HEMPHILL COUNTY
Underground Water Conservation District

High Plains Underground Water Conservation District

"Conserving Water for Future Generations"

NORTH PLAINS GROUNDWATER Conservation District

Groundwater Management Area #1 – GMA#1

MEMORANDUM

To: Honorable Chairman and Members

From: Kyle G. Ingham, Local Government Services Director

Date: August 19, 2014

Re: Agenda Item #13

RECEIVE AND DISCUSS – PRESENTATION REGARDING THE SOCIOECONOMIC IMPACTS REASONABLY EXPECTED TO OCCUR BASED ON POTENTIAL DESIRED FUTURE CONDITIONS IN THE MAJOR AQUIFERS OF GMA#1. {TEXAS WATER CODE §36.108(D)(6)]

Texas Water Code §36.108 (d)(6) requires that before voting on the proposed desired future conditions of the aquifers, the districts shall consider the socioeconomic impacts reasonably expected to occur. As part of its consideration, the GMA-1 Joint Planning Committee reviews socioeconomic impact studies prepared by the Texas Water Development Board for regional water planning purposes as well as studies that target areas in GMA-1 that may experience socioeconomic impacts base on the selected desired future conditions. The GMA-1 Joint Planning Committee reviews three studies regarding the socioeconomic impacts as follows:

"Socioeconomic Impacts of Projected Water Shortages for the Panhandle (Region A) Regional Water Planning Area"

"Evaluation of Changing Land Use and Potential Water Conservation Strategies North Plains Groundwater Conservation District"

"Economic Impacts of Groundwater Management Standards in the Panhandle Groundwater Conservation District of Texas"

Socioeconomic Impacts of Projected Water Shortages for the Panhandle (Region A) Regional Water Planning Area

Texas Administrative Code Chapter 357 requires that regional water planning groups evaluate the impacts of not meeting water needs as part of the regional water planning process and directs the Texas Water Development Board (TWDB) to provide technical assistance. The report, "Socioeconomic Impacts of Projected Water Shortages for the Panhandle (Region A) Regional Water Planning Area" constitutes the TWDB's technical assistance for Region A and was prepared and completed in April 2010 in support of the 2011 Panhandle Regional Water Plan. The report, which can be found in Appendix I of the 2011 Panhandle Regional Water Plan, details what would happen if identified water shortages in the region were to go unmet. The report is based on regionally generated data that have been analyzed through the IMPLAN model. The regional data is coupled with state level multipliers to produce the impacts presented.

The report is limited only to the impacts (direct impacts and some indirect) of not meeting water needs due to drought (drought of record) and provides a range of possible impacts based on severity of shortages. The report uses TWDB projected changes in demographics and economic activity and addresses the period 2010-2060. The monetary impacts are reported in 2006 dollars and address potential loss of employment, income and taxes. The results in the report are from using the economic IMPLAN model which is a model that was developed that uses estimates of demand, final payments, industry input-output and benchmark input-output generated by the US Bureau of Economic Analysis.

Agriculture
In the report impacts to agriculture are distributed across the predominate crop types of the region and estimate associated reductions in output for affected crop sectors and potential job loss. Shortages are assumed to affect all Agriculture sectors equally.

Livestock
Livestock takes into account cattle ranching, feedlot, diaries, poultry and other livestock as well as milk manufacturing and meat packing. As with agriculture shortages are assumed to affect all agriculture sectors equally.

Municipal
Impacts to municipal users are broken into domestic, commercial use and commercial users and institutional use with several disclaimers about uncertainties in the estimates.

