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TO: Colorado Water Conservation Board Members

FROM: Emily LoDolce, Water Resources Engineer
Interstate, Federal and Water Information Section

DATE: May 18-19, 2016 Board Meeting

AGENDA ITEM: 24. HB15-1178 Dewatering Grant Application for a Pilot Project in the Gilcrest Area

Introduction

There have been increased occurrences of high groundwater issues since about 2008 in several areas in the lower South Platte Basin. HB12-1278 resulted in a report, The HB12-1278 Study of the South Platte River Alluvial Aquifer (Colorado Water Institute at Colorado State University, 31 December 2013), on these groundwater issues. The South Platte Basin Roundtable formed a Groundwater Technical Committee (Technical Committee) in 2014 to review recommendations from the HB12-1278 report, the first of which concerns mitigation of localized high groundwater conditions.

HB15-1178 (Saine & Humphrey—Marble) established an emergency dewatering grant program for the purpose of lowering the water table in areas in and around Gilcrest and Sterling. HB15-1013 (Coram—Sonnenberg & Hodge) called for two pilot projects, one near Gilcrest or LaSalle in Water District 2 and one near Sterling in Water District 64, to demonstrate proposed methods for effectively lowering the water table.

This agenda item concerns an application submitted by the West Greeley Conservation District (WGCD) for $140,329.50 from the emergency dewatering grant program. The funds will be used to administer the pilot project, to lease augmentation water, to monitor and collect data, and to provide incentives for participants to use groundwater for irrigation in favor of surface water. The objective of the pilot project is to lower the groundwater table in the Gilcrest area and encourage cooperation and collaboration between entities and individuals in Water District 2.

Background

The Technical Committee has discussed the high groundwater around Gilcrest extensively over the last year and a half. Multiple factors are contributing to the high groundwater problems, including: average to above-average precipitation in the South Platte watershed, the lack of adequate surface drainage in and around Gilcrest, subsurface geology, increased recharge for augmentation, and decreased groundwater pumping.

The Town of Gilcrest has taken several steps to mitigate the damage caused by high groundwater levels to town facilities (such as the wastewater treatment plant and residents' basements). Early in 2015 CWCB provided $20,000 to Gilcrest to initiate dewatering by pumping the "Lorenz well", an irrigation well located on the northeast side of town just east of the wastewater treatment plant, and discharging the dewatering water to the Big Bend Drain, which empties into the Union Ditch, through which it is conveyed to the South Platte River. DOLA matched this with $15,000. The Lorenz well pumped over the summer and fall during free-river conditions and groundwater level measurements taken during that time showed a 2-4 ft drop in groundwater levels. When the well was turned off, the groundwater rebounded to original levels within a week or two. The dewatering was generally

considered successful, although the quick recovery time of the aquifer highlighted the need for a more permanent, comprehensive solution to lower the groundwater table. At the January 2016 Board meeting, Gilcrest applied for and was granted $139,800 from the HB15-1178 emergency dewatering fund for an engineering study to look at dewatering and conveyance alternatives that will lead to a long-term solution to the continuing high groundwater issues in the town. This study is currently underway.

Although the high groundwater issues in the Town of Gilcrest are being addressed via dewatering and the engineering analysis, agricultural producers in the area continue to suffer from a high water table that is flooding their fields and basements. The HB12-1278 study concludes that changes in water administration have led to increasing groundwater levels in the basin, but it also acknowledges that "senior water rights must be protected in any adjustments to the systems and… wells cannot be relieved from the obligation to replace out-of-priority depletions that cause material injury to senior surface water rights." The intent of this pilot project is to lower the groundwater table via alternative management strategies, while operating within the existing legal boundaries of prior appropriation. The pilot includes elements of the HB12-1278 study and HB15-1013, and seeks funding from the fund established with HB15-1178.

The WGCD has worked extensively with the Technical Committee, the CWCB, and Central to establish a framework for incentivizing increased pumping and reduced surface water diversion from participating farmers within the pilot project study area (Figure 1). In order to participate, wells must have existing contracts with Central (i.e., their depletions are covered under Central's Groundwater Management Subdistrict [GMS] and/or Well Augmentation Subdistrict [WAS] decreed augmentation plans). To ensure the burden of replacing the depletions caused by additional pumping in the pilot project do not fall entirely on Central, WGCD is contracting with the City of Aurora (Aurora) to lease augmentation water for a period of 10 years. Aurora is interested in helping the WGCD and the State implement this pilot, and so they have reduced their contractual leased water rate from $300 per acre-foot (AF) to $125 per AF specifically for this pilot project.

