

**MINUTES OF THE FEBRUARY 8, 2016
BOARD OF DIRECTORS MEETING OF
NORTH PLAINS GROUNDWATER CONSERVATION DISTRICT**

The Board of Directors of North Plains Groundwater Conservation District met in regular session February 8, 2016 at 9:00 a.m. in the Conference Room of the North Plains Water Conservation Center, 6045 County Road E., Etter, Texas. The following persons were present:

Members Present at 9:09 a.m.:

Bob B. Zimmer, President;
Danny Krienke, Secretary;
Gene Born, Director;
Harold Grall, Vice-President;
Justin Crownover, Director;
Mark Howard, Director; and
Zac Yoder, Director.

Staff Present during part or all of the meeting:

Steve Walthour, General Manager;
Dale Hallmark, Assistant General Manager/Hydrologist;
Kirk Welch, Assistant General Manager/Outreach;
Pauletta Rhoades; Finance and Administration Coordinator;
Kristen Lane, Executive Assistant;
Casey Tice, Compliance Coordinator;
Odell Ward, GIS and Natural Resources Tech Lead; and
Laura West, Production Monitoring Coordinator;
Paul Sigle, Agricultural Engineer;
Karen Mannis, Natural Resource Specialist;
Jerry Green, Natural Resource Specialist
Curtis Schwertner, Natural Resource Specialist;
Patsy Long, Part-time Receptionist;
Shari Stanford, Natural Resource Specialist;
Mike Pitts, Monitor Well Coordinator; and,
Lynsey McAnally, Conservation Outreach Assistant.

Others present during part or all of the meeting:

Louis Leven;
F. Keith Good, Attorney; and,
Ellen Orr, Paralegal.

President Zimmer declared a quorum present and called the meeting to order at 9:09 a.m. Director Zac Yoder gave the invocation. Mark Howard led the pledge.

1 – Public Comment

President Zimmer asked if there were persons present who desired to make public comments. No public comments were received.

2 – Consent Agenda

The Consent Agenda, was discussed by the Board and consisted of: the review and approval of the Minutes of the regular January 12, 2016 Board Meeting; the review and approval of District expenditures for January 1, 2016 through January 31, 2016, including the General Manager's expense and activity report; the review and approval of payment to Lemon, Shearer, Phillips & Good, P.C. for professional services and out-of-

pocket expenses from January 1, 2016 through January 31, 2016 in the amount of \$5,710.70; review and adoption of a resolution to exempt personal property taxes on personal boats, personal vehicles, airplanes, motor homes and trailers for calendar year 2015 in Dallam, Sherman, Hansford, Ochiltree, Lipscomb, Hartley, Moore and Hutchinson Counties, Texas; consider and approve homestead exemptions for 2016 of 10% or \$10,000 – Homestead; \$100,000 - Over 65; \$100,000 - Disability SS; the maximum percentage for Disabled Veterans; and review and consider accepting a \$2,300.00 bid offer from Jonathan R. Sharp for property struck off of the tax rolls at 110 Mackenzie Avenue N., Stinnett, Texas. Justin Crownover moved to approve the Consent Agenda. Zac Yoder seconded the motion and it was unanimously approved by the Board.

Troy Dale Hallmark, Assistant General Manager/Hydrologist of the District, was recognized by the Board and honored for twenty years of service.

The Board recessed at 9:14 a.m. (for refreshments and celebration with Dale) and reconvened at 9:31 a.m.

Action Agenda 3d - Receive report and consider action regarding GMA-1.

Steve Walthour presented the following report:

2015 Possible Production
For Discussion Purposes Only
2/2/2016

District Production Average					2015 District Production Comparison				MAG From Proposed DFC								
County	Average Annual Production 2010-2015	Estimated MAG Average 2010-2015	Annual Average DFC Available Reserve	MAG Percent Above or Below Production	2015 Production	2015 Estimated MAG	2015 DFC Available Reserve	MAG Percent Above or Below Production	County	2015	2016	2020	2030	2040	2050	2060	2070
Dallam	354,888	393,607.73	41,220	10%	284,174	378,541	94,367	25%	Dallam	381,900	402,300	368,570	296,055	231,405	172,021	116,499	78,820
Hansford	191,811	279,008.75	87,198	45%	153,699	273,480	119,790	44%	Hansford	287,639	265,814	265,814	265,814	265,814	265,814	265,814	265,814
Hartley	436,018	414,284.25	-21,734	-5%	395,166	396,622	61,455	15%	Hartley	513,044	493,485	428,894	352,668	288,208	225,129	166,511	120,905
Hutchinson	64,494	60,579.25	-3,899	-6%	54,897	59,845	4,948	8%	Hutchinson	65,983	59,736	60,783	62,418	63,505	63,913	63,887	62,877
Lipscomb	44,253	288,831.00	244,578	89%	32,807	287,152	254,345	89%	Lipscomb	54,556	252,671	252,671	233,671	232,871	232,871	232,871	232,871
Moore	212,816	196,684.25	-15,632	-7%	150,987	189,578	38,591	20%	Moore	273,874	222,548	216,254	189,799	154,418	117,628	83,597	55,652
Ochiltree	94,810	263,716.00	168,906	64%	78,430	237,899	179,539	76%	Ochiltree	113,834	231,480	231,432	231,432	231,432	231,432	231,432	231,432
Sherman	382,220	317,880.25	-64,339	-17%	268,414	311,796	43,382	14%	Sherman	404,616	406,849	407,168	355,348	285,336	215,577	146,931	80,391
Total	1,790,261	2,212,558	482,303	27%	1,856,513	2,154,890	796,417	37%	Total	2,046,320	2,333,903	2,229,564	2,006,999	1,773,784	1,542,190	1,327,334	1,153,713

West - Production Average					2015 West Production Comparison				MAG From Proposed DFC								
County	Average Annual Production 2010-2015	Estimated MAG Average 2010-2015	Annual Average DFC Available Reserve	MAG Percent Above or Below Production	2015 Production	2015 Estimated MAG	2015 DFC Available Reserve	MAG Percent Above or Below Production	County	2015	2016	2020	2030	2040	2050	2060	2070
Dallam	354,888	395,608	41,220	10%	284,174	378,541	94,367	25%	Dallam	381,900	402,300	368,570	296,055	231,405	172,021	116,499	78,820
Hartley	436,018	414,284	-21,734	-5%	395,166	396,622	61,455	15%	Hartley	513,044	493,485	428,894	352,668	288,208	225,129	166,511	120,905
Moore	212,816	196,684	-15,632	-7%	150,987	189,578	38,591	20%	Moore	273,874	222,548	216,254	189,799	154,418	117,628	83,597	55,652
Sherman	382,220	317,880	-64,339	-17%	268,414	311,796	43,382	14%	Sherman	404,616	406,849	407,168	355,348	285,336	215,577	146,931	80,391
Total	1,384,943	1,321,990	-62,953	-5%	1,089,740	1,276,535	237,785	19%	Total	1,574,934	1,529,182	1,418,884	1,158,764	960,362	728,360	513,591	346,798

East - Production Average					2015 East Production Comparison				MAG From Proposed DFC								
County	Average Annual Production 2010-2015	Estimated MAG Average 2010-2015	Annual Average DFC Available Reserve	MAG Percent Above or Below Production	2015 Production	2015 Estimated MAG	2015 DFC Available Reserve	MAG Percent Above or Below Production	County	2015	2016	2020	2030	2040	2050	2060	2070
Hansford	191,811	279,009	87,198	45%	153,699	271,199	117,509	43%	Hansford	287,639	265,814	265,814	265,814	265,814	265,814	265,814	265,814
Hutchinson	64,494	60,575	-3,839	-6%	54,897	58,352	4,655	8%	Hutchinson	65,983	59,736	60,783	62,418	63,509	63,913	63,887	62,877
Lipscomb	44,138	288,831	244,578	89%	32,807	286,480	253,673	89%	Lipscomb	54,556	252,671	252,671	233,671	232,871	232,871	232,871	232,871
Ochiltree	94,810	263,716	168,906	64%	78,430	255,670	177,240	69%	Ochiltree	113,834	231,480	231,432	231,432	231,432	231,432	231,432	231,432
Total	395,309	892,131	496,822	56%	319,773	872,901	559,127	63%	Total	471,986	808,721	810,689	812,335	813,422	813,836	813,789	812,515

Achieving the DFC

The District has tools for achieving DFCs provided through the District's Management Plan and the District's Rules. District Rules 8.4 and 8.5 provide the formula for review and calculation of allowable annual production. Rule 8.4 sets the conditions for the District to consider a reduction of allowable annual production, if production exceeds the MAG during the first three years of the 5-year cycle. Rule 8.5 provides the method of calculating a reduction in the allowable annual production limit. However, District Rule 8.7 (Board Variance) provides that the Board may set an allowable annual production limit for a Management Zone that varies from the calculations, if a review of all of the aquifer characteristics and conditions warrants such a variance. For example, an aquifer condition of heavy pumping caused by an exceptional drought year, or years, could be a valid reason for granting a variance.