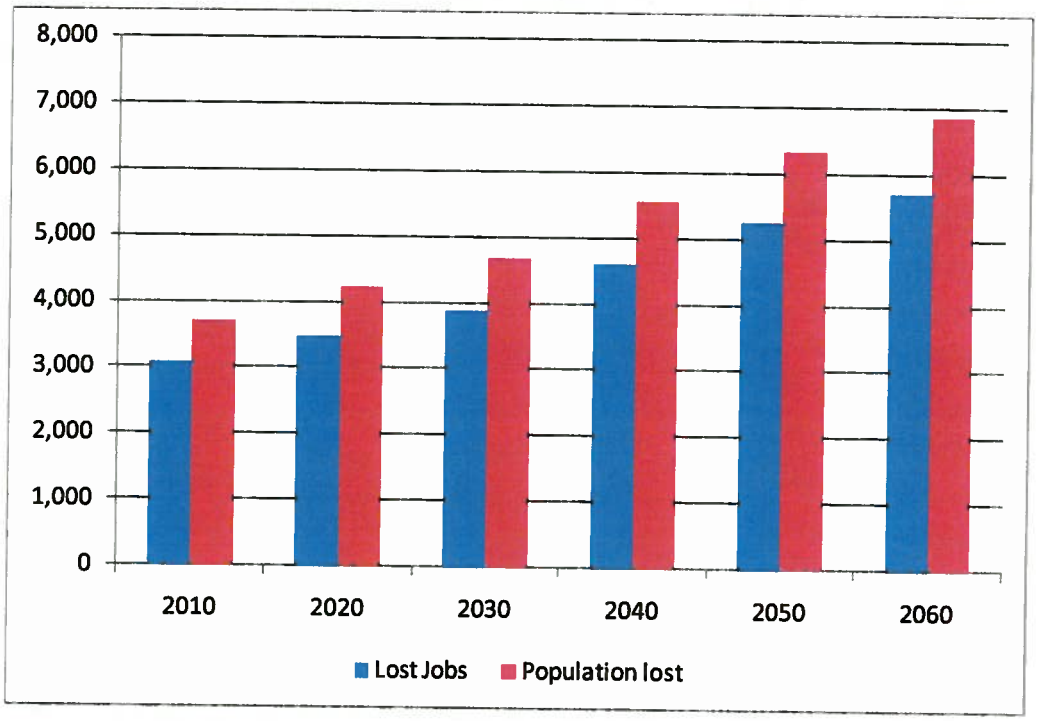
Industrial
Industrial impacts are addressed separate from municipal and commercial use but do address manufacturing, mining and steam-electric.

Social
In the report social impacts focus strictly on demographic effects associated mostly with potential changes in population, declines in jobs and school enrollment.

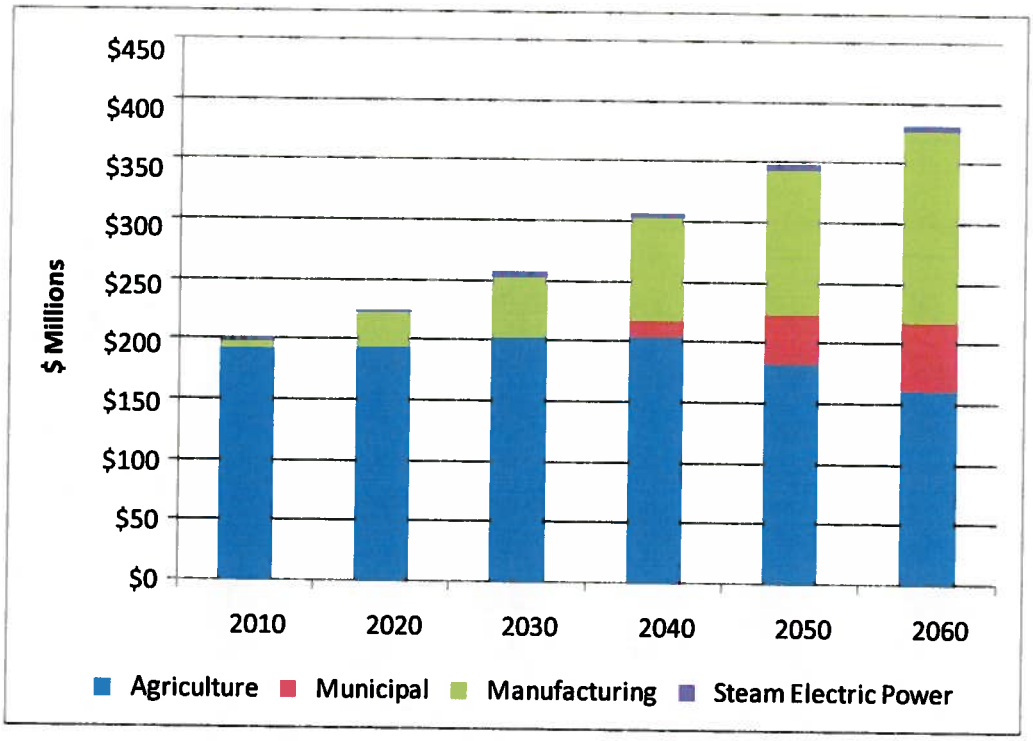
The TWDB's analysis calculated the impacts of a severe drought occurring in a single year at each decadal period in the PWPA. It was assumed that all of the projected shortage was attributed to drought. Under these assumptions, the TWDB's findings can be summarized as follows:

- With the projected shortages, the region's projected 2060 population would be reduced by approximately 1 percent.
- Without any additional supplies, the projected water needs would reduce the region's projected 2060 employment by 5,700 jobs.
- Without any additional supplies, the projected water needs would reduce the region's projected annual income and taxes in 2060 by $381 million.

2011 Panhandle Regional Water Plan shows the projected impact on population and jobs over the planning period is shown in the figure below.



2011 Panhandle Regional Water Plan shows the impacts to income and local and state taxes are shown in the figure below.



Evaluation of Changing Land Use and Potential Water Conservation Strategies North Plains Groundwater Conservation District

Researchers from Texas A&M AgriLife Extension, West Texas A&M University, and Texas Tech University prepared a report "Evaluation of Changing Land Use and Potential Water Conservation Strategies". North Plains Groundwater Conservation District commissioned the study to determine the impacts of meeting desired future conditions proposed during the last planning cycle. It has been projected through the planning efforts set forth in Senate Bills 1, 2, 3 and 4 that the four western counties of the district will have difficulty in meeting the Desired Future Condition (DFC) of having 40% of the groundwater remaining in 50 years. Evaluation of the economic implications from changing land use, alternative water conservation strategies being considered, and/or the impacts of potential water policies originating from the state or federal government can aid the district in making important policy decisions.

The objective of this study is to evaluate the short and long-term implications of changing land use and alternative water conservation strategies being considered by the NPGCD. Specifically, changing land use and water conservation strategies identified by the district will be evaluated using computer models that project saturated thickness, producer gross margin, and impacts on the regional economy. The results of different scenarios are compared to a status quo baseline scenario to evaluate their impacts.

Two scenarios were identified by the district for analysis in Phase II of this project. The first scenario involved estimating the impacts on saturated thickness, producer income and the regional economy over a 50-year time horizon assuming no constraints on water use are imposed (unconstrained scenario). Changing conditions warranted updating the data used in developing the models to analyze the scenarios in Phase Two. Increases in local demand, rising commodity prices, and technological advancements have influenced the expansion of irrigated acres in the western portion of the NPGCD. Saturated thickness of the western counties started with an average saturated thickness of 156 feet which declined to 59 feet by year 50. As saturated thickness declined, gross margin also declined from $342.57 per acre in year one to $218.50 by year 50. Agricultural production under the unconstrained scenario in the western counties generates impacts to the NPGCD Region of $59 billion in output and $24 billion in value added over the 50-year time horizon, and an annual average of approximately 6,400 jobs. The average initial saturated thickness in the eastern counties of the district started at 201 feet with an average gross margin of $186.03 per acre. Ending average saturated thickness was 180 feet with an average gross margin of $293.22 per acre by year 50. Agricultural production under the unconstrained scenario in the eastern counties generates impacts to the NPGCD Region of approximately $23 billion in output, $9 billion in value added, and an annual average of 2,400 jobs.

