTY	CONSTRUCTION FUNDING		
MINING, MARTIN	MINING CONSERVATION - MARTIN COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, MASON	MINING CONSERVATION - MASON COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, MASON	MINING CONSERVATION - MASON COUNTY	CONSTRUCTION FUNDING		
MINING, MASON	MINING CONSERVATION - MASON COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, MCCULLOCH	MINING CONSERVATION - MCCULLOCH COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, MCCULLOCH	MINING CONSERVATION - MCCULLOCH COUNTY	CONSTRUCTION FUNDING		
MINING, MCCULLOCH	MINING CONSERVATION - MCCULLOCH COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, MENARD	MINING CONSERVATION - MENARD COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, MENARD	MINING CONSERVATION - MENARD COUNTY	CONSTRUCTION FUNDING		
MINING, MENARD	MINING CONSERVATION - MENARD COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, MIDLAND	DIRECT NON-POTABLE REUSE WATER FROM CITY OF MIDLAND - MIDLAND COUNTY MINING	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, MIDLAND	DIRECT NON-POTABLE REUSE WATER FROM CITY OF MIDLAND - MIDLAND COUNTY MINING	CONSTRUCTION FUNDING		
MINING, MIDLAND	DIRECT NON-POTABLE REUSE WATER FROM CITY OF MIDLAND - MIDLAND COUNTY MINING	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, MIDLAND	MINING CONSERVATION - MIDLAND COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, MIDLAND	MINING CONSERVATION - MIDLAND COUNTY	CONSTRUCTION FUNDING		
MINING, MIDLAND	MINING CONSERVATION - MIDLAND COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, MITCHELL	DIRECT NON-POTABLE REUSE FOR SALES FROM COLORADO CITY (TYPE II) - MITCHELL COUNTY MINING	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	Plan is still in talking phase	

Sponsor Entity Name	ProjectName	IFR Element Name	IFR Element Value	Year Of Need
MINING, MITCHELL	DIRECT NON-POTABLE REUSE FOR SALES FROM COLORADO CITY (TYPE II) - MITCHELL COUNTY MINING	CONSTRUCTION FUNDING	Plan is still in talking phase	
MINING, MITCHELL	DIRECT NON-POTABLE REUSE FOR SALES FROM COLORADO CITY (TYPE II) - MITCHELL COUNTY MINING	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	Plan is still in talking phase	
MINING, MITCHELL	MINING CONSERVATION - MITCHELL COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, MITCHELL	MINING CONSERVATION - MITCHELL COUNTY	CONSTRUCTION FUNDING		
MINING, MITCHELL	MINING CONSERVATION - MITCHELL COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, PECOS	MINING CONSERVATION - PECOS COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, PECOS	MINING CONSERVATION - PECOS COUNTY	CONSTRUCTION FUNDING		
MINING, PECOS	MINING CONSERVATION - PECOS COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, REAGAN	MINING CONSERVATION - REAGAN COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, REAGAN	MINING CONSERVATION - REAGAN COUNTY	CONSTRUCTION FUNDING		
MINING, REAGAN	MINING CONSERVATION - REAGAN COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, REEVES	MINING CONSERVATION - REEVES COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, REEVES	MINING CONSERVATION - REEVES COUNTY	CONSTRUCTION FUNDING		
MINING, REEVES	MINING CONSERVATION - REEVES COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, RUNNELS	DEVELOP OTHER AQUIFER SUPPLIES - RUNNELS COUNTY MINING	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, RUNNELS	DEVELOP OTHER AQUIFER SUPPLIES - RUNNELS COUNTY MINING	CONSTRUCTION FUNDING		
MINING, RUNNELS	DEVELOP OTHER AQUIFER SUPPLIES - RUNNELS COUNTY MINING	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, RUNNELS	MINING CONSERVATION - RUNNELS COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, RUNNELS	MINING CONSERVATION - RUNNELS COUNTY	CONSTRUCTION FUNDING		
