

Agenda Item: 10.

Memorandum

To: Papio-Missouri River Natural Resources District Programs Projects and Operations Subcommittee

From: Paul W. Woodward, PE, Groundwater Management Engineer

Date: February 26, 2018

Re: Review and Recommendation on Joint Funding Agreement with USGS for the Western Sarpy County GeoScene 3D Aquifer Characterization Project

The Board approved the submission of a Water Sustainability Fund (WSF) grant application for the Western Sarpy County GeoScene 3D Aquifer Characterization project in June 2016, see Figure 1 for map of the study area. The grant was not awarded in 2016, so the application was resubmitted in June 2017. The Natural Resources Commission subsequently approved the application in December 2017 for \$120,000 to serve as a 60% cost-share match.

When the grant was initially submitted, the U.S. Geological Survey (USGS) was approved to conduct the study. USGS is uniquely qualified to perform this project as the 3D modeling software, known as GeoScene 3D, is produced and licensed by a company in Denmark which is working directly with USGS. As part of the Nebraska GeoCloud Program, this same software is being used to house all of the Airborne Electromagnetic Survey (AEM) data that is being collected statewide.

As a result of the ENWRA project to collect AEM data of western Sarpy County, see Figure 2, Aqua Geo Frameworks developed a GeoScene 3D project using available geologic well records and the AEM survey data. The result is a baseline (starting point) GeoScene 3D project which models some of the current wells with the AEM cross sections.

As part of this Western Sarpy County GeoScene 3D Aquifer Characterization Project, USGS proposes to enhance the baseline GeoScene 3D project by:

- incorporating additional well logs and available geologic records
- grouping and mapping potential pocket aquifers
- adding groundwater quality testing results to visualize areas of concern
- identifying areas of insufficient data or information

The proposed project would take place in the NRD's fiscal years of FY 19 and 20. The USGS is providing \$77,700 in federal matching funds. Funding for the project is as follows:

AGENCY	PMRNRD FY 19 (July 2018-June 2019)	PMRNRD FY 20 (July 2019-June 2020)	TOTAL
WSF	\$72,000	\$48,000	\$120,000
PMRNRD	\$48,000	\$32,000	\$80,000
USGS	\$66,000	\$11,700	\$77,700
Totals	\$186,000	\$91,700	\$277,700

A Joint Funding Agreement with USGS that outlines this funding arrangement with the District and includes their anticipated services and costs is attached.

Staff recommends that the subcommittee recommend to the Board of Directors that the General Manager be authorized to execute a Joint Funding Agreement with the U.S. Geological Survey for the Western Sarpy County GeoScene 3D Aquifer Characterization Project for a total non-federal cost of \$200,000, subject to changes deemed necessary by the General Manager and approval as to form by District Legal Counsel.