Essentially, reductions under Rules 8.4 and 8.5 do not occur unless the Board so chooses.

It was reported that a second tool that the District may incorporate more into its Management Plan as a method of achieving DFCs is the conservation education program. Under the District's conservation education program: the on-farm demonstration projects; the meter reimbursement program; the Water Conservation Center conservation outreach; and the Master Irrigator Program, all have significant import in achieving the District's DFCs.

Current Desired Future Conditions

In 2005, the Texas Legislature required groundwater conservation districts across the state to conduct joint planning with the other districts in management areas established by the Texas Water Development Board. The GCDs in each GMA were required to review the management plans, the accomplishments of the management area, and proposals to adopt new or amend existing desired future conditions. North Plains GCD is located in Groundwater Management Area 1 which encompasses eighteen counties and all, or part of, four groundwater conservation districts in the Texas Panhandle. The districts in GMA-1 adopted desired future conditions (DFCs) in 2009 and 2010 for the Blaine, Dockum and Ogallala/Rita Blanca Aquifers. Those DFCs are summarized in the table below.

Aquifer	Desired Future Condition Summary	Desired Future Condition Date Adopted
Blaine	Fifty percent of the volume in storage remaining in 50 years in Wheeler County.	6/3/2010
Dockum	Average decline in water levels will decline no more than 30 feet over the next 50 years.	6/3/2010
Ogallala and Rita Blanca	Forty percent of volume in storage remaining in 50 years in Dallam, Hartley, Moore, and Sherman counties; Fifty percent of volume remaining in 50 years in Armstrong, Potter, Randall, Hansford, Hutchinson, Lipscomb, Ochiltree, Carson, Donley, Gray, Roberts, Wheeler, and Oldham counties; and 80 percent of volume in storage remaining in 50 years in Hemphill County.	7/7/2009

The Blaine Aquifer is not located in the District. During the first round of planning, the District requested GMA-1 combine the Rita Blanca and Ogallala aquifers in proposing DFCs because the data for the Rita Blanca Aquifer was not delineated well enough from the Ogallala Aquifer. The District selected the same 30-foot draw-down amount as the other counties for the Dockum in GMA-1.

Once the DFCs were finally adopted, the TWDB returned GAM runs to the districts to be used to gage the districts' achievement of the DFC goals. GAM Run 12-005 MAG provides the modeled available groundwater (MAG) for the Ogallala and Rita Blanca Aquifers; GAM Run 10-019 MAG provides the modeled available groundwater for the Dockum aquifer. The reports provide MAG amounts by county, management zone, groundwater conservation district, and river basin. The MAG based on the DFCs is summarized in the table above.

Modeled Available Groundwater

The District currently uses groundwater amounts extracted from GAM Run 12-005. The table below shows the MAG amounts from that table. At the time the GAM Run was completed, the PGMA area in Dallam County had not been added to the District so the "No District" amount for Dallam County represents that area. North Plains GCD Ogallala and Rita Blanca Aquifers MAG by Decade from TWDB GAM Run 12-005 (in acre-feet) is:

County	District	Year					
		2010	2020	2030	2040	2050	2060

Dallam	NorthPlains	314,814	277,174	245,338	216,215	188,745	163,943
	No Dist.*	89,793	75,300	63,738	54,102	46,068	39,548
Hansford	NorthPlains	284,588	262,271	240,502	218,405	197,454	177,536
Hartley	NorthPlains	424,813	368,430	319,149	276,075	238,186	205,137
Hutchison	NorthPlains	61,306	58,383	50,723	44,360	39,048	34,580
Lipscomb	NorthPlains	290,510	283,794	273,836	256,406	237,765	219,100
Moore	NorthPlains	193,001	186,154	162,142	137,321	114,658	95,490
Ochiltree	NorthPlains	269,463	246,475	224,578	203,704	183,227	164,265
Sherman	NorthPlains	322,683	300,908	263,747	229,122	197,480	169,172
Total		2,250,971	2,058,889	1,843,753	1,635,710	1,442,631	1,268,771

*Dallam County Priority Groundwater Management Area (PGMA) not in District during GAM Run 12-005.