MINING, RUNNELS	MINING CONSERVATION - RUNNELS COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, SCHLEICHER	MINING CONSERVATION - SCHLEICHER COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, SCHLEICHER	MINING CONSERVATION - SCHLEICHER COUNTY	CONSTRUCTION FUNDING		
MINING, SCHLEICHER	MINING CONSERVATION - SCHLEICHER COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, SCURRY	DEVELOP LOCAL ALLUVIUM AQUIFER SUPPLIES - SCURRY COUNTY MINING	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, SCURRY	DEVELOP LOCAL ALLUVIUM AQUIFER SUPPLIES - SCURRY COUNTY MINING	CONSTRUCTION FUNDING		
MINING, SCURRY	DEVELOP LOCAL ALLUVIUM AQUIFER SUPPLIES - SCURRY COUNTY MINING	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, SCURRY	MINING CONSERVATION - SCURRY COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, SCURRY	MINING CONSERVATION - SCURRY COUNTY	CONSTRUCTION FUNDING		
MINING, SCURRY	MINING CONSERVATION - SCURRY COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, STERLING	MINING CONSERVATION - STERLING COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		

Sponsor Entity Name	ProjectName	IFR Element Name	IFR Element Value	Year Of Need
MINING, STERLING	MINING CONSERVATION - STERLING COUNTY	CONSTRUCTION FUNDING		
MINING, STERLING	MINING CONSERVATION - STERLING COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, SUTTON	MINING CONSERVATION - SUTTON COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, SUTTON	MINING CONSERVATION - SUTTON COUNTY	CONSTRUCTION FUNDING		
MINING, SUTTON	MINING CONSERVATION - SUTTON COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, TOM GREEN	MINING CONSERVATION - TOM GREEN COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, TOM GREEN	MINING CONSERVATION - TOM GREEN COUNTY	CONSTRUCTION FUNDING		
MINING, TOM GREEN	MINING CONSERVATION - TOM GREEN COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, UPTON	MINING CONSERVATION - UPTON COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, UPTON	MINING CONSERVATION - UPTON COUNTY	CONSTRUCTION FUNDING		
MINING, UPTON	MINING CONSERVATION - UPTON COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, WARD	MINING CONSERVATION - WARD COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, WARD	MINING CONSERVATION - WARD COUNTY	CONSTRUCTION FUNDING		
MINING, WARD	MINING CONSERVATION - WARD COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, WINKLER	MINING CONSERVATION - WINKLER COUNTY	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, WINKLER	MINING CONSERVATION - WINKLER COUNTY	CONSTRUCTION FUNDING		
MINING, WINKLER	MINING CONSERVATION - WINKLER COUNTY	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
ODESSA	RO TREATMENT OF EXISTING SUPPLIES - ODESSA	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
ODESSA	RO TREATMENT OF EXISTING SUPPLIES - ODESSA	CONSTRUCTION FUNDING		
ODESSA	RO TREATMENT OF EXISTING SUPPLIES - ODESSA	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
PECOS	WATER AUDITS AND LEAK - PECOS	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
PECOS	WATER AUDITS AND LEAK - PECOS	CONSTRUCTION FUNDING		
PECOS	WATER AUDITS AND LEAK - PECOS	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
PECOS COUNTY WCID #1	DEVELOP EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - PECOS COUNTY WCID #1	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
PECOS COUNTY WCID #1	DEVELOP EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - PECOS COUNTY WCID #1	CONSTRUCTION FUNDING		
PECOS COUNTY WCID #1	DEVELOP EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - PECOS COUNTY WCID #1	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
RANKIN	WATER AUDITS AND LEAK - RANKIN	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
RANKIN	WATER AUDITS AND LEAK - RANKIN	CONSTRUCTION FUNDING		
RANKIN	WATER AUDITS AND LEAK - RANKIN	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