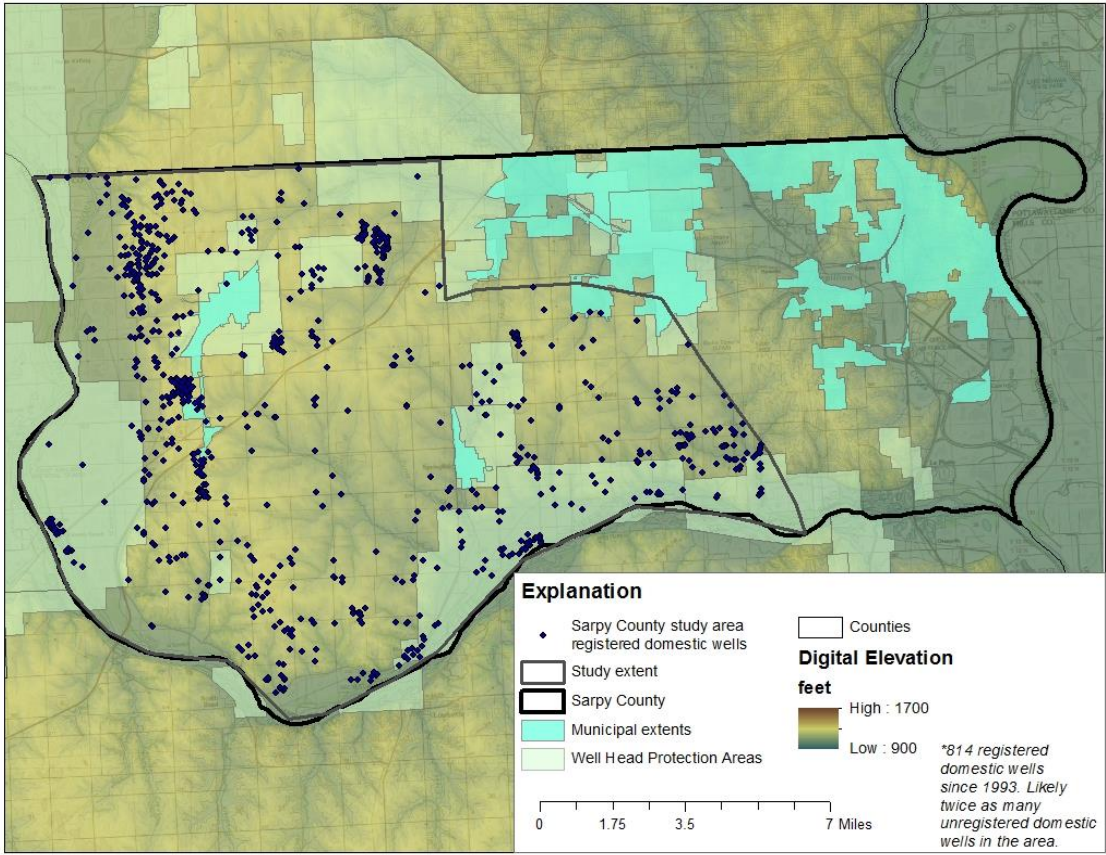


Figure 1. Study Area Map

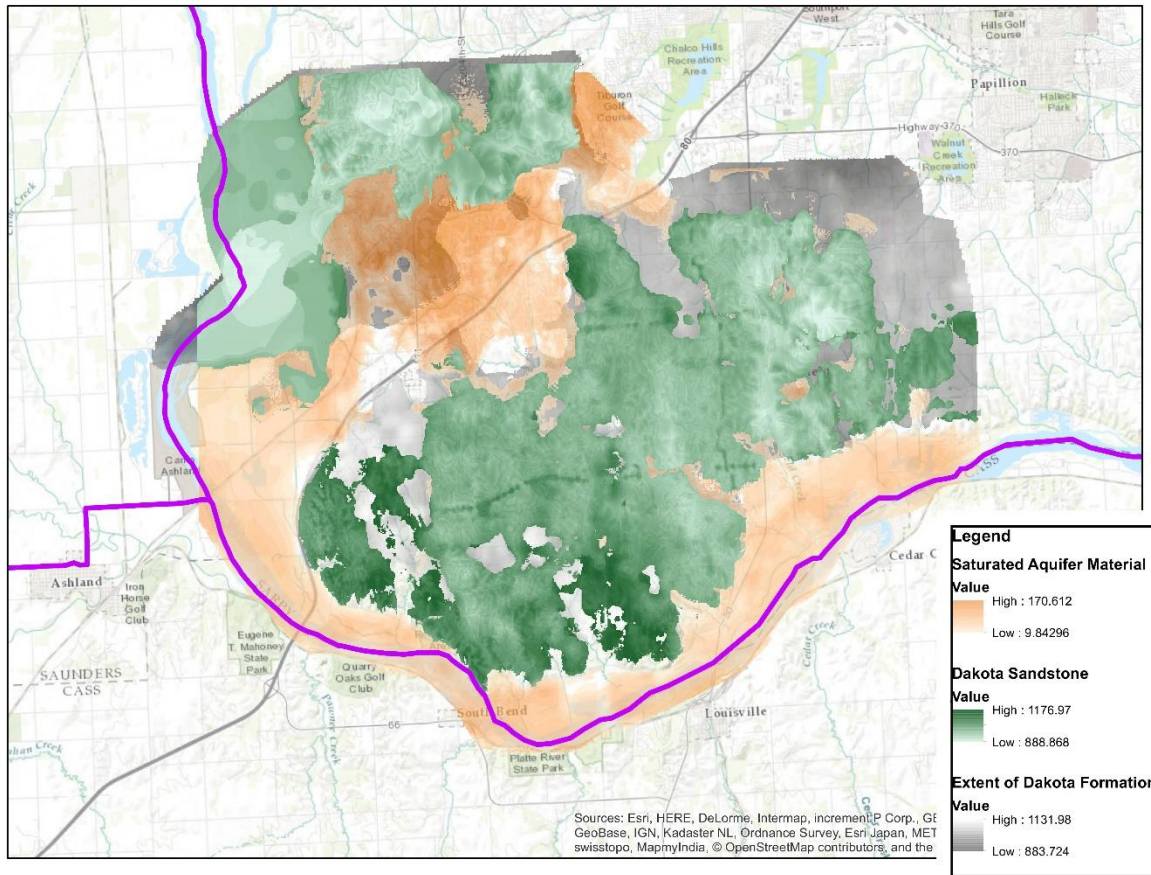


Figure 2. Example of AEM data used for aquifer characterization



United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Water Resources Discipline
Nebraska Water Science Center
5231 South 19th Street
Lincoln, NE 68512-1271