For the Dockum Aquifer, the District currently uses amounts interpreted from TWDB GAM Run10-019 MAG version 2 Table 1 (Estimated total annual pumping for the Dockum Aquifer in Groundwater Management Area 1). In August 2011, all of Dallam County was not in the District yet, and the report did not provide a breakdown in MAG amounts by county and district as was later done for the Ogallala and Rita Blanca Aquifers. North Plains GCD Dockum Aquifer MAG by Decade from TWDB GAM Run10-019 Version 2 (in acre-feet) is shown in the table below.

County	Year					
	2010	2020	2030	2040	2050	2060
Dallam	4,034	4,034	4,034	4,034	4,034	4,034
Hartley	3,567	3,567	3,567	3,567	3,567	3,567
Moore	5,395	5,395	5,395	5,395	5,395	5,395
Sherman	591	591	591	591	591	591
Total	13,587	13,587	13,587	13,587	13,587	13,587

The District combines Dockum and Ogallala/Rita Blanca MAG amounts in acre-feet for application of the District Rules as shown below:

County	Year					
	2010	2020	2030	2040	2050	2060
Dallam, Hartley, Moore, Sherman	1,358,691	1,221,553	1,067,701	926,422	798,724	686,877
Hansford, Hutchison, Ochiltree, Lipscomb	905,867	850,923	789,639	722,875	657,494	595,481
Total	2,264,558	2,072,476	1,857,340	1,649,297	1,456,218	1,282,358

The General Manager reported that he used an average decline rate from the beginning of the decade to the start of the next decade to compare the MAG to groundwater production.

The High Plains Aquifer System (HPAS) in Texas consists of the southern and northern portions of the Ogallala Aquifer, the Rita Blanca Aquifer, the Edwards-Trinity (High Plains) Aquifer, and the Dockum Aquifer. In 2015, the TWDB accepted the HPAS Groundwater Availability Model that characterizes groundwater flow in the Dockum, Ogallala, and Rita Blanca Aquifers in the District to use to calculate MAG. For the previous models and the current HPAS model, the District can pick a starting point for groundwater pumping and the model can adjust pumping of a period to meet the MAG required to achieve a DFC. The TWDB's contractor prepared a preliminary draft MAG from the HPAS model based on a combination of production from 2011- 2013 and preliminary estimates of 2014 production. Additionally, the District staff asked the contractor to run HPAS with 40% left in storage in 50 years for the Dockum Aquifer in Dallam, Hartley, Moore and Sherman Counties. The table below represents a summary of the preliminary MAG for the Dockum, Ogallala and Rita Blanca Aquifers for the counties located in the District.

All Aquifers	Available Groundwater(afy)
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County	2015	2016	2020	2030	2040	2050	2060	2070
Dallam, Hartley, Moore, Sherman	1,572,370	1,427,841	1,354,378	1,130,379	900,868	673,672	463,636	295,381
Hansford, Hutchison, Ochiltree, Lipscomb	471,986	808,721	810,680	812,335	813,422	813,830	813,789	812,915

Groundwater Availability Models

Groundwater scientists construct GAMs using a variety of formats. For example, during the first round of planning the District used its own pumping data compared to aquifer storage amount estimates to preliminarily determine reasonable DFCs before presenting the same to the joint planning committee. The spreadsheet model was a conservative approach to predicting aquifer conditions because it assumed all groundwater pumped came from aquifer storage and did not take into account other parameters. On the other end of the spectrum, groundwater availability models can be based on MODFLOW. MODFLOW is the U.S. Geological Survey modular finite-difference flow model, which is a computer code that solves the groundwater flow equation. The program is used by hydrogeologists to simulate the flow of groundwater through aquifers. Since MODFLOW's original development in the early 1980s the USGS have released multiple upgrades, and is now considered to be the de facto standard code for aquifer simulation. There are several actively developed commercial and non-commercial graphical user interfaces for MODFLOW. MODFLOW is the basis for the groundwater models used during the last round of GMA-1 joint planning and the new HPAS model.

