LRE WATER
CONNECTING WATER TO LIFE

September 11, 2024

Penny Hanson, General Manager
Neches and Trinity Valleys GCD
501 Devereaux Street
Jacksonville, TX 75766

RE: Hydrogeological Report for the Neches and Trinity Valleys GCD
Upper Wilcox Wellfield – Redtown Ranch Property, Anderson County, TX

Dear Ms. Hanson,

LRE Water ("LRE") is pleased to submit this Hydrogeological Report to the Neches and Trinity Valleys Groundwater Conservation District ("NTVGCD" or District) on behalf of Redtown Ranch Holdings, LLC. The purpose of this Hydrogeological Report is to assess the potential impacts associated with a proposed wellfield on an approximately 7,465-acre property (herein referred to as the "Redtown Ranch Property") in Anderson and Houston County, Texas. According to District Rule 5.4(k), an applicant requesting to drill and operate a proposed new well or well system with a daily maximum capacity of more than 2 million gallons or requests to modify to increase production or production capacity of a non-exempt well with an outside casing diameter greater than 10 inches is required to submit a Hydrogeological Report with the permit application. This Hydrogeologic Report addresses the area of influence, estimated drawdown, recovery time, relation of proposed pumping to the "modeled available groundwater" and the desired future conditions (DFCs), and water usage for the proposed production as it relates to the current Regional Plan. The information provided herein is intended to supplement the Groundwater Availability Study prepared by LRE for Redtown Ranch Holdings, LLC, dated May 31, 2024, and to address deficiencies in the permit application, as noted in the District's letter to Redtown Ranch Holdings, LLC, dated August 8, 2024.

The proposed wellfield in Anderson County consists of eight (8) wells on the Redtown Ranch Property producing a total combined production capacity of 9,800 gallons per minute (gpm), or 15,849 acre-feet per year (ac-ft/yr) from the Upper Wilcox Aquifer of the Carrizo-Wilcox Aquifer System. The intended use for which production is requested includes all beneficial purposes as those terms are defined in Section 36.001(9), Texas Water Code (2011), and NTVGCD Rule 1(c). The produced water from this wellfield is planned to be used within Regional Water Planning Areas C, G, H, K, and/or L.

Background

For this work, LRE compiled and reviewed publicly available information pertaining to the geologic structure, lithology, and hydraulic properties of the Upper Wilcox Aquifer beneath the Redtown Ranch Property. This included a review of geologic and hydrogeologic data from published groundwater studies, geologic maps, state well reports, well drilling reports, and other applicable information from published literature. Data sources included the Texas Commission on Environmental Quality (TCEQ), the Texas Water Development Board (TWDB) Groundwater Database, the Submitted Drillers Report (SDR) Database, the Brackish Resources Aquifer Characterization System (BRACS) Database, and LRE files. LRE's literature review included the TWDB Report No. 150 ("R-150") "Ground-Water Conditions in Anderson, Cherokee, Freestone, and Henderson Counties, Texas by Guyton & Associates (1972) and TWDB Report No. 18 ("R-18") "Ground Water Resources of Houston County, Texas" by G.E. Tarver (1966). Hydraulic properties for the Upper Wilcox Aquifer were extracted from the Northern Portion of the Queen City, Sparta, and Carrizo-Wilcox Aquifer Groundwater Availability Model ("North QCSCW GAM") Conceptual Report as detailed in Schorr and others (2020).

Appendix A provides the latitude and longitude coordinates and pumping rates for the proposed wells on the Redtown Ranch Property. The proposed wellfield in Anderson County includes eight (8) wells completed in the Upper Wilcox Aquifer producing a combined production capacity of 9,800 gpm (15,849 ac-ft/yr), and the proposed wellfield in Houston County (outside the jurisdiction of the NTVGCD) consists of four (4) wells completed in the Upper Wilcox Aquifer producing a combined production capacity of 5,000 gpm (8,086 ac-ft/yr). Each proposed well will be completed with an outer casing diameter greater than 10 inches and will be equipped with a pump capable of producing the proposed pumping rates provided in Appendix A. On August 15, 2024, the District provided LRE (via email) a list of all exempt and non-exempt wells registered with the NTVGCD in Anderson County. LRE compiled all publicly available well data from the NTVGCD, the TWDB, and the SDR Databases to identify wells in Anderson County within a 5-mile radius of the Redtown Ranch Property, as shown in Figure 1 and in the table provided in Appendix B. All proposed well locations within the District boundaries are at least a ¼-mile radial distance from the nearest property boundary and other surrounding wells (Figure 1). The proposed well locations in Anderson County meet the minimum well spacing requirements outlined in District Rule 7(a) and adhere to the TCEQ's well setback requirements from potential sources of contamination or flood-prone areas, as specified in Title 30 of the Administrative Code (30 TAC) §290.41(c)(1).

