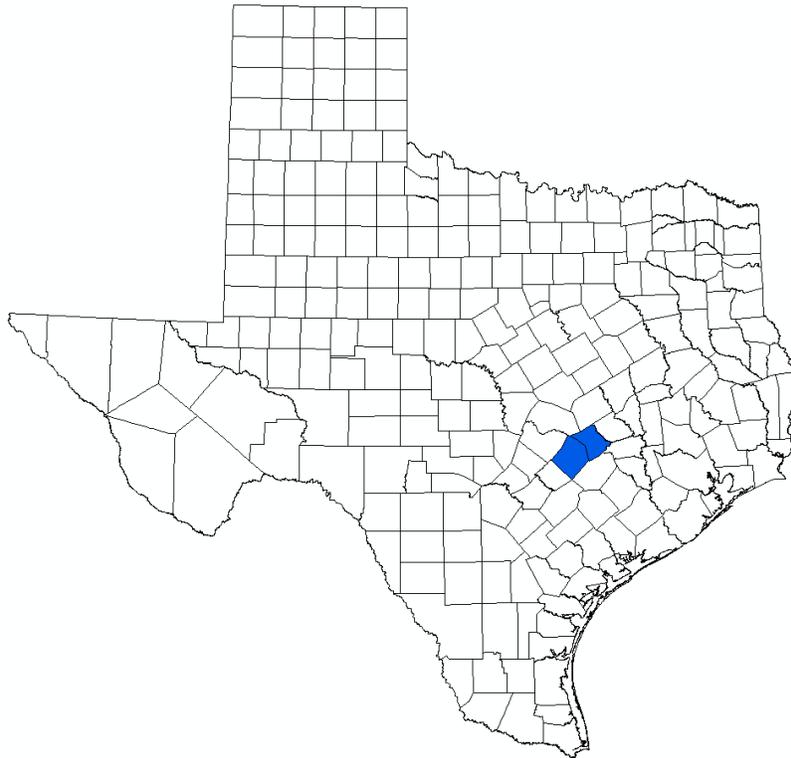*Draft Report*

Aqua WSC Permit Applications Review: Pumping Simulations

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1.0   Introduction

1.1   Background

In October 2022, Aqua Water Supply Corporation (Aqua WSC) submitted four operating permit applications as follows:

- Foster Well (October 26, 2022)
- Tiner Well (October 21, 2022)
- Waterson Well #1 (October 25, 2022)
- Waterson Well #2 (October 25, 2022)

On February 13, 2023, Aqua WSC submitted results of a 36-hour pumping test as a Response to Request for Additional Information from LPGCD.

This report documents the results of groundwater model simulations that were completed as part of the LPGCD review of the permit application. Each well was included in a simulation with proposed pumping added to the DFC run of the GAM (Run S-19). The wells were treated individually, and the report is organized around the simulations and analyses associated with each well.

All files associated with this report have been uploaded to a Google Drive folder that can be accessed with this link:

https://drive.google.com/drive/folders/1_5RehgpYFbTAsudmvBd2MLjGEHHB3E3Z?usp=sharing

1.2   Summary of Proposed Wells

Well data from the applications are summarized in Table 1. The permit applications included latitude and longitude coordinates. These were converted to GAM coordinates using Surfer, a commercial gridding program.

Table 1. Summary of Aqua WSC Well Information

Well	Foster	Tiner	Waterson 1	Waterson 2
Latitude	29.8137	29.88838	30.008022	29.994137
Longitude	-97.3179	-97.26742	-97.357345	-97.367376
X-Coordinate (GAM - ft)	5770258.418	5785562.752	5756084.293	5753036.354
Y-Coorindate (GAM - ft)	19171826.73	19199418.11	19242307.61	19237174.26
Depth (ft)	1,170	1,250	1,000	1,000
Screen Interval (ft)	800 to 1,094	777.5 to 1.010	690 to 1,000	745 to 1,000
Well Capacity (gpm)	500	3,000	2,000	2,000
Volume (AF/yr)	807	4,839	3,226	3,226

The applications listed the Carrizo Aquifer as the production formation. However, the comparison of the Waterson wells screen interval, GAM information, and independent geologic information suggests that the Waterson wells, as proposed, will be completed in the Wilcox Aquifer.

1.3   Summary of Results and Conclusions

Key findings and conclusions of this analysis are:

Foster Well

- Proposed pumping volume = 807 AF/yr
- Drawdown from 2011 to 2070 at Foster Well location = 18 ft
- Significant sources of the proposed pumping:
    - Captured outflow that would have gone to Caldwell and Fayette counties.
    - Vertical inflow from the overlying Reklaw formation
    - Storage reduction in the Carrizo Aquifer.

Tiner Well

- Proposed pumping volume = 4,839 AF/yr
- Drawdown from 2011 to 2070 at Tiner Well location = 102 ft
- Significant sources of the proposed pumping:
    - Induced inflow from the shallow flow system.
    - Induced vertical inflow from the overlying Reklaw formation.
    - Storage reduction in the Carrizo Aquifer.
    - Captured outflow components from Fayette County
    - Captured vertical outflow to the underlying Calvert Bluff Aquifer
    - Storage decline in the Carrizo Aquifer.

Waterson 1 Well

- Proposed pumping volume = 3,226 AF/yr
- Drawdown from 2011 to 2070 at Waterson 1 well location = 119 ft
- Significant sources of the proposed pumping:
    - Over half of the proposed pumping would be sourced as induced inflow from the shallow flow system.
    - Induced inflow from the overlying Carrizo Aquifer.
    - Storage decline supplies less than ten percent of the increased pumping.

Waterson 2 Well

- Proposed pumping volume = 3,226 AF/yr
- Drawdown from 2011 to 2070 at Waterson 2 well location = 163 ft
- Significant sources of the proposed pumping:
    - Over half of the proposed pumping would be sourced as induced inflow from the shallow flow system.
    - Induced inflow from the overlying Carrizo Aquifer.
    - Storage decline supplies less than ten percent of the increased pumping.

2.0 Summary of Well Completions and GAM Data

2.1 Well Completions

The Fortran program *getcellnum.exe* was written to locate the proposed production wells and the monitoring wells in the GAM grid. The reported screen intervals were used to assign the aquifer completion. Table 2 summarizes the well completion data, and Figure 1 presents a map with well locations and the monitoring wells are color coded to designate the completion interval.