February 27, 2018

John Winkler
Papio-Missouri River Natural Resources District
8901 South 154th Street
Omaha, NE 68138

Dear Mr. Winkler:

Enclosed are two copies of Joint Funding Agreement No. _____ for the Sarpy County Geoscene 3D and Dakota Mapping project. The total amount of the agreement is \$277,700 or \$77,700 for the U.S. Geological Survey and \$200,000 for the Papio-Missouri River Natural Resources District. Please sign one copy of the agreement and return it to this office by _____, 2018. The second copy is for your records. Work cannot be started until we receive the signed agreement.

Work performed with funds from this agreement will be conducted on a fixed-price basis under the authority of statute 43 USC 36C. Billings will be rendered quarterly. The results of all work under this agreement will be available for publication by the U.S. Geological Survey.

For more information or any questions concerning this agreement, please contact Amanda Flynn at 402-328-4144.

Sincerely,

Jason Lambrecht, Acting Director
USGS Nebraska Water Science Center

3 Enclosures
USGS DUNS No. 949286512

Form 9-1366
(April 2015)

**U.S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
JOINT FUNDING AGREEMENT**

Customer #: 6000000134
Agreement #:
Project #: NR00H3B
TIN #: 47-0542469
Fixed Cost Agreement YES

FOR

Water Resources Investigations

THIS AGREEMENT is entered into as of the, 1st day of March, 2018 by the U.S. GEOLOGICAL SURVEY, UNITED STATES DEPARTMENT OF THE INTERIOR, party of the first part, and the Papiro-Missouri River Natural Resources District, party of the second part.

1. The parties hereto agree that subject to availability of appropriations and in accordance with their respective authorities there shall be maintained in cooperation Sarpy County GeoScene 3D and Dakota Mapping herein called the program. The USGS legal authority is 43 USC 36C; 43 USC 50; and 43 USC 50b.

2. The following amounts shall be contributed to cover all of the cost of the necessary field and analytical work directly related to this program. 2(b) includes In-Kind Services in the amount of
 - (a) by the party of the first part during the period

Amount	Date	to	Date
\$77,700.00	July 1, 2018		September 30, 2020

 - (b) by the party of the second part during the period

Amount	Date	to	Date
\$200,000.00	July 1, 2018		September 30, 2020

 - (c) Contributions are provided by the party of the first part through other USGS regional or national programs, in the amount of: \$0.00

Description of the USGS regional/national program:

 - (d) Additional or reduced amounts by each party during the above period or succeeding periods as may be determined by mutual agreement and set forth in an exchange of letters between the parties.

 - (e) The performance period may be changed by mutual agreement and set forth in an exchange of letters between the parties.

3. The costs of this program may be paid by either party in conformity with the laws and regulations respectively governing each party.

4. The field and analytical work pertaining to this program shall be under the direction of or subject to periodic review by an authorized representative of the party of the first part.

5. The areas to be included in the program shall be determined by mutual agreement between the parties hereto or their authorized representatives. The methods employed in the field and office shall be those adopted by the party of the first part to insure the required standards of accuracy subject to modification by mutual agreement.

6. During the course of this program, all field and analytical work of either party pertaining to this program shall be open to the inspection of the other party, and if the work is not being carried on in a mutually satisfactory manner, either party may terminate this agreement upon 60 days written notice to the other party.

9-1366 (Continuation)

Customer #:

600000134

Agreement #:

- 7. The original records resulting from this program will be deposited in the office of origin of those records. Upon request, copies of the original records will be provided to the office of the other party.
- 8. The maps, records, or reports resulting from this program shall be made available to the public as promptly as possible. The maps, records, or reports normally will be published by the party of the first part. However, the party of the second part reserves the right to publish the results of this program and, if already published by the party of the first part shall, upon request, be furnished by the party of the first part, at costs, impressions suitable for purposes of reproduction similar to that for which the original copy was prepared. The maps, records, or reports published by either party shall contain a statement of the cooperative relations between the parties.
- 9. USGS will issue billings utilizing Department of the Interior Bill for Collection (form DI-1040). Billing documents are to be rendered. Payments of bills are due within 60 days after the billing date. If not paid by the due date, interest will be charged at the current Treasury rate for each 30 day period, or portion thereof, that the payment is delayed beyond the due date. (31 U SC 3717; Comptroller General File B-212222, August 23, 1983).