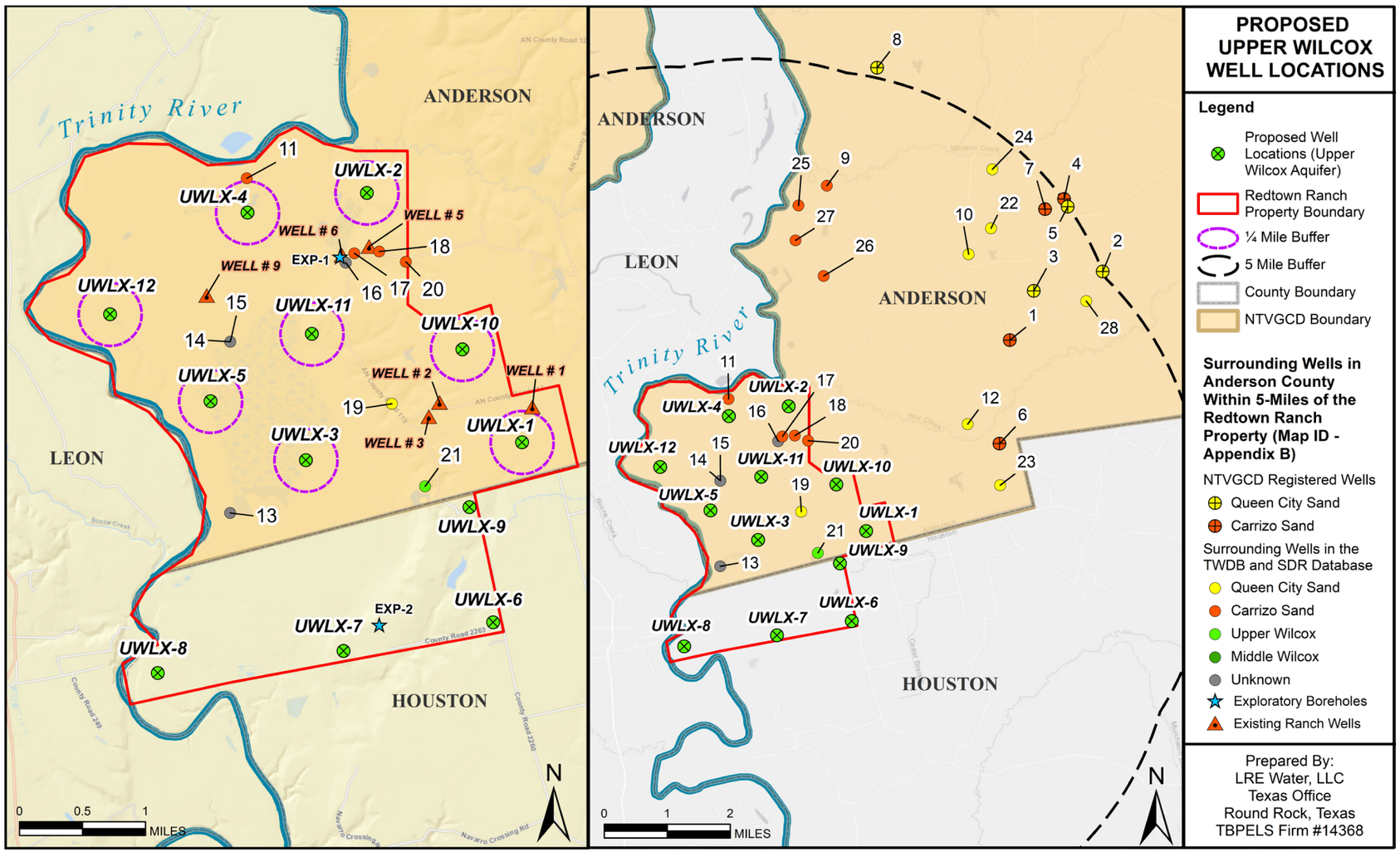


Figure 1. Proposed Well Locations on the Redtown Ranch Property

Hydraulic Aquifer Properties

Andrews & Foster Drilling Company (A&F) drilled two 7.875-inch exploratory boreholes ("EXP-1" and "EXP-2") to determine formation depths and sand thickness of the aquifers beneath the Redtown Ranch Property. Exploratory borehole EXP-1 was drilled in Anderson County at Latitude 31.540694, Longitude -95.716917 to approximately 1,197 feet below land surface (ft bls), and exploratory borehole EXP-2 was drilled in Houston County at Latitude 31.498361, Longitude -95.710417 to approximately 1,307 ft bls, as shown in Figure 1. LRE used the geophysical logs from the exploratory boreholes and geophysical logs in the BRACS database to correlate formation depths and calculate net sand thickness of the formations beneath the Redtown Ranch Property. Based on the depths of the exploratory boreholes and interpreted depths for the Wilcox Group beneath the Redtown Ranch Property, the exploratory boreholes EXP-1 and EXP-2 likely penetrated the Upper Wilcox Aquifer.

Due to the absence of site-specific aquifer test data for the Upper Wilcox Aquifer on the Redtown Ranch Property, LRE utilized reported pumping test data from nearby wells. Within 15 miles of the Redtown Ranch Property, transmissivity values for the Upper Wilcox Aquifer, as reported in TWDB R-150, range from 4,300 gallons per day per foot (gpd/ft) to 47,000 gpd/ft (Guyton & Associates, 1972). Estimated transmissivity values for the Upper Wilcox Aquifer were calculated using reported specific capacity data and the Driscoll (1986) estimation method. Transmissivity estimates from surrounding wells using the Driscoll (1986) estimation method range from approximately 800 gpd/ft to 36,000 gpd/ft for the Upper Wilcox Aquifer.

Hydraulic conductivity values for the Upper Wilcox Aquifer reported in TWDB R-150 vary from 49 gallons per day per foot squared (gpd/ft^2) to 338 gpd/ft^2 (Guyton & Associates, 1972), while estimates from nearby wells using transmissivity calculated from the Driscoll (1986) estimated method range from 8.8 gpd/ft^2 to 360 gpd/ft^2. Three large-capacity industrial wells (State Well Numbers 3821703, 3821704, and 3829105), located approximately 14 miles northeast of the Redtown Ranch Property, have estimated hydraulic conductivity values of 318.3 gpd/ft^2, 276.7 gpd/ft^2, and 266.9 gpd/ft^2, which equates to an average hydraulic conductivity of 287.3 gpd/ft^2 for the Upper Wilcox Aquifer. LRE determined that this average hydraulic conductivity value of 287.3 gpd/ft^2 is representative of large-capacity wells fully penetrating the Upper Wilcox Aquifer. Therefore, this average hydraulic conductivity value of 287.3 gpd/ft^2 was multiplied by net sand thickness to estimate transmissivity for the Upper Wilcox Aquifer beneath the proposed well locations on the Redtown Ranch Property. The transmissivity values for the proposed wellsites range from approximately 38,785 gpd/ft to 47,405 gpd/ft.

Table 1 provides a summary of the estimated hydraulic properties of the Upper Wilcox Aquifer for the proposed well locations from surrounding well data, interpretation of geophysical logs, and data from the North QCSCW GAM Conceptual Report (Schorr and others, 2020).

Table 1. Estimated Hydraulic Properties for the Upper Wilcox Aquifer

Proposed Well	Top of Screen (ft bls)	Bottom of Screen (ft bls)	Aquifer Thickness (ft)	Net Sand Thickness (ft)	Pump Setting (ft bls)	Static Water Level (ft bls)	S*	K (gpd/ft^2)	T (gpd/ft)
UWLX-1	705	1,200	495	150	600	60	0.0007	287.3	43,095
UWLX-2	725	1,160	435	140	550	0	0.0006	287.3	40,225
UWLX-3	605	1,130	525	150	520	0	0.0007	287.3	43,095
UWLX-4	600	1,130	530	155	500	0	0.0007	287.3	44,530
UWLX-5	600	1,130	530	155	510	0	0.0007	287.3	44,530
UWLX-10	715	1,200	485	155	600	60	0.0007	287.3	44,530
UWLX-11	645	1,175	530	150	550	25	0.0007	287.3	43,095
UWLX-12	585	1,125	540	165	500	0	0.0007	287.3	47,405
UWLX-6	695	1,215	520	135	600	55	0.0006	287.3	38,785
UWLX-7	640	1,160	520	140	550	10	0.0006	287.3	40,220
UWLX-8	610	1,135	525	140	510	0	0.0006	287.3	40,220
UWLX-9	695	1,210	515	145	600	60	0.0007	287.3	41,660

"ft bls" indicates feet below land surface; land surface elevation from NED (USGS, 2004), "ft" indicates feet, "gpd/ft^2" indicates gallons per day per foot squared, "gpd/ft" indicates gallons per day per foot, "*" indicates property obtained from the North QCSCW GAM Conceptual Report (Schorr and others, 2020), S = Storativity (confined aquifer), K = hydraulic conductivity, T = Transmissivity, cells highlighted in gray indicate wells located in Houston County (outside NTVGCD boundary).