Table 2. Summary of Aquifer Completion Results for All Wells

Well	Foster	Tiner	Waterson 1	Waterson 2
Depth (ft)	1,170	1,250	1,000	1,000
Screen Interval (ft)	800 to 1,094	777.5 to 1,010	690 to 1,000	745 to 1,000
GAM Node	105111	105124	160184	160180
GAM Layer	7	7	9	9
Surface Elevation (ft MSL)	509	496	435	471
Layer Top Elevation (ft MSL)	-168	-135	-316	-299
Layer Bottom Elevation (ft MSL)	-629	-582	-538	-490
Depth to Layer Top (ft)	677	631	751	770
Depth to Layer Bottom (ft)	1138	1078	973	961

South of the Colorado River, the Wilcox is commonly treated as undifferentiated (i.e. the Calvert Bluff, Simsboro, and Hooper designations are not used). The GAM still defines the subunits of the Wilcox Aquifer as individual layers. For purposes of these simulations, pumping in the Waterson 1 and 2 wells was specified in layer 9, but the analysis of the water budget results treated the Wilcox Aquifer as a single unit.
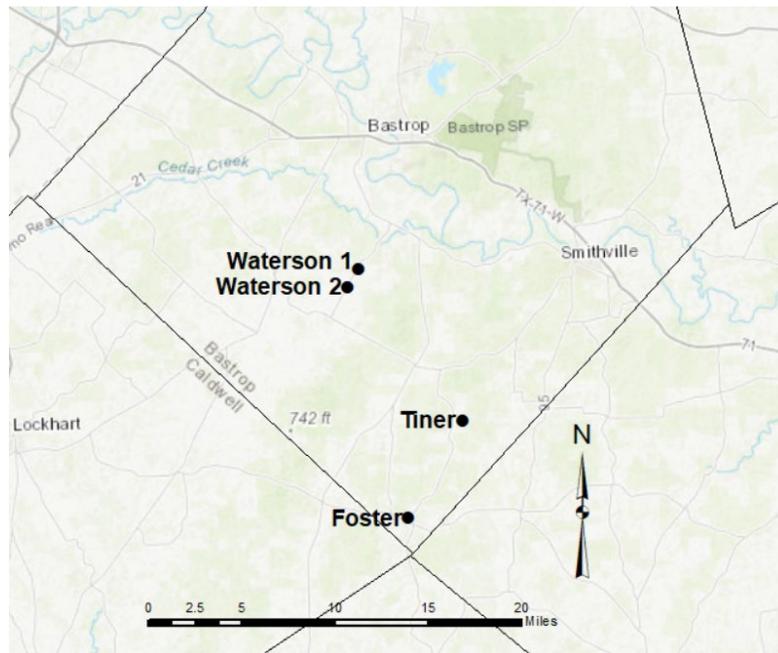
Figure 1. Location Map of Proposed Production Wells

2.2 GAM Parameters Aqua WSC Well Locations

Data from the GAM at the locations of the four Aqua WSC wells are presented in Table 3.

For comparison to the transmissivity at the Foster and Tiner well locations (26,276 gpd/ft and 45,038 gpd/ft, respectively), the average transmissivity of all Carrizo Aquifer cells in LPGCD is 22,112 gpd/ft. No pumping test results for the Carrizo Aquifer were submitted with the permit application.

For comparison to the transmissivity at the Waterson 1 and 2 well locations (12,969 gpd/ft and 9,072 gpd/ft, respectively), the average transmissivity for layer 9 is 26,770 gpd/ft. The single pumping test provided in the Aqua WSC application is from "Jacob's Well" completed in the Simsboro Aquifer. Calculated transmissivity ranged between 14,000 and 22,000 gpd/ft.

Table 3. GAM Parameters at Aqua WSC Well Locations

GAM Data or Calculation from GAM Parameters		Aqua WSC Well			
		Foster	Tiner	Waterson 1	Waterson 2
GAM Cell Number		105111	105124	160184	160180
GAM Aquifer Code		7	7	9	9
Official Aquifer Cell (1=yes)		1	1	1	1
GAM Layer		7	7	9	9
Outcrop (0=no)		0	0	0	0
Cell Area (acres)		640	40	160	160
Top (ft)		-168	-135	-316	-299
Bottom (ft)		-629	-582	-538	-490
Thickness (ft)		461	447	222	191
K (ft/day)		7.62	13.47	7.81	6.35
T (gpd/ft)		26,276	45,038	12,969	9,072
Storativity (dimensionless)		1.78E-04	1.77E-04	8.79E-05	7.49E-05
Specific Storage (dimensionless)		1.50E-01	1.50E-01	1.50E-01	1.50E-01
GWE 2010 (ft)		381.83	376.05	360.43	370.01
GWE 2070 (ft)		236.87	283.46	328.17	340.15
DFC Drawdown (ft)		144.96	92.59	32.26	29.86
Artesian Head 2010 (ft)		549.83	511.05	676.43	669.01
Pumping Test (36 hours) Drawdown (ft)	Q=100 gpm	8.46	5.07	17.14	24.25
	Q=300 gpm	25.38	15.22	51.42	72.76
	Q=500gpm	42.30	25.37	85.71	121.27
	Q=700gpm	59.22	35.52	119.99	169.78
	Q=900gpm	76.14	45.67	154.27	218.29

3.0 GAM Simulations

The simulation used by GMA 12 as the basis for the DFC (Run S-19) is documented in the 2022 GMA 12 Explanatory Report (Daniel B. Stephens & Associated Inc. and others, 2022). The most recent version of the GAM is documented in Young and Kushnereit (2020). Complete documentation of the GAM is available in Young and others (2018). The model files from Run S-19 were used and modified as described below.

3.1 Pumping Scenarios

The Fortran program *makepump.exe* was written to develop the WEL files for each of the pumping simulations. The main input to the program is the cell-by-cell flow file from the calibrated model (*gma12.cbb*) for the DFC GAM run (i.e. Run S-19). Each well proposed in the Aqua WSC permit applications was added to the Run S-19 pumping to yield four WEL files:

- *Foster.wel*
- *Tiner.wel*
- *Waterson1.wel*
- *Waterson2.wel*

3.2 GAM Files for Simulations

The pumping file used in each of the scenarios is documented above. The other input files used to run the simulations are summarized in Table 4. Please note that four of the files were modified from Run S-19 to eliminate echoing of input data to the standard output file (DRN, GNC, HFB, and RIV packages).

The executable for MODFLOW-USG is *mfusg-1.4.exe*, with a file date of 1/27/2021.

