THORNHILL GROUP, INC.

Professional Hydrogeologists • Water Resources Specialists

June 13, 2023

Mr. Alan M. Day, General Manager
Brazos Valley Groundwater Conservation District
112 West 3rd Street
Hearne, Texas 77859

Re: Supplemental Information for Badgerjack Resource Holdings Permit Applications – Responses to Questions/Comments from District Consultants

Dear Mr. Day:

Thornhill Group, Inc. (TGI) received from you on June 6, 2023 the e-mailed transmittal of questions and comments from Ground Water Consultants (GWC) and Advanced Groundwater Solutions (AGS) regarding the Badgerjack Resource Holdings, L.P. Aquifer Evaluation Report that TGI prepared and is dated February 10, 2023. This letter provides our responses to those questions and comments.

Note that the report was primarily prepared by Mr. Wesley Bluvstein, P.G. and was signed and sealed by him as a professional geoscientist licensed in Texas. Mr. Bluvstein is no longer with our firm. Therefore, the responses are prepared and submitted by Mr. Eric Seeger, P.G. and me. The GWC/AGS comments are provided below followed by our responses. In-text tables are provided within this letter under the comment in which they are addressed. Otherwise, applicable tables, maps, and other information are provided in the Attachment section to this letter.

GWC/AGS Questions and Comments and TGI Responses

1. *The number of BVGCD permitted and registered wells within 1-mile of the proposed Badgerjack wells shown on Figure 2 of the Hydrogeological Report is not the same as the number of BVGCD Simsboro wells shown on Exhibit No. 1 (Figure No. – Map depicting Locations of Badgerjack Wells Nos. 1, 2, 3, 4 & 12) included in the Badgerjack Resource Holdings, LP Application submitted to BVGCD. Table 2 included [sic] the Hydrogeological Report has the same number of wells as shown of Figure 2 included [sic] the Hydrogeological Report but does not include the additional wells shown on Figure 2 included as Exhibit No. 1. Please check the BVGCD permitted and registered Simsboro wells within 1-mile of the proposed Badgerjack wells and update Table 2 as needed.*

Table 2 has been updated and the missing wells have been added (see Attachment). TGI also includes revised Figure 2 and added Figures 2a through 2c showing BVGCD wells within 1 mile of the proposed Badgerjack well sites.

2. *What GAM stress period/year are the extracted GAM heads from in the table on Page 7 of the Aquifer Evaluation Report?*

TGI does not know which GAM stress period Mr. Bluvstein used for the water-level elevations in the referenced table on Page 6 of the Aquifer Evaluation Report. TGI believes that monitored water levels provide a more accurate basis for the evaluations. Therefore, we have replaced the table on Page 6 with the table below which utilizes measured water levels from the most recent (i.e., 2023) available measurements in the BVGCD dataset. The water-level elevations are rounded as these are estimated values at each of the proposed Badgerjack well sites.

Well Identification	Estimated Water Level Elevation (ft AMSL)	Simsboro Top (ft AMSL)	Artesian Head (ft)
Badgerjack_1	180	137	43
Badgerjack_2	180	131	49
Badgerjack_3	180	-8	188
Badgerjack_4	175	0	175
Badgerjack_5	175	-175	350
Badgerjack_6	175	-383	558
Badgerjack_7	175	-423	598
Badgerjack_8	175	-1,079	1,254
Badgerjack_9	175	-1,079	1,254
Badgerjack_10	175	-1,076	1,251
Badgerjack_11	175	-1,076	1,251
Badgerjack_12	180	-95	275

Notes: Estimated water level elevation is based on the depth to water level reported on the BVGCD Groundwater Map for surrounding monitoring wells completed in the Simsboro aquifer.