Analytical Groundwater Modeling

LRE conducted analytical groundwater modeling to assess local drawdown impacts, recovery time, and well interference between proposed wells on the Redtown Ranch property. The input parameters used in the analytical modeling are presented in Table 1. Proposed well locations and pumping rates were selected based on considerations of the hydrogeologic conditions, including aquifer depths, net sand thickness, aquifer productivity, hydraulic characteristics, and well spacing requirements. The results of the analytical modeling simulating the proposed production of 15,849 ac-ft/yr from the Upper Wilcox Aquifer in Anderson County and 8,086 ac-ft/yr from the Upper Wilcox Aquifer in Houston County after five years is summarized in Table 2.

The cumulative drawdown, calculated using the Cooper-Jacob (1946) equation, includes drawdown in the wellbore from both the pumping well and additional drawdown imposed from surrounding proposed wells producing from the Upper Wilcox Aquifer on the Redtown Ranch Property (Table 2). This modeling includes production from proposed wells located on the Redtown Ranch Property in Houston County (which are located

outside of the NTVGCD boundaries) to more accurately depict the well interference and cumulative drawdown in the wellfield.

Table 2. Five-Year Analytical Modeling Results

Proposed Well	County	Proposed Pumping Rate (gpm)	Proposed Production (ac-ft/yr)	Drawdown from Pumping Well (ft)	Drawdown Imposed from Surrounding Wells (ft)	Cumulative Drawdown (ft)	Recovery Time (Days)
ULWX-1	Anderson	1,400	2,264	136	213	349	1,389
UWLX-2	Anderson	1,400	2,264	146	199	345	1,419
UWLX-3	Anderson	1,000	1,617	97	230	327	1,501
UWLX-4	Anderson	1,200	1,941	113	207	320	1,560
UWLX-5	Anderson	1,000	1,617	94	223	317	1,569
UWLX-10	Anderson	1,300	2,102	123	218	341	1,430
UWLX-11	Anderson	1,200	1,941	117	226	343	1,416
UWLX-12	Anderson	1,300	2,102	116	197	313	1,614
UWLX-6	Houston	1,300	2,102	141	200	341	1,444
UWLX-7	Houston	1,200	1,941	125	204	329	1,507
UWLX-8	Houston	1,300	2,102	136	183	319	1,582
UWLX-9	Houston	1,200	1,941	121	222	343	1,416

"gpm" indicates gallons per minute, "ft" indicates feet, "ac-ft/yr" indicates acre-feet per year, "*" indicates average, cells highlighted in gray indicate wells located in Houston County (outside of NTVGCD boundary).

Based on the proposed pumping rates and estimated hydraulic properties in Table 1, cumulative drawdown in the proposed wells in Anderson County ranges from 313 to 349 feet after five years (Table 2). Recovery time was calculated as the time required for water levels to recover 90% of the drawdown after pumping for five years using the Theis (1935) equation, which ranges from 1,389 days to 1,614 days (Table 2). Appendix C provides hydrographs of the simulated pumping and recovery water levels in the proposed wells due to the combined production of 15,849 ac-ft/yr in Anderson County and 8,086 ac-ft/yr in Houston County. The area of influence can typically be defined as the distance where the impacts from pumping result in 1-foot of drawdown in the aquifer. Figure 2 illustrates the area of influence and cumulative drawdown in the Upper Wilcox Aquifer within the District boundaries after five years of pumping, based on the analytical modeling using the Cooper-Jacob (1946) equation and input parameters in Table 1.

It is important to note the analytical modeling assumes the aquifer is infinite and homogeneous, and does not take into account the existence of any boundary conditions, such as faults, transformation flow, or recharge from the land surface. Therefore, actual aquifer conditions and impacts to the Upper Wilcox Aquifer may differ from the results presented herein.

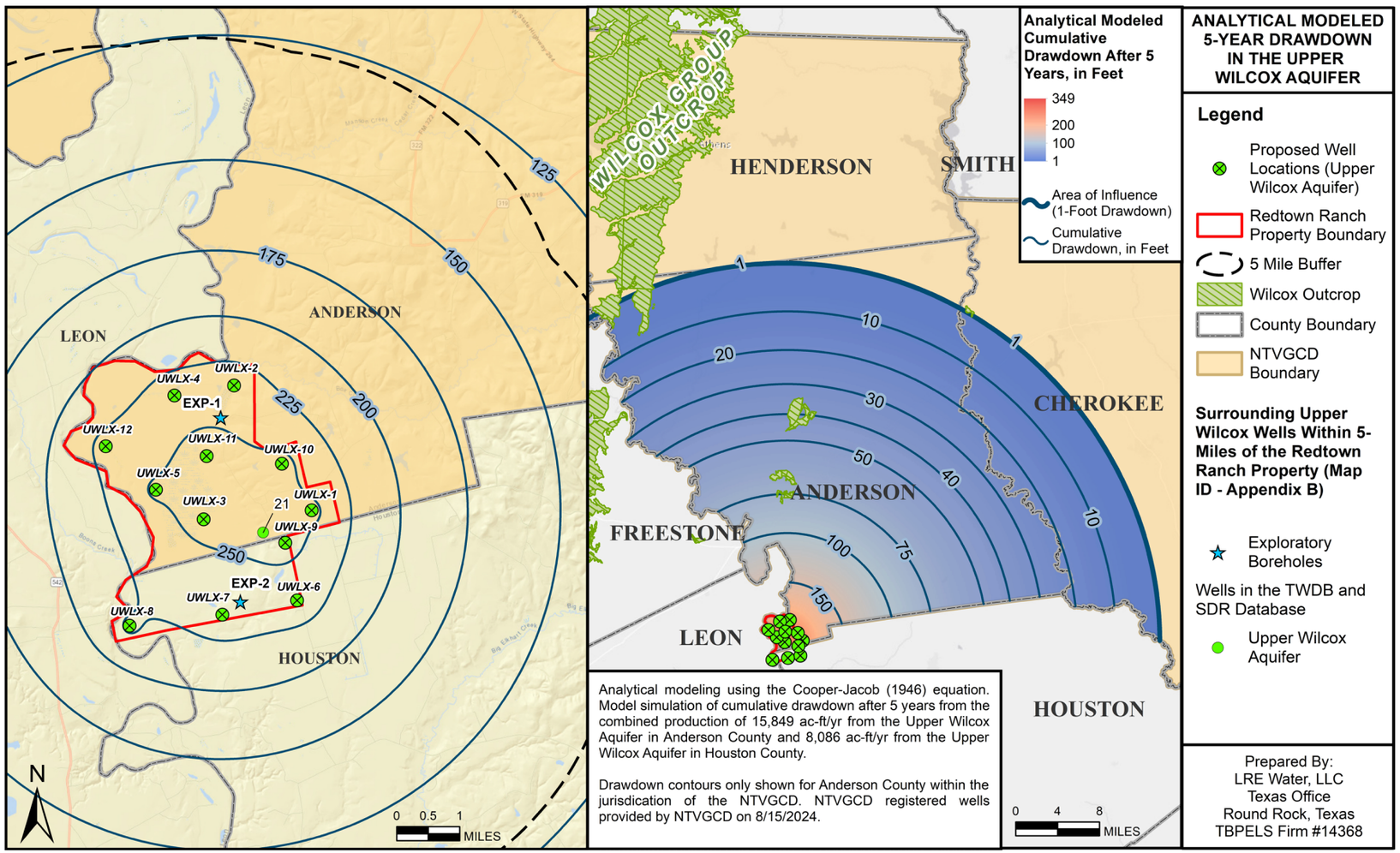


Figure 2. Analytical Modeled Cumulative 5-Year Drawdown in the Upper Wilcox Aquifer