Output file names follow the convention of the pumping files by including the name of the scenario (Foster, Tiner, Waterson1, or Waterson2). Output files include:

- Standard output (.lst)
- WEL package flow reduction (.afr)
- Cell by cell flow (.cbb)
- Groundwater elevations or heads (.hds)
- Drawdown (.ddn)

Table 4. Pumping Simulations Input Files (Excluding Pumping)

MODFLOW Package	File Name	File Date	Notes
BAS6	gma12.bas	1/27/2021	
DISU	gma12.dis	1/27/2021	
DRN	gma12.drn	2/24/2023	Added NOPRINT Specfication
EVT (5 files)	gma12.evt	1/27/2023	
	evt.depth.ref	1/27/2023	
	evt.nodes.ref	1/27/2023	
	evt.rate.ref	1/27/2023	
	evt.top.ref	1/27/2023	
GHB	gma12.ghb	1/27/2023	
GNC	gma12.gnc	2/24/2023	Added NOPRINT Specfication
HFB6	gma12.hfb	2/24/2023	Added NOPRINT Specfication
Initial Heads	initital_2010_heads.hds	1/27/2021	
LPF	gma12.lpf	1/27/2023	
OC	gma12.oc	1/27/2023	
RCH	gma12.rch	1/27/2023	
RIV	gma12.riv	2/24/2023	Added NOPRINT Specfication
SMS	gma12.sms	1/27/2023	

3.3   Groundwater Elevation and Attributable Drawdown

The Fortran program *gethed.exe* was written to extract groundwater elevation and calculate attributable drawdown data from each model simulation (including Run S-19). The output from *gethed.exe* includes one file for each scenario (Run S-19, Foster, Tiner, Waterson 1, and Waterson 2), and includes results from each well site. These files were imported into an Excel file and named *Aqua GWE ADD 4 wells.xlsx*.

Please note that each tab of the spreadsheet file represents a single pumping scenario (Run S-19, Foster, Tiner, Waterson 1, and Waterson 2). In each tab, columns C to F are the annual groundwater elevation estimates for each well location. In each tab, columns G to J are the drawdown attributable to a single Aqua WSC well pumping for the identified scenario (i.e., groundwater elevation from the DFC scenario minus the pumping scenario groundwater elevation). These results, therefore, represent the simulations results at the pumping well location and three "monitoring" locations.

3.4   Groundwater Budgets

Cell by cell output from the simulations were used to develop groundwater budgets using Zone Budget (a post processor developed by the USGS):

- Because the Foster and Tiner wells are completed in the Carrizo Aquifer, the groundwater budgets for these wells are based on defining zones based on model layer. Each model layer in LPGCD was assigned a unique zone number. Outside of LPGCD, each county was assigned a unique zone number. For the purposes of this analysis, the Carrizo Aquifer

is the unit of interest.

- Because the Waterson 1 and Waterson 2 wells are completed in the undifferentiated Wilcox Aquifer, the groundwater budgets for these wells are based on lumping model layers 8, 9, and 10 together in Bastrop and Lee counties. All other layers retained their unique zone number. Outside LPGCD, each county was assigned a unique zone number. For the purposes of this analysis, the undifferentiated Wilcox Aquifer is the unit of interest (Calvert Bluff, Simsboro, and Hooper in GAM layer nomenclature).

Table 5 summarizes the file names associated with the groundwater budget analysis.

**Table 5. Summary of Filenames - Groundwater Budget Analysis**

| Simulation	File Type	File Name
Run S-19 (Carrizo)	DIS file	gma12.dis
	Zone file	zbzones.dat
	cbb file	RunS-19.cbb
	Raw Budget file	base.2.csv
	Processed Budget file	ZB Base.xlsx
Run S-19 (Wilcox)	DIS file	gma12.dis
	Zone file	zbzonesWilcox.dat
	cbb file	RunS-19.cbb
	Raw Budget file	S-19Wilcox.2.csv
	Processed Budget file	wbRunS-19Carrizo.xlsx
Foster (Carrizo)	DIS file	gma12.dis
	Zone file	zbzones.dat
	cbb file	Foster.cbb
	Raw Budget file	Foster.2.csv
	Processed Budget file	wbFoster.xlsx
Tiner (Carrizo)	DIS file	gma12.dis
	Zone file	zbzones.dat
	cbb file	Tiner.cbb
	Raw Budget file	Tiner.2.csv
	Processed Budget file	wbTiner.xlsx
Waterson 1 (Wilcox)	DIS file	gma12.dis
	Zone file	zbzonesWilcox.dat
	cbb file	Waterson1.cbb
	Raw Budget file	Waterson1.2.csv
	Processed Budget file	wbWaterson1Wilcox.xlsx
Waterson 2 (Wilcox)	DIS file	gma12.dis
	Zone file	zbzonesWilcox.dat
	cbb file	Waterson2.cbb
	Raw Budget file	Waterson2.2.scv
	Processed Budget file	wbWaterson2Wilcox.xlsx

4.0   Foster Well Simulation Results

4.1   Groundwater Elevation and Drawdown Results

Groundwater elevation and attributable drawdown results are summarized in the following:

- Figure 2 presents the comparison of groundwater elevation in the Foster well for the DFC run (Run S-19) and the Foster pumping simulation.
- Figure 3 presents the groundwater elevation results of the Foster pumping simulation for all four well sites (Foster, Tiner, Waterson 1, and Waterson 2).
- Figure 4 presents the attributable drawdown of the Foster pumping simulation for all four well sites (Foster, Tiner, Waterson 1, and Waterson 2).
- Table 6 presents the attributable drawdown (from 2010 conditions) in 2070 for all four well sites (Foster, Tiner, Waterson 1, and Waterson 2).
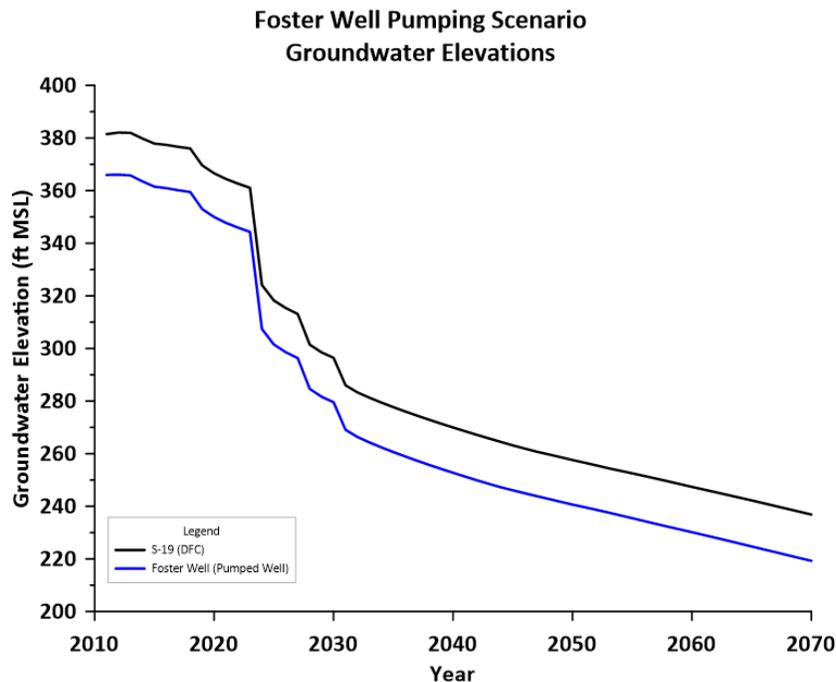
Figure 2. Groundwater Elevation Hydrograph (DFC and Foster Scenarios)
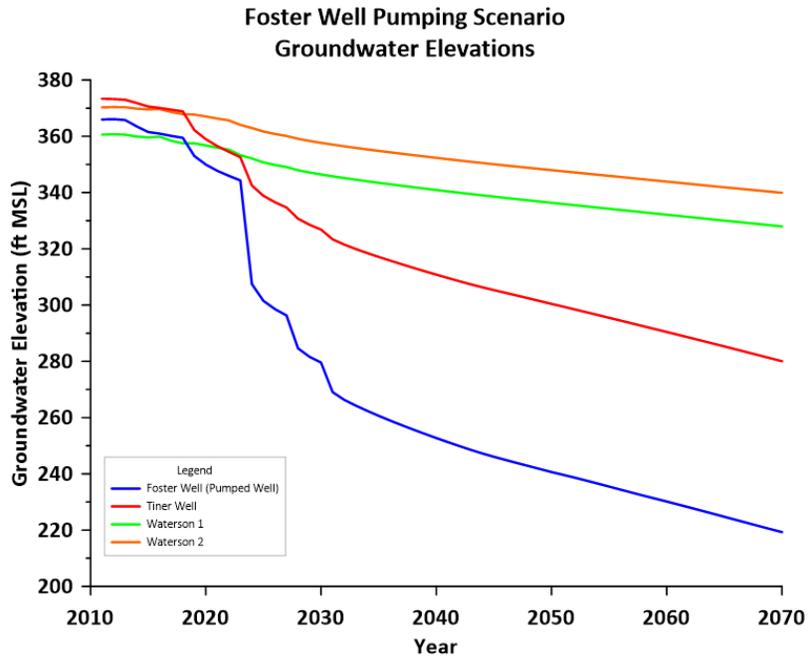
Figure 3. Groundwater Elevation Hydrograph (Foster Scenario, All Locations)
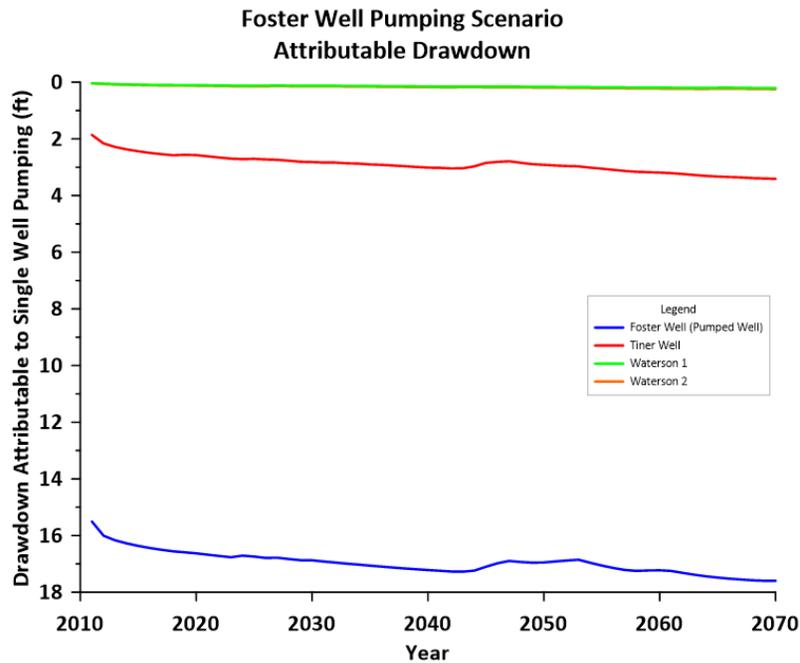
Figure 4. Attributable Drawdown Hydrograph (Foster Scenario)

Table 6. Attributable Drawdown in 2070 - Foster Scenario

Location	Attributable Drawdown in 2070 (ft) (2011 Starting Conditions)
Foster (Pumping Well)	18
Tiner	3
Waterson 1	0
Waterson 2	0

4.2   Groundwater Budget Results

Table 7 presents the groundwater budget of the LPGCD portion of the Carrizo Aquifer for the DFC simulation and the simulation when the Foster well is pumped at a constant rate of 807 AF/yr. The difference between each water budget component is presented in AF/yr and as a percentage of the pumping increase associated with adding Foster well pumping to the DFC simulation.

Please note that most of the pumping is sourced from captured outflow that would have gone to Caldwell and Fayette counties. Other significant sources of water to supply the Foster well are vertical inflow from the overlying Reklaw formation and storage reduction in the Carrizo Aquifer.

**Table 7. Groundwater Budget Comparison - Foster Well Pumping Scenario**

LPGCD Groundwater Budget Layered, Carrizo Aquifer	DFC/Run S-19 (2011 to 2070) (AF/yr)	Foster Well (2011 to 2070) (AF/yr)	Difference (AF/yr)	Difference (% of Pumping Increase)
Inflows				
From Shallow Flow System (Layer 2)	10,471	10,533	62	7.69
From Reklaw (Layer 6)	10,262	10,370	108	13.37
From Washington County	521	518	-2	-0.29
Total Inflow	21,254	21,422		
Outflows				
Pumping	7,448	8,255	807	100.00
To Burleson County	7,130	7,125	5	0.60
To Caldwell County	2,131	1,865	266	32.97
To Fayette County	4,081	3,913	168	20.80
To Calvert Bluff (Layer 8)	5,545	5,465	80	9.92
Total Outflow	26,336	26,624		
Storage				
Inflow minus Outflow	-5,081	-5,202	121	14.95
Model Storage Change	-5,081	-5,202		
Water Balance Error	0	0		

5.0 Tiner Well Simulation Results

5.1 Groundwater Elevation and Drawdown Results

Groundwater elevation and attributable drawdown results are summarized in the following:

- Figure 5 presents the comparison of groundwater elevation in the Tiner well for the DFC run (Run S-19) and the Tiner pumping simulation.
- Figure 6 presents the groundwater elevation results of the Tiner pumping simulation for all four well sites (Foster, Tiner, Waterson 1, and Waterson 2).
- Figure 7 presents the attributable drawdown of the Tiner pumping simulation for all four well sites (Foster, Tiner, Waterson 1, and Waterson 2).
- Table 8 presents the attributable drawdown (from 2010 conditions) in 2070 for all four well sites (Foster, Tiner, Waterson 1, and Waterson 2).
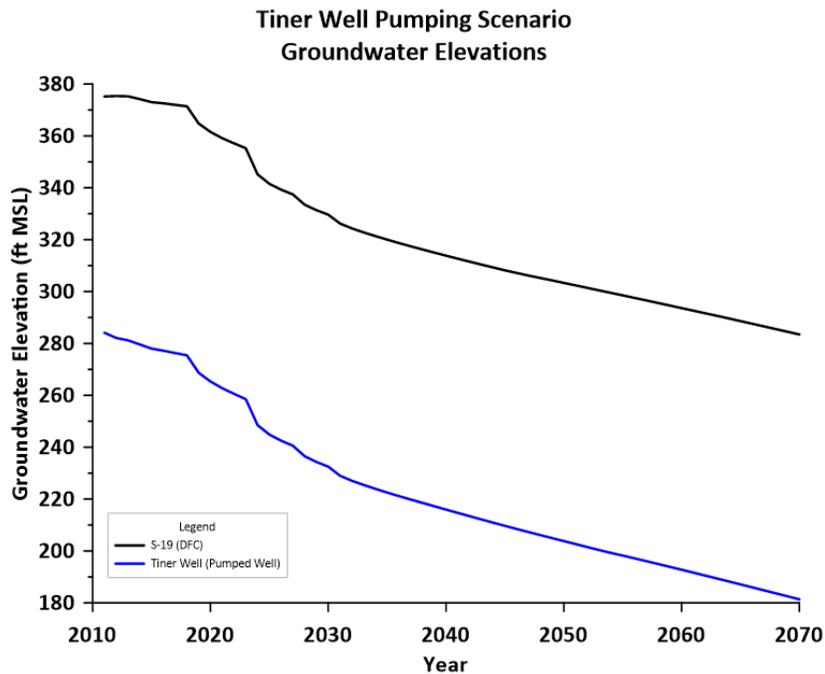
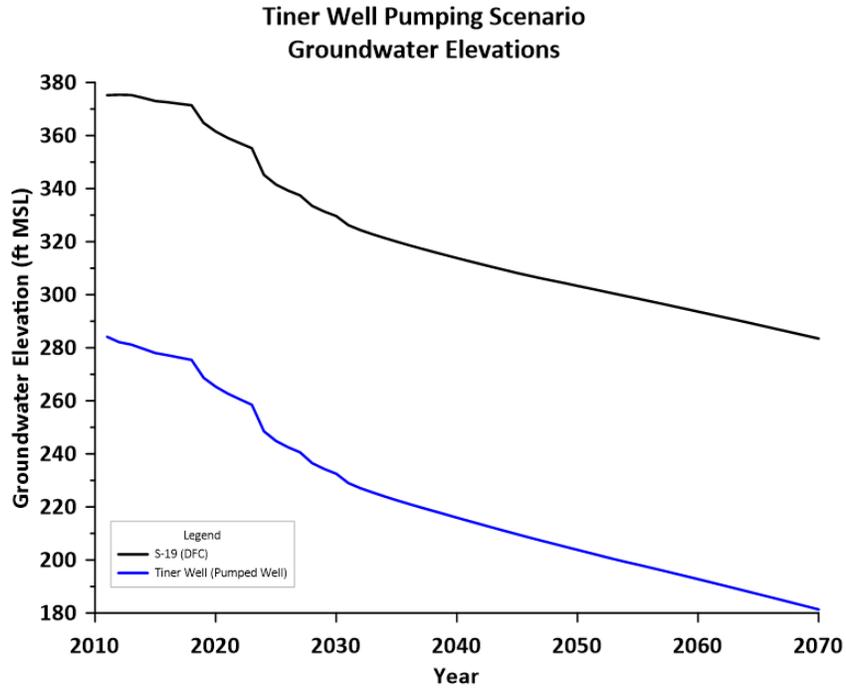**Figure 5. Groundwater Elevation Hydrograph (DFC and Tiner Scenarios)**

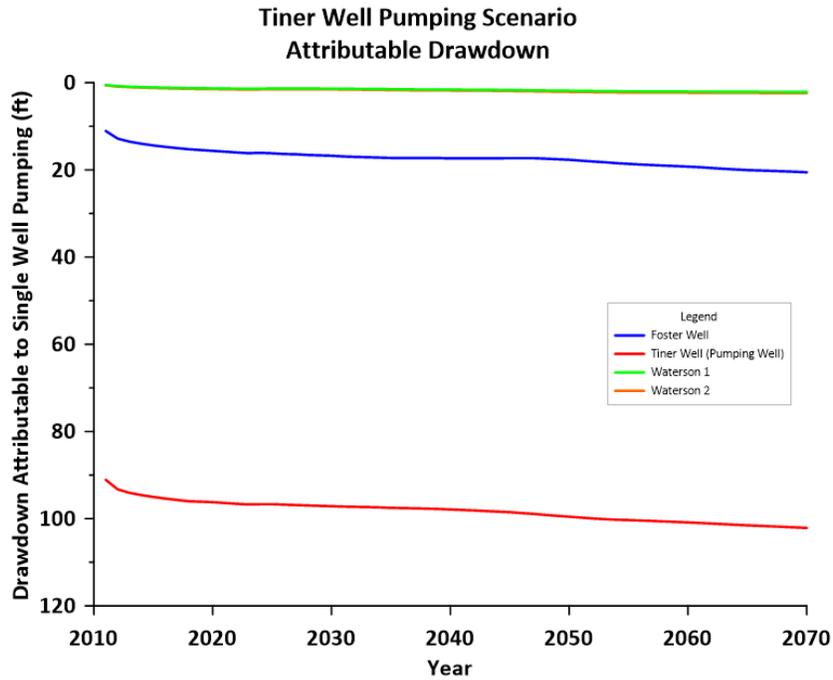**Figure 6. Groundwater Elevation Hydrograph (Tiner Scenario, All Locations)**

Figure 7. Attributable Drawdown Hydrograph (Tiner Scenario)

Table 8. Attributable Drawdown in 2070 - Tiner Scenario

Location	Attributable Drawdown in 2070 (ft) (2011 Starting Conditions)
Foster	21
Tiner (Pumping Well)	102
Waterson 1	2
Waterson 2	2

5.2 Groundwater Budget Results

Table 9 presents the groundwater budget of the LPGCD portion of the Carrizo Aquifer for the DFC simulation and the simulation when the Tiner well is pumped at a constant rate of 4,839 AF/yr. The difference between each water budget component is presented in AF/yr and as a percentage of the pumping increase associated with adding Tiner well pumping to the DFC simulation.

