

Water Committee Meeting
 Wednesday, December 30, 2020 7:30 AM
 Lake Wanahoo Educational Building
 P.O. Box 126
 Wahoo, NE 68066

1. UNFINISHED BUSINESS
 To table flow meter discussion until February Water Committee, so Committee could know if grant funding would be available.

2. REGULATORY

- A. GROUND WATER MANAGEMENT AREA

1. Well Permit Program
2. Nitrate Tool Development
 Invoice is attached for \$14,500.25 per contract.

Activities included:

- Finalizing the tool input layers and incorporating the SWB model outputs; and,
3. Continued developed and refinement draft tool for upcoming demo to LPN water resource staff
 4. Cost Share Programs
 - a. Irrigation Well Sample Kits
 327 kits were sent out in 2020.
 5. Bellwood Phase 2 Area
 6. 2020 is the eighteenth year for this Phase 2 Area.

	8.	10.	13.	16.	19.
7.		11.	14.	17.	20.
	9.				

		12.	15.	18.	21.
22.	23.	24.	25.	26.	27.
28.	29.	30.	31.	32.	33.
34.	35.	36.	37.	38.	39.

40.	41.	42.	43.	44.	45.
46.	47.	48.	49.	50.	51.
52.	53.	54.	55.	56.	57.
58.	59.	60.	61.	62.	63.

64	65.	66.	67.	68.	69.
70	71.	72.	73.	74.	75.
76	77.	78.	79.	80.	81.
82	83.	84.	85.	86.	87.

88	89.	90.	91.	92.	93.
94	95.	96.	97.	98.	99.
100	101	102	103	104	105
106	107	108	109	110	111
112	113	114	115	116	117

11	119	120	121	122	123

124. All sample results from Lab have been received and sent to producer. The final two (Nick Schmit) were this week.

125. Richland - Schuyler Phase 3 Area

126. 2020 is the fifth year of this Phase 3 Area. Attached is NRCS guidance on irrigation management cost-sharing. Mark Walkenhorst attended the Committee meeting to explain the planning guidance along with answering questions. Mark thought that a grant through NRCS funding could be available in 2021 to do Best Management Practices in an identified area like the Phase Areas. The Committee thought the District should follow-up with Mark and look into this option for a joint project.

The LPN contracted for \$4,300 with EA Engineering, July 2020, on conducting additional vadose soil sampling on the demonstrations fields in the Phase Areas. The samples were collected and sent to the UNL Water Center in November 2020. An invoice is attached that was received on December 31, 2020.

127. Year	128. Nitrate-nitrogen Range	129. Percent Nitrate-nitrogen 0 to 8.0 ppm	130. Percent Nitrate-nitrogen 8.01 to 10.00 ppm
141. 2004	142. 0 to 47 ppm	143. 30% (42 of 139)	132. Percent Nitrate-nitrogen 10% (14 of 139)
147. 2005	148. 0 to 120 ppm	149. 31.3% (74 of 236)	133. Percent Nitrate-nitrogen 10.2% (24 of 236)
153. 2006	154. 0 to 53 ppm	155. 28% (50 of 181)	134. Percent Nitrate-nitrogen 14% (26 of 181)

159. 07 20	160. 0 to 99 ppm	161. 32% (75 of 231)	162. 10% (22 of 231)
165. 08 20	166. 0 to 46 ppm	167. 28% (53 of 190)	168. 12% (23 of 190)
171. 09 20	172. 0 to 57 ppm	173. 33% (72 of 216)	174. 6% (13 of 216)
177. 10 20	178. 0 to 57.5 ppm	179. 31% (70 of 229)	180. 7% (15 of 229)
183. 11 20	184. 0 to 65.8 ppm	185. 28% (67 of 241)	186. 9% (21 of 241)
189. 12 20	190. 0 to 52.6 ppm	191. 29% (70 of 241)	192. 9% (21 of 241)
195. 13 20	196. 0 to 94.0 ppm	197. 25% (63 of 252)	198. 9% (23 of 252)
201. 14 20	202. 0 to 101.0 ppm	203. 27% (68 of 251)	204. 9% (22 of 251)
207. 15 20	208. 0 to 53.3 ppm	209. 23% (55 of 238)	210. 12% (29 of 238)
213. 16 20	214. 0 to 50.5 ppm	215. 25% (58 of 228)	216. 10% (22 of 228)
219. 17 20	220. 0 to 53.4 ppm	221. 25% (60 of 238)	222. 6% (1 4 of 238)
225. 18 20	226. 0 to 56.9 ppm	227. 26.5% (50 of 189)	228. 6.3% (12 of 189)
231. 19 20	232. 0 to 39.4 ppm	233. 25% (53 of 209)	234. 11% (22 of 209)
237. 20 20	238. 0 to 50.8 ppm	239. 26% (69 of 261)	240. 6% (1 5 of 261)

All sample results from Lab have been received and sent to producers. The four Horejsi water samples were received in mid-December

243. LPNNRD Operator Certification

First event will be January 12 in David City and then a virtual presentation on January 28 starting at 6:30 pm. Topics for the meeting on the 28th will discuss split application of nitrogen, cover crops, manure management and UNL-NRD updates. Committee wants to make sure that UNL manure recommendations are in step with NRD regulations. Staff needs to keep the communication open with UNL.

B. GROUND WATER ENERGY LEVELS

Attached is Summary Table along with comparison maps. The only well to not be in the "Decreased" column was the Hanson monitoring well which had a decrease of 0.22' so it was in the 'Unchanged' column.

A couple of factors to consider regarding these water levels:

- Winter Storm Ulmer (Bomb Cyclone) in March 2019 - some fields not farmable due to the flooding, remained too wet, debris and sand to be removed, so well not used.
- Lack of precipitation during the growing season in 2020, particularly in August, early September, so 'last irrigation' went longer.

3. GROUND WATER PROGRAMS

A. DECOMMISSIONED WELL PROGRAM

1. Well Estimates

2. # new wells has been reviewed and approved for decommissioning since the last Committee meeting.

3. Well Owner	4. Type of Well	5. Cost Share Estimate	6. County
7.	8.	9.	10.
11.	12.	13.	14.
15.	16.	17.	18.

19. Plugged Wells

20. # wells have been plugged, reviewed, and ready for cost share payment approval this month.

21. Well Owner	22. Type of Well	23. Cost Share Estimate	24. County
25.	26.	27.	28.
29.	30.	31.	32.
33.	34.	35.	36.

B. LOWER PLATTE NORTH NRD GROUND WATER STUDIES

1. Eastern Nebraska Water Resources Assessment (ENWRA)

Katie Cameron gave a report to the Water Committee, which is shown below. Attached are the invoices for the \$30,000 yearly dues and Geo-Cloud \$3,400 per contract.

Katie sent this information about ENWRA Activities.

2020 Eastern Nebraska Water Resources Assessment (ENWRA) Activities Update:

- Coordination: routine administration, financial budget through Lower Platte South NRD, spring technical meeting, and website updates/Dropbox management (includes new 2020 AEM tab, video tutorials, new project info)
- Assisted NRDs with prep and coordination of information for summer 2020 AEM flights in Nemaha and Papio-Missouri River NRDs (included contacting local clerks with maps and dates, processing several sets of 2019 test hole logs into lithology summarized geophysical log scans w/ preliminary top/bottom of main aquifer units or Dakota calls). Also assisted NeDNR with the upcoming AEM spotlight for the WSF storyboard for the Natural Resources Commission website
- Answered over 20 public inquiries on the AEM datasets, NDEE and NeDNR interagency inquiries, private landowner inquiries on AEM, and several consultant inquiries/requests on AEM data coordinated through the NRDs.
- ENWRA pilot site maintenance, transducer downloads, and sampling fieldwork for 78 pilot site wells. The Ashland pilot site has new replacement monitoring wells with transducers and dedicated pumps southwest of the former ASH01 location taken away by May 2019 flooding. Several older deep well pumps went bad at all three sites, possibly due to sedimentation or fouling of screens. Several new metals parameters were added to ENWRA's routing sampling list in 2020 as a one time recon effort. Compilation, graphing and evaluating of lab and transducer data for the ENWRA website (linked to our Dropbox: https://www.dropbox.com/sh/kuq64jl1eqk27gh/AAB3PVFTBsK9_iLZ2_8Z-KZCa?dl=0). Nitrate sampling was conducted at the Firth shallow well for lab comparison to Aqua Troll 600 readings of nitrates every 8 hours (weekly lab samples collected in July and August 2020 to compare with Troll readings). Nitrate sensors appear to only last 6 months from shipment according to discussions with in-situ and based on our graphed data, after a second round with a new instrument sensor, the aqua Troll study will conclude in July 2021 and it will be available to NRDs for future localized short term uses. Pilot site sampling results for ASH Vadose Upland Site (monitoring well 55 feet deep) and the Mead area weather station specific to Lower Platte North is attached. Nitrate levels have dropped at the ASH Upland Vadose monitoring well location, the heat dissipation and aqua spy probe control box installed with it in 2008 was irreparably damaged by mice and will be decommissioned. Of the nine added parameters collected at the Ashland Vadose Upland site in 2020, Barium was detected at 0.263 mg/L (naturally occurring, 2 is the MCL) and Selenium and Uranium were reported at low concentrations.
- Water Sustainability Fund (WSF) Natural Resources Commission (NRC) Projects - Status reports due March 2021:
 - Award #4125 - Secondary Bedrock Sampling and Age Dating: Chris Hobza of the USGS provided the results of this project to the group on December 9,

2020 via recorded Zoom

https://www.dropbox.com/s/2qjklilixy3we6n/SecondaryBedrock_Dec_9_2020_Zoom.mp4?dl=0

The accompanying manuscript is in final review at USGS and will be posted on the ENWRA website. The sampling and Age-dating laboratory results are currently available on the <https://waterdata.usgs.gov/nwis> database. This project will be closed out with a final status report to the WSF in March 2021.

- Award #4164- the Nebraska GeoCloud (NGC): Jesse Korus debued the guidelines and standards for the online platform on July 1, 2020 (<https://youtu.be/8YrPwk6llm8>). Additional to the several training sessions for groundwater professionals on the NGC and GeoScene3D held over the years, a "how to" webinar was provided on August 27, 2020 (<https://youtu.be/xk09q4wJX3k>). A small advisory group made up of project partners was formed to steer the continued use and further development of the NGC along with a two-year extension to the interlocal agreement for sustaining the NGC online platform through the 10 participating NRDs. This Project and its benefit to constituents is expected to continue well past the final WSF close-out report anticipated on or before March 31, 2021.
- 2. • Downloaded and tested many datasets from NGC, created several AEM data Geoscene3D project files for each of the ENWRA NRDs including the Lower Platte North for use with the Nebraska Viewer Geoscene3D license to observe resistivity data along profiles without limitation of scales and perspectives like PDFs in reports. Made headway in creating master shapefiles and maps of the AEM flight lines for use with NGC and for the individual NRDs GIS mapping needs.
 - Upcoming: ENWRA updates to each of the NRD boards not caught-up in 2020, Coordinator will schedule meetings with water staff at each ENWRA NRD in January to discuss how ENWRA plans fit in and potential ENWRA grant applications for submittal in 2021.