ROBERT LEE	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - ROBERT LEE	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
ROBERT LEE	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - ROBERT LEE	CONSTRUCTION FUNDING		
ROBERT LEE	DEVELOP ADDITIONAL EDWARDS-TRINITY PLATEAU AQUIFER SUPPLIES - ROBERT LEE	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
SAN ANGELO	DESALINATION OF OTHER AQUIFER SUPPLIES IN TOM GREEN COUNTY - SAN ANGELO	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$9,500,000.00	2050

Sponsor Entity Name	ProjectName	IFR Element Name	IFR Element Value	Year Of Need
SAN ANGELO	DESALINATION OF OTHER AQUIFER SUPPLIES IN TOM GREEN COUNTY - SAN ANGELO	CONSTRUCTION FUNDING	$48,467,000.00	2050
SAN ANGELO	DESALINATION OF OTHER AQUIFER SUPPLIES IN TOM GREEN COUNTY - SAN ANGELO	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
SAN ANGELO	DIRECT AND/OR INDIRECT REUSE FOR MUNICIPAL USE - SAN ANGELO	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$24,000,000.00	2016
SAN ANGELO	DIRECT AND/OR INDIRECT REUSE FOR MUNICIPAL USE - SAN ANGELO	CONSTRUCTION FUNDING	$126,000,000.00	2017
SAN ANGELO	DIRECT AND/OR INDIRECT REUSE FOR MUNICIPAL USE - SAN ANGELO	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
SAN ANGELO	HICKORY WELL FIELD EXPANSION IN MCCULLOCH COUNTY - SAN ANGELO	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$45,000,000.00	2026
SAN ANGELO	HICKORY WELL FIELD EXPANSION IN MCCULLOCH COUNTY - SAN ANGELO	CONSTRUCTION FUNDING	$22,604,000.00	2026
SAN ANGELO	HICKORY WELL FIELD EXPANSION IN MCCULLOCH COUNTY - SAN ANGELO	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
SAN ANGELO	WEST TEXAS WATER PARTNERSHIP - SAN ANGELO	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$5,000,000.00	2030
SAN ANGELO	WEST TEXAS WATER PARTNERSHIP - SAN ANGELO	CONSTRUCTION FUNDING	$34,175,200.00	2030
SAN ANGELO	WEST TEXAS WATER PARTNERSHIP - SAN ANGELO	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
SONORA	DIRECT NON-POTABLE REUSE FOR IRRIGATION OF INDUSTRIAL AND MUNICIPAL PARKS (TYPE I) - SONORA	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$49,850.00	2020
SONORA	DIRECT NON-POTABLE REUSE FOR IRRIGATION OF INDUSTRIAL AND MUNICIPAL PARKS (TYPE I) - SONORA	CONSTRUCTION FUNDING	$445,950.00	2021
SONORA	DIRECT NON-POTABLE REUSE FOR IRRIGATION OF INDUSTRIAL AND MUNICIPAL PARKS (TYPE I) - SONORA	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
SONORA	WATER AUDITS AND LEAK - SONORA	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$100,000.00	
SONORA	WATER AUDITS AND LEAK - SONORA	CONSTRUCTION FUNDING	$2,386,600.00	
SONORA	WATER AUDITS AND LEAK - SONORA	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
STEAM ELECTRIC POWER, COKE	STEAM ELECTRIC POWER CONSERVATION - COKE COUNTY SEP	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
STEAM ELECTRIC POWER, COKE	STEAM ELECTRIC POWER CONSERVATION - COKE COUNTY SEP	CONSTRUCTION FUNDING		
STEAM ELECTRIC POWER, COKE	STEAM ELECTRIC POWER CONSERVATION - COKE COUNTY SEP	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
STEAM ELECTRIC POWER, ECTOR	STEAM ELECTRIC POWER CONSERVATION - ECTOR COUNTY SEP	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		

Sponsor Entity Name	ProjectName	IFR Element Name	IFR Element Value	Year Of Need
STEAM ELECTRIC POWER, ECTOR	STEAM ELECTRIC POWER CONSERVATION - ECTOR COUNTY SEP	CONSTRUCTION FUNDING		
STEAM ELECTRIC POWER, ECTOR	STEAM ELECTRIC POWER CONSERVATION - ECTOR COUNTY SEP	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
STEAM ELECTRIC POWER, MITCHELL	STEAM ELECTRIC POWER CONSERVATION - MITCHELL COUNTY SEP	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
STEAM ELECTRIC POWER, MITCHELL	STEAM ELECTRIC POWER CONSERVATION - MITCHELL COUNTY SEP	CONSTRUCTION FUNDING		