Please note that significant sources of the pumping are induced inflow from the shallow flow system and induced vertical inflow from the overlying Reklaw formation. Significant captured outflow components include flow to Fayette County and captured vertical outflow to the underlying Calvert Bluff Aquifer. Storage decline is also a relatively large source of the pumping.

**Table 9. Groundwater Budget Comparison - Tiner Well Pumping Scenario**

LPGCD Groundwater Budget Layered, Carrizo Aquifer	DFC/Run S-19 (2011 to 2070) (AF/yr)	Tiner Well (2011 to 2070) (AF/yr)	Difference (AF/yr)	Difference (% of Pumping Increase)
Inflows				
From Shallow Flow System (Layer 2)	10,471	11,098	626	12.95
From Reklaw (Layer 6)	10,262	11,489	1,227	25.36
From Washington County	521	508	-13	-0.26
Total Inflow	21,254	23,095		
Outflows				
Pumping	7,448	12,287	4,839	100.00
To Burleson County	7,130	7,096	34	0.71
To Caldwell County	2,131	1,698	433	8.96
To Fayette County	4,081	3,237	844	17.44
To Calvert Bluff (Layer 8)	5,545	4,723	822	16.99
Total Outflow	26,336	29,041		
Storage				
Inflow minus Outflow	-5,081	-5,946	864	17.87
Model Storage Change	-5,081	-5,946		
Water Balance Error	0	0		

6.0   Waterson 1 Well Simulation Results

6.1   Groundwater Elevation and Drawdown Results

Groundwater elevation and attributable drawdown results are summarized in the following:

- Figure 8 presents the comparison of groundwater elevation in the Waterson 1 well for the DFC run (Run S-19) and the Waterson 1 pumping simulation.
- Figure 9 presents the groundwater elevation results of the Waterson 1 pumping simulation for all four well sites (Foster, Tiner, Waterson 1, and Waterson 2).
- Figure 10 presents the attributable drawdown of the Waterson 1 pumping simulation for all four well sites (Foster, Tiner, Waterson 1, and Waterson 2).
- Table 10 presents the attributable drawdown (from 2010 conditions) in 2070 for all four well sites (Foster, Tiner, Waterson 1, and Waterson 2).
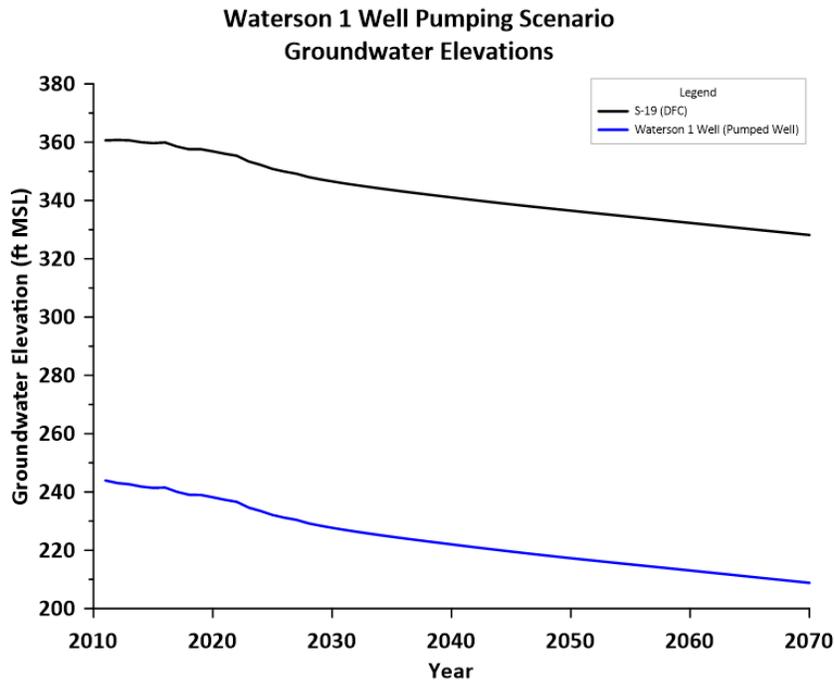
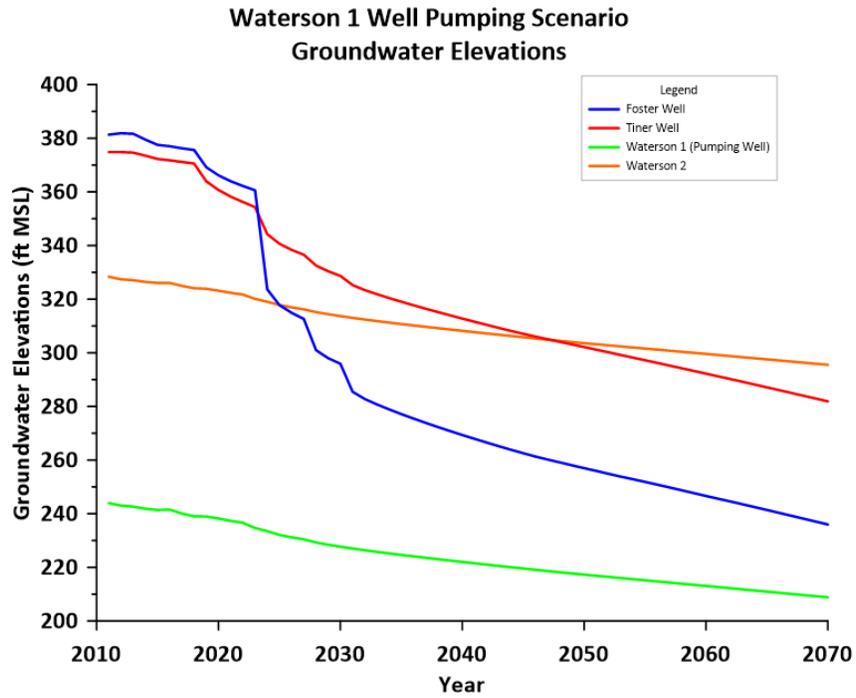**Figure 8. Groundwater Elevation Hydrograph (DFC and Waterson 1 Scenarios)**