Because this pilot project involves voluntary reduction of surface water diversions, it is important to note that participation does not constitute abandonment of water rights. The year(s) in which the farmer is participating in this pilot should not be considered part of a "representative study period" for the calculation of historical consumptive use, should the water right ever be involved in a water court case requiring such calculation.

Although not "dewatering" in the traditional sense of pumping a well and discharging the water to the river, the pilot project meets the spirit of HB15-1178 as it will help "to mitigate the damaging high groundwater levels" in the Gilcrest area. It is the hope of WGCD and the Technical Committee that a successful pilot project in 2016 will lead to a second year of alternative management strategies to lower the groundwater table, and will establish relationships between water management entities and individuals in Water District 2 that will allow for the development of creative and collaborative solutions to high groundwater issues in years to come.

Application Summary

The application submitted by WGCD proposes to lower the groundwater table in the Gilcrest area by offering a choice of two incentives to farmers irrigating land within the seven-section pilot project study area shown in Figure 1. These incentives are:

- Option A: Farmers will be paid $60/AF of water pumped that they would not normally have pumped, up to Central's yearly quota (for the 2016 irrigation season, GMS wells receive a 50% quota, and WAS wells receive a 55% quota).

- Option B: Farmers can pump beyond their quota from Central up to their full decreed pumping amount, and augmentation water will be provided by WGCD (leased through Aurora) for wells pumping under this pilot project.

Under normal operating conditions, the farmers in the pilot project area preferentially use their surface water supplies and opt to save their groundwater quota for later in the irrigation season as insurance in case their ditch goes out of priority. For the last several years, the wet conditions have resulted in area ditches staying in priority for most or all of the irrigation season, which means groundwater pumping has been quite low. Surface water is generally a less expensive way to irrigate, so the incentive offered in Option A is intended to cover at least a portion of the additional costs of pumping groundwater. Option B is geared towards farmers with limited or no surface water supplies, those who have historically pumped their full quota, and/or those who would prefer to use groundwater and having supply above their quota makes it economically worthwhile. The additional pumping quota will allow them to fully irrigate their crop and/or plant more water-intensive but higher value crops.

This pilot project involves many entities fullfilling various roles. These can be summarized as follows:

- **WGCD** – applicant to the HB15-1178 emergency dewatering fund and fiscal agent for the project. Will coordinate with partnering entities and be a point of contact for farmers.
- **Central** – will provide the augmentation plans under which the participating wells will legally pump. Will collect and make available to WGCD monthly pumping volumes from participants.
- **Aurora** –will lease augmentation water at a discounted rate for a period of 10 years.
- **Colorado State University** – Professor Ryan Bailey (Civil Engineering) will work with participating farmers to install monitoring wells, data loggers, and rain gages on their property. He and a student will collect the data throughout the summer, fall, and winter to track the change in groundwater levels as the pilot project is operating.
- **CWCB** – will provide support staff to coordinate with participating entities and serve as an alternative point of contact for farmers.
- **Technical Committee** – will provide direction and guidance, as well as a regular meeting place to discuss challenges/issues with the pilot project as they arise.

If this grant request is approved, WGCD will alert Aurora that the contract for augmentation water is needed, and Aurora will take the contract to their council for approval. Central will publically notice the inclusion of the water in their augmentation plan. The public notice period is 30 days. Following the public notice, and assuming there are no objections, participating farmers will be alerted that they will either be reimbursed for pumping above a certain volume or they will be able to pump up to their full decreed quota, depending on which option they chose. Total anticipated pumping in the pilot project area is 1,273 AF, which represents an increase of 745 AF when compared to annual average pumping in 2013-2015. Based on groundwater modeling performed for the Technical Committee in 2015 and 2016, WGCD anticipates a decrease in water levels on the order of 1to 5 ft across the study area.

Attachments

The grant application from WGCD is attached to this memo. In that application, Figure 1 shows the seven-section pilot project study area and the participating farms. Figure 2 shows the calculated depth to groundwater based on measurements made in the fall of 2014 underneath the study area. The itemized budget request is Item 8 on page 7.