C. Pipeline Information

Tom,

A few comments.

We will not look further at possibly using the Bellwood 5 H reservoir.

It is unlikely that we will look further at using the Bellwood 2 C reservoir. If we are able to firm this up prior to the 12/30/20 committee meeting, I will let you know.

In regard to the irrigation well that we plan to use, it would be a primary source, not a backup source, as far as using the water for dust control. The well is not in a special quantity area.

Steve
Steven P. Case
Attorney

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Steve,

As we discussed yesterday, on Monday, the LPNNRD Board did have some continued discussion regarding Keystone XL Pipeline's request for pumping water (10.7 million gallons) from a Bellwood Watershed floodwater dam reservoir, for pipeline leak testing and dust control in 2021. This discussion also included the possibility of Keystone negotiating with a private landowner to pump approximately 8.3 million gallons of water from an irrigation well near the project area. While no formal decision was made, some concerns and questions were presented. We are of the understanding that these water uses being considered are for backup purposes only, as Keystone is applying for a temporary pumping permit from the Platte River as the primary project water source. This permit is being handled by the Nebraska Department of Natural Resources (NDNR). To help sum things up at this point, below is a recap of what has been previously discussed and what future information will be helpful to LPNNRD.

Pumping from Bellwood Watershed Floodwater Retarding Dam Reservoirs

With regard to pumping from a Bellwood floodwater dam reservoir, most of these 13 structures in Butler County have reached or are nearing their estimated 50-year sediment storage life. This means the availability of surface water is greatly diminished as silt has replaced much of the originally designed permanent water pool in some instances. As mentioned earlier, this is especially true for the 50-year old Bellwood Structure 5 H, which is located about 2 miles north and 3 miles west of David City. LPNNRD holds landowner easements for operation and maintenance for the 13 dams, which includes holding the related impounded water rights. In the past, we have not been involved with allowing third party water pumping from our dams and reserved these rights, on a limited basis, for landowner irrigation purposes who have permanent water located on their property. As an example, in the 1970's, LPNNRD did allow one of the original landowners at structure 5H permission to pump limited irrigation water for crops. However, it appears that this activity has not occurred for several years. It was mentioned at the Board meeting that silt would likely need to be dredged from 5H before pumping could be considered, but dredging is a very involved and expensive process that the LPNNRD hasn't done previously.

Another structure discussed was Bellwood Flood Retarding Dam 2-C. Structure 2-C is located approximately 2 miles south and 1 mile west of the town of Bellwood. Structure 2-C's embankment is located in Section 36, Township 16 North, Range 1 East, but the majority of the permanent water is located to south in Section 1, Township 15 North, Range 1 East. The structure was built in 1993 with a total estimated permanent water storage capacity of 391.5 acre feet when new. If I calculated correctly, there would have been an estimated 127,570,666 million gallons of potential maximum permanent water capacity when constructed. Now being 27 years old, it is expected that about half of the original permanent water storage capacity has been replaced by sediment. Even for landowner irrigation, permits have been granted on a very limited basis and there are no active permits on any of our district structures that we are aware of. We are aware that

many landowners use or enjoy the reservoirs for livestock water, recreation and aesthetic purposes. That being said, LPNNRD is very sensitive on maintaining good public relations with landowners associated with these dams and they would need to be agreeable to any outside use being considered. They would also need to provide any ingress/egress on their property.

My understanding from the Nebraska Department of Natural Resources (NDNR) is that your client's request would be for a one year temporary permit. Should the Board consider applying for such permit, it would be contingent on any NDNR and LPNNRD requirements and of course landowner concurrence.

Pumping Irrigation Water from a Private Landowner Irrigation Well

Considering the issues associated with pumping from one of the Bellwood dams, it appears using a private irrigation well for backup project use appears more probable. In this case, Keystone would work directly with a private landowner to negotiate using water from their irrigation well. LPNNRD would be less directly involved, but depending on where the well is located (i.e. a Special Water Quantity Area), we may need to work closely with the landowner and NDNR on the amount of water being used for this purpose.

We are planning for you and any other representatives to join our upcoming committee meetings to discuss the Keystone Pipeline Project plans and water needs. The Projects committee will discuss the water use request for our dams and the Water committee will discuss the water use from an irrigation well. Both committee meetings start at 7:30 a.m., Wednesday, December 30, 2020. We will coordinate with you about Zooming in to both meetings at different times. The full LPNNRD Board would then discuss the topic at their January 11, 2020 Board Meeting.

A few of the Board/staff questions or comments thus far are:

- More detailed information is desired about the entire project scope (miles of pipeline, location, schedule etc..) .
- In the past, how has Keystone previously tested for pipeline leaks and controlled dust on other portions of the project?
- Would the planned water use be in the vicinity of the project area, all within LPNNRD boundaries, or would water be pumped several miles away? This might be an issue if pumping water occurs from one watershed basin into another.
- Is a water flowmeter planned to be used to track the amount of water usage?
- How would water be returned to a reservoir after pipe testing and what amount or percent would not be returned (i.e. normal loss for testing and amount loss for dust control). It would be murky water for the testing so how would this affect your testing? Returning it to the pond could change the water temperature which would be detrimental to fish populations. Also, would there be any residues in the pipe that might cause water quality issues?
- With regard to water used from an irrigation well, how would that water be dispersed after use? Our assumption would be that the irrigation well water would be discharged over the surrounding land or to a tributary. So how does that work

and what precautions are taken not to cause erosion, water runoff and environmental impacts to other property in the area?

- What happens if we experience a severe drought in 2021 and the pumping severely depletes available reservoir water? In the case of an irrigation well, what happens if such pumping has an adverse effect on surrounding domestic or irrigation wells in the area?
- Would it be possible or needed to meet with Keystone representatives to tour the subject area in our District, to obtain a better mutual understanding of the proposed project? Granted, that might be somewhat challenging this time of year and with parties dealing with virus issues.

D.

We will keep in touch and please let me know if have any questions.

Sincerely,

Tom Mountford

Please let me know if you have any questions.

4. SURFACE WATER PROGRAMS

A. USGS STREAM FLOW GAUGING SITES

An agreement from USGS to continue partnering on 2 stream gauge sites at Shell Creek - Columbus and Wahoo Creek - Ashland, along with a dedicated monitoring well at Mead. LPN share is \$17,340. These gauges are valuable in assisting LPN in flooding situations and during a drought.

5. OTHER

A. COMMENTS FROM THE PUBLIC



Daryl Andersen
 Lower Platte North NRD
 511 Commercial Park Road
 Wahoo, NE 68066-0126

December 15, 2020
 Project No: 5036LPN01
 Invoice No: 15700

Project 5036LPN01 Nitrate Assessment Web-Based Tool

Professional Services through November 25, 2020.

Task 01 Hydrogeologic Asmnt & Aquifer Vlnrbly

Professional Personnel

	Hours	Rate	Amount	
Hume, David	3.00	218.00	654.00	
Sopiwnik, Roscoe	.25	140.00	35.00	
Totals	3.25		689.00	
Total Labor				689.00
				Total this Task \$689.00

Task 03 Soil-Water-Balance Model

Professional Personnel

	Hours	Rate	Amount	
Barber, Joel	16.50	165.00	2,722.50	
Sopiwnik, Roscoe	.75	140.00	105.00	
Totals	17.25		2,827.50	
Total Labor				2,827.50
				Total this Task \$2,827.50

Task 04 Interactive Web-Based Desktop Tool

Professional Personnel

	Hours	Rate	Amount	
Close, Kelly	9.75	225.00	2,193.75	
Sopiwnik, Roscoe	13.50	140.00	1,890.00	
Totals	23.25		4,083.75	
Total Labor				4,083.75

Consultant

Doug Kulak				3,900.00
				Total this Task \$7,983.75

Task 06 Funding Strategy Assistance

Consultants

JEO Consulting Group Inc.

11/23/2020 JEO Consulting Group Inc.

3,000.00

Total Consultants

3,000.00

3,000.00

Total this Task

\$3,000.00

Total this Invoice

\$14,500.25

Outstanding Invoices

Invoice Number

Date

Balance

15392

11/11/2020

5,677.00

5,677.00

Total Now Due

\$20,177.25

TERMS: Net 30 days. A finance charge of 1.5% per month, with an annual rate of 18% is applied to past due amounts.



June 24, 2020

Daryl Andersen
Lower Platte North NRD
P.O. Box-126
Wahoo, Nebraska 68066

RE: Scope of Work and Contact
Contaminant Movement Analysis and Web-Based Desktop User Interface Tool

Dear Daryl,

LRE Water (LRE) is pleased to provide the Lower Platte North Natural Resource District (LPNNRD) with the following scope of work and contract for services associated with the Contaminant Movement Analysis and Web-Based Desktop User Interface Tool (Project). Per your June 9, 2020 email, the LPNNRD Board approved LPNNRD Water Committee's recommendation to contract with LRE for the Project.

I. SCOPE OF WORK

LRE's approach and scope were provided to the LPNNRD in our Contaminant Movement Analysis and Web-Based Desktop User Interface Tool for BMP Management, dated April 27, 2020. Please refer to this submittal for Project background details and LRE approach. The following phases and tasks are summarized below.

- Phase 1: Hydrogeologic Assessment and Aquifer Vulnerability Analysis
- Phase 2: 3D AEM Model Using Leapfrog
- Phase 3: Soil-Water-Balance Model (SWB) for Estimating Groundwater Recharge
- Phase 4: Interactive Web-Based Desktop Tool
- Phase 5: Data Gaps and Recommendations
- Phase 6: Funding Strategy Assistance

Phase 1: Hydrogeologic Assessment and Aquifer Vulnerability Analysis

TASK 1: DEVELOP HYDROGEOLOGIC DATABASE

This task will include development of a hydrogeologic database for the Bellwood and Richland-Schuyler Study Areas from readily available information, including NeDNR well logs, CSD test hole logs, and LIDAR. The method used to develop the database will also serve as a "pilot" example for how the LPNNRD can approach other future study areas using ESRI's ArcGIS and other applicable software, which will allow the data to be analyzed, visualized, and interpreted. As part of the task, the Project Team will obtain relevant hydrogeologic data and

studies for the Study Areas, if available during the Project, from sources that will include, but not be limited to the following:

- LPNNRD Vadose Zone Sampling by Dr. Snow from UNL (in progress)
- CSD well and test hole database
- CSD hydrogeologic study on groundwater levels and nitrates in groundwater at the Study Areas (in progress)
- NeDNR's Lower Platte Missouri Tributary numerical flow model
- USGS's Elkhorn-Loup model
- Results of this task will be the foundation to complete the following tasks.