Numerical Groundwater Modeling

LRE conducted numerical modeling to evaluate the regional impacts of the proposed production on the adopted DFCs after five years of pumping. LRE added the proposed well locations in the North QCSCW GAM model cells in MODFLOW and simulated the proposed combined annual production of 15,849 ac-ft from the Upper Wilcox Aquifer in Anderson County and 8,086 ac-ft from the Upper Wilcox Aquifer in Houston County (North QCSCW GAM; Layer 7) for five years. This modeling included production from proposed wells located in Houston County on the Redtown Ranch Property (outside of the NTVGCD boundaries) to accurately depict the impacts from the proposed wellfield. The numerical modeled cumulative drawdown resulting from the proposed production in the Upper Wilcox Aquifer is illustrated in Figure 3.

It is important to note that the hydraulic properties obtained from surrounding well data for the Upper Wilcox Aquifer on the Redtown Ranch Property, specifically estimates of transmissivity and storativity, are higher than those in the North QCSCW GAM Numerical Report for the Upper Wilcox Aquifer (Panday and others, 2020; Layer 7), which are used in the numerical modeling. Therefore, the drawdown and projected impacts from the proposed production in the numerical modeling are greater than the drawdown and impacts from the analytical modeling. To more accurately reflect current aquifer conditions and regional impacts from the proposed combined production, updates to the hydraulic properties of the Upper Wilcox Aquifer (Layer 7) in the North QCSCW GAM will be necessary.

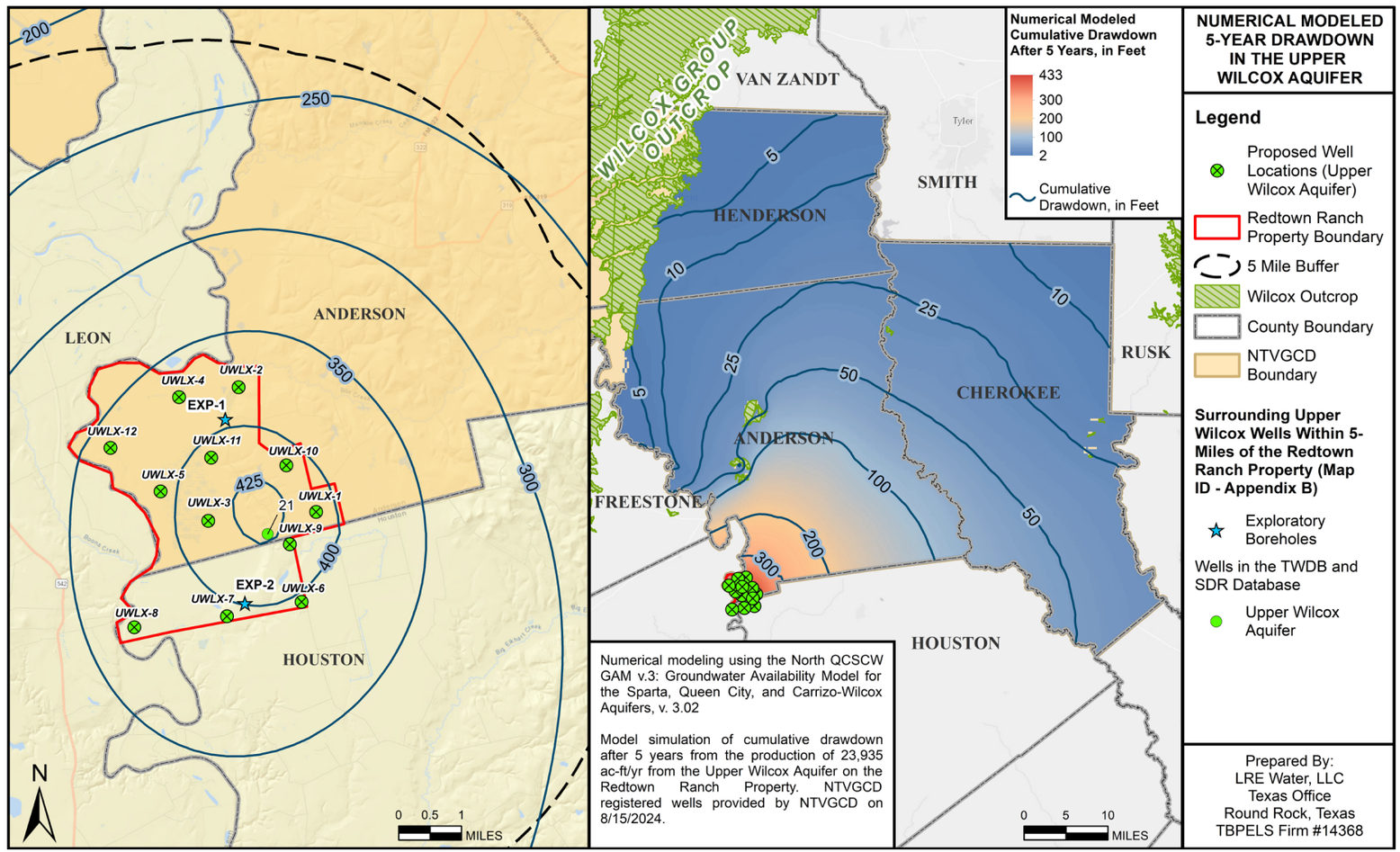


Figure 3. Numerical Modeled Cumulative 5-Year Drawdown in the Upper Wilcox Aquifer (North QCSCW GAM; Layer 7)

Modeled Available Groundwater

Modeled available groundwater (MAG), as defined in Chapter 36 of the Texas Water Code (2011), is the estimated average amount of water that may be produced annually to achieve a DFC. The MAG, as set forth in Section H of the District's Groundwater Management Plan (Amended August 15, 2019), is based on the model run GAM Run 17-024 MAG from June 19, 2017 (Wade, 2017). The MAG for the Carrizo-Wilcox Aquifer is 29,088 ac-ft in Anderson County from 2010 to 2070 based on the GAM Run 17-024 MAG (Wade, 2017). The TWDB issued the most recent GAM Run-21-016 MAG Report for the Carrizo-Wilcox, Queen City, and Sparta Aquifers in GMA-11 on February 17, 2022 (Wade, 2022). This report used the North QCSCW GAM and documented development of the estimated modeled available groundwater associated with the DFCs adopted by GMA-11 on August 11, 2021. According to the 2021 Joint Planning Cycle GAM Run 21-016 MAG, the MAG for the Carrizo-Wilcox Aquifer is 27,024 ac-ft in Anderson County from 2020 to 2080 (Wade, 2022).