Staff Recommendation

This grant will allow the WGCD to implement a pilot project for the 2016 irrigation season that is anticipated to lower the groundwater table in the vicinity of the pilot project study area and encourage cooperation and collaboration between entities and individuals in Water District 2. CWCB staff asks that the Board consider for approval, with conditions if necessary, the WGCD's emergency dewatering grant application.

HB15-1178 Grant Application

Project: Dewatering Pilot Project near Gilcrest
Applicant: West Greeley Conservation District
Total Grant Request: $140,329.50

Contact Information:
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1. Introduction

This application is being submitted by the West Greeley Conservation District (WGCD). Through this application, the WGCD requests $140,329.50 from the HB15-1178 emergency dewatering grant fund for a voluntary dewatering Pilot Project to test alternative water management strategies in the area.

The South Platte Basin Roundtable Groundwater Technical Committee (Technical Committee) has been discussing alternate means to lower the high groundwater in the Gilcrest area. Currently, the Town of Gilcrest has been dewatering using the Lorenz well, and was awarded $139,800 from the HB 15-1178 Grant Program for an engineering analysis to identify permanent dewatering solutions.

This Pilot Project seeks to demonstrate that high groundwater can be lowered by changing water management practices within the Pilot Project area (Figure 1). This Pilot Project will incentivize farmers to pump more groundwater within the Pilot Project area for irrigation purposes, while forgoing the same amount of surface water diversions. This will be accomplished through one of two options:

Option A: Farmers will be paid $60/AF of water pumped that they would not normally have pumped up to Central Colorado Water Conservancy District's (Central) yearly quota (for the 2016 irrigation season, GMS wells received 50% quota, and WAS wells were given 55%).

Option B: Farmers will be able to pump beyond their quota from Central up to their full decreed pumping amount, and augmentation water will be provided by the WGCD for wells pumping under this Pilot Project.

Under normal operating conditions, the farmers in the Pilot Project area preferentially use their surface water supplies and opt to save their groundwater quota for later in the irrigation season as insurance in case their ditch goes out of priority. For the last several years, the wet hydrologic conditions have resulted in area ditches staying in priority for most or all of the irrigation season, which means groundwater pumping has been quite low. Surface water is generally a less expensive way to irrigate. Pumping groundwater incurs a demand charge (which can be several hundred to one thousand dollars) when the well is first turned on, electricity charge for the power use over the irrigation season, and the cost of upkeep and maintenance on the pump itself. On top of this, farmers participating in the Pilot

Project still pay a ditch assessment for their surface water shares regardless of whether or not they use them, so the incentive offered in Option A was necessary to cover at least a portion of these costs. Option B is geared towards farmers with limited or no surface water supplies, those who have historically pumped their full quota, and/or those who would prefer to use groundwater and having supply above their quota makes it economically worthwhile. The additional pumping quota will allow them to fully irrigate their crop and/or plant more water-intensive but higher value crops.

The West Greeley Conservation District has worked extensively with the Technical Committee, the Colorado Water Conservation Board (CWCB), and Central to ensure the success of the Pilot Project. Augmentation supply to cover the additional pumping will be leased from the City of Aurora and incorporated into Central's existing augmentation plans specifically for Pilot Project well pumping. The WGCD is not responsible for replacing any depletions caused by the Pilot Project, as they will be fully covered by Central's existing augmentation plans. The idea for this Pilot Project originates from the Brown and Caldwell High Groundwater Analysis (2015), which concluded that a reduction in surface diversions and increase in pumping would lower the regional water table. Given this information, this Pilot Project meets the spirit of HB 15-1178 as it will help "to mitigate the damaging high groundwater levels" in the Gilcrest area.

2. Figures

Figure 1 shows the Pilot Project area, the locations of participating fields, and the irrigation wells that will be pumped. Figure 2 shows the depth to groundwater as calculated by the Colorado Geological Survey for the fall of 2014. Figure 3 shows Central's service area and reach designations.

3. Proposed and/or Existing Infrastructure

This Pilot Project will rely on existing irrigation wells on the properties of the participants. All the wells are included in one of two decreed augmentation plans managed by Central, the Groundwater Management Subdistrict (GMS) or the Well Augmentation Subdistrict (WAS), meaning they are legally allowed to pump. Projected pumping amounts for the Pilot Project can be found in Table 1, on the next page.