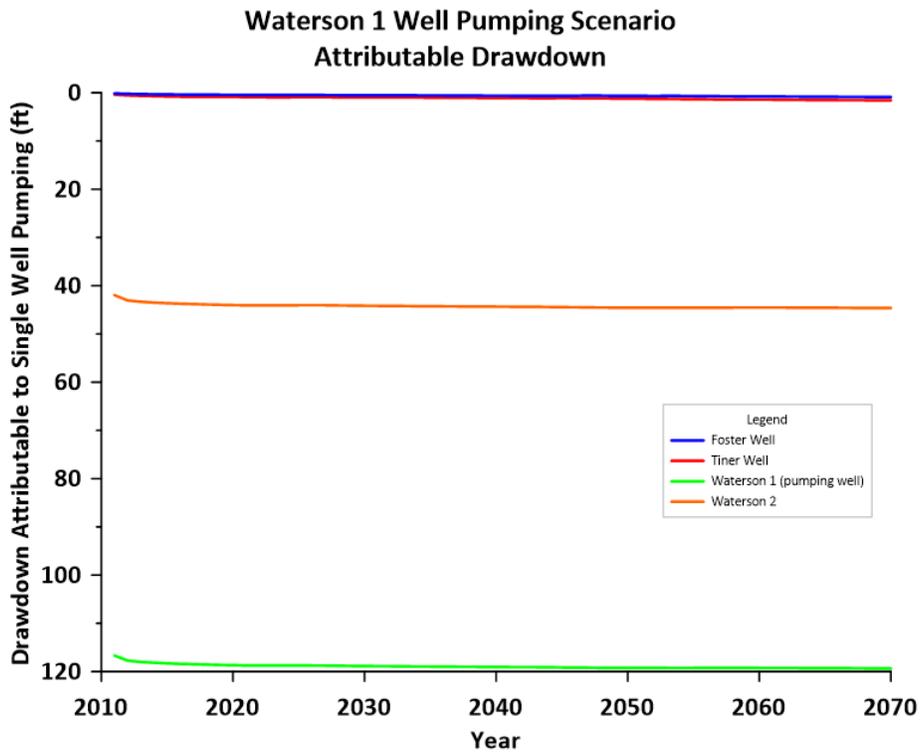**Figure 9. Groundwater Elevation Hydrograph (Waterson 1 Scenario, All Locations)**

Figure 10. Attributable Drawdown Hydrograph (Waterson 1 Scenario)

Table 10. Attributable Drawdown in 2070 – Waterson 1 Scenario

Location	Attributable Drawdown in 2070 (ft) (2011 Starting Conditions)
Foster	1
Tiner	2
Waterson 1 (Pumping Well)	119
Waterson 2	45

6.2 Groundwater Budget Results

Table 11 presents the groundwater budget of the LPGCD portion of the Wilcox Aquifer for the DFC simulation and the simulation when the Waterson 1 well is pumped at a constant rate of 3,226 AF/yr. The difference between each water budget component is presented in AF/yr and as a percentage of the pumping increase associated with adding Waterson 1 well pumping to the DFC simulation.

Please note that over half of the proposed pumping would be sourced from the shallow flow system. The only other significant source is induced inflow from the overlying Carrizo Aquifer. Storage decline supplies less than ten percent of the increased pumping.

Table 11. Groundwater Budget Comparison – Waterson 1 Well Pumping Scenario

LPGCD Groundwater Budget Layered, Undifferentiated Wilcox	DFC/Run S-19 (2011 to 2070) (AF/yr)	Waterson 1 Well (2011 to 2070) (AF/yr)	Difference (AF/yr)	Difference (% of Pumping Increase)
Inflows				
From Alluvium (Layer 1)	126	132	6	0.20
From Shallow Flow System (Layer 2)	45,998	48,177	2,179	67.62
From Carrizo (Layer 7)	5,545	6,165	620	19.23
From Caldwell County	1,493	1,618	125	3.89
From Milam County	9,226	9,233	7	0.22
From Washington County	1,939	1,936	-2	-0.07
From Williamson County	2,447	2,448	1	0.04
Total Inflow	66,774	69,710		
Outflows				
Pumping	63,367	66,589	3,222	100.00
To Burleson County	19,581	19,558	23	0.71
To Fayette County	537	487	50	1.54
Total Outflow	83,485	86,634		
Storage				
Inflow minus Outflow	-16,711	-16,925	213	6.62
Model Storage Change	-16,711	-16,925		
Water Balance Error	0	0		

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7.0   Waterson 2 Well Simulation Results

7.1   Groundwater Elevation and Drawdown Results

Groundwater elevation and attributable drawdown results are summarized in the following:

- Figure 11 presents the comparison of groundwater elevation in the Waterson 2 well for the DFC run (Run S-19) and the Waterson 2 pumping simulation.
- Figure 12 presents the groundwater elevation results of the Waterson 2 pumping simulation for all four well sites (Foster, Tiner, Waterson 1, and Waterson 2).
- Figure 13 presents the attributable drawdown of the Waterson 2 pumping simulation for all four well sites (Foster, Tiner, Waterson 1, and Waterson 2).
- Table 12 presents the attributable drawdown (from 2010 conditions) in 2070 for all four well sites (Foster, Tiner, Waterson 1, and Waterson 2).
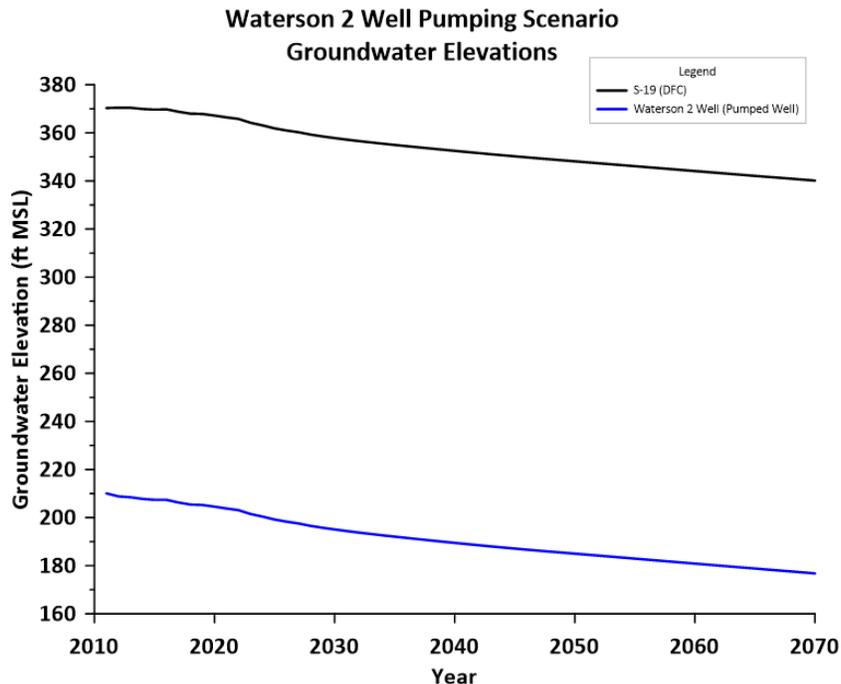