The most recent DFCs were approved by GMA-11 on August 11, 2021, based on Scenario 33, as documented in Technical Memorandum 21-01 (Hutchinson, 2021a). As described in the GMA-11 Desired Future Conditions Explanatory Report (Hutchinson, 2021c), average drawdown across the county represents the regional average drawdown occurring from pumping during the period of interest. The most recently adopted DFCs for the Carrizo-Wilcox Aquifer are 155 feet in Anderson County from 2013 to 2080 (Hutchinson, 2021a).

Cumulative drawdown from the numerical modeling was computed and compared to the drawdown from the "Base Run" used to calculate the 2021 DFC's for the Carrizo-Wilcox Aquifer (Hutchison, 2021b). Table 3 presents the MODFLOW modeling results comparing the simulated "Base Run" average drawdown in Anderson County after five years, based on Scenario 33 documented in Technical Memorandum 21-01 (Hutchinson, 2021b), and the simulated model-predicted average drawdown in Anderson County after pumping a total combined production of 23,935 ac-ft for five years from the Upper Wilcox Aquifer (Layer 7) at the Redtown Ranch Property.

The average drawdown in Anderson County from the "Base Run" scenario is 102.10 feet in the Upper Wilcox Aquifer (Layer 7) after five years (Hutchinson, 2021b) (Table 3). The additional drawdown in the Upper Wilcox Aquifer in Anderson County as a result of the combined annual production of 23,935 ac-ft from the Redtown Ranch Property is approximately 119.61 feet after five years (Table 3).

Table 3. Five-Year Model Predicted Average Drawdown in Anderson County

Aquifer	Model Layer	Simulated "Base Run" Scenario 33 (TM 21-01)	Simulated "Base Run" & "Proposed UWLX"	Simulated "Proposed UWLX" Only
Average Drawdown in Anderson County, in Feet				
Queen City	4	32.05	65.95	33.90
Carrizo Sand	6	93.77	203.84	110.07
Upper Wilcox	7	102.10	221.71	119.61
Middle Wilcox	8	122.18	266.97	144.79
Lower Wilcox	9	154.60	335.75	181.15
Avg CZ-WLX	6-9	116.24	252.50	136.26

"Base Run" indicates the Groundwater Availability Model (GAM) Scenario 33, TM 21-01 (Hutchinson, 2021b), "Proposed UWLX" indicates proposed production of 23,935 ac-ft in the Upper Wilcox Aquifer (Layer 7).

LRE also calculated the average drawdown in Anderson County in all layers of the Carrizo-Wilcox Aquifers (Layers 6-9) as a result of the proposed production of 23,935 ac-ft/yr from the Upper Wilcox Aquifer at the Redtown Ranch Property. The average drawdown in the Carrizo-Wilcox Aquifers in Anderson County from the "Base Run" scenario is 116.24 feet after five years (Hutchinson, 2021b), and the additional drawdown in the Carrizo-Wilcox Aquifers in Anderson County as a result of the combined annual production of 23,935 ac-ft is approximately 136.26 feet after five years (Table 3).

Regional Water Plan

The place of use for the proposed water will be in areas that are currently experiencing significant water challenges, specifically in counties that are part of Regional Water Planning Areas C, G, H, K, and/or L. Detailed and board-approved water plans are accessible at the following links: https://www.twdb.texas.gov/waterplanning/rwp/regions/ and https://texasstatewaterplan.org/statewide. Based on the 2021 Interactive State Water Plan Viewer, the following deficits are projected:

- Region C: A shortfall of 250,000 acre-feet by 2030, increasing to a 1.24 million acre-feet deficit by 2070.
- Region G: A shortfall of 100,000 acre-feet by 2040, increasing up to a 300,000 acre-feet deficit by 2070.
- Region H: A shortfall of 210,000 acre-feet by 2030, increasing to 700,000 acre-feet deficit by 2070.
- Region K: A shortfall of 40,000 acre-feet by 2040, increasing to a 100,000 acre-feet deficit by 2070.

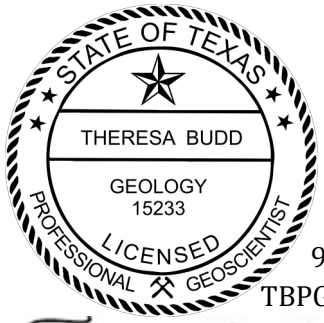
- Region L: A shortfall of 50,000 acre-feet by 2030, increasing to a 210,000 acre-feet deficit by 2070.

Based on the planning data for 2026, which is currently under development, greater deficits are expected in these Regional Planning Areas. However, according to the 2021 Interactive State Water Plan Viewer, Anderson County is projected to have no water deficit from now until 2070. The water to be produced from the Upper Wilcox Aquifer is crucial for serving populations in regions of Texas that are expected to face significant water shortages.

LRE appreciates the opportunity to provide you with this Hydrogeologic Report on behalf of Redtown Ranch Holdings, LLC. If you have any questions, please do not hesitate to contact us.

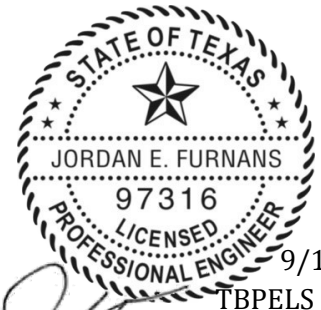
Sincerely,

LRE Water



9/11/2024
TBPG Firm #50516

Theresa Budd, PG
Senior Project Hydrogeologist



9/11/2024
TBPELS Firm #14368

Jordan Furnans, PhD, PE, PG
Vice President TX Operations

References

Cooper, H.H. and C.E. Jacob, 1946, A generalized graphical method for evaluating formation constants and summarizing well field history, Am. Geophys. Union Trans., vol. 27, p. 526-534.

Driscoll, F.G., 1986, Groundwater and Wells. 2nd Edition, Johnson Division, St. Paul.

Guyton, W.F., and Associates, 1972, Ground-Water Conditions in Anderson, Cherokee, Freestone and Henderson Counties, Texas: Texas Water Development Board Rept. 150, 250 p.

Hutchison, W.R., 2021a, GMA 11 Technical Memorandum 21-01, Adjusted Pumping Simulations for Joint Planning with Updated Groundwater Availability Model for the Sparta, Queen City, and Carrizo-Wilcox Aquifers, 31 p.

Hutchison, W.R., 2021b, Base Scenario Pumping Factors using Updated Groundwater Availability Model for the Sparta, Queen City, and Carrizo-Wilcox Aquifers.

Hutchinson, W.R., 2021c, Desired Future Conditions Explanatory Report (Final) Carrizo-Wilcox/Queen City/Sparta Aquifers for Groundwater Management Area 11.