The Pilot Project will cover participants' consumptive use above their 2013-2015 annual average consumptive use, and Central's GMS and WAS augmentation plans will cover the remainder.

Table 1: Pilot Project Participation, Pumping, and Replacement Obligation.

Pilot Project Option	Subdistrict & Contract No.	Participant Name (Landowner, if leased)	Field Efficiency	2013-15 Historical Pumping (AF)	GMS/WAS 2016 Allotment (Metered Pumping, AF)	2016 Pilot Project Increased Pumping (Metered Pumping, AF)	2016 Total Pumping by Contract (AF)	Total Consumptive Use Replacement Obligation per Pilot Project (AF)
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
B	GMS, 423	Fritzler, Edward J. & Eileen	0.6	111	158	205	316	123
A	GMS, 388	Greiman, Grant G. & Janel	0.78	3	54	51	54	39
A	WAS, 886	Strohauer (Lorenz)	0.8	99	175	76	175	61
A	GMS, 751	Ulrich, Max	0.75	14	64	51	64	38
B	WAS, 863	Webb, Duke (Heitman)	0.6	15	80	94	109	56
B	GMS, 415	Webb, Duke (Nelson)	0.6	8	79	110	118	66
B	GMS, 748	Webb, Grady (Bruce)	0.6	37	42	47	84	28
B	WAS, 94	Wiedeman (Peppler)	0.6	0	92	30	122	18
B	GMS, 968	Wiedeman (Schwindt)	0.73	58	57	0	57	0
B	GMS, 421	Wiedeman, Terry & Janice	0.6	85	83	10	93	6
B	WAS, 921	Wiedeman, Terry & Janice	0.75	8	51	72	81	54
		Totals		**439**	**935**	**745**	**1,273**	**490**

Notes:

Pilot Project A Member pumps up to 2016 quota issued by GMS/WAS, Pilot Project lease covers pumping in excess of average pumping data from 2013 to 2015.

Pilot Project B Member pumps 100% quota issued by GMS/WAS, Pilot Project lease covers pumping in excess of average pumping data from 2013 to 2015.

Contract #421 10 AF increase pumping covered by Pilot Project, by contract holder request. Historically pumping covered by quota trading. No surface supplies on the farm.

Contract #921 30 AF pumping requested in addition to the WAS 2016 Quota. This WAS well has not pumped recently except for 8.39 AF in 2015.

Pilot Project provides 72.15 AF pumping coverage in total. Contract holder has 18.5 shares of FIDCO.

Contract #94 WAS well has not pumped last several years, WAS will cover 2016 quota (92.11 AF), Pilot Project covers additonal 30 AF requested. No surface supplies on the farm.

Contract #968 Historical pumping in GMS has been covered with quota trading. No additional pumping greater than the 2016 GMS quota needed. No surface supplies on the farm.

Contract #s 415 & 863 Leasee would pump 75% of allotment if available. Each contract also has 2 shares of PVIC.

Contract #748	Leasee would pump 100% of allotment if available. No surface supplies on the farm.
Column (d)	Field efficiency used to determine total consumptive use replacement obligation.
Column (f)	2016 pumping allotment; the limit of what Option A participants can pump.
Column (g)	Extra pumping incentivized by the Pilot Project. The consumptive use portion of this will be added to the augmentation plans.
Column (h)	Total anticipated pumping by participants for irrigation season 2016.
Column (i)	The amount of consumptive use to be augmented by the Pilot Project (multiply Column (g) by Column (d)).
Shrink	In order to deliver 490 AF at the depletion point per the decreed augmentation plans, a total of 850.5 AF of water must be released from the Robert W. Hite Wastewater Treatment Plant in Denver. The decreed shrink is 0.5% per river mile, and there are a total of 110 river miles between the point of discharge and the depletion point. Delivery requirement = (490) / (0.995^110).