Task Deliverables:

- LIDAR
- Well and test hole shapefiles
- Water level elevation surface raster
- Saturated sand thickness raster
- Total low-permeable (i.e., silt and clay) thickness above the Aquifer raster
- Bedrock surface elevation raster
- Well density raster

TASK 2: HYDROGEOLOGIC CROSS SECTIONS

This task includes development of six hydrogeologic cross sections (one north to south and one east to west in each study area) through the Bellwood and Richland-Schuyler Study Areas using the geodatabase and an ESRI ArcGIS tool. The transect locations will be based on LRE Water's review the areas where nitrate concentrations are highest, review of UNL's study, and discussions with LPNNRD. If the LPNNRD feels fewer than sections are needed, these will be eliminated from the task. The sections will use available hydrogeologic information from NeDNR well logs and CSD test holes, while referencing all data to precise LIDAR elevations to ensure consistency. To ensure accessibility and usability, the final cross sections can be linked within the Tool. The workflow used to cut these cross sections is easily repeatable within these or other areas throughout the LPNNRD.

Task Deliverables:

- Six (6) 2-D hydrogeologic cross sections within the Bellwood and Richland-Schuyler Study Areas (three in each area)
- Applicable cross section transect location shapefile to include in the Tool

TASK 3: AQUIFER VULNERABILITY ANALYSIS

This task will include two primary sub-tasks to determine the relative vulnerability of the Aquifer to the downward migration of potential contaminants at grade. The results of Task 3 will provide the LPNNRD and stakeholders information to identify potential contaminant source areas as well as to develop land management initiatives that

target BMPs to mitigate future contamination. Included as part of this task is an assessment of the total thickness of till, clay, and silt (low-permeable material both saturated and unsaturated) above the Aquifer. A vulnerability ranking (low, medium, high) will be applied across the Study Areas. In addition, a review of all available nitrate data across the Study Areas will be completed. The most recent nitrate value at each well location across the Study Areas will be mapped, and the concentrations will also be evaluated at screened intervals for wells on the cross section. This will provide insight into the horizontal and vertical nitrate concentrations and possible primary migration pathways in the Aquifer, and if low-permeable layers have an impact.

Task Deliverables:

- Summary vulnerability ranking layer for the Study Areas
- Most recent nitrate results posted on cross sections for wells on or near the hydrogeologic cross sections completed during Task 2, and mapped surface will be created.
- An interpolated nitrate concentration raster for Aquifer by depth, if sufficient data exists.

Phase 2: 3D AEM Model Using Leapfrog

TASK 1: GATHER AEM DATA AND BUILD 3-D AEM MODEL USING LEAPFROG

This task will provide the LPNNRD with a powerful interactive 3D geologic model using Leapfrog. The 3D model will be built from the existing AEM to develop the hydrogeologic framework. AEM data in and around the Study Areas will be obtained from the ENWRA website or directly from ENWRA personnel. The data will be processed and prepared for input into Leapfrog and the AEM data will be interpolated to create 3-D volumes across the Study Areas. LIDAR data will be used to define the top of the of the Leapfrog model and the bedrock surface created in Phase 1 will be used to define the unconsolidated-bedrock contact in the Leapfrog model. Additionally, well and test hole lithology data will be incorporated into the Leapfrog project to display the lithology as boreholes. The method used to process, visualize, and deliver the AEM data will also serve as a “pilot” example for how the LPNNRD can approach other future study areas or the entire LPNNRD. Once the Leapfrog model is developed, it will be provided to LPNNRD to access and view with the free Leapfrog Viewer application. The Viewer application will allow LPNNRD to “fly around and through” the interpolated AEM data, cut slices (profiles or cross-sections) through the AEM data, and view select saved “scenes” that could target certain areas of interest or near the hydrogeologic cross sections in Phase 1.

Task Deliverables:

- Powerful 3D geologic model Leapfrog Viewer 3D AEM Model of AEM resistivity data
- Well and test hole lithology displayed as boreholes in Leapfrog Viewer
- Link to download the free Leapfrog Viewer application from SEEQUENT
- Assistance to LPNNRD on how to navigate in the Leapfrog Viewer

Phase 3: Soil-Water-Balance Model (SWB) for Estimating Groundwater Recharge

LRE Water use the US Geological Survey's (USGS) SWB model to simulate the magnitude and spatial distribution of groundwater recharge. The USGS SWB model is a grid based analytical model that applies a modified version of the Thornthwaite-Mather soil-moisture-balance approach to estimate groundwater recharge over the two study areas. The simulated distribution of groundwater recharge rates will be incorporated in the Tool. The district will be able to view the simulated recharge distribution on a daily basis over the modeling period using the model viewer.

We are assuming a 2-year model simulation period. The first year will set initial soil conditions and the second year used to simulate groundwater recharge. LRE Water will construct from and calibrate the model to observed vadose zone conditions. If the available observations data warrants automated calibration, LRE Water will implement PEST, an automated calibration program, to calibrate the model. Otherwise, LRE Water will calibrate the model manually.

LRE assumes the following for this task:

- We will not explicitly model nitrate transport. Nitrate transport will be inferred based on estimated loading and simulated groundwater recharge
- We will use model input data, including precipitation, air temperature, land-use classification, and hydrologic soil parameters from the aquifer vulnerability assessment, publicly available groundwater models, Dr. Snow's UNL study, and publicly available gridded data sets
- The modeling will include a 2-year simulation period

Task Deliverables:

- SWB model files and output grids for the Tool in Phase 4.

Phase 4: Interactive Web-Based Desktop Tool (Tool)

The data and assessment outcomes from Phases 1 through 3 will be leveraged to provide the LPNNRD with a tool that will be easy to navigate for staff and the general public. The Tool will be an interactive web-based desktop application for quick review and effective decision making related to conducting analyses on implementing BMPs to assist in controlling the leaching of nitrate and other contaminants at the ground surface, and potentially into the Aquifer. The Tool will also provide preliminary desktop hydrogeologic information that could be used to evaluate the suitability of locating high- capacity wells. To accomplish this, an Amazon Web Services (AWS) cloud server will be created to house the website and a small database. Tabular data sets will be developed for the relevant spatial layers to produce spatially gridded values that indicate suitability "rankings" appropriate for that layer.

Layers that will be made available for the tool and consideration for flexible ranking evaluations will be discussed with the LPNNRD. These may include:

- LiDAR

- Aquifer vulnerability assessment (thickness of unsaturated clay and silt).
- Depth to groundwater of Aquifer
- Land use
- Soil groups
- Soil water balance vadose zone model output
- Well and test hole locations linked to the well and test hole log in the NeDNR's database
- Cross section transects linked to hydrogeologic cross sections
- Well density
- Vadose zone sample locations with results provide by UNL
- Nitrate concentrations in groundwater

The Tool will be created with a map-based interface and the ability to accept a location and zoom to that location automatically. The location entered will be intersected with the selected gridded data sets and a suitability "score" will be calculated behind the scenes and used to render the symbol for the entered point. The symbol will represent the suitability of that location for a new well based on the values associated with the grid cells underlying the point (e.g., Green-go, Yellow-caution, Red-stop). The interface will allow the user to turn the layers on and off removing or adding them to the score calculation, and to also apply weighting factors by sliding a value bar for each layer, forcing the layer to have more or less influence on the score. The symbol will refresh automatically as these controls are used to reflect changes in the score.

Task Deliverables:

- An LRE Water hosted interactive website with online help Tool-tips
- An LRE Water hosted cloud server and database supporting the Tool
- A personalized web address for the Tool (e.g. www.lpnrd-asses.org)
- System documentation and training on use of the Tool
- 1 year of paid-up hosting and maintenance for the system

Phase 5: Data Gaps and Recommendations

The primary objectives to addressing the LPNNRD's need for a Tool to assist with BMPs will be met following the completion of Phases 1 through 4; however, there may be data gaps identified as part of the Project the LPNNRD wishes to address to have a better understanding of the Study Areas, primarily related to groundwater flow and the flow paths of nitrates and other contaminants once they enter the Aquifer. In this phase, the LRE Water team will work LPNNRD staff to identify these data gaps that could be addressed with additional studies funded from sources identified under Phase 6.

These may include, but not be limited to the following:

- Interpreting the hydrostratigraphy from more than 1,200 well logs and test holes in the two areas combined may be an important task to improve the conceptual hydrogeologic framework between the AEM flight

lines. Although these will be included in Leapfrog and the Tool, an interpolation of these stratigraphic layers may be beneficial to the LPNNRD.

- Conducting a more robust numerical model of the unsaturated zone using HYDRUS and incorporating the information from UNL’s study for calibration and LPNNRD’s planned seepage meter data.
- The existing ELM and LPMT groundwater flow models may not be suitable for simulating the detailed groundwater flow in the Study Areas that the LPNNRD desires. Building a more detailed multi-layer numerical groundwater flow model of the Study Areas using MODFLOW coupled with output from HYDRUS may be more useful and can be used to simulate Study Area-specific conditions.
- Refining the Tool with additional data and/or developing a desktop dashboard that the LPNNRD could use to evaluate water level trends, pumping rates from flow meters, and seepage meter real-time data would provide staff and the public (if desired) with real-time information at their desktop.

Phase 6: Funding Strategy Assistance

Should additional studies or evaluation of the Study Areas, or other locations in the LPN be warranted and require additional funding to address data gaps identified Phase 5, a solid option may be the Natural Resources Committee (NRC) Water Sustainability Fund (WSF). The LRE Water team partner, JEO, has extensive experience and success obtaining funding from the WSF. The WSF may be more favorable for larger-scale projects, which benefits multiple communities and large groups of people. Also, the WSF has been favorable to entities that utilize AEM data for water management projects.

II. TIME REQUIRED

LRE can complete the above phases by the end of September 2020.

Delays caused by major changes in the project plans or by circumstances beyond the control of the engineer could extend the time of completion.

III. PAYMENT

The services described above can be accomplished for time and materials not-to-exceed \$ 56,000

PHASE NO.	PHASENAME	COST
01	Hydrogeologic Assessment and Aquifer Vulnerability Analysis	\$18,000
02	3-D AEM Model Using Leapfrog	\$16,500
03	Soil-Water-Balance Model (SWB) for Estimating Groundwater Recharge	\$9,000
04	Interactive Web-Based Desktop Tool (Tool)	\$9,300
05	Data Gaps and Recommendations	\$1,500
06	Funding Strategy Assistance	\$1,700
TOTAL		\$56,000



Invoices are submitted monthly for time and expenses incurred. Terms of payment are net 45 days. Overdue accounts are subject to an interest charge of 1.5 percent per month and services will stop whenever payment is overdue more than 75 days.

Payments for our services, like other professional services, are based on the actual time spent on your behalf and are measured by standard hourly rates in effect at the time the services are performed. For those assigned to your team, those rates currently range from \$200–\$265 for principals; \$100–\$250 for engineers and hydrologists; and \$70–\$130 for data processing, technicians and IT support. Individuals are assigned to a project based on the type of services involved and the experience and expertise of the individual.

Routine expenses such as telephone and copies are included in the rates above. Outside expenses such as laboratory analysis, obtaining aerial photos, or other special services incurred directly in connection with the project are billed at cost plus 5 percent to cover handling and administration. Reimbursable expenses billed at cost include airfares, automobile rental, and other travel or per diem costs for projects more than 100 miles from the office site. Subconsultants to LRE are billed at cost plus 10 percent.