STEAM ELECTRIC POWER, MITCHELL	STEAM ELECTRIC POWER CONSERVATION - MITCHELL COUNTY SEP	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
STEAM ELECTRIC POWER, WARD	DEVELOP PECOS VALLEY AQUIFER SUPPLIES - WARD COUNTY STEAM ELECTRIC POWER	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
STEAM ELECTRIC POWER, WARD	DEVELOP PECOS VALLEY AQUIFER SUPPLIES - WARD COUNTY STEAM ELECTRIC POWER	CONSTRUCTION FUNDING		
STEAM ELECTRIC POWER, WARD	DEVELOP PECOS VALLEY AQUIFER SUPPLIES - WARD COUNTY STEAM ELECTRIC POWER	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
UPPER COLORADO RIVER AUTHORITY	VOLUNTARY TRANSFER (PURCHASE) - UCRA	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
UPPER COLORADO RIVER AUTHORITY	VOLUNTARY TRANSFER (PURCHASE) - UCRA	CONSTRUCTION FUNDING		
UPPER COLORADO RIVER AUTHORITY	VOLUNTARY TRANSFER (PURCHASE) - UCRA	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
WINTERS	DIRECT POTABLE REUSE - WINTERS	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
WINTERS	DIRECT POTABLE REUSE - WINTERS	CONSTRUCTION FUNDING		
WINTERS	DIRECT POTABLE REUSE - WINTERS	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
WINTERS	VOLUNTARY TRANSFER (PURCHASE) - WINTERS	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
WINTERS	VOLUNTARY TRANSFER (PURCHASE) - WINTERS	CONSTRUCTION FUNDING		
WINTERS	VOLUNTARY TRANSFER (PURCHASE) - WINTERS	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		

Appendix N

Implementation Survey Results

Sponsor Region	Sponsor	Recommended Water Management Strategy	CapitalCost	SS2010	SS2020	SS2030	SS2040	SS2050	SS2060	Project Description	Infrastructure Type*	At what level of Implementation is the project?*	If not implemented, why?*	Initial Volume of Water Provided (acft/yr)	Funds Expended to Date ($)	Project Cost ($) (should include development and construction costs)	Year the Project is Online?*	Is this a phased project?*	(Phased) Ultimate Volume (acft/yr)	(Phased) Ultimate Project Cost ($)	Year project reaches maximum capacity?*	What is the project funding source(s)?*	Included in the 2016 Plan?*	Comments
F	ANDREWS	Desalination	$6,717,000	0	950	950	950	950	950	Desalination	Water Treatment Plant	Not Implemented	Too soon											
F	ANDREWS	Municipal conservation	$0	84	191	240	265	287	310	Municipal Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	BALLINGER	Municipal conservation	$0	33	88	107	119	131	144	Municipal Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	BALLINGER	New/renew water supply	$0	0	0	0	0	491	508	Contract renewal	No Infrastructure	Not Implemented	Too soon											
F	BALLINGER	Subordination	$0	917	930	920	910	900	890	Subordination of downstream senior water rights	No Infrastructure	Not Implemented	Other										Yes	
F	BIG SPRING	Municipal conservation	$0	241	603	676	698	725	754	Municipal Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	BRADY	Municipal conservation	$0	77	192	214	222	230	239	Municipal Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	BRADY	Subordination	$0	2,170	2,170	2,170	2,170	2,170	2,170	Subordination of downstream senior water rights	No Infrastructure	Not Implemented	Other										Yes	
F	BRONTE VILLAGE	Municipal conservation	$0	16	45	48	48	50	51	Municipal Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	BRONTE VILLAGE	Rehabilitation of pipeline	$1,364,900	0	0	0	0	0	0	Rehabilitation of pipeline	Pipeline	Not Implemented	Too soon											
F	BRONTE VILLAGE	Subordination	$0	129	129	129	129	129	129	Subordination of downstream senior water rights	No Infrastructure	Not Implemented	Other										Yes	
F	COLEMAN	Municipal conservation	$0	33	75	90	95	101	107	Municipal Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	COLEMAN	Subordination	$0	2,030	2,031	2,027	2,025	2,019	2,011	Subordination of downstream senior water rights	No Infrastructure	Not Implemented	Other										Yes	