4. Permissions

A public meeting was held on February 4, 2016 in Gilcrest to explain the Pilot Project, solicit feedback, and gain participants. The above Table 1 shows the individuals who have agreed to participate in the Pilot Project for the 2016 Irrigation Season. Central supports the Pilot Project as long as they aren't required to find or purchase the augmentation water for the additional pumping. They will be required to notice the additional water into their plan, and the administrative costs to do so are a line item in the proposed budget. The City of Aurora and the WGCD are working on a contractual lease agreement for Aurora to cover the full volume of depletions lagged over a period of ten (10) years, from November 1, 2016 to October 31, 2025. Over this period, the first ten years of lagged depletions will be replaced to the top of "Reach A", as defined by Figure 3. The excess leased water, which represents the lagged depletions in years 11 through 40, will be provided according to a mutually-beneficial schedule agreed upon by Aurora and Central. Central already leases water from Aurora, and the two entities have a history of working together. Aurora will need to take the proposed lease to their council for approval in July. For this reason, WGCD is asking for approval of the Pilot Project contingent on Aurora's council approving the lease agreement.

5. Permitting

The irrigation wells are already permitted. Monitoring wells installed as part of the Pilot Project will be permitted for monitoring through DWR. Notices of intent will be filed with DWR as soon as monitoring well locations are finalized the last week of April.

6. Real-time Monitoring for Data Collection

In order to determine the influence on the aquifer of increased pumping and decreased surface diversions, data will be collected from the various monitoring wells in the Pilot Project area. Currently, data are collected at varying intervals from monitoring wells owned by the Town of Gilcrest, the U.S. Department of Agriculture, and DWR.

As part of this Pilot Project, but with a separate funding source, Dr. Ryan Bailey at Colorado State University (CSU) is working to install up to six (6) monitoring wells on participating farms. He meets with participants for the initial introduction and site visit on April 19, 2016, and will determine the location of the new monitoring wells by the end of April. Well installation is tentatively scheduled for the last week of May. Although the locations of these new wells are not yet available (as of April 15, 2016), a map of their installed locations and copies of either their monitoring well permits or their notices of intent to drill, as filed with DWR, will be available in time for the CWCB Board meeting on May 18, 2016. The cost of Dr. Bailey and a student's time over the course of the Pilot Project to collect and analyze data is included as a line item in the budget.

All the irrigation wells participating in the Pilot Project have meters. Pumping data are reported to Central on a monthly basis. Central, the WGCD, and the GWTC will work jointly to maintain a database of pumping specific to the Pilot Project.

7. Measurable Outcome and Duration of Pumping:

The Pilot Project has the following objectives:

1) Lower the groundwater table in the vicinity of the Pilot Project study area.
2) Evaluate the effectiveness of increased pumping and reduced surface water use on lowering the groundwater table.
3) Encourage cooperation and collaboration between entities and individuals in the Pilot Project study area.

The measurable outcomes include the following:

1) How much did the groundwater table drop during the Pilot Project, and how does this compare to groundwater level variations in recent years?
2) How much did pumping among participants increase compared to recent years?

The pumping will occur for 10 months during the 2016 irrigation season (June 2016-March 2017). If successful, the WGCD and the Technical Committee hope to implement the project again during the 2017 irrigation season.

8. Itemized Grant Request

Itemized Budget Request for HB15-1178 Grant Application	
1. Augmentation Water Lease	
Lease @ $125 / AF	$106,312.50
subtotal	*$106,312.50*
2. Incentive to Option A Participants	
Participant 1 (GG)	$3,033.60
Participant 2 (MU)	$3,042.60
Participant 3 (HS)	$4,540.80
subtotal	*$10,617.00*
3. Data Collection (CSU)	
Travel	$2,000.00
Undergraduate student salary	$3,500.00
Faculty salary	$1,500.00
15% indirect to CSU	$1,050.00
subtotal	*$8,050.00*
4. Administrative Costs (WGCD)	
Invoicing	$1,600.00
Meetings	$3,750.00
subtotal	*$5,350.00*
5. Administrative Costs (Central)	
Add water to existing plans	$10,000.00
subtotal	*$10,000.00*
Grand Total	**$140,329.50**

Itemized Grant Request Notes:

1. Lease 850.5 AF of water for augmentation at a rate of $125 per AF.
2. Option A payments of $60 per AF of increased pumping above participants' 2013-2015 average up to the Central 2016 quota (Greiman: 50.56 AF; Ulrich: 50.71 AF; Strohauer 75.68 AF).
5. Administrative costs for Central are dependent on the response to the notice to add augmentation water to their plans. If there are no objections, Central anticipates this will cost approximately $4,000 to $5,000. If there are objections, the cost could double to $10,000. If there are significant objections, the Pilot Project will not be able to proceed.