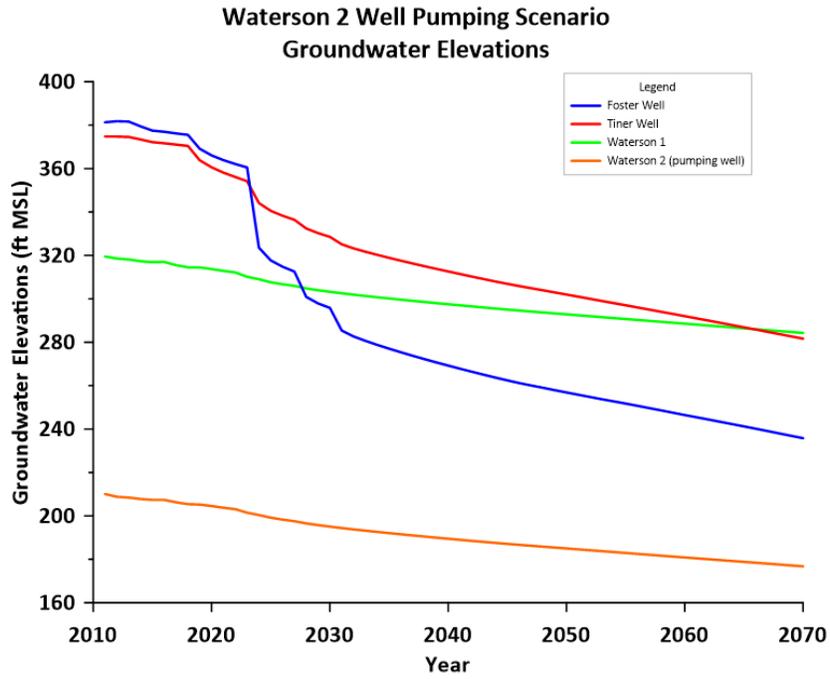**Figure 11. Groundwater Elevation Hydrograph (DFC and Waterson 2 Scenarios)**

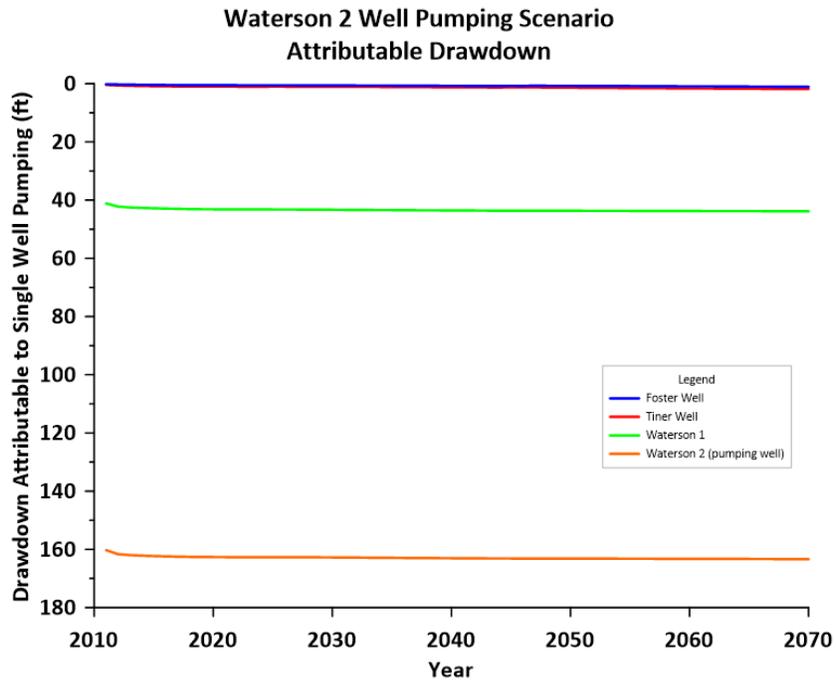**Figure 12. Groundwater Elevation Hydrograph (Waterson 2 Scenario, All Locations)**

Figure 13. Attributable Drawdown Hydrograph (Waterson 2 Scenario)

Table 12. Attributable Drawdown in 2070 – Waterson 2 Scenario

Location	Attributable Drawdown in 2070 (ft) (2011 Starting Conditions)
Foster	1
Tiner	2
Waterson 1	44
Waterson 2 (Pumping Well)	163

7.2 Groundwater Budget Results

Table 13 presents the groundwater budget of the LPGCD portion of the Wilcox Aquifer for the DFC simulation and the simulation when the Waterson 2 well is pumped at a constant rate of 3,226 AF/yr. The difference between each water budget component is presented in AF/yr and as a percentage of the pumping increase associated with adding Waterson 2 well pumping to the DFC simulation.

Please note that over half of the proposed pumping would be sourced from the shallow flow system. The only other significant source is induced inflow from the overlying Carrizo Aquifer. Storage decline supplies less than ten percent of the increased pumping.

Table 13. Groundwater Budget Comparison – Waterson 2 Well Pumping Scenario

LPGCD Groundwater Budget Layered, Undifferentiated Wilcox	DFC/Run S-19 (2011 to 2070) (AF/yr)	Waterson 2 Well (2011 to 2070) (AF/yr)	Difference (AF/yr)	Difference (% of Pumping Increase)
Inflows				
From Alluvium (Layer 1)	126	131	5	0.15
From Shallow Flow System (Layer 2)	45,998	48,121	2,122	65.87
From Carrizo (Layer 7)	5,545	6,122	576	17.89
From Caldwell County	1,493	1,680	187	5.79
From Milam County	9,226	9,233	7	0.22
From Washington County	1,939	1,936	-3	-0.09
From Williamson County	2,447	2,448	1	0.04
Total Inflow	66,774	69,669		
Outflows				
Pumping	63,367	66,589	3,222	100.00
To Burleson County	19,581	19,559	23	0.70
To Fayette County	537	480	57	1.78
Total Outflow	83,485	86,627		
Storage				
Inflow minus Outflow	-16,711	-16,958	246	7.65
Model Storage Change	-16,711	-16,958		
Water Balance Error	0	0		

8.0 References

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