F	COLEMAN COUNTY WSC	Subordination	$0	144	144	148	151	157	165	Subordination of downstream senior water rights	No Infrastructure	Not Implemented	Other										Yes	
F	COLORADO CITY	Develop Dockum Aquifer supplies	$17,855,000	0	2,200	2,200	2,200	2,200	2,200	New wells	Wells	Not Implemented	Too soon											
F	COLORADO RIVER MWD	Desalination	$131,603,990	0	0	0	9,500	9,500	9,500	Desalination	Water Treatment Plant	Not Implemented	Too soon											
F	COLORADO RIVER MWD	Develop Cenozoic Aquifer supplies	$76,268,000	0	0	6,000	6,000	6,000	6,000	New wells	Wells	Not Implemented	Too soon											
F	COLORADO RIVER MWD	New/renew water supply	$8,964,000	0	5,200	5,200	5,200	5,200	5,200	Contract renewal	No Infrastructure	Not Implemented	Too soon											
F	COLORADO RIVER MWD	Replacement well	$10,440,000	0	0	0	0	0	0	Replacement Well	Wells	Not Implemented	Other											
F	COLORADO RIVER MWD	Reuse	$128,748,000	0	12,380	12,380	12,380	12,380	12,380	Potable Reuse Plant	Water Treatment Plant	Currently Operating		1855	13,000,000	13,000,000	2013	No				TWDB	No	
F	COLORADO RIVER MWD	Subordination	$0	47,601	46,906	36,233	35,765	34,410	33,934	Subordination of downstream senior water rights	No Infrastructure	Not Implemented	Other										Yes	
F	COUNTY-OTHER, COLEMAN	Subordination	$0	20	19	19	18	18	18	Subordination of downstream senior water rights	No Infrastructure	Not Implemented	Other										Yes	
F	COUNTY-OTHER, KIMBLE	Subordination	$0	9	9	9	9	9	9	Subordination of downstream senior water rights	No Infrastructure	Not Implemented	Other										Yes	
F	COUNTY-OTHER, MCCULLOCH	Bottled water program	$0	0	0	0	0	0	0															
F	COUNTY-OTHER, MENARD	Develop Hickory Aquifer supplies	$0	20	21	20	20	19	19															
F	COUNTY-OTHER, RUNNELS	New/renew water supply	$0	0	0	0	0	94	77															
F	COUNTY-OTHER, RUNNELS	Subordination	$0	330	266	217	165	31	0	Subordination of downstream senior water rights	No Infrastructure	Not Implemented	Other										Yes	
F	EDEN	Advanced treatment	$2,582,000	0	0	0	0	0	0		Water Treatment Plant	All Phases Fully Implemented		0			2015	No			2015	TWDB	No	
F	EDEN	Replacement well	$1,800,000	0	0	0	0	0	0		Wells	Not Implemented	Other										No	
F	IRRIGATION, ANDREWS	Irrigation conservation	$4,822,904	0	2,727	5,455	5,455	5,455	5,455	Irrigation Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	IRRIGATION, BORDEN	Irrigation conservation	$478,200	0	230	460	460	460	460	Irrigation Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	IRRIGATION, BROWN	Irrigation conservation	$54,917	0	93	185	185	185	185	Irrigation Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	IRRIGATION, COLEMAN	Subordination	$0	1,348	1,348	1,348	1,348	1,348	1,348	Subordination of downstream senior water rights	No Infrastructure	Not Implemented	Other										Yes	
F	IRRIGATION, CONCHO	Irrigation conservation	$1,895,367	0	748	1,496	1,496	1,496	1,496	Irrigation Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	IRRIGATION, ECTOR	Irrigation conservation	$304,680	0	245	490	490	490	490	Irrigation Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	IRRIGATION, GLASSCOCK	Irrigation conservation	$11,422,560	0	3,631	7,262	7,262	7,262	7,262	Irrigation Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	IRRIGATION, HOWARD	Irrigation conservation	$647,652	0	327	653	653	653	653	Irrigation Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	IRRIGATION, IRION	Irrigation conservation	$21,137	0	37	73	73	73	73	Irrigation Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	IRRIGATION, IRION	Weather Modification	$0	0	0	0	0	0	0	Weather Modification to increase precipitation	No Infrastructure	Currently Operating		0									Yes	