3. *Please check the 1-year and 10-year GAM and analytical modeling results shown in the table on Page 9 of 10 of the TGI Aquifer Evaluation Report. Some drawdown values shown in the table on Page 9 of the TGI report are not in agreement with the contours shown on Figures 5, 6, 7, and 8 in the TGI Aquifer Evaluation Report.*

TGI reviewed the contour maps illustrating the GAM simulations drawdown and analytical drawdown calculations and noted discrepancies in the table on Page 9 of 10 of the Aquifer Evaluation Report. TGI has submitted corrections as noted in Item 3.1. and Item 3.2. below.

1. *GAM verification runs result in drawdown contours that are generally similar to the GAM contours shown on Figures 5 and 6 of the TGI Aquifer Evaluation Report. The contours developed from the GAM verification runs are in general agreement with the 1-year and 10-year GAM simulated drawdown values for most wells shown on Table 1 of the TGI Aquifer Evaluation Report.*

   The contour maps illustrating drawdown from GAM simulations are correct. However, TGI noted some discrepancies in the tabulated values on Page 9 of 10 in comparison to Figure 5 and Figure 6. TGI has corrected the table in accordance with the contours in Figure 5 and Figure 6 and re-submits it herein. Please replace the table on Page 10 of 11 in the original Aquifer Evaluation Report with the table below (see 3.2.).

2. *AGS was able to generally recreate the 1-year and 10-year analytical model results for most of the wells shown on Table 1 of the Aquifer Evaluation Report. However, there are differences between some of the simulated drawdown results at the Badgerjack wells shown in the table on Page 9 of 10 of the TGI Aquifer Evaluation Report and the results obtained during the AGS analytical modeling verification simulations. AGS used the Badgerjack well production rates and aquifer properties outlined in the Aquifer Evaluation Report to estimate drawdown values at 1-foot from the well(s). Please elaborate on the TGI methodology, if different from the above, used to estimate the analytical model results at the Badgerjack wells shown in the table on Page 9 of 10 of the TGI Aquifer Evaluation Report.*

   TGI noted discrepancies in the analytical values. We could not replicate Mr. Bluvstein's Theis calculations and noted that several of the well location inputs were in error; therefore, TGI re-constructed the analytical calculations in accordance with the methodology used in our previous reports submitted to BVGCD. We have re-drawn the drawdown maps and corrected the tabulation. Please replace Figure 7 and Figure 8 in the original Aquifer Evaluation Report with Figure 7 (Revised) and Figure 8 (Revised), respectively. Also, please replace the table on Page 9 of 10 of the original Aquifer Evaluation Report with the tabulation below.

Well Identification	1-Year GAM Drawdown (ft)	10-Year GAM Drawdown (ft)	1-Year Analytical Drawdown (ft)	10-Year Analytical Drawdown (ft)
Badgerjack_1	28	59	79	90
Badgerjack_2	44	68	83	93
Badgerjack_3	49	73	86	96
Badgerjack_4	39	59	76	86
Badgerjack_5	33	42	56	67
Badgerjack_6	37	47	67	77
Badgerjack_7	36	46	67	77
Badgerjack_8	27	36	59	69
Badgerjack_9	28	36	59	68
Badgerjack_10	39	50	46	57
Badgerjack_11	38	49	47	57
Badgerjack_12	58	79	79	89

Additional to the comments by GWC and AGS, TGI noted on page 9 of 10 and on page 10 of 10 of the Aquifer Evaluation Report that Mr. Bluvstein noted that three (3) Badgerjack wells could potentially "…abstract water from storage." Basic hydrogeology dictates that (as Mr. Theis wrote) all pumped water is derived from storage. Mr. Bluvstein was noting that some pumping water levels could fall slightly below the top of the uppermost Simsboro sands. Note that TGI will advise Badgerjack and selected drillers to complete wells such that uppermost sands are not screened to prevent physical conditions in the well related to drawing the water level below the top of the screen. Otherwise, the overall reduction in storage from the Simsboro Aquifer will still be infinitesimally small.