In scenario 2 (the DFC scenario), water use was limited in each county where necessary to meet the DFC for the individual counties and the district as a whole. A comparison of the unconstrained scenario and the constrained water use scenario results was conducted to evaluate the resultant impacts on saturated thickness, producer income and the regional economy over a 50-year time horizon. The DFC only resulted in restricted water use in Dallam and Hartley Counties. Under this scenario, average saturated thickness for the western portion of the NPGCD decreased to 65.05 feet by year 50 which is 10% higher than the unconstrained scenario.

Reduced yields resulted in a reduced average gross margin for the western portion of $163.35 per acre which is 25% lower than the unconstrained scenario. In addition, economic activity in the sub-region was reduced 3.5 billion dollars over the 50 years and an annual average of 239 jobs was lost compared to the unconstrained model.

Evaluating the impacts of imposing a regional DFC rather than a county specific DFC in the western counties helped lessen the overall negative economic impacts. Ending gross margin was estimated to be $50 per acre higher, economic activity over the 50-year time line was 1.3 billion more and annual employment averaged 87 more than the county specific DFC. However, region-wide saturated thickness did decline an additional 2.75 feet for the period.

A final scenario was added by the project team in which a sensitivity analysis was conducted for the amount of irrigated acreage that could be added to counties projected not to be constrained by the DFC. Results indicated that Dallam and Hartley Counties would both need to reduce irrigated acreage by 20% in order to meet the DFC while the remaining counties in the district could actually increase irrigated acreage in a range from 5% in Moore County to 500% in Lipscomb County.

Given the current economic environment, there exist incentives for landowners to either convert existing dryland acres or break out rangeland for irrigated purposes. It can be concluded from this analysis that Dallam and Hartley Counties cannot sustain further increases in irrigated acreage. In fact, either a decrease in irrigated acreage or a lower application of irrigation per acre will need to occur in order for these counties to meet their target DFC. However, the eastern counties of the district could actually increase irrigated acreage substantially and still be able to meet their DFC. Increasing irrigated acreage in these counties could be one way to offset some of the economic losses that will occur in the western counties as the aquifer declines. Further research should be conducted to determine the feasibility as well as the costs and benefits associated with any increases in irrigated acreage in these counties. A copy of the report is attached.

Economic Impacts of Groundwater Management Standards in the Panhandle Groundwater Conservation District of Texas

Researchers from the Texas Tech University Department of Agricultural and Applied Economics and Texas AgriLife Extension Service evaluated the 50/50 management standard for the Panhandle Groundwater Conservation District on three specific yet linked levels. County level, specific study area, and farm level analyses were conducted to estimate the economic impacts of the 50/50 management standard on the economic viability of agriculture in the region. The county level and hydrologic study area optimization analyses were transferred into economic projections using IMPLAN which estimated any spillover effects that the management standard would have to the region. In this case the region was defined as all of the counties in which PGCD has jurisdiction to impose the 50/50 management standard. The overall results indicate that the 50/50 management standard will have no significant effects on the region at all average levels of analysis including the county, hydrologic study area, and representative farm level. The only case in which the management standard impacted agricultural production practices was illustrated in an extreme case of drawdown on the Donley County High Drawdown Farm, where drawdown levels of the aquifer were simulated to be double the average for farms in the region. Even at these high rates of decline, the farm only indicated slight changes in economic viability as a result of the 50/50 management standard and this scenario is only likely to affect a very small percentage of farmers within the region.