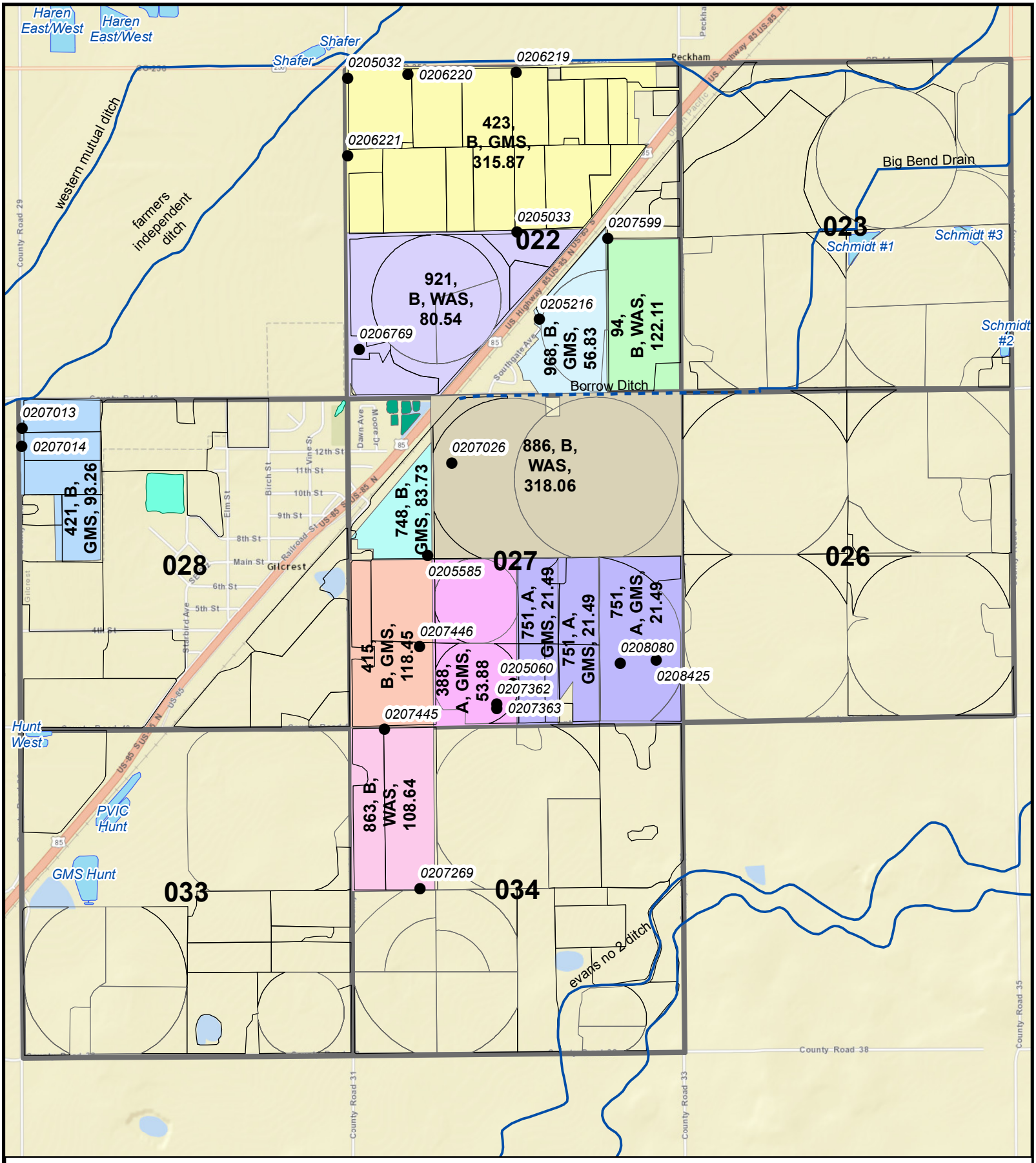

Figure 1. Pilot Project Area and Participant Details.