The scope described under Part I represents our estimate of the services required based on the information provided. As the project proceeds and additional facts are discovered, it may be necessary to perform additional services and some items described may not be needed. For these reasons, we can provide only an estimate of the time and cost of completing the services.

IV. LIMITATION OF LIABILITY

In recognition of the relative risks and benefits of the project to both LPNNRD and LRE, the risks have been allocated such that LPNNRD agrees, to the fullest extent permitted by law, to limit the liability of LRE and its officers, employees, and sub-consultants, to LPNNRD and all of LPNNRD's contractors and consultants, for any and all claims, losses, costs, damages of any nature whatsoever; or claims expenses from any cause or causes, including attorneys' fees and costs and expert witness fees and costs, so that the total aggregate liability of LRE to LPNNRD shall not exceed the total amount of \$100,000 or the total fees billed to this project, whichever is less. It is intended that this limitation apply to any and all liability or cause of action however alleged or arising, unless otherwise prohibited by law.

V. SPECIAL SERVICES

Services in addition to those described under Part I will be performed or obtained for the client's account upon request and approval at rates currently in effect. Special services may include, but are not limited to, expert testimony, appearances at public meetings, soil investigations, topographic and land surveys, including establishment of boundaries, well drilling, well and aquifer testing, electric logging, water quality

sampling and analysis, preparation of construction drawings and specifications, material testing, data management, environmental permitting, and regulatory compliance.

Acceptance of this scope and authorization to proceed with the services can be indicated by signing one copy and returning it to us for our files.

Thank you again for the opportunity to work with LPNNRD. If you have any questions on the information provided, please call Dave Hume at 612-805-0919.

Sincerely,

LRE WATER

For: _____

LPNNRD


R. Gregory Roush, P.E.
Principal

By:  GENERAL MANAGER
Authorized Signature/Title



David S. Hume, PG
VP Midwest Operations

Date: 6/23/2020

DSH



EA Engineering, Science, and Technology, Inc., PBC

221 Sun Valley Boulevard
Suite D
Lincoln, NE 68528-1576
Phone: 402-476-3766
Federal ID: 52-0991911

PLEASE REMIT PAYMENT TO:

Via Mail:
225 Schilling Circle, Suite 400
Hunt Valley, MD 21031-1800

Via ACH:
SunTrust Bank
Acct Number: 59869458
Routing #: 021052053

Attn: Daryl Andersen
Lower Platte North NRD
PO Box 126
Wahoo, NE 68066

Invoice Date : 12/31/2020
Invoice # : 142563
EA Project # : 6359001
Terms : Due upon Receipt
Project Manager : PETERSEN, JAMIE

For Professional Services Rendered through: 11/30/2020

Vadose Soil Sampling

Total Project Fee Authorized	4,300.00
Percent Complete as of 11/30/2020	100.00
Fee Earned To Date	4,300.00
Less Previous Billings	0.00
Amount Due this Invoice	4,300.00

Interest charges accrue at 1.5% per month for balances over 30 days.
(Contractual agreements supercede standard EA billing terms).

EA Engineering, Science, and Technology, Inc., PBC does business in the following jurisdictions under the names listed below:

California	DBA - EA Engineering, Science, and Technology, Inc.	New York	DBA - EA Science and Technology
Michigan	DBA - EA Science and Technology	North Carolina	DBA - EA Science, and Technology, Inc.
Missouri	DBA - EA Engineering, Science, and Technology, Inc.	Washington D.C.	DBA - EA Engineering, Science, and Technology, PBC Inc.

June 30, 2020

Daryl Andersen
Lower Platte North Natural Resources District
P.O. Box 126
Wahoo, NE 68066

RE: Proposal – Vadose Soil Sampling
EA Proposal No. 0702547

Dear Daryl:

The purpose of this letter is to provide EA Engineering, Science, and Technology, Inc., PBC's (EA's) requested project proposal based on your request for proposal on June 29, 2020. EA's proposal response consists of three elements: Scope of Work, Price Schedule, and EA's Standard Consulting Services Contract. EA proposes to perform the requested services as outlined in the attached documents for a fixed price of \$4,300.00.

Under EA's Consulting Services Contract format, this project will be identified as shown above as Contract No. 0702547. If additional projects/services are desired, follow-on work can be added by simply forwarding a proposal that references the Consulting Services Contract above, which will serve as a Basic Ordering Agreement. Follow-on projects will contain the same basic identifying number as above followed by a dash and a numerically increasing number. This will facilitate expedited proposal preparation, project setup, and execution.

As the first project, *Exhibit A-1: Scope of Work*, *Exhibit B-1: Price Schedule*, and *Exhibit C: Consulting Services Contract* are provided. Please review the attached exhibits to ensure that they meet your approval. To confirm your acceptance of EA's project approach and technical assumptions, pricing, and contract terms, please sign and date the acknowledgement of proposal in the "client" space provided on Page 3 of EA's Consulting Services Contract, and return this entire document to my attention. I will have the contract countersigned by the appropriate EA personnel and a copy immediately returned for your records. EA will begin work shortly after receiving the documents.

We thank you for the opportunity to be of service on this project. If we can be of any further assistance, please contact me at (402) 476-3766.

Sincerely,



Jamie Petersen

Attachments

Exhibit A-1: Scope of Work (Contract No. 0702547)

This Scope of Work is incorporated into the Consulting Services Contract referenced above between EA Engineering, Science, and Technology, Inc., PBC (EA) and Lower Platte North NRD (LPNNRD). EA will conduct the following activities for this project:

SCOPE OF WORK

EA will collect soil samples from 16 soil borings in two agricultural fields (eight borings/field) located near Schuyler, NE. One field uses gravity irrigation and the other uses pivot irrigation, both fields are being used for nitrate tests during the 2020 growing season. Sampling will occur in the fall/winter of 2020 after crops have been harvested, weather permitting. The vadose sampling will be conducted as follows:

- Soil samples from 16 borings will be collected using EA's small, truck-mounted rig with a two-person crew. EA will provide one field crew member and the LPNNRD will provide one field crew member for the samples collected with EA's truck-mounted rig. The EA field crew member will collect samples, note a detailed description of soil texture, and log the soil cores.
- Samples will typically be collected at 3-foot intervals to a maximum depth of 15 feet below ground surface. If soil properties change, 2 to 4-foot intervals may be necessary. The borings will be terminated once penetrating a water bearing formation, upon refusal, or upon reaching an unsaturated sand and gravel layer that prevents recovery of cores.
- Quality Assurance/Quality Control (QA/QC) procedures will include duplicate samples at a rate of one QA/QC sample per 10 samples collected (10%), for a total of approximately 10 samples.
- EA will conduct the one-call for utility clearance for the sites prior to sampling.
- Sample location coordinates will be documented using a sub-meter GPS.

Deliverables:

The primary deliverable for the Schuyler Vadose Zone Sampling will be the boring logs at each sample location.

ASSUMPTIONS

1. If a Quality Assurance Project Plan (QAPP) or Sampling and Analysis Plan (SAP) is necessary, EA assumes the LPNNRD will develop and provide it to EA prior to sampling.
2. LPNNRD will lead efforts to coordinate all site access with property owners.
3. LPNNRD will provide one field crew member to assist with sample collection using EA's small, truck-mounted rig.
4. Groundwater is expected to be approximately 8 feet below ground surface.
5. Soil samples will all be disturbed samples.
6. No analysis or narrative of the analytical results is required for this project.
7. Cost associated with shipping of soil samples and analytical analysis are not included in the scope of work.

Exhibit B-1: Price Schedule (Contract No. 0702547)

The following project price and/or rates apply to the services provided by EA Engineering, Science, and Technology, Inc., PBC for the project and contract referenced above.

EA proposes to perform the requested services as outlined for a fixed price of \$4,300.00. The labor and other direct costs necessary to complete work are included in the fixed price.

Exhibit C: EA's Consulting Services Contract

EA, as used herein, means **EA Engineering, Science, and Technology, Inc., PBC**.

Client as used herein means the other party to this Agreement.

WHEREAS, EA provides an extensive range of integrated and comprehensive consulting, engineering, scientific, and analytical services; and

WHEREAS, Client desires to utilize EA's services.

NOW, THEREFORE, for good and valuable consideration, EA agrees to provide the professional services described herein, and Client agrees to accept and pay for such services, all in accordance with the following terms and conditions:

1. **Definitions**—The following terms shall have the meanings set forth below whenever they are used in this Agreement:
 - a. "Scope of Work" (SOW) shall mean the description of the services to be provided by EA as mutually agreed upon by EA and Client and will be performed on either a firm fixed price (FFP) or time and materials (T&M) basis. The SOW and the Price will be set out in the attached Exhibit "A"(s) (or EA's Proposal) as described below, incorporated by reference into this Agreement.
 - b. "Documentation" shall mean deliverable documentation as described in the SOW.
 - c. "Equipment" shall mean all indoor and outdoor equipment used by EA at Client sites for the purpose of providing services as described in the SOW.
 - d. "Proprietary Information" shall mean all data, information, manuals, materials, trade secrets, patents, products, processes, plans, whether in written, graphic or oral form, and similar proprietary know-how of EA.
2. **Ordering**—EA services sought by the Client shall be ordered as follows:
 - a. In response to either a written or verbal request from Client, EA will prepare a written proposal that shall minimally contain a SOW, cost and form of compensation (FFP or T&M).
 - b. Each EA Proposal shall be dated and sequentially numbered as Exhibit A1, A2, A3, etc. and reference this EA Consulting Services Agreement number.
 - c. If acceptable, the Client will sign and date the EA proposal acknowledging acceptance of the costs of the services to be rendered by EA.
3. **Compensation/Billing**—EA's invoices will be issued at least monthly and are payable upon receipt. Invoices shall reference the appropriate EA Proposal Letter or Exhibit A numbers. Balances thirty (30) days past due are subject to interest at 1.5% per month. EA may suspend services under any Client Agreement until all past due accounts have been paid.

The SOW is often not fully definable prior to the execution of this Agreement as investigation may uncover additional facts and information requiring an alteration in the SOW and/or the Price for the services. For services on a time and materials basis, the proposed fees are EA's best estimate of the charges required to complete the SOW. EA will inform Client of any material changes to either the SOW or the Price that may be required and which may alter the terms of this Agreement.

Costs and schedule commitments are subject to renegotiation for unreasonable delays caused by Client's failure to provide free access to sampling areas, specified facilities, or information, or for delays caused by unpredictable occurrences, or force majeure, such as fires, floods, strikes, riots, unavailability of labor or materials or services, acts of God or of the public enemy, or acts or regulations of any governmental agency. Temporary work stoppage caused by any of the above may result in additional cost beyond that outlined in this Agreement.

In the event EA is required to respond to a subpoena, government inquiry, or other legal process related to the services in connection with a proceeding to which it is not a party, Client shall reimburse EA for its costs and compensate EA at its then standard rates for the time spent gathering information and documents. Client agrees to compensate EA at the rate of one and one-half times EA's then current hourly rates for time spent in any deposition, hearing, proceeding, or trial.