Neches and Trinity Valleys Groundwater Conservation District Groundwater Management Plan, Adopted June 11, 2003. Amended August 15, 2019.

Neches and Trinity Valleys Groundwater Conservation District Rules, Effective as of June 11, 2003. Amended September 17, 2020.

Schorr, S., Zivic, M., Hutchinson, W.R., Panday, S., Rumbaugh, J., 2020. Conceptual Model Report: Groundwater Availability Model for Northern Portion of the Queen City, Sparta, and Carrizo-Wilcox Aquifers. Final Report prepared for Texas Water Development Board, Contract Number 1648302063.

Tarver, G.E., 1966, Ground-water Resources of Houston County, Texas: Texas Water Development Board Rept. 18, 68 p.

Texas Water Code, 2011, http://www.statutes.legis.state.tx.us/docs/WA/pdf/WA.36.pdf.

Theis, C.V., 1935, The relation between the lowering of the piezometric surface and the rate and duration of discharge of a well using groundwater storage, Am. Geophysics. Union Trans., vol 16, 519-524 p.

U.S. Geological Survey, 2004, National Elevation Dataset 30-Meter Resolution Digital Elevation Model.

Wade, Shirley, 2022, GAM Run 21-016 MAG: Modeled Available Groundwater for the Carrizo-Wilcox, Queen City, and Sparta Aquifers in Groundwater Management Area 11. Texas Water Development Board.

Wade, Shirley, 2017, GAM Run 17-024 MAG: Modeled Available Groundwater for the Carrizo-Wilcox, Queen City, and Sparta Aquifers in Groundwater Management Area 11. Texas Water Development Board.

Appendix A

Location of Proposed Upper Wilcox Wells on the Redtown Ranch Property

Appendix A – Location of Proposed Upper Wilcox Wells on the Redtown Ranch Property

Proposed Well	Latitude (NAD83) Decimal Degrees	Longitude (NAD83) Decimal Degrees	Latitude (NAD83) Degrees Minutes Seconds	Longitude (NAD83) Degrees Minutes Seconds	Proposed Pumping Rate (gpm)	Proposed Production (ac-ft/yr)
ULWX-1	31.519785	-95.69181585	31° 31' 11.226" N	95° 41' 30.537" W	1,400	2,264
UWLX-2	31.5480998	-95.71350724	31° 32' 53.159" N	95° 42' 48.626" W	1,400	2,264
UWLX-3	31.51711401	-95.72082104	31° 31' 1.610" N	95° 43' 14.956" W	1,000	1,617
UWLX-4	31.54548498	-95.72950403	31° 32' 43.746" N	95° 43' 46.215" W	1,200	1,941
UWLX-5	31.52363497	-95.73383201	31° 31' 25.086" N	95° 44' 1.795" W	1,000	1,617
UWLX-10	31.5303401	-95.70014224	31° 31' 49.224" N	95° 42' 0.512" W	1,300	2,102
UWLX-11	31.53169198	-95.72043601	31° 31' 54.091" N	95° 43' 13.570" W	1,200	1,941
UWLX-12	31.53337403	-95.74763698	31° 32' 0.146" N	95° 44' 51.493" W	1,300	2,102
Total Combined Production in Anderson County					9,800	15,849
UWLX-6	31.4989663	-95.69511773	31° 29' 56.279" N	95° 41' 42.424" W	1,300	2,102
UWLX-7	31.49522751	-95.71512428	31° 29' 42.819" N	95° 42' 54.447" W	1,200	1,941
UWLX-8	31.49215104	-95.74000641	31° 29' 31.744" N	95° 44' 24.023" W	1,300	2,102
UWLX-9	31.51217251	-95.69867272	31° 30' 43.821" N	95° 41' 55.222" W	1,200	1,941
Total Combined Production in Houston County					5,000	8,086

"NAD83" indicates North American Datum of 1983, "gpm" indicates gallons per minute, "ac-ft/yr" indicates acre-feet per year, cells highlighted in gray indicate proposed wells located in Houston County (outside NTVGCD boundary).

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Appendix B

Surrounding Wells in Anderson County Within 5-Miles of the Redtown Ranch Property

Appendix B – Surrounding Wells in Anderson County Within 5-Miles of the Redtown Ranch Property

Map ID	Well ID (Well Report Tracking Number, or State Well Number)	Source ID (NTVGCD, SDR, TWDB Database)	Latitude (NAD83)	Longitude (NAD83)	Well Name/Owner	Well Depth/ Borehole Depth (ft)	Well Use	LRE-Designated Aquifer
1	402572	NTVGCD	31.56461	-95.65446	LINH HOANG LE'S HOPE FARM LLC 1	600	Domestic	Carrizo
2	661718	NTVGCD	31.58095	-95.62991	KERRY JAMES LOCKE	200	Domestic	Queen City
3	561846	NTVGCD	31.576111	-95.648334	JESSE JAMES	178	Domestic	Queen City
4	-	NTVGCD	31.59744	-95.64077	REYNALDO VERA	640	Domestic	Carrizo
5	441813	NTVGCD	31.59569	-95.63975	MIKE TROCKO	255	Domestic	Queen City
6	-	NTVGCD	31.54069	-95.65656	LEON BARTON, JR	460	Domestic	Carrizo
7	403727	NTVGCD	31.595	-95.645833	MIKE FRANKS	695	Domestic	Carrizo
8	-	NTVGCD	31.626667	-95.691944	JERALD UNDERWOOD	110	Domestic	Queen City
9	3827201	TWDB	31.599167	-95.704723	Emmett Coleman	565	Irrigation	Carrizo
10	3827304	TWDB	31.584167	-95.666112	Emmett Coleman	330	Stock	Queen City
11	3827401	TWDB	31.549445	-95.729722	Moore & Wardlaw	417	Irrigation	Carrizo
12	3827602	TWDB	31.545	-95.665278	Mary Johnson	36	Domestic	Queen City
13	3827702	TWDB	31.510834	-95.730833	Moore & Wardlaw	-	Irrigation	Unknown
14	3827703	TWDB	31.530555	-95.731389	Moore & Wardlaw	-	Irrigation	Unknown
15	3827704	TWDB	31.530555	-95.731389	Moore & Wardlaw	-	Irrigation	Unknown
16	3827705	TWDB	31.54	-95.716111	Vernon Calhoun	-	Irrigation	Unknown
17	3827706	TWDB	31.541111	-95.715001	Moore & Wardlaw	425	Irrigation	Carrizo
18	3827707	TWDB	31.541389	-95.711667	Vernon Calhoun	350	Domestic	Carrizo
19	3827708	TWDB	31.523889	-95.709445	Vernon Calhoun	50	Unused	Queen City
20	3827804	TWDB	31.540278	-95.708056	Ronald Burke	300	Domestic	Carrizo
21	3827805	TWDB	31.514445	-95.704723	Vernon Calhoun	600	Domestic	Upper Wilcox
22	43690	SDR	31.590278	-95.660278	Carl Rutledge	144	Domestic	Queen City
23	223632	SDR	31.531111	-95.656112	Cook, D.	161	Domestic	Queen City
24	337816	SDR	31.603889	-95.660278	D. Criswell	223	Domestic	Queen City
25	47021	SDR	31.594445	-95.712223	Nat Coleman	500	Irrigation	Carrizo
26	47058	SDR	31.578333	-95.705001	Gary Gunnels	455	Irrigation	Carrizo
27	262950	SDR	31.586389	-95.712778	Ronnie Steadman	485	Irrigation	Carrizo
28	410138	SDR	31.574056	-95.634167	CHARLES RYLEE	182	Irrigation	Queen City