If you have any questions, please feel free to contact me or Mr. Eric Seeger directly at (512) 244-2172.

The seal appearing on this document was authorized by Michael R. Thornhill, P.G. on June 13, 2023.

Sincerely,
THORNHILL GROUP, INC.

Michael R. Thornhill, P.G.
President

Attachments

cc: Mr. Ed McCarthy, McCarthy & McCarthy LLP
Mr. Richard Gaas, Badgerjack Resource Holdings, LP
Ms. Cathy Gaas, Badgerjack Resource Holdings, LP

Attachment 1 –
Table and Figures

Table 2. Registered/Permitted Simsboro Wells Within a One-Mile Radius - Revised 06/13/2023

Registration or Permit Number	Latitude	Longitude	Name of Well	Owner	Well Depth feet	Casing Diameter Inches	Casing Depth feet BGL	Screen Diameter Inches	Screen Depth ft BGL	Aquifer
BVHU-0045	31.039972	-96.683673	Major Oak Power LLC - TOP WW #1	Texas-New Mexico Power Co.	999	24, 18, & 10	+2 - 40 +2 - 604 604 - 614	10	614 - 664	Simsboro
BVR-0073	31.018133	-96.637100	Well #1	Gaas, Ronnie & Cathy OR Ruby Brien	380	4, 2 & 2 1/2	+1 - 340 329 - 350 370 - 380	2 1/2	350 - 370	Simsboro
BVR-0118	30.995918	-96.680121	Well #1	Unknown	365	Unknown	Unknown	Unknown	Unknown	Simsboro
BVR-0309	31.045148	-96.670744	Well #2	Sessums, Billy D.	450	4 & 2	+1 - 380 368 - 410 430 - 450	2 1/2	410 - 430	Simsboro
BVOP-0322	31.012027	-96.687656	Well #4	Unknown	u	Unknown	Unknown	Unknown	Unknown	Simsboro
BVR-0644	31.022643	-96.630527	Lastor - Domestic	Lastor, Lillian	480	4 & 2	0 - 320 320 - 460	2	460 - 480	Simsboro
BVR-0739	31.008676	-96.632443	Unknown	Burke, John	505	4	0 - 480	4	480 - 500	Simsboro
BVR-0880	31.020944	-96.670283	#1	Ables, Wallace	560	4 & 2 1/2	0 - 500 487 - 500	2 1/2	500 - 560	Simsboro
BVR-1006	31.026580	-96.646252	Old Barn Well	Rampy, Ty	400	4	Unknown	Unknown	Unknown	Simsboro
BVR-1012	31.024717	-96.644026	House Well	Rampy, Ty	390	4 & 2	+1 - 340 329 - 350 370 - 390	2	350 - 370	Simsboro
BVR-1098	31.022964	-96.624560	Unknown	McInnes, Dianne	540	4 & 2 1/2	0 - 440 530 - 540	2 1/2	430 - 530	Simsboro
BVR-1200	31.016029	-96.681019	Unknown	Davis, Bob	483	4 & 2	+1 - 400 390 - 453 473 - 483	2 1/2	453 - 473	Simsboro
BVR-1268	31.020404	-96.669160	#2	Jones, Sandra	340	4	0 - 340	Unknown	Unknown	Simsboro
BVR-2802	31.018358	-96.625752	Well #2	Bingle Road Properties	500	4 & 2	0 - 295 295 - 490	2	490 - 500	Simsboro
BVR-2946	31.019023	-96.625399	Well #3	Hajduk, Kenneth & Darlene	495	4 1/2	0 - 455	4 1/2	455 - 495	Simsboro
BVR-2998	31.022173	-96.673365	Unknown	Pride, Allen	484	4 & 2 1/2	+1 - 348 344 - 384 424 - 484	2 1/2	384 - 424	Simsboro
BVR-2999	31.020082	-96.674835	Unknown	St. Paul Church	540	4 & 2	+1 - 400 389 - 515 535 - 540	2 1/2	515 - 535	Simsboro
BVR-3004	31.038897	-96.667651	Well #2	Gaas, Ronnie	400	4 & 2	+1 - 320 307 - 370 390 - 400	2 1/2	370 - 390	Simsboro
BVR-3006	31.006163	-96.690419	Well #2	Hill, Betty E.	594	4 & 2	+1 - 532 552 - 594	2	522 - 552	Simsboro
BVR-3703	31.025780	-96.672887	#1	Hard, James & Lorrie	501	4	0 - 460	4	460 - 500	Simsboro
BVR-4287	31.011512	-96.638853	Unknown	Berger, Dwayne	540	4 & 2 1/2	0 - 454 530 - 540	2.5	430 - 530	Simsboro
BVR-4288	31.011059	-96.633712	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Simsboro
BVR-4322	31.031439	-96.628308	Well #1	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Simsboro
BVR-4545	31.024475	-96.626825	Well #2	XTO Energy	440	4	0 - 340	4	340 - 440	Simsboro
BVR-4565	31.022941	-96.672354	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Simsboro