For services provided on a time and materials basis, the minimum time segment is four (4) hours for field work and one (1) hour for office work. The rental or use of EA's Equipment will be charged to the project in accordance with EA's "Corporate Equipment Rate Billing Schedule," which is either incorporated into the rates shown in Exhibit B or is available upon Client's request. Equipment rates are subject to annual adjustment each September. EA's labor rates for services provided on a time and materials basis are fixed for one year with annual adjustment upon notice to Client.

Expenses related to the services and reimbursable by Client ("Other Direct Costs") include without limitation, travel and living expenses, phone, FAX, overnight delivery services, postage, shipping, and production costs; identifiable drafting and word processing supplies; equipment usage and rental fees; and expendable materials and supplies. Other Direct Costs are reimbursable by Client and are billed at EA's cost plus 20%.

Subconsultant and/or subcontractor costs are reimbursable by Client and are billed at EA's cost plus 20%. Where applicable, any local or state taxes or fees (except state income taxes) are in addition to any quoted price/cost.

4. **Termination**—This Agreement may be terminated by either party in the event of substantial failure by the other party to fulfill its obligations under this Agreement through no fault of the terminating party. Such termination is effected upon providing: (1) not less than thirty (30) calendar days written notice, and (2) an opportunity for consultation with the terminating party prior to termination. Client will be responsible for all services and direct expenses associated with the project through the effective date of cancellation, plus reasonable fee(s) and/or expenses for reallocation and demobilization of personnel and equipment.
5. **Confidential Information/Inventions**—All Proprietary Information furnished by EA in connection with this Agreement, but not developed as a result of work under this Agreement or under prior agreements between Client and EA, shall be held confidential by Client, and returned to EA within thirty (30) days of the completion of the services or conclusion of the litigation wherein EA's services were provided.

All inventions, techniques, and improvements held by EA to be proprietary or trade secrets of EA prior to any use on behalf of Client, as well as all inventions, techniques, and improvements developed by EA independent of the services rendered to Client under this Agreement, remain the property of EA. Documents provided by Client will remain the Client's property, but EA may retain one confidential file copy.

6. **Standard of Care**—EA will prepare all work and provide services in accordance with generally accepted professional practices ordinarily exercised by reputable companies performing the same or similar services in the same geographic area. NO WARRANTIES OR GUARANTIES, EXPRESS OR IMPLIED, ARE MADE WITH RESPECT TO ANY GOODS OR SERVICES PROVIDED UNDER THIS AGREEMENT, AND ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY DISCLAIMED.

Client shall furnish documents and information reasonably within Client's control and deemed necessary by EA for proper performance of its services. EA may rely upon Client-provided documents and information in performing the services required under this Agreement and EA assumes no responsibility or liability for their accuracy.

Client agrees to advise EA, no later than upon the execution of this Agreement, of any hazardous substance or any condition, known or that reasonably should be known by Client, existing in, on, or near the site where EA's services are to be performed, that presents a potential danger to human health, the environment, or EA's equipment. Client agrees to a continuing obligation to provide EA related information as it becomes available to the Client. By virtue of entering into this Agreement or providing services hereunder, EA does not assume control of, or responsibility as an operator, waste generator or otherwise for the site or the person(s) in charge of

the site, or undertake responsibility for reporting to any federal, state, or local public agencies any conditions at the site that may present a potential danger to public health, safety or the environment. Client agrees to notify the appropriate federal, state, or local public agencies as required by law; or otherwise to disclose, in a timely manner, any information that may be necessary to prevent damage to human health, safety, or the environment.

Upon Client's request, EA's work product may be provided on magnetic media. By such request, Client agrees that the written copy retained by EA in its files shall be the official base document. The Client will retain one conformed written copy. EA makes no warranty or representation to Client that the magnetic copy is accurate or complete. Any modifications of such magnetic copy by Client shall be at Client's sole risk and without liability to EA. Such magnetic copy is subject to all conditions of this Agreement.

7. **Indemnification**—Each party shall indemnify, defend and hold harmless the other party from and against all liability, loss, cost, expense, or damage caused by the indemnifying party's negligent acts or negligent omissions in the performance of this Agreement. However, in the event of any loss, damage or liability, whether to person or to property, arising out of the sole negligence of either EA or Client, such party will assume full responsibility for any liability arising thereof and hold harmless the other party. EA and Client further agree that if either EA or Client engages in willful misconduct, such party shall assume full responsibility for any liability arising thereof irrespective of the nature and degree of the other party's negligence, and will indemnify and hold harmless the other party. In no event shall EA be liable for any special, incidental, economic, or consequential damages whatsoever, regardless of the legal theory under which such damages may be incurred. In no event will EA's liability under this provision or Agreement exceed the lesser of the fees actually paid to EA under this Agreement or \$50,000.

For claims related to or involving pollution, toxic substances, or hazardous wastes or for any other claims arising from underground hidden or undisclosed hazards, Client agrees to release, defend, indemnify and hold harmless EA and its officers, directors, employees, agents, consultants, and subcontractors from all claims, damages, losses, and expenses, including, but not limited to, reasonable fees and expenses of attorneys and consultants, and court costs, arising out of the performance of this Agreement. Such indemnification and release include claims which arise out of the actual, alleged, or threatened dispersal, escape, or release of chemicals, wastes, liquids, gases, or any other material, irritant, contaminant or pollutant regardless of the legal theory under which such damages may be incurred.

EA's field personnel will avoid hazards or utilities that are visible to them at the site. EA is not responsible for any damage or loss to property owned by Client or third parties due undisclosed or unknown surface or subsurface conditions, except to the extent such damage or loss is a direct result of EA's gross negligence.

8. **Severability**—If any term or provision of this Agreement is held or deemed to be invalid or unenforceable, in whole or in part, by a court of competent jurisdiction, this Agreement shall be ineffective to the extent of such invalidity or unenforceability without rendering invalid or unenforceable the remaining terms and provisions of this Agreement.
9. **Third Party Rights**—EA's services under this Agreement are being performed solely for the benefit of Client, and no other entity shall have any claim against EA because of this Agreement or the performance or nonperformance of services provided by EA hereunder.
10. **Entire Agreement**—This Agreement contains the entire agreement of the parties. It may not be modified or terminated orally. Any modification to these terms and conditions without the written approval of EA shall be null and void. In no event will the terms of any purchase order, work order or any other document provided by Client modify or amend this Agreement, even if it is signed by EA, unless EA signs a written statement expressly indicating that such terms supersede the terms of this Agreement. Any such terms are expressly rejected by EA.
11. **Assignment**—EA reserves the right to assign this Agreement to its affiliates, subsidiaries, or successors as necessary in order to effectively carry out and complete the services specified by this Agreement.
12. **Governing Law**—This Agreement shall be deemed made in, and in all respects interpreted, construed, and governed by, the laws of the State of Maryland, U.S.A. All disputes arising hereunder are to be resolved in the

state and federal courts having jurisdiction of such disputes sitting in the State of Maryland or hearing appeals therefrom. Both parties consent to the jurisdiction of such courts over them for the purposes of this Agreement, and agree to accept service of process by registered mail.

ATTACHMENTS

Exhibit A – Scope of Work
(May be added by reference to EA Proposal Letter[s])

Exhibit B – EA Price Schedule, and/or EA Labor Rates and, EA Equipment Cost Rate Schedule
(May be added by reference to EA Proposal Letter[s])

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC., PBC

By: _____

Name: _____

Title: _____

Date: _____

Lower Platte North Natural Resources District

By: Gene Ruzicka

Name: Gene Ruzicka -

Title: Board Chairman - LPN

Date: July 13, 2020

Planning Guidance Document

Nebraska Practice Payment Schedule for
EQIP FY2021



October 1, 2020

Irrigation Pipeline

Code: 430

Reporting Unit: Foot

Practice Lifespan: 20 Years

Approximate 2021 Share Rate: 35%

LPNNRD 2020 Priority: Medium

Definition:

A pipeline and appurtenances installed to convey water for storage or application, as part of an irrigation water system.

Purpose:

This practice may be applied as part of a resource management system to achieve one or more of the following purposes:

- Conveyance of water from a source of supply to an irrigation system or storage reservoir.
- Reduce energy use.
- Develop renewable energy systems (i.e., in-pipe hydropower).

Conditions Where Practice Applies:

This practice applies to water conveyance and distribution pipelines installed above or below ground.

This practice does not apply to multiple outlet irrigation system components (e.g., surface gated pipes, sprinkler lines, or micro irrigation tubing).

Scenario 3: PVC, 10 Inch, by the Foot

Description: Although the title of this scenario includes a reference to 10-inch diameter pipe, this is to be used for all below ground installation of irrigation pipeline common to Nebraska. Typical practice includes construction of 1,300 feet of pressure rating 80 psi (SDR 51), PVC plastic irrigation pipe (PIP) with appurtenances, installed below ground with a minimum of 2.5 feet of ground cover. Appurtenances include: couplings, fittings, air vents, pressure relief valves, thrust blocks, dog-legs (risers), and inline valves. Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements.

Payment Unit: Linear Foot

Payment Schedule:

Practice Name	Scenario	EQIP-General	EQIP-General-HU	Source Water (WP)
430 – Irrigation Pipeline	#3 – PVC, 10-in by the foot	\$4.30	\$7.38	\$4.30

Irrigation System, Microirrigation

Code: 441

Reporting Unit: Acre

Practice Lifespan: 15 Years

Approximate 2021 Share Rate: 35%

LPNNRD 2020 Priority: Medium

Definition:

An irrigation system for frequent application of small quantities of water on or below the soil surface: as drops, tiny streams, or miniature spray through emitters or applicators placed along a water delivery line.

Purpose:

This practice is applied to achieve the following purpose:

- Efficiently and uniformly apply irrigation water and maintain soil moisture for plant growth.
- Prevent contamination of ground and surface water by efficiently and uniformly applying chemicals.
- Establish desired vegetation (e.g., windbreaks).

Conditions Where Practice Applies:

This practice applies on sites where soils and topography are suitable for irrigation of crops or other desirable vegetation and an adequate supply of suitable quality water is available for the intended purpose(s).

Microirrigation is suited to virtually all agricultural crops, and residential and commercial landscape systems. Microirrigation is also suited to steep slopes where other methods would cause excessive erosion, and areas where other application devices interfere with cultural operations.

Use NRCS Conservation Practice Standard (CPS) Code 442, Sprinkler System, for systems that uniformly wet the entire field and typically have design discharge rates of 60 gal/hr. or greater at individual application discharge points.

Scenario 1: SDI (Subsurface Drip Irrigation)

A subsurface drip irrigation system (SDI) with a lateral spacing of 40 inches. This buried drip irrigation system utilizes a thin wall tape with inline emitters at a uniform spacing for the system laterals. The dripperline or tape is normally installed by being plowed in approx. 10-18 inches deep with a chisel shank type plow equipped with tape reels. This type of drip irrigation system utilizes a buried supply manifold with automated zone control valves and a buried flush manifold with manual flush valves. This permanent micro-irrigation system includes an automated filter station, flow meter (functional used meter is usually available for an existing well, so meter cost is excluded), backflow prevention device, automated control box or timer, the thin wall dripperline or tape for laterals, both a supply and a flushing manifold and numerous types of water control valves. This is an all-inclusive system starting with the filter station including all required system components out to the flush valves. The water supply line from the water source to the filter station is an irrigation pipeline (430) and is not included as part of this system.