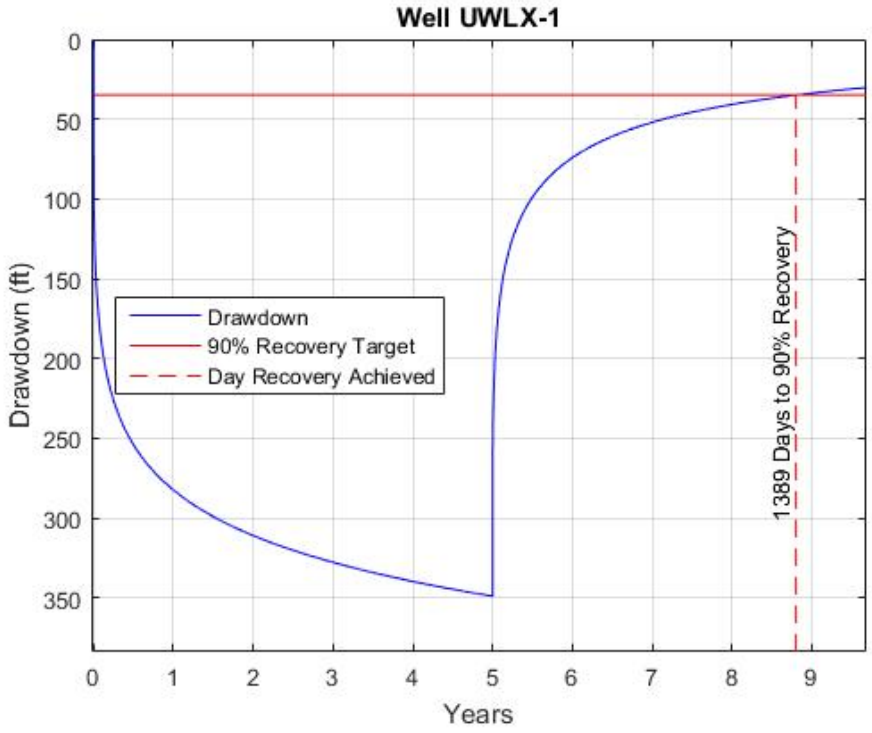
"NAD83" indicates North American Datum of 1983, "ft" indicates feet, LRE-designated aquifer classification based on well depth and/or screen intervals, "-" indicates not applicable or missing data.

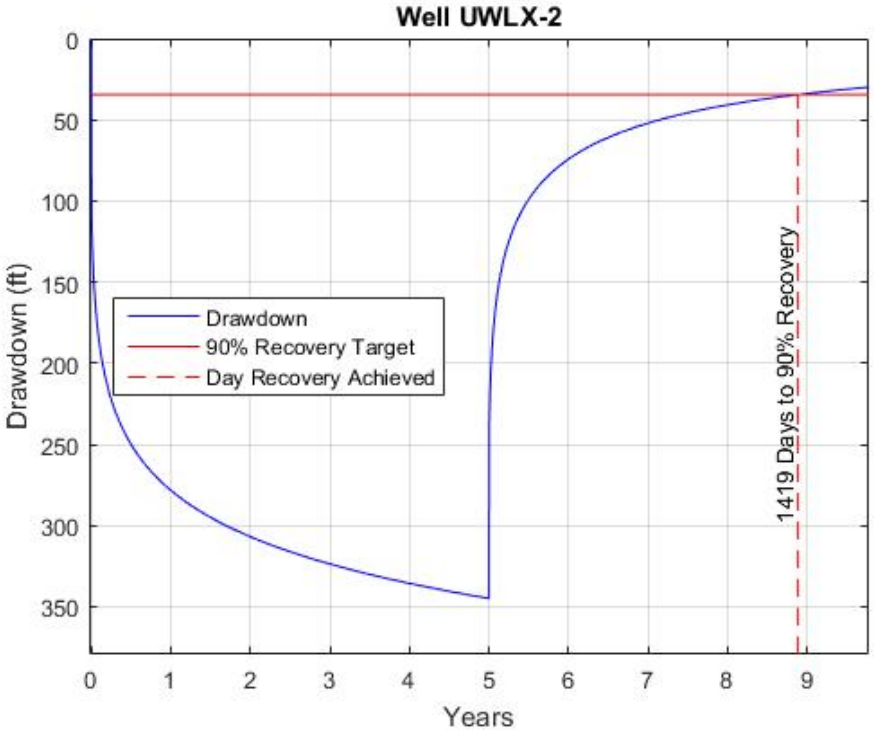
LRE WATER

Appendix C

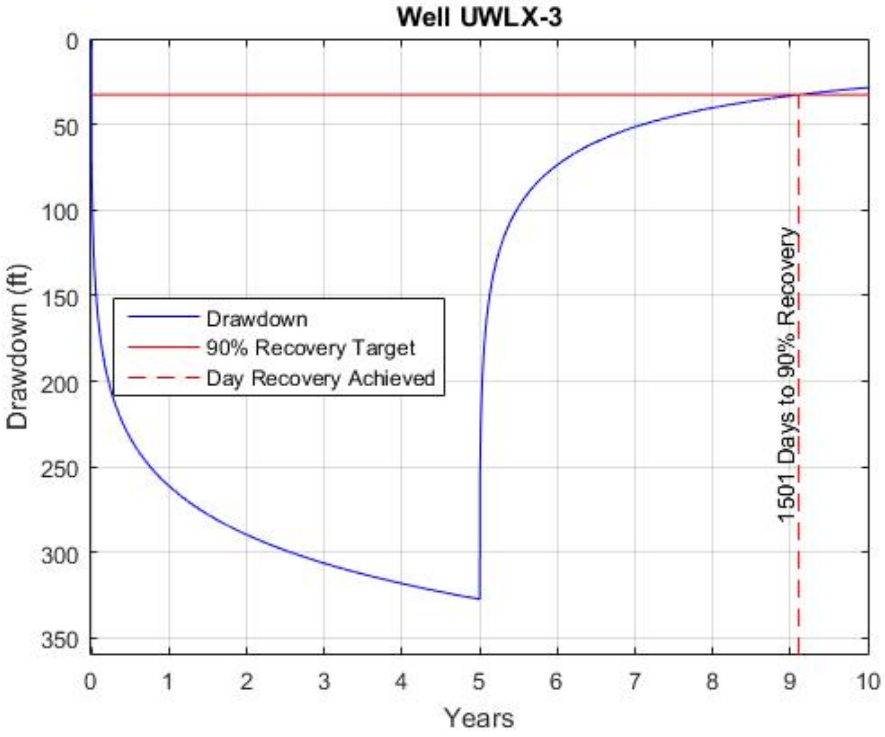
Pumping and Recovery Hydrographs from Analytical Modeling