F	IRRIGATION, KIMBLE	Irrigation conservation	$141,658	0	74	147	147	147	147	Irrigation Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	IRRIGATION, MARTIN	Irrigation conservation	$4,001,621	0	1,751	3,502	3,502	3,502	3,502	Irrigation Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	IRRIGATION, MASON	Irrigation conservation	$713,460	0	746	1,491	1,491	1,491	1,491	Irrigation Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	IRRIGATION, MCCULLOCH	Irrigation conservation	$166,844	0	197	394	394	394	394	Irrigation Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	IRRIGATION, MENARD	Irrigation conservation	$16,029	0	23	46	46	46	46	Irrigation Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	IRRIGATION, MIDLAND	Irrigation conservation	$3,169,471	0	1,800	3,600	3,600	3,600	3,600	Irrigation Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	IRRIGATION, MITCHELL	Irrigation conservation	$2,548,056	0	865	1,729	1,729	1,729	1,729	Irrigation Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	IRRIGATION, MITCHELL	Weather Modification	$0	0	0	0	0	0	0	Weather Modification to increase precipitation	No Infrastructure	Currently Operating		0									Yes	
F	IRRIGATION, PECOS	Irrigation conservation	$8,329,226	0	6,300	12,600	12,600	12,600	12,600	Irrigation Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	IRRIGATION, REAGAN	Irrigation conservation	$6,275,976	0	1,968	3,936	3,936	3,936	3,936	Irrigation Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	IRRIGATION, REEVES	Irrigation conservation	$8,253,318	0	5,824	11,648	11,648	11,648	11,648	Irrigation Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	IRRIGATION, SCHLEICHER	Irrigation conservation	$176,982	0	107	214	214	214	214	Irrigation Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	IRRIGATION, SCURRY	Irrigation conservation	$1,290,508	0	571	1,143	1,143	1,143	1,143	Irrigation Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	IRRIGATION, STERLING	Irrigation conservation	$25,860	0	45	89	89	89	89	Irrigation Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	IRRIGATION, SUTTON	Irrigation conservation	$194,940	0	142	284	284	284	284	Irrigation Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	IRRIGATION, TOM GREEN	Irrigation conservation	$10,120,488	0	5,774	11,548	11,548	11,548	11,548	Irrigation Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	IRRIGATION, UPTON	Irrigation conservation	$2,944,152	0	920	1,840	1,840	1,840	1,840	Irrigation Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	IRRIGATION, WARD	Irrigation conservation	$437,760	0	785	1,570	1,570	1,570	1,570	Irrigation Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	IRRIGATION, WARD	Weather Modification	$0	0	0	0	0	0	0	Weather Modification to increase precipitation	No Infrastructure	Currently Operating		0									Yes	
F	IRRIGATION, WINKLER	Irrigation conservation	$196,902	0	195	389	389	389	389	Irrigation Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	JUNCTION	Subordination	$0	991	991	991	991	991	991	Subordination of downstream senior water rights	No Infrastructure	Not Implemented	Other										Yes	
F	MANUFACTURING, COLEMAN	Subordination	$0	6	6	6	6	6	6	Subordination of downstream senior water rights	No Infrastructure	Not Implemented	Other										Yes	
F	MANUFACTURING, KIMBLE	Subordination	$0	1,000	1,000	1,000	1,000	1,000	1,000	Subordination of downstream senior water rights	No Infrastructure	Not Implemented	Other										Yes	
F	MANUFACTURING, RUNNELS	New/renew water supply	$0	0	0	0	0	13	15	Contract renewal	No Infrastructure	Not Implemented	Too soon											
F	MANUFACTURING, RUNNELS	Subordination	$0	63	70	76	82	74	79	Subordination of downstream senior water rights	No Infrastructure	Not Implemented	Other										Yes	
F	MENARD	Develop Hickory Aquifer supplies	$1,684,000	140	139	140	140	141	141	New wells	Wells	Not Implemented	Other											