Payment Unit: Acre

Payment Schedule:

Practice Name	Scenario	EQIP-General	EQIP-General-HU	Source Water (WP)
441 – Irrigation System, Microirrigation	#1 – SDI (Subsurface Drip Irrigation)	\$740.64	\$1,269.66	\$1,058.05

Irrigation Water Management

Code: 449

Reporting Unit: Acre

Practice Lifespan: 1 Years

Approximate 2021 Share Rate: Varies

LPNNRD 2020 Priority: High

Definition:

The process of determining and controlling the volume, frequency, and application rate of irrigation water.

Purpose:

- Improve irrigation water use efficiency
- Minimize irrigation induced soil erosion
- Decrease degradation of surface and groundwater resources
- Manage salts in the crop root zone
- Manage air, soil, or plant micro-climate
- Reduce energy use

Conditions Where Practice Applies:

This practice is applicable to all irrigated lands. An irrigation system adapted for site conditions (soil, slope, crop grown, climate, water quantity and quality, air quality, etc.) must be in place and capable of efficiently applying water to meet the intended purpose(s).

Scenario 4: IWM, Advanced Technique

Approximate 2021 Share Rate: 40%

A high intensity irrigation water management system for producers using a checkbook method with advanced methods of determining irrigation water applied, and estimating crop evapotranspiration, monitoring field soil moisture, or monitoring crop temperature stress. Typical methods include flow measurement, daily record keeping, and use of real-time evapotranspiration estimates (such as those provided dedicated weather stations) and/or soil moisture sensors with automated data logging to monitor field soil moisture content and/or crop temperature. For this scenario, soil moisture is determined by automated soil moisture monitoring stations equipped with telemetry data. Irrigation amounts are recorded from a flow meter near the pump. Telemetry data is automatically sent to a computer with irrigation software. Irrigator also receives real time data via mobile phone applications. Some data such as total water applied may be entered into computer software manually.

Payment Unit: Each

Payment Schedule:

Practice Name	Scenario	EQIP-General	EQIP-General-HU	Source Water (WP)
449 – Irrigation Water Management	#4 – IWM, Advanced Technique	\$1,094.66	\$1,778.82	\$1,778.82

Scenario 27: IWM: Advanced Technique Incorporating Precision Irrigation

Approximate 2021 Share Rate: 40%

IWM, Advanced Technique that incorporates existing precision irrigation technology into the Irrigation Water Management Plan. Center pivot Variable Rate Irrigation (VRI) speed control and automated timing and frequency control of a subsurface drip irrigation (SDI) system are examples of precision irrigation technology. An irrigation prescription must be developed and uploaded into the irrigation control system that varies application rates, ranges, and amounts based on management zones or sectors within the field.

Payment Unit: Each

Payment Schedule:

Practice Name	Scenario	EQIP-General	EQIP-General-HU	Source Water (WP)
449 – Irrigation Water Management	#27 – IWM, Advanced Technique Incorporating Precision Irrigation	\$1,838.49	\$2,987.54	\$2,987.54

Scenario 33: IWM: Consultant Based IWM No Equipment**Approximate 2021 Share Rate: 50%**

An irrigation water management system that consists of a consultant providing irrigation scheduling information to a producer. For the typical scenario, the consultant uses local evapotranspiration data and appropriate crop coefficients to develop irrigation recommendations. The consultant provides these recommendations to the farmer on a regular basis and includes the timing and amount of irrigation water to be applied to the crop during the season. In this scenario, no equipment is installed in the field and the evapotranspiration data is obtained from local sources.

In addition to the in-season IWM recommendations, the consultant discusses the irrigation water management plan with the producer before the start of the growing season. At the end of the season, the consultant meets with the producer to discuss the results.

Payment Unit: Each**Payment Schedule:**

Practice Name	Scenario	EQIP-General	EQIP-General-HU	Source Water (WP)
449 – Irrigation Water Management	#33 – Consultant Based IWM No Equipment	\$333.92	\$500.88	\$500.88

Criteria:

1. Eligible land – Cropland that has been irrigated two of the last five years. A waiver may potentially be obtained for this eligibility requirement for stand-alone IWM contracts. Please consult the EQIP Program Manager for more information on the process of granting this waiver.
2. Implementation required for three years.
3. An IWM plan is to be developed and followed that defines when irrigation is needed and the amount and rate of water to apply.
4. Participant is to enter into a purchase / service agreement or contract with a “consultant” to provide:
 - a. Management assistance to aid the producer with data interpretation and provide advice regarding irrigation scheduling throughout each growing season.
 - b. A platform on which remote real-time data is telemetrically sent to a computer or hand-held device equipped with irrigation software to provide irrigation scheduling recommendations.
5. The consultant must be qualified to provide management assistance such as a CCA (Certified Crop Advisor), IWM dealer, CID (Certified Irrigation Designer), or the like.
6. The irrigation system utilized must include a flow meter near the pump to measure irrigation amounts. If the pumping plant does not include a flow meter, code 587 may be included in the contract to provide financial assistance to install a flow meter as a one-time payment.
7. Information / data gathered throughout the growing season will be used for decision making to schedule irrigation water application according to the IWM Plan and the IWM conservation practice standard (449).
8. Payments will not be made until the participant satisfactorily demonstrates to NRCS that the practice has been applied as required.
9. IWM, Advanced Technique
 - a. Multiple soil moisture sensors shall be installed at each moisture monitoring location at a minimum of three separate depths throughout the root zone based on the crop grown.
 - b. Management assistance from the vendor shall include installation and removal of soil moisture sensors.
 - c. Allows for the purchase or lease of remote soil moisture sensors that utilize telemetry, including annual subscription fees.

- d. May be used with either stand-alone IWM contracts or combined with 442 or 441 structural practices.

11. IWM, Advanced Technique Incorporating Precision Irrigation

- a. All requirements set forth for IWM, Advanced Technique are applicable to IWM, Advanced Incorporating Precision Irrigation.
- b. Incorporate Precision Irrigation Technology into the Irrigation Water Management Plan. Center pivot Variable Rate Irrigation (VRI) speed control technology that is integral to an electronic control panel with GPS for field location is an example of precision Irrigation. Another example of precision irrigation is automated timing and frequency control of a subsurface drip irrigation (SDI) system based on environmental conditions, soil properties, and crop growth stages. An irrigation prescription must be developed by a consultant and uploaded into the irrigation control system. Irrigation application rates, ranges, and amounts are then varied based on management zones or sectors within the field defined by soil mapping, previous year(s) yield maps, soil properties, field topography and features, or similar criteria. Updated prescriptions will be included as data changes during the season, where applicable.
- c. May be used with either stand-alone IWM contracts or combined with 442 or 441 structural practices.

12. Consultant Based IWM No Equipment

- a. "Equipment" is defined as soil moisture sensors. No other apparatus, instrument, or tool other than soil moisture sensors will be considered "equipment" under this scenario.
- b. Irrigation scheduling recommendations may be developed by computer algorithms or computer modeling based on the soil-water balance.
- c. May only be used with stand-alone IWM contracts.

Sprinkler System

Code: 442

Reporting Unit: Acre

Practice Lifespan: 15 Years

Approximate 2021 Share Rate: Varies

LPNNRD 2020 Priority: Medium

Definition:

A distribution system that applies water by means of nozzles operated under pressure.

Purpose:

This practice is applied as part of a conservation management system to accomplish one or more of the following:

- Efficient and uniform application of water on irrigated lands
- Improve plant condition, productivity, health and vigor
- Prevent the entry of excessive nutrients, organics, and other chemicals in surface and groundwater
- Improve condition of soil contaminated with salts and other chemicals
- Reduce particulate matter emissions to improve air quality
- Reduce energy use

Conditions Where Practice Applies:

This standard applies to the planning and functional design of all sprinkler system components (e.g., laterals, risers, nozzles, heads, and pressure regulators).

Individual sprinkler design discharge rates covered by this standard typically have design nozzle discharge rates exceeding 1 gallon per minute and wet the entire field surface uniformly.

Areas must be suitable for sprinkler water application and have a water supply of adequate quantity and quality for intended purpose(s).

This standard applies to planning and design of sprinkler application systems for:

- meeting crop water demands
- crop cooling, frost protection, or bloom delay
- leaching or reclamation of saline or sodic soils, or soils contaminated by other chemicals that can be controlled by leaching
- application of chemicals, nutrients, and/or waste water
- dust and particulate control from:
 - o confined animal pen areas
 - o unpaved road
 - o staging areas
 - o equipment storage yards

This standard applies to renozzling existing sprinkler systems to reduce pressure, reduce flow rate, or increase distribution uniformity.

This standard does not include criteria for mini- or micro-sprinkler systems, which are covered by NRCS Conservation Practice Standard (CPS) Code 441, Irrigation System, Microirrigation.

Scenario 1: Gravity to Pivot Conversion

Approximate 2021 Share Rate: 30%

Installation of a low-pressure center pivot system.

Payment Unit: Linear Foot

Payment Schedule:

Practice Name	Scenario	EQIP-General	EQIP-General-HU	Source Water (WP)
442 – Sprinkler System	#1– Gravity to Pivot Conversion	\$18.97	\$34.79	\$25.30

Scenario 3: System Renovation, Renozzle with Drops

Approximate 2021 Share Rate: 40%

Center Pivot and Linear Move sprinkler systems are used in large crop fields with fairly regular field borders and flat topography. The scenario involves changing nozzles on center pivot or lateral move irrigation systems to low-pressure systems to improve efficiency of water use and reduce energy use. This scenario is intended for cropland areas where the objective is water or energy conservation. A typical scenario assumes a 1300 LF span with 232 nozzles, renozzled with low-pressure nozzles and pressure regulators on drops.

Payment Unit: Each Nozzle on Drop

Payment Schedule:

Practice Name	Scenario	EQIP-General	EQIP-General-HU	Source Water (WP)
442 – Sprinkler System	#3 – System Renovation, Renozzle with Drops	\$13.44	\$21.83	\$16.79

1. All scenarios – does not include the well, pumping plant, or flow meter costs.
2. Irrigation Water Management 449 is required for the first three years of this practice.
3. Structure for Water Control 587, flow meter should be added in conjunction with this practice.
4. System Renovation, Renozzle – to be eligible, existing sprinkler system must have impact sprinklers installed on top of mainline with system operating pressures at the base point equal to or exceeding 80 psi. The scenario must be applied in conjunction with Code 533, Scenario 1 – Irrigation, Modify Pump to ensure the pumping plant is synchronized with the sprinkler system’s renovated lower pressure requirements.
5. All components of the system must meet NRCS standards and specifications.
6. Eligible land – Cropland that has been irrigated 2 of the last 5 years.
7. Scenarios 4, 5 and 6 are **not** available in general EQIP or the Ogallala Aquifer Initiative. They are limited to special statewide VRI initiatives only

Structure for Water Control

Code: 587

Reporting Unit: Number

Practice Lifespan: 20 Years

Approximate 2021 Share Rate: 75%

LPNNRD 2020 Priority: High (with 442 IWM)

Definition:

A structure in a water management system that conveys water, controls the direction or rate of flow, maintains a desired water surface elevation or measures water.