The HPAS model consists of four layers, and the model grid is composed of uniformly spaced half-mile square grid cells. The model incorporates parameters such as well discharge; aquifer storage; recharge; evapotranspiration; spring discharge; flow into rivers, draws and escarpments later flow through the aquifer; and cross-formational flow from one aquifer to another in each cell. The new model (as well as the older models) uses a concept of creating a balanced water budget by modeling steady-state aquifer conditions compared to modeling transient aquifer conditions. The model simulates the time period from 1930 to 2012, with an initial steady-state stress period that represents pre-development conditions beginning in 1930. To make the HPAS model work, modelers reviewed and modified reported historical groundwater pumping located in HPAS GAM Appendix C, water level information provided by observed and simulated hydrographs in Appendix B, and other hydrologic data from across the High Plains region in an effort to estimate aquifer conditions before and during pumping. All groundwater models have limitations with respect to data support, scale, and the assumptions used in their development. The more accurate the data incorporated into the model the more usable the result.

The table below shows HPAS steady-state model for the Ogallala Aquifer for the counties in the District. This table was extracted from the Final Numerical Model Report for the HPAS GAM Appendix A.

The water budget for the Ogallala Aquifer by county for the steady-state model (from Table A.1.1) is shown below. Negative values are extractions, and positive values are injections.

County	Recharge	ET	Springs	Rivers	Draws	Escarpments	Lateral	Cross-Formational
Dallam	24,489	-2,416	0	11,778	-389	0	-33,912	451
Hansford	11,525	-4,540	0	-13,446	-133	0	6,594	0
Hartley	29,125	-7,346	-69	-14,320	0	-1,825	-4,325	-1,240
Hutchinson	6,962	-5,977	-426	-18,842	-3,728	-12,165	34,176	0
Lipscomb	29,600	-8,292	0	-3,849	0	0	-17,459	0
Moore	17,353	-1,054	0	-3,600	-1,056	-3,809	-7,535	-298

Ochiltree	12,379	-487	0	1,938	0	0	-13,830	0
Sherman	17,547	-406	0	5,975	0	0	-23,170	54

The HPAS GAM Numerical Report shows the water budget of the transient model for the Ogallala Aquifer by County for 1980 and 2012. The water budget for 2012 of the transient model (from Table A.3.1) is shown below. Negative values are extractions, and positive values are injections.

County	Recharge	ET	Springs	Rivers	Draws	Escarpments	Reservoirs	Wells	Storage	Lateral	Cross-Formational
Dallam	24,600	-61	0	19,836	0	0	0	-429,574	379,136	7,428	-1,365
Hansford	11,531	-483	0	10,052	0	0	419	-242,130	217,629	2,981	0
Hartley	29,186	-3,213	-2	-5,377	0	-1,636	42	-488,903	486,978	-17,996	920
Hutchinson	7,082	-2,367	-185	-4,744	-798	-6,860	0	-85,118	82,617	10,373	0
Lipscomb	29,621	-5,733	0	1,567	0	0	0	-56,294	47,145	-16,307	0
Moore	17,436	0	0	5,266	-164	-1,730	0	-282,841	256,336	7,024	-1,326
Ochiltree	12,379	-170	0	3,738	0	0	126	-113,704	100,672	-3,040	0
Sherman	17,550	0	0	9,682	0	0	0	-397,598	370,112	246	9

In the HPAS model, recharge remains essentially the same between the steady-state model and the transient model. However, as groundwater is pumped the other modeled parameters must be changed and water taken from storage to balance the water budget. The water budget for the steady-state model and the two transient models from the HPAS GMA Report are included in the *HPAS GAM Numerical Report Water Balance Excel workbook* attach in this file.

Total Estimated Recoverable Storage.

In 2011, the Texas Legislature amended the Texas Water Code, §36.108(d) which provides that, before voting on proposed desired future conditions for a relevant aquifer within a groundwater management area, the groundwater conservation districts shall consider the total estimated recoverable storage as provided by the executive administrator of the TWDB, along with other factors listed in §36.108(d). Texas Administrative Code Rule §356.10 defines the total estimated recoverable storage as the estimated amount of groundwater within an aquifer that accounts for recovery scenarios that range between 25 percent and 75 percent of the porosity-adjusted aquifer volume.