BVR-0309

BVHU-0045

BVR-3004

Badgerjack_1

BVR-3703

BVR-4565

BVR-2998

BVR-0880

BVR-1268

BVR-2999

Explanation

- BVGCD Reported Well Completed in the Simsboro and W/in 1 Mile
- Proposed Badgerjack Resource Well
- 1 Mile Radius from Well Locations
- Badgerjack Resource Property

0 1,000 2,000 ft

Badgerjack Resource Holdings, L.P.

Revised Figure 2:
BVGCD Wells Within 1 Mile

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Explanation

- BVGCD Reported Well Completed in the Simsboro and W/in 1 Mile
- Proposed Badgerjack Resource Well
- 1 Mile Radius from Well Locations
- Badgerjack Resource Property

0 1,000 2,000 ft

Badgerjack Resource Holdings, L.P.

Revised Figure 2a:
BVGCD Wells Within 1 Mile

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BVR-0880
BVR-1268
BVR-2999
BVR-1200
BVOP-0322
Badgerjack_3
Badgerjack_2
Badgerjack_12
BVR-3006
BVR-0118

Explanation

- BVGCD Reported Well Completed in the Simsboro and W/in 1 Mile
- Proposed Badgerjack Resource Well
- 1 Mile Radius from Well Locations
- Badgerjack Resource Property

0 1,000 2,000 ft

Badgerjack Resource Holdings, L.P.

Revised Figure 2b:
BVGCD Wells Within 1 Mile

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Explanation

- BVGCD Reported Well Completed in the Simsboro and W/in 1 Mile
- Proposed Badgerjack Resource Well
- 1 Mile Radius from Well Locations
- Badgerjack Resource Property

0 1,000 2,000 ft

Badgerjack Resource Holdings, L.P.