Purpose:

The practice may be applied as a management component of a water management system to control the stage, discharge, distribution, delivery or direction of water flow.

Conditions Where Practice Applies:

This practice applies wherever a permanent structure is needed as an integral part of a water-control system to serve one or more of the following functions:

- Control the division or measurement of irrigation water. Typical structures: division boxes and water measurement devices.

Scenario 7: Flow Meter with Mechanical Index

Permanently installed water flow meter with mechanical, cumulative volume and rate index. Meters can be any flow measurement device that meets CPS 433, (i.e., meters: turbine, propeller, acoustic, magnetic, venturi, orifice, etc.) with or without straightening vanes. This scenario is to be used for installation of all flow meters which will not incorporate telemetry into its operation.

Payment Unit: Inch

Payment Schedule:

Practice Name	Scenario	EQIP-General	EQIP-General-HU
587 – Structure for Water Control	#7 – Flow Meter with Mechanical Index	\$119.39	\$143.27

Scenario 9: Flow Meter with Electronic Index & Telemetry

Permanently installed water flow meter with an electronic flow rate and volume index and data telemetry transmission system. Meters can be any flow measurement device that meets CPS 433, (i.e., meters: turbine, propeller, acoustic, magnetic, venturi, orifice, etc.) with or without straightening vanes. Meter nominal diameter for insert type turbine meters will be installation pipe size. Typical installation would include installation of a 10-inch magnetic flow meter, with electronic index output and telemetry data transfer system for monitoring irrigation system flow rate. This scenario shall be used only for installation of a flow meter which will incorporate telemetry into its operation; if the flow meter is telemetry capable, but the telemetry capability will not be utilized, then refer to Scenario 7: Flow Meter with Mechanical Index.

Payment Unit: Inch

Payment Schedule:

Practice Name	Scenario	EQIP-General	EQIP-General-HU
587 – Structure for Water Control	#9 – Flow Meter with Electronic Index & Telemetry	\$317.39	\$380.87

Criteria:

1. Flow Meter with Mechanical Index and Flow Meter with Electronic Index & Telemetry – payment is calculated by diameter of pipe at location of installation.
 - a. Each well serving an irrigation system is eligible for a flow meter installation.
 - b. Only one flow meter with telemetry per system is eligible for cost share.
 - c. IWM (449) is required for 3 years.

Water Well

Code: 642

Reporting Unit: Number Practice Lifespan: 20 Years

Approximate 2021 Share Rate: Scenario 5; 35% Scenario 6; 40% Scenario 7; 50%.

LPNNRD 2020 Priority: Medium

Definition:

A hole drilled, dug, driven, bored, jetted, or otherwise constructed to an aquifer.

Purpose:

- Provide water for livestock, wildlife, irrigation, and other agricultural uses.

Conditions Where Practice Applies:

This practice applies on all land uses where the underground supply of water is sufficient in quantity and quality for the intended purpose. This practice applies only to production water wells. Specifically excluded are any types of wells installed solely for monitoring or observation purposes, injection wells, and piezometers. The standard does not apply to pumps installed in wells; above ground installations, such as pumping plants, pipelines, and tanks; temporary test wells; and decommissioning of wells (refer to Conservation Practice Standard (CPS) Water Well Decommissioning (351)).

Scenario 5: Single PVC Casing, Greater than 100 ft. Deep

Typical construction is for the installation of a well, in areas where sufficient water is known to occur 100 - 300 feet of the ground surface. The well shall be drilled, dug, driven, bored, jetted or otherwise constructed to an aquifer for water supply. The purpose of the practice is to provide water for livestock or micro-irrigation. An average well depth is 200 feet. Well casings are 4-6" in diameter. Plastic casing and screen is installed to a depth of 200 feet.

Payment Unit: Linear Foot

Payment Schedule:

Practice Name	Scenario	EQIP-General	EQIP-General-HU
642 – Water Well	#5 – Single PVC Casing, greater than 100 ft. deep	\$12.15	\$24.30

Scenario 6: Single PVC Casing with Pitless Unit, Greater than 100 ft. Deep

Typical construction is for the installation of a well with a pitless unit, in areas where sufficient water is known to occur 100 - 300 feet of the ground surface. The well shall be drilled, dug, driven, bored, jetted or otherwise constructed to an aquifer for water supply. The purpose of the practice is to provide water for livestock or micro-irrigation. An average well depth is 200 feet. Well casings are 4-6" in diameter. Plastic casing and screen is installed to a depth of 200 feet.

Payment Unit: Linear Foot

Payment Schedule:

Practice Name	Scenario	EQIP-General	EQIP-General-HU
642 – Water Well	#6 – Single PVC Casing with pitless unit, greater than 100 ft. deep	\$20.17	\$32.78

Scenario 7: Steel or Copper, 100 ft. or Deeper

Typical construction is for the installation of a well, in areas where sufficient water is known to occur greater than 2000 feet from the ground surface. The well shall be drilled, dug, driven, bored, jetted or otherwise constructed to an aquifer for water supply. The purpose of the practice is to provide water for livestock or micro-irrigation. An average well depth is 2500 feet. Plastic Surface casings are 6" in diameter with smaller diameter casing and screen extending into the water bearing formation. Steel casing and screen is installed to a typical depth of 2500 feet.

Payment Unit: Linear Foot

Payment Schedule:

Practice Name	Scenario	EQIP-General	EQIP-General-HU
642 – Water Well	#7 – Steel or Copper, 100 ft. or deeper	\$29.08	\$43.62

Scenario 9: Dual Casing PVC

Typical construction is for the installation of a well, in areas where sufficient water is known to occur within 300 feet from the ground surface in formations that typically contain artesian pressure. The well shall be drilled, dug, driven, bored, jetted or otherwise constructed to an aquifer for water supply. The purpose of the practice is to provide water for livestock or micro-irrigation. An average well depth is 300 feet. Surface casings are 4-6" in diameter with grouting to

Criteria:

Applies to new livestock wells and replacements for existing wells which have met the practice lifespan (20 years). If blowouts, trailing or other resource concerns are present at the replacement well location, the well should be relocated to a more suitable location.

Irrigation Water Management Plan

Conservation Activity Plan (CAP)

Code: 118

Reporting Unit: Each

Approximate 2021 Share Rate: 75%

LPNNRD 2020 Priority: High

Definition:

A Conservation Activity Plan for Irrigation Water Management Plan (CAP118) is a conservation plan that documents decisions by producers/growers to control the volume, frequency, and rate of water for efficient irrigation in accordance with Practice Standard 490 (Irrigation Water Management). Natural resource concerns include water quantity and all other appropriate resource concerns.

Purpose:

To assist the client in the development of a conservation plan for irrigation water management (CAP118) in accordance with Practice Standard 490 that identifies resource concerns (including, but not limited, to the following); provides the producer with a guide for proper management of irrigation water resources; and an IWM plan to implement:

- Manage soil moisture to promote desired crop response.
- Optimize use of available water supplies.
- Minimize irrigation induced soil erosion.
- Decrease non-point source pollution of surface and groundwater resources.
- Manage salts in the crop root zone.
- Manage air, soil, or plant micro-climate.
- Proper and safe chemigation or fertigation.
- Improve air quality by managing soil moisture to reduce particulate matter or movement.
- Reduce energy use.

An irrigation system adapted for site conditions (soil, slope, crop grown, climate, water quantity and quality, etc.) must be available and capable of applying water to meet the intended purpose(s).

Conditions Where Practice Applies:

This practice is applicable to agricultural operations with existing irrigation systems.

Payment Unit: Each

Payment Schedule:

Code	Scenario Number	Scenario Description	EQIP-General	EQIP-General-HU
118	13	Irrigation Water Management Plan	\$2,718.98	\$3,262.77
118	17	Irrigation Water Management Plan with pump test	\$4,272.68	\$5,127.21

Criteria:

1. The CAP plan must be completed by a NRCS Technical Service Provider (TSP) certified for CAP118.
2. The CAP118 plan must meet criteria outline in the NRCS FOTG.
3. Only one Conservation Activity Plan (CAP) may be concurrently approved and developed on an eligible land unit (i.e., field) at the same time, and must cover all eligible acres currently under the control of the applicant and included in their conservation plan.
4. CAPs are to be completed within the first year. Modifications are strongly discouraged.