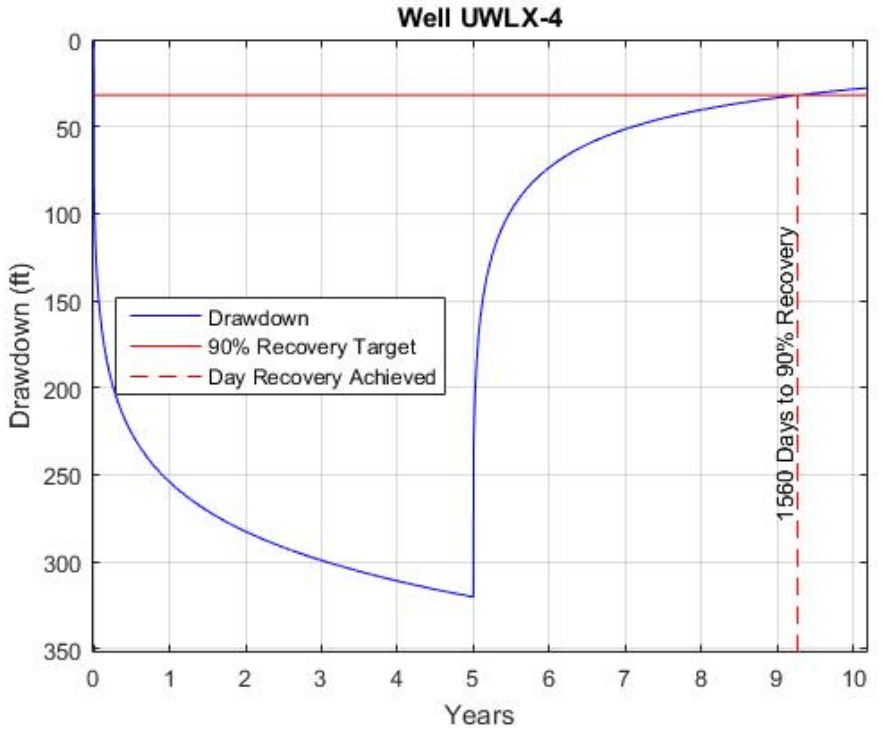
Appendix C – Pumping and Recovery Hydrographs



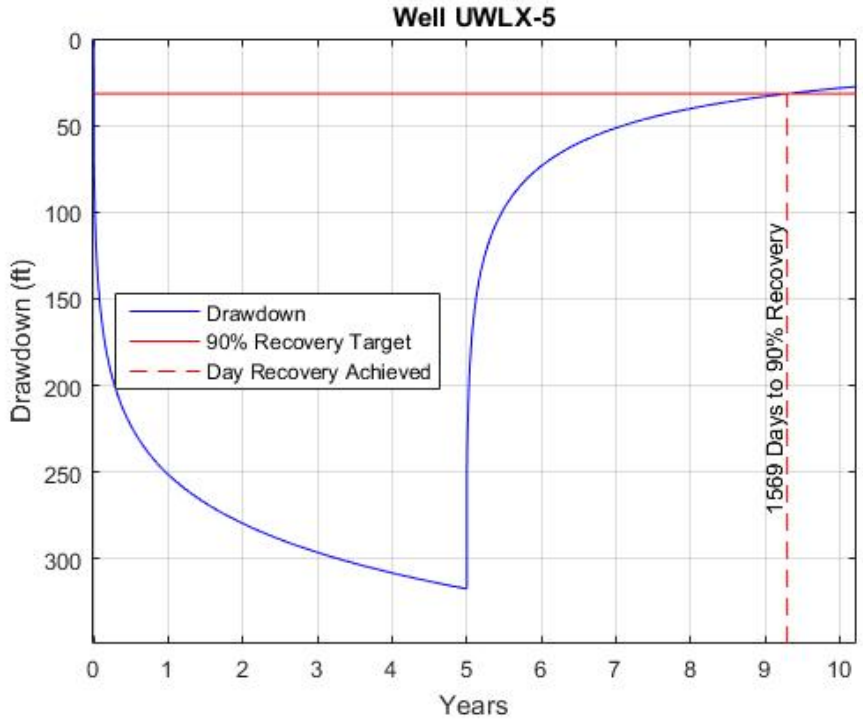


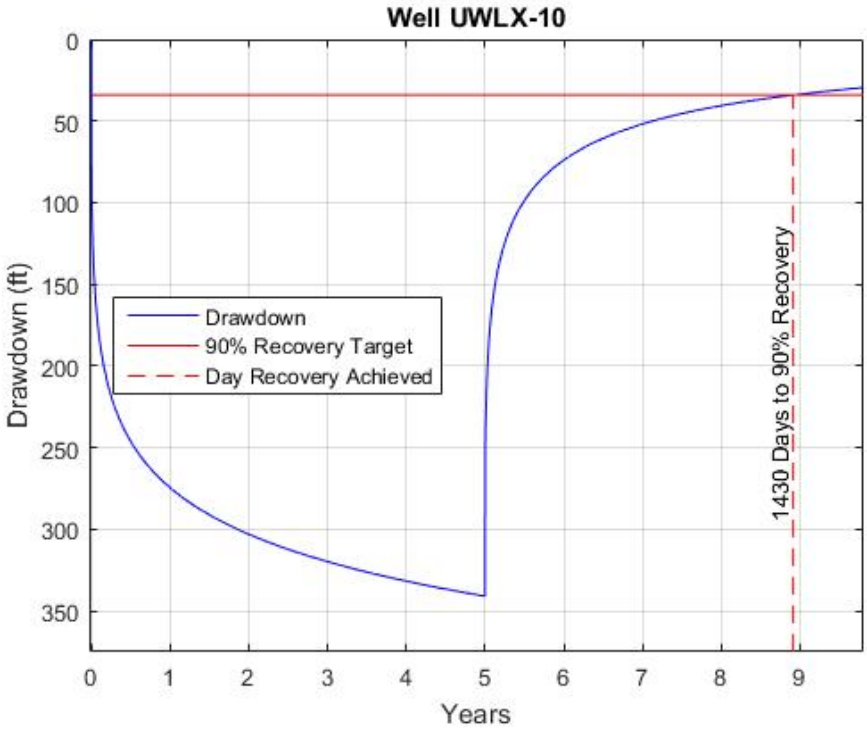
Appendix C – Pumping and Recovery Hydrographs





Appendix C – Pumping and Recovery Hydrographs





Appendix C – Pumping and Recovery Hydrographs