U.S. Geological Survey United States Department of the Interior <u>USGS Point of Contact</u>	Papio-Missouri River NRD <u>Customer Point of Contact</u>
Name: Amanda Flynn Address: 5231 S. 19th Street, Lincoln, NE 68512 Telephone: 402-328-4144 Email: aflynn@usgs.gov	Name: Marlin Petermann Address: 8901 S 154th Street, Omaha, NE 68138 Telephone: 402-444-6222 Email: mpetermann@papionrd.org

Signatures and Date

Signature: _____	Date: _____	Signature: _____	Date: _____
Name: _____	Name: _____	Title: _____	Title: _____

Title: Western Sarpy County GeoScene 3D Aquifer Characterization Project, and isopach map of the Dakota Aquifer in southwest Sarpy County
Amanda Flynn, US Geological Survey Nebraska Water Science Center

Purpose: The population of Sarpy County has been increasing steadily since 1940. As of 2010, it is estimated there are over 1,700 domestic wells in Sarpy County supplying drinking water to approximately 5,300 people. Domestic well installations have been increasing steadily in the Western Sarpy County area adjacent to and West of Springfield. Sampling of these wells has shown some elevated nitrate levels, and some areas have nitrates above the EPA MCL.

The geologic system in this area is complex and has not been mapped in detail. The aquifers have been defined through stratigraphy from drilled wells and water quality sampling, but the aquifers have been crosscut by streams, leading to isolated aquifer sections. These isolated aquifers are being developed for domestic and commercial purposes, but the extent of the isolated aquifers and how they connect to underlying aquifers and the stream systems is not known.

Scope: The Papio-Missouri Natural Resources District needs to better understand the aquifer extents and thicknesses within Sarpy County to understand the resource and decide on management plans, both for capacity and groundwater quality concerns. The District has been collecting many different types of data, such as water levels, water quality, and geophysical data, but the data has not been compiled into a single project for a complete understanding of the complex system.

A GeoScene 3D project of western Sarpy County would help fill this void. GeoScene 3D is a graphical 3D interface which would allow the managers to visualize the aquifers, the placement of wells within the aquifers and the connections of the aquifers with each other and the land surface. GeoScene 3D allows for the import of airborne electromagnetic (AEM) data, in addition to borehole logs and hand-drawn cross sections, to interpolate the aquifer properties from multiple sources. A complete GeoScene 3D project will aid NRD managers in understanding where impacted aquifers are located, identifying flow paths between aquifers and surface water bodies, and in identifying areas where additional water level and water quality monitoring will be beneficial to the District. This information can be used in guiding well installation for landowners who are interested and identifying areas with potential sustainability issues.

Once the data is uploaded into the project, interpolated and revised, the layers can be exported from the program to make maps. The Dakota aquifer in Sarpy County has not been previously mapped in detail. The aquifer is being utilized by more domestic users in the past 15 years, and is also impacted by high nitrates. Publishing an isopach map of the thickness of the Dakota Aquifer in southwest Sarpy County will aid stakeholders in understanding the extent and possible limitations of the resource.

Deliverables: The GeoScene 3D project will be provided to the NRD as a tool for managers to use to understand the aquifers within the county. A USGS Open-File Report (OFR) will be written, explaining the data used to create the project, how to use the project as a tool to understand the resource, and the limitations of the project. Additionally, a USGS Scientific Investigations Map (SIM) will be generated documenting the thickness and extent of the Dakota Aquifer in southwest Sarpy County. A shapefile of the top and bottom elevation of the Dakota Aquifer and associated metadata will be released with the SIM.

Timeline:

		2018						2019												2020					
		Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Data Collection																									
DNR well classification	Flynn	x	x	x	x	x																			
	Traylor/Kavan				x	x																			
Existing	Flynn				x																				
ENWRA wells- Unregistered well logs-	Traylor/Kavan				x	x	x																		
	Flynn				x		x																		
	Traylor/Kavan	x	x	x	x																				
GeoScene																									
Model Build	Flynn							x	x	x	x	x													
	Traylor							x	x																
OFR review and publication	Flynn																								
Dakota Isopach Map																									
Contouring	Flynn																								
	Traylor																								
SIM review and publication	Flynn																								
	Kavan																								

Estimated Budget:

Federal Breakout	FFY18	FFY19	FFY20	Total
USGS Cost	\$ 16,500	\$ 52,425	\$ 8,775	\$ 77,700
WSF/PMRNRD	\$ 30,000	\$ 110,000	\$ 60,000	\$ 200,000
Total	\$ 46,500	\$ 162,425	\$ 68,775	\$ 277,700

	PMRNRD FY 19(July2018-June 2019)	PMRNRD FY 20 (July 2019-June 2020)	Totals
WSF	\$72,000	\$48,000	\$120,000
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