The label on participating fields is as follows:
Contract #, Option, Subdistrict, and Total Estimated Pumping (AF) for 2016

Participating wells (WDID)
7 Section Pilot Area
Recharge Ponds
Gilcrest Muni WWTP
Gilcrest Det Pond

Participating Field by Contract

421
423
748
751
863
886
921
968
94
388
415

N

0 0.25 0.5 1 Miles

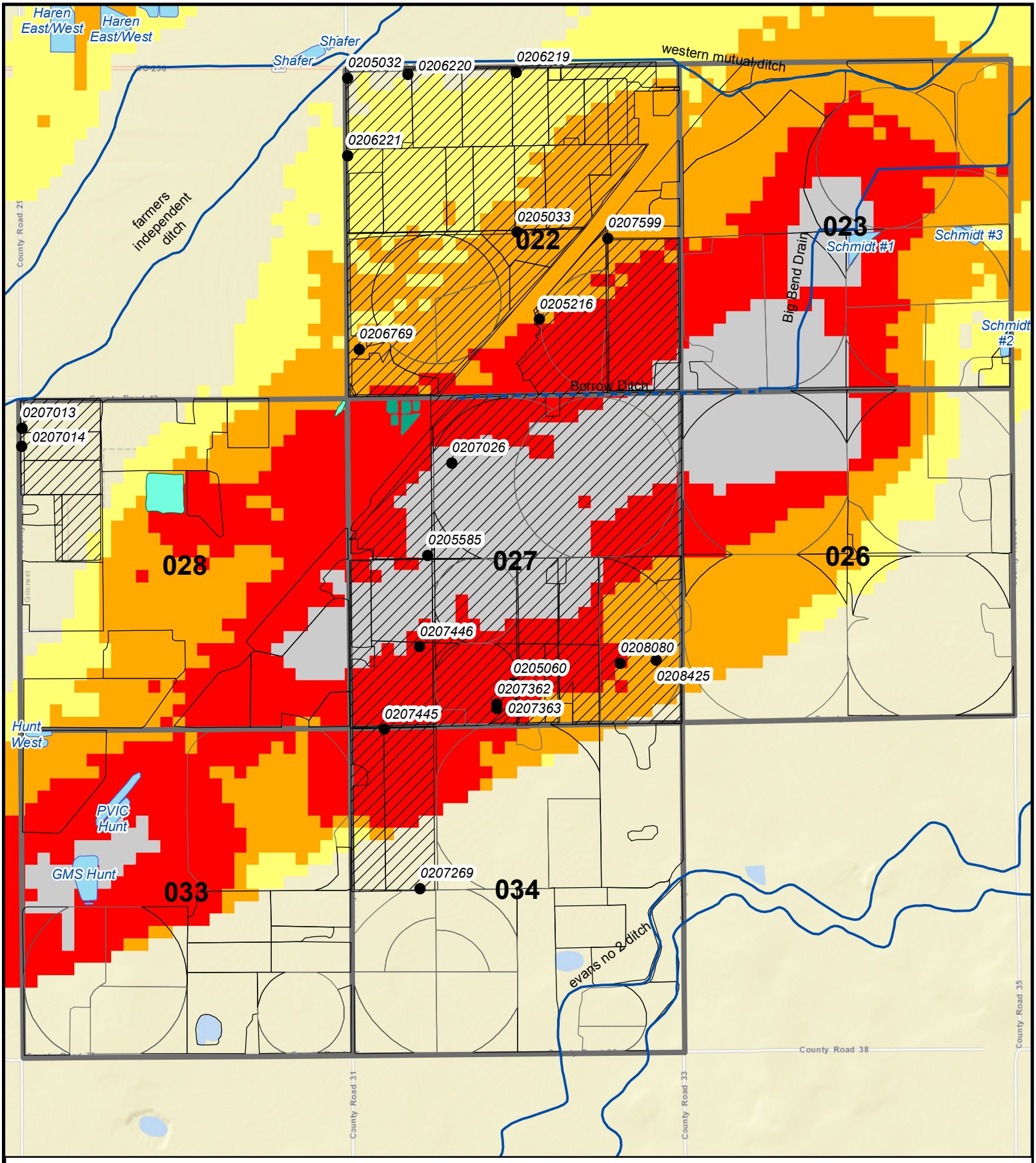

Figure 2. Pilot Project Area and Depth to Groundwater.