Total estimated recoverable storage (TERS) is the amount that can **ever** be recovered from an aquifer regardless of economics. When compared to a 50-year planning period, **ever** is a long time. For example when the DFC is 50 percent of the storage left in 50 years, this means that the remaining 50 percent in storage minus the part in storage that is not recoverable is available forever after 50 years. So if the high point of TERS for an aquifer such as the Ogallala aquifer is 75 percent, the total actual storage remaining available after 50 years is 25 percent of the current storage. For confined aquifers such as the Dockum aquifer within the District, groundwater extraction is extremely difficult. The likelihood that 25 percent of the total storage can ever be recovered is remote. A true recoverable percentage could be in the five percent to less than five percent range regardless of what the TWDB adopted by rule. The Rita Blanca aquifer is another confined aquifer in the District. TERS does not account for water quality, so water that is recoverable in storage may not be of sufficient quality to beneficially use without treatment.

In January, the General Manager forwarded to the Board, TWDB GAM Task Run 15-006 Total Estimated Recoverable Storage (TERS) for Aquifer in GMA-1. The tables below are extracted from TWDB GAM Task Run 15-006.

Total estimated recoverable storage by county for the Dockum Aquifer included in District. (TWDB GAM Task Run 15-006).

<i>County</i>	<i>Total Storage (acre-feet)</i>	<i>25 percent of Total Storage (acre-feet)</i>	<i>75 percent of Total Storage (acre-feet)</i>
Dallam	80,000,000	20,000,000	60,000,000
Hartley*	96,000,000	24,000,000	72,000,000
Moore*	7,400,000	1,850,000	5,550,000
Sherman	540,000	135,000	405,000
Total	183,940,000	45,985,000	137,955,000
Total	183,940,000	45,985,000	137,955,000

* Includes the entire county.

Total estimated recoverable storage by Groundwater Conservation District for the Dockum Aquifer within GMA 1. (TWDB GAM Task Run 15-006).

<i>Groundwater Conservation District</i>	<i>Total Storage (acre-feet)</i>	<i>25 percent of Total Storage (acre-feet)</i>	<i>75 percent of Total Storage (acre-feet)</i>
High Plains UWCD ²	28,000,000	7,000,000	21,000,000
North Plains GCD	170,000,000	42,500,000	127,500,000
Panhandle GCD	15,000,000	3,750,000	11,250,000
No District	77,000,000	19,250,000	57,750,000
Total	290,000,000	72,500,000	217,500,000

Total estimated recoverable storage by county for the Ogallala aquifer within GMA -1. (TWDB GAM Task Run 15-006).

<i>County</i>	<i>Total Storage (acre-feet)</i>	<i>25 percent of Total Storage (acre-feet)</i>	<i>75 percent of Total Storage (acre-feet)</i>
Dallam	15,000,000	3,750,000	11,250,000
Hansford	24,000,000	6,000,000	18,000,000
Hartley*	17,000,000	4,250,000	12,750,000
Hutchinson*	11,000,000	2,750,000	8,250,000

Lipscomb	18,000,000	4,500,000	13,500,000
Moore*	10,000,000	2,500,000	7,500,000
Ochiltree	21,000,000	5,250,000	15,750,000
Sherman	18,000,000	4,500,000	13,500,000
Total	134,000,000	33,500,000	100,500,000

* Includes the entire county.

Total estimated recoverable storage by groundwater conservation District for the Ogallala Aquifer within GMA - 1. (TWDB GAM Task Run 15-006).

<i>County</i>	<i>Total Storage (acre-feet)</i>	<i>25 percent of Total Storage (acre-feet)</i>	<i>75 percent of Total Storage (acre-feet)</i>
Hemphill County UWCD	15,000,000	3,750,000	11,250,000
High Plains UWCD	3,100,000	775,000	2,325,000
North Plains GCD	130,000,000	32,500,000	97,500,000
Panhandle GCD	77,000,000	19,250,000	57,750,000
No District	9,600,000	2,400,000	7,200,000
Total	234,700,000	58,675,000	176,025,000

Total estimated recoverable storage by county for the Rita Blanca aquifer within GMA-1. (TWDB GAM Task Run 15-006).