Revised Figure 2c:
BVGCD Wells Within 1 Mile

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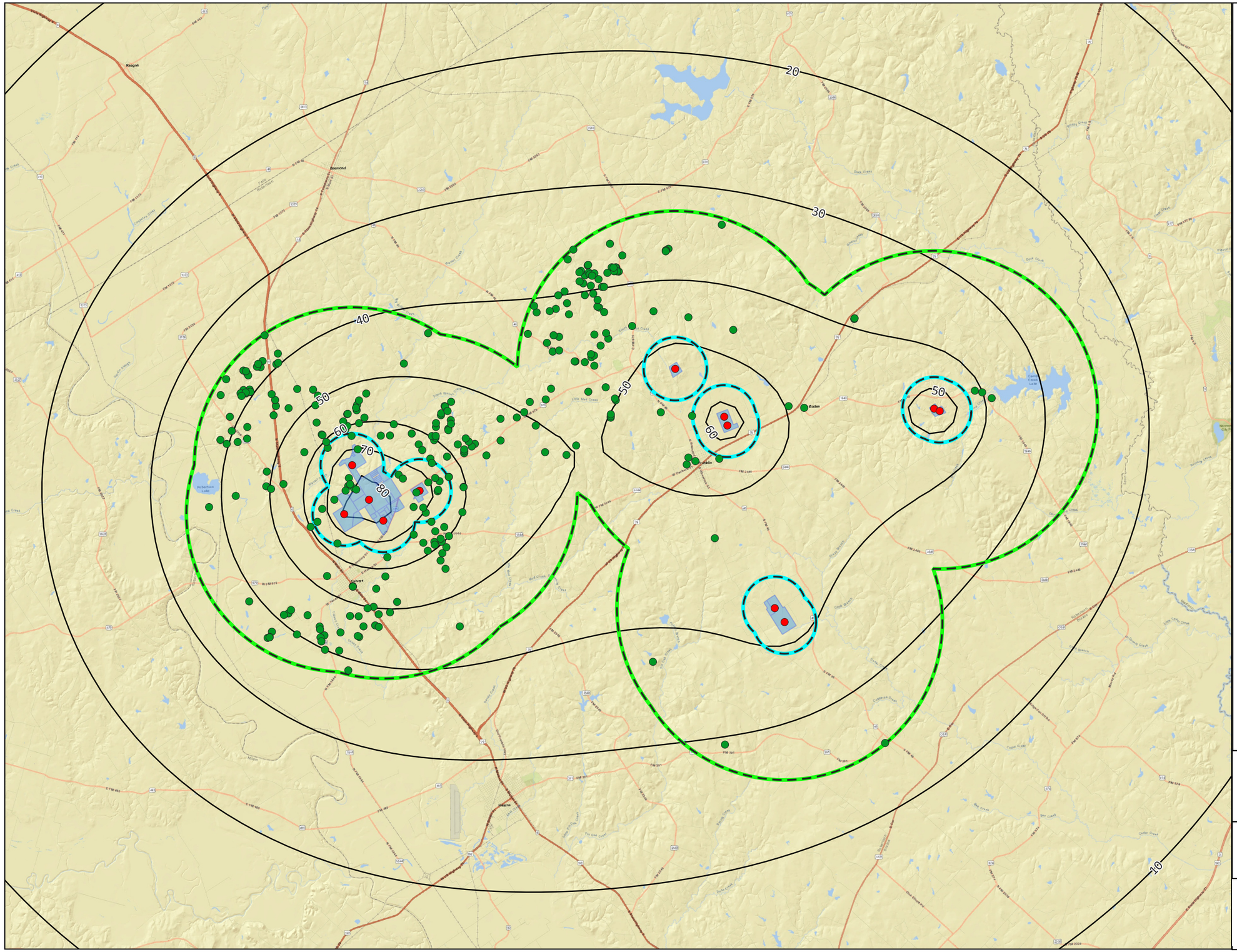

Explanation

- BVGCD Reported Well Completed in the Simsboro and W/in 5 Miles
- Proposed Badgerjack Resource Well
- 1-Yr Modeled Drawdown Contour Interval = 10 feet
- 1 Mile Radius from Well Locations
- 5 Mile Radius from Well Locations
- Badgerjack Resource Property

0 3 6 mi

Badgerjack Resource Holdings, L.P.