- Participating wells (WDID)
- 7 Section Pilot Area
- Recharge Ponds
- Gilcrest Muni WWTP
- Gilcrest Det Pond
- Pilot Participants

GWDepth_2014Fall
ft bgs

- 0 - 0.5
- 0.6 - 5
- 5.1 - 10
- 10.1 - 15
- 15.1 - 34.6

N

0 0.25 0.5 1 Miles

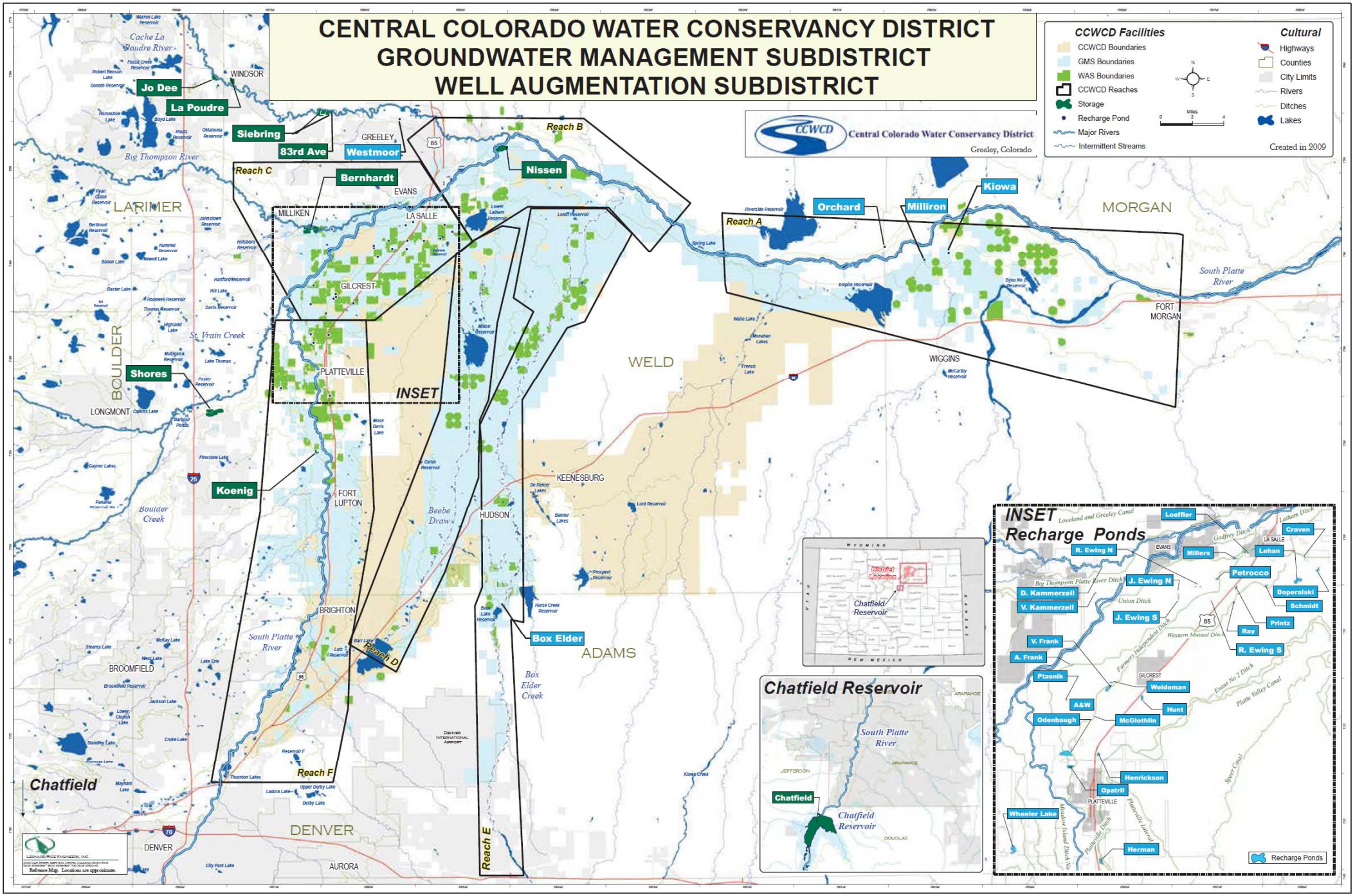

Figure 3. Central Colorado Water Conservancy District GMS and WAS Boundaries