F	MENARD	Municipal conservation	$0	10	24	28	30	32	33	Municipal Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	MIDLAND	Develop Cenozoic Aquifer supplies	$168,507,000	0	0	13,600	13,600	13,600	13,600	New wells	Wells	Currently Operating		7000	$209,000,000	$209,000,000	2012	Yes	31000		2030	Local (market issue)	Yes	
F	MIDLAND	Municipal conservation	$0	1,344	2,616	3,061	3,261	3,457	3,663	Municipal Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	MIDLAND	New/renew water supply	$0	0	0	10,000	9,800	9,600	9,400	Contract renewal	No Infrastructure	Not Implemented	Too soon											
F	MILLERSVIEW-DOOLE WSC	New/renew water supply	$0	0	0	0	0	500	500	Contract renewal	No Infrastructure	Not Implemented	Too soon											
F	MINING, COLEMAN	Subordination	$0	17	18	18	18	18	18	Subordination of downstream senior water rights	No Infrastructure	Not Implemented	Other										Yes	
F	ODESSA	Municipal conservation	$0	551	1,200	1,536	1,715	1,920	2,149	Municipal Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	RICHLAND SUD	Bottled water program	$3,000	1	1	1	1	1	1															
F	RICHLAND SUD	Develop Ellenburger Aquifer supplies	$5,148,000	0	200	200	200	200	200															
F	RICHLAND SUD	Replacement well	$1,701,000	0	0	0	0	0	0															
F	ROBERT LEE	Municipal conservation	$0	16	40	44	45	46	48	Municipal Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	ROBERT LEE	New water treatment plant and storage facilities	$2,436,000	0	0	0	0	0	0	New water treatment plant and storage facilities	Water Treatment Plant	Not Implemented	Other											
F	SAN ANGELO	Brush control	$23,020,000	8,362	8,362	8,362	8,362	8,362	8,362	Brush Control	No Infrastructure	Currently Operating		8,362					8,362			Self (cash)	Yes	
F	SAN ANGELO	Desalination	$75,440,000	0	0	0	5,600	5,600	5,600	Desalination	Wells	Not Implemented	Too soon											
F	SAN ANGELO	Develop Hickory Aquifer supplies	$173,307,000	0	6,700	10,000	12,000	12,000	12,000	McCulloch County Well Field	Wells	Currently Operating		6,700	70,000,000	120,000,000	2014	Yes	12000	$120,000,000	2040	TWDB	Yes	
F	SAN ANGELO	Municipal conservation	$0	701	1,705	2,009	2,127	2,255	2,371	Municipal Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	SAN ANGELO	Rehabilitation of pipeline	$6,157,000	0	0	2,281	2,267	2,254	2,240	Rehabilitation of pipeline	Pipeline	Not Implemented	Other											
F	SAN ANGELO	Subordination	$0	12,310	12,120	11,930	11,739	11,280	11,360	Subordination of downstream senior water rights	No Infrastructure	Not Implemented	Other										Yes	
F	SNYDER	Municipal conservation	$0	70	154	191	205	220	234	Municipal Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	STANTON	New/renew water supply	$0	392	422	429	430	415	393	Contract renewal	No Infrastructure	Not Implemented	Too soon											
F	STEAM ELECTRIC POWER, COKE	Subordination	$0	310	247	289	339	401	477	Subordination of downstream senior water rights	No Infrastructure	Not Implemented	Other										Yes	
F	STEAM ELECTRIC POWER, MITCHELL	Subordination	$0	5,023	4,847	4,670	4,493	4,317	4,140	Subordination of downstream senior water rights	No Infrastructure	Not Implemented	Other										Yes	
F	UNIVERSITY LANDS	New/renew water supply	$0	0	0	0	750	760	773	Contract renewal	No Infrastructure	Not Implemented	Too soon											
F	UPPER COLORADO RIVER AUTHORITY	Subordination	$0	3,862	3,743	3,625	3,507	3,388	3,270	Subordination of downstream senior water rights	No Infrastructure	Not Implemented	Other										Yes	
F	WINTERS	Municipal conservation	$0	21	55	63	67	71	76	Municipal Conservation	No Infrastructure	Sponsor Has Taken Official Action to Initiate Project											Yes	
F	WINTERS	Reuse	$2,158,000	0	0	0	110	110	110															
F	WINTERS	Subordination	$0	552	561	566	571	575	591	Subordination of downstream senior water rights	No Infrastructure	Not Implemented	Other										Yes	