The baseline projections for drawdown in saturated thickness in Carson and Donley Counties were projected to have nearly 80% of the 2010 saturated thickness remaining in the aquifer in 2060. Thus, for a county wide management restriction to have significant aggregate economic impacts on both Carson and Donley Counties the management standard would have to be as follows:

Saturated thickness remaining in 50 years:

„X Greater than 80% in Carson County or (80/50)

„X Greater than 80% in Donley County or (80/50)

This study did not evaluate the economic impacts of an alternative water market where irrigated producers could sell their water in lieu of irrigated crop production. Had this

¡§market¡¨ been included in this study, the economic projections would vary from what is presented. Potential impacts of this market sell-off could include; reduced commodity production within PGCD and reduced economic activity from agricultural input suppliers. Typically, agricultural producers receive a greater value for sold water in comparison to what can be generated on the farm. Hence, it is possible that farm level revenue would increase or at least be maintained under the addition of an external water market.

The management plan proposed by PGCD allows production agriculture to continue to be profitable while setting a goal (50/50) which prevents excessive decline in groundwater resources. It is important to note that even with water conservation strategies such as the 50/50 in place, the economic activity of the region will change and in some cases decline as irrigation water availability is reduced through the mining of the Ogallala Aquifer.

Other Socio Economic Studies:

In addition to the above referenced studies regarding socio-economic impacts of groundwater management in the Texas High Plains and Panhandle,

Additional documentation used in this item is found in the reference folder under SOCIO ECONOMIC STUDIES

Discussion

1. In review of the information contained within this summary, what other information does the Joint Planning Committee wish to consider?

Notes:

1. This memo/summary is intended to help educate and facilitate discussion & joint planning among GMA#1 members at this time. It is not anticipated that this memo/summary will be acted upon in relationship to the Explanatory Report at this time.
2. Supporting documents related to this Factor will be included in a folder entitled with the Factor Number under the GMA#1 Shared Dropbox folder. These folders shall contain all factor related documents going forward.

2012 State Water Plan Existing Supplies

	2010	2020	2030	2040	2050	2060
Blaine Aquifer						
Childress	7,218	5,319	5,150	4,868	4,305	3,742
Collingsworth	9,719	7,519	7,219	6,919	6,119	5,419
Wheeler	49	49	49	49	49	49
Dockum Aquifer						
Dallam	6,806	6,806	6,806	6,806	6,806	6,806
Hartley	1,161	1,161	1,161	1,161	1,161	1,161
Moore	14,100	14,100	13,300	11,600	10,200	8,900
Oldham	1,409	1,409	1,409	1,409	1,409	1,409
Potter	579	579	579	579	579	579
Randall	365	365	365	365	365	365
Ogallala Aquifer						
Armstrong	6,679	6,170	5,974	5,692	5,179	4,670
Carson	76,474	66,083	63,294	59,548	49,304	47,298
Collingsworth	523	523	523	523	523	523
Dallam	156,424	140,884	124,993	110,447	97,326	85,137
Donley	32,807	30,396	29,430	27,915	24,885	21,857
Gray	35,146	31,516	31,438	30,710	29,504	27,423
Hansford	134,494	117,657	113,525	104,627	94,530	84,656
Hartley	118,480	108,596	97,213	86,817	77,138	68,363
Hemphill	6,048	5,930	5,601	5,027	4,476	3,985
Hutchinson	52,412	52,651	52,381	51,913	51,387	50,488
Lipscomb	19,488	18,088	17,501	16,494	14,753	13,040
Moore	93,559	86,070	78,633	71,042	63,482	56,444
Ochiltree	66,371	57,582	55,939	53,286	48,059	42,845
Oldham	4,713	4,397	4,285	4,101	3,730	3,345
Potter	10,524	9,715	9,250	8,837	8,373	7,807
Randall	32,390	28,029	26,655	25,225	22,893	20,635
Roberts	66,760	65,561	65,005	64,272	61,441	60,569
Sherman	153,277	137,254	121,164	106,723	93,766	81,643
Wheeler	15,476	13,653	13,172	12,321	11,057	9,863
Other Aquifer						
Armstrong	102	102	102	102	102	102
Childress	62	62	62	62	62	62
Collingsworth	30	30	30	30	30	30
Donley	71	71	71	71	71	71
Hall	40	40	40	40	40	40
Wheeler	331	331	331	331	331	331
Seymour Aquifer						
Childress	520	620	620	620	620	620
Collingsworth	19,384	15,384	14,884	14,184	12,684	11,184
Hall	16,939	10,951	10,621	10,073	8,978	7,883