Revised Figure 7:
1-Year Analytical Drawdown

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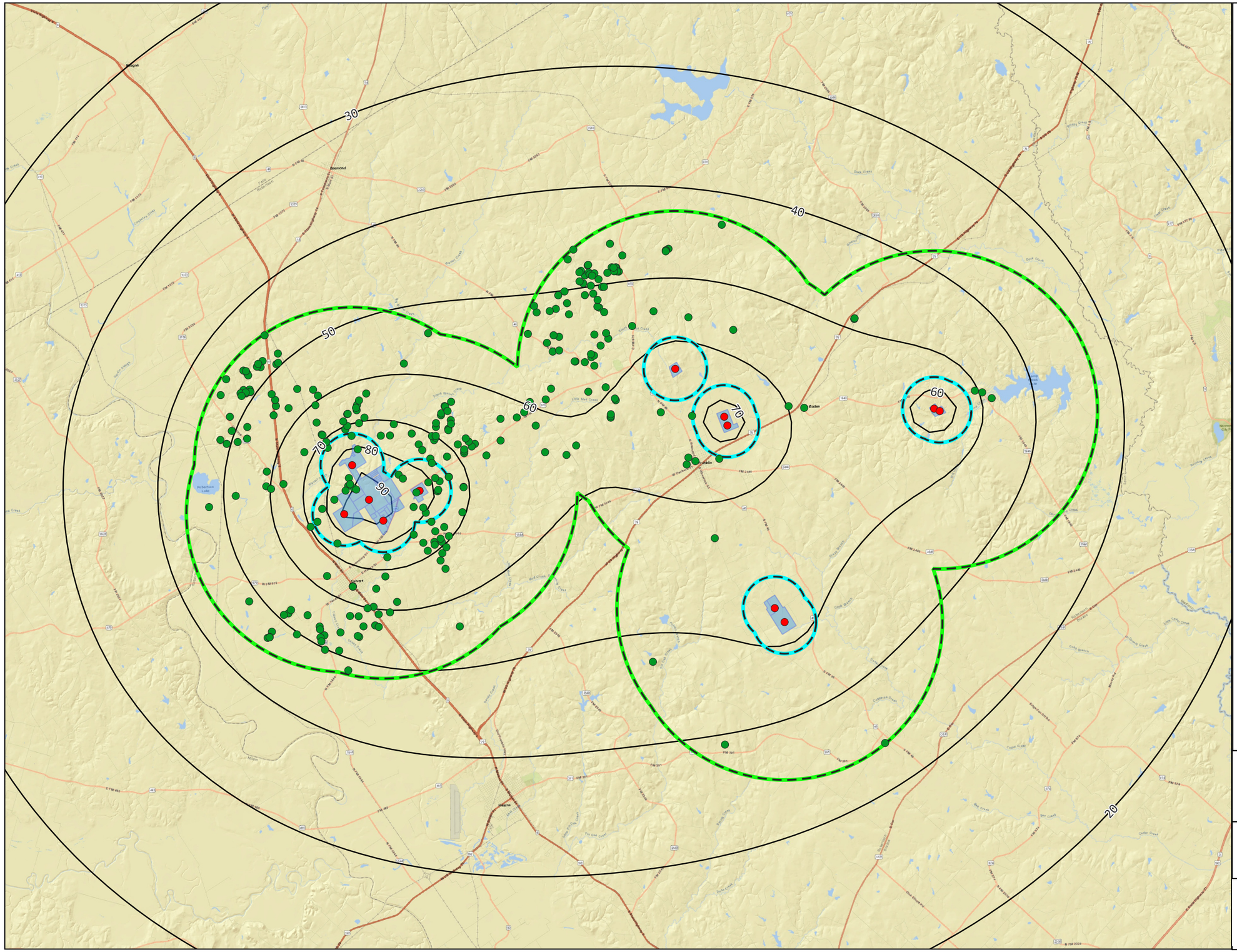

Explanation

- BVGCD Reported Well Completed in the Simsboro and W/in 5 Miles
- Proposed Badgerjack Resource Well
- 10-Yr Modeled Drawdown Contour Interval = 10 feet
- 1 Mile Radius from Well Locations
- 5 Mile Radius from Well Locations
- Badgerjack Resource Property

0 3 6 mi

Badgerjack Resource Holdings, L.P.

Revised Figure 8:
10-Year Analytical Drawdown

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