Irrigation Conservation					
	2020	2030	2040	2050	2060
ARMSTRONG	2,170	2,251	2,397	2,478	2,558
CARSON	17,316	17,957	19,112	19,754	20,395
CHILDRESS	1,640	1,704	1,819	1,883	1,946
COLLINGSWORTH	2,879	3,021	3,276	3,418	3,560
DALLAM	59,275	108,476	121,561	122,958	122,958
DONLEY	2,910	3,031	3,249	3,370	3,490
GRAY	5,279	5,475	5,825	6,019	6,214
HALL	3,220	3,354	3,595	3,728	3,862
HANSFORD	24,436	45,264	51,215	51,951	51,951
HARTLEY	53,755	98,786	110,553	111,772	111,772
HEMPHILL	228	237	253	260	268
HUTCHINSON	7,514	14,044	15,905	16,128	16,128
LIPSCOMB	2,279	2,360	2,506	2,587	2,668
MOORE	31,602	58,995	66,995	67,846	67,846
OCHILTREE	17,257	17,899	19,053	19,694	20,335
OLDHAM	814	844	900	930	961
POTTER	936	974	1,041	1,077	1,114
RANDALL	18,028	18,673	19,835	20,481	21,126
ROBERTS	2,772	2,893	3,114	3,236	3,357
SHERMAN	41,128	77,102	86,803	87,896	87,896
WHEELER	1,676	1,740	1,854	1,917	1,980

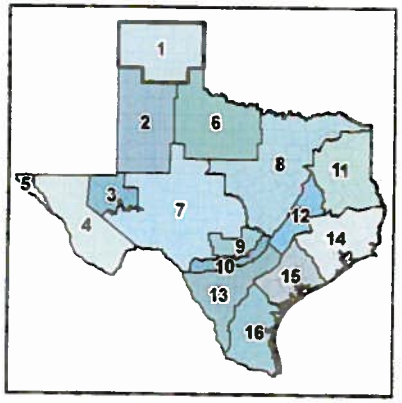
Municipal Conservation					
	2020	2030	2040	2050	2060
Carson County					
Panhandle	17	29	28	25	23
Dallam County					
Texline	7	12	12	12	11
Gray County					
Pampa	15	65	65	65	65
Lefors	3	4	4	4	4
Hall County					
Memphis	13	22	22	22	22
Hansford County					
Gruver	10	16	17	17	17
Spearman	22	39	41	42	42
Hutchinson County					
Borger	24	71	114	107	102
Moore County					
Cactus	18	31	31	31	31
County-Other	29	63	75	83	87
Dumas	89	158	166	171	174
Sunray	18	34	36	38	39
Ochiltree County					
Perryton	64	113	118	120	123
Potter County					
Amarillo	780	1383	1480	1585	1675
County-Other	69	143	174	209	236
Randall County					
Amarillo	595	1070	1159	1256	1337
Canyon	80	176	191	208	227
County-Other	101	197	231	268	299
Wheeler County					
Wheeler	9	15	15	15	15

Dallam | Sherman | Hansford | Ochiltree | Lipscomb

Hartley | Moore | Hutchinson | Roberts | Hemphill

Oldham | Potter | Carson | Gray | Wheeler

Randall | Armstrong | Donley



Groundwater Management Area #1

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Miles

MISSION: The Texas Water Development Board's (TWDB) mission is to provide leadership, planning, financial assistance, information, and education for the conservation and responsible development of water for Texas.