Ground Water Level Summary Comparison of Fall 2019 to Fall 2020

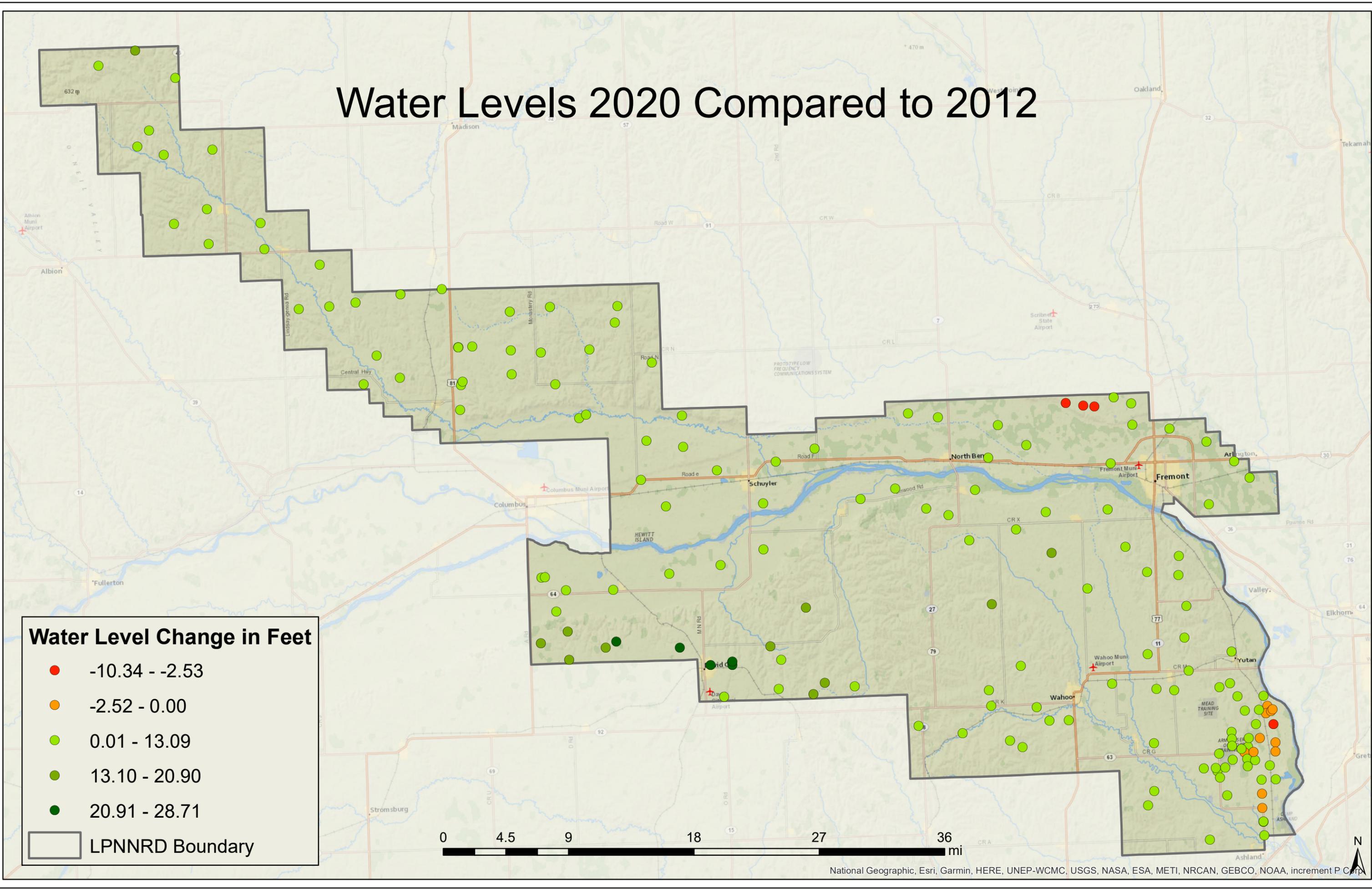
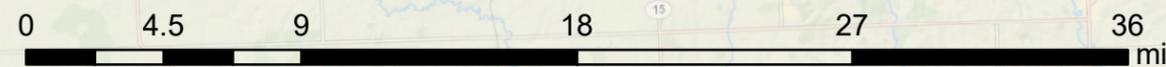
Aquifer Subarea	Number of Wells Measured	Median Change (Feet)	Mean Change (Feet)	Number of Wells Increased	Number of Wells	
					Unchanged (+ or - 0.3 Feet)	Number of Wells Decreased
Platte Valley	56	-2.63	-3.19	0	0	56
Bellwood	5	-2.02	-2.24	0	0	5
Fremont	5	-1.38	-1.97	0	0	5
Fremont East	3	-5.71	-5.07	0	0	3
Leshara Platte Valley	1	-1.40	-1.40	0	0	1
North Bend	9	-2.63	-3.12	0	0	9
Octavia	5	-2.72	-2.33	0	0	5
Platte River Uplands	4	-5.77	-7.80	0	0	4
Schuyler	6	-2.49	-2.19	0	0	6
Wann	18	-3.15	-3.18	0	0	18
Shell Creek	46	-3.33	-4.62	0	0	46
Lower Newman Grove	2	[-3.11, -6.44]	-4.78	0	0	2
Lower Shell Creek	6	-1.42	-1.35	0	0	6
Middle Shell Creek	17	-3.82	-5.60	0	0	17
Newman Grove	3	-3.81	-3.74	0	0	3
Platte Center	6	-1.53	-1.94	0	0	6
Shell Creek Uplands	2	[-1.34, -13.75]	-7.54	0	0	2
Upper Newman Grove	9	-2.68	-5.33	0	0	9
Upper Shell Creek	1	-13.78	-13.78	0	0	1
Todd Valley	19	-1.82	-2.83	0	1	18
(north of Hwy 92)	8	-4.21	-4.49	0	0	8
(south of Hwy 92)	11	-1.38	-1.62	0	1	10
Uplands	56	-4.42	-11.39	0	0	56
David City	19	-30.16	-25.15	0	0	19
Leshara Uplands	4	-4.07	-3.33	0	0	4
Morse Bluff	3	-2.37	-5.66	0	0	3
Prague	5	-2.10	-7.02	0	0	5
Swedeburg	9	-0.96	-1.30	0	0	9
Weston	7	-3.31	-5.62	0	0	7
Yutan	5	-5.75	-6.48	0	0	5
Yutan South	4	-2.81	-2.80	0	0	4
				0	1	176

Water Levels 2020 Compared to 2012

Water Level Change in Feet

- -10.34 - -2.53
- -2.52 - 0.00
- 0.01 - 13.09
- 13.10 - 20.90
- 20.91 - 28.71

LPNNRD Boundary



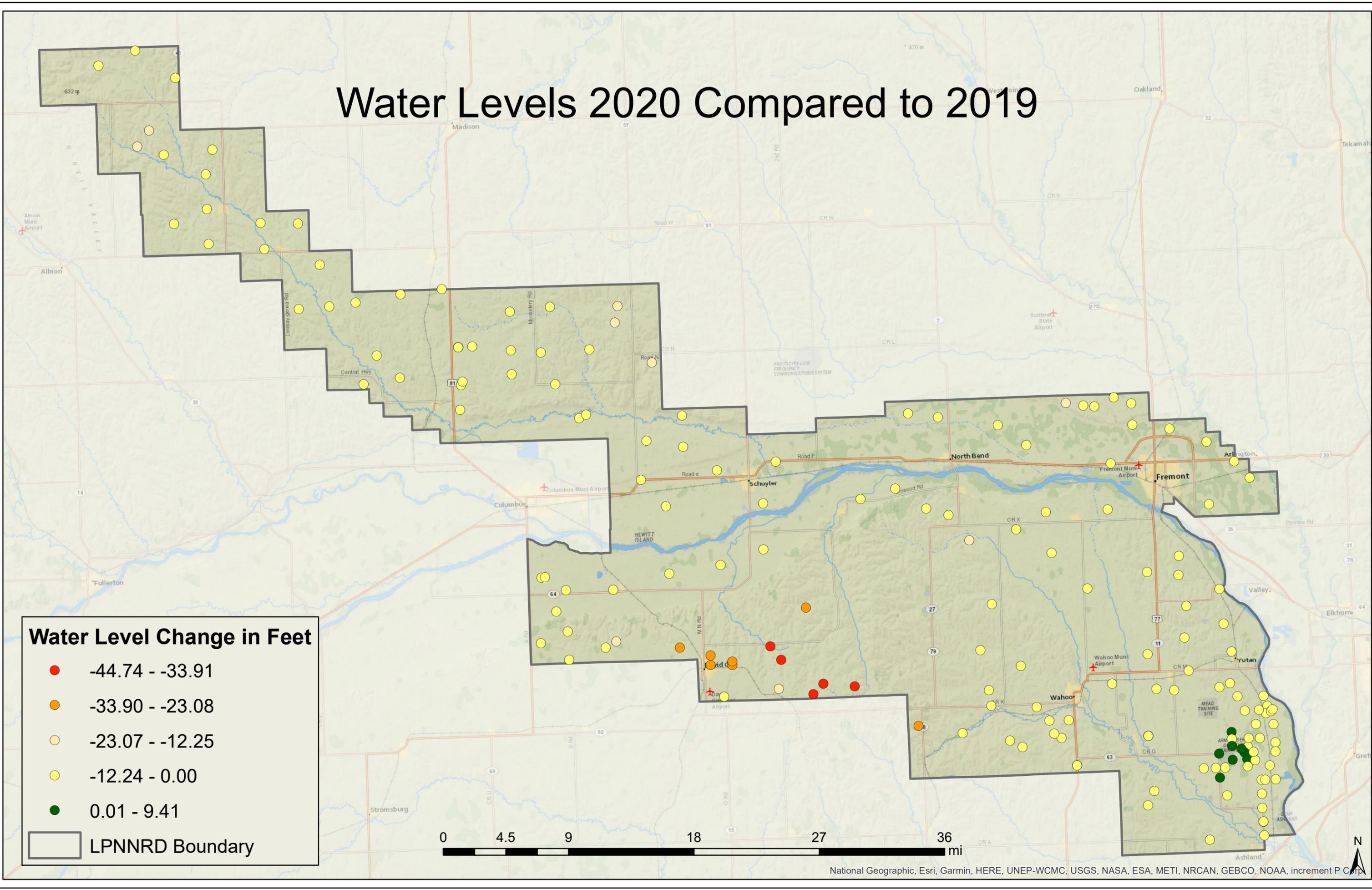
Water Levels 2020 Compared to 2019

Water Level Change in Feet

- -44.74 - -33.91
- -33.90 - -23.08
- -23.07 - -12.25
- -12.24 - 0.00
- 0.01 - 9.41

LPNNRD Boundary

0 4.5 9 18 27 36 mi



Date: December 21, 2020

Attn: Daryl Andersen
Lower Platte North Natural Resources District
PO Box 126
Wahoo, NE 68066

From: Katie Cameron, ENWRA Project Coordinator

Daryl,

Please find attached the annual ENWRA dues invoice for fiscal year 2021 (FY21) and the first annual invoice for the 2-year Interlocal Agreement Renewal for the Nebraska GeoCloud (NGC) with a table summarizing the Sponsor commitments related to the 2-year extension.

Please let me know if you have questions.

Thank you,



Kathleen Cameron, Survey Hydrogeologist/ENWRA Coordinator
kcameron_enwra@lpsnrd.org
(402) 419.4798

Enclosures

3125 Portia Street PO Box 83581 Lincoln, NE 68501-3581
(402) 476-2729
www.enwra.org

ENWRA
PO Box 83581
Lincoln, NE 68501-3581

INVOICE

INVOICE #3062
DATE: December 17, 2020

TO: Lower Platte North Natural Resources District
PO Box 126
Wahoo, NE 68066
Attn: Daryl Andersen

DESCRIPTION	AMOUNT
FY 2020 ENWRA annual dues	\$30,000
TOTAL	\$30,000

Make all checks payable to ENWRA.

Thank you!

ENWRA
PO Box 83581
Lincoln, NE 68501-3581

INVOICE

INVOICE #4032
DATE: December 17, 2020

TO: Lower Platte North Natural Resources District
PO Box 126
Wahoo, NE 68066
Attn: Daryl Andersen

DESCRIPTION	AMOUNT
FY 2021 first annual Nebraska GeoCloud (NGC) dues (first of two equivalent payment obligations under the 10 NRD interlocal NGC agreement renewal dated May 14, 2020)	\$3,400
TOTAL	\$3,400

Make all checks payable to ENWRA.

Thank you!

ARTICLE IV

FUNDING

Section 4.01

Each District will budget funds for fiscal year FY2021 and FY2022 as follows:

Financial Sponsors	FY21	FY22	Total
LPSNRD	\$3,400	\$3,400	\$6,800
LPNNRD	\$3,400	\$3,400	\$6,800
P-MRNRD	\$3,400	\$3,400	\$6,800
LCNRD	\$1,000	\$1,000	\$2,000
LENRD	\$3,400	\$3,400	\$6,800
NNRD	\$3,400	\$3,400	\$6,800
LLNRD	\$3,400	\$3,400	\$6,800
UENRD	\$1,700	\$1,700	\$3,400
CPNRD	\$3,400	\$3,400	\$6,800
TPNRD	\$3,400	\$3,400	\$6,800
ENWRA (LCNRD, LENRD, LPNNRD, LPSNRD, NNRD, P-MRNRD)	\$25,000	\$25,000	\$50,000
TOTALS	\$54,900	\$54,900	\$109,800

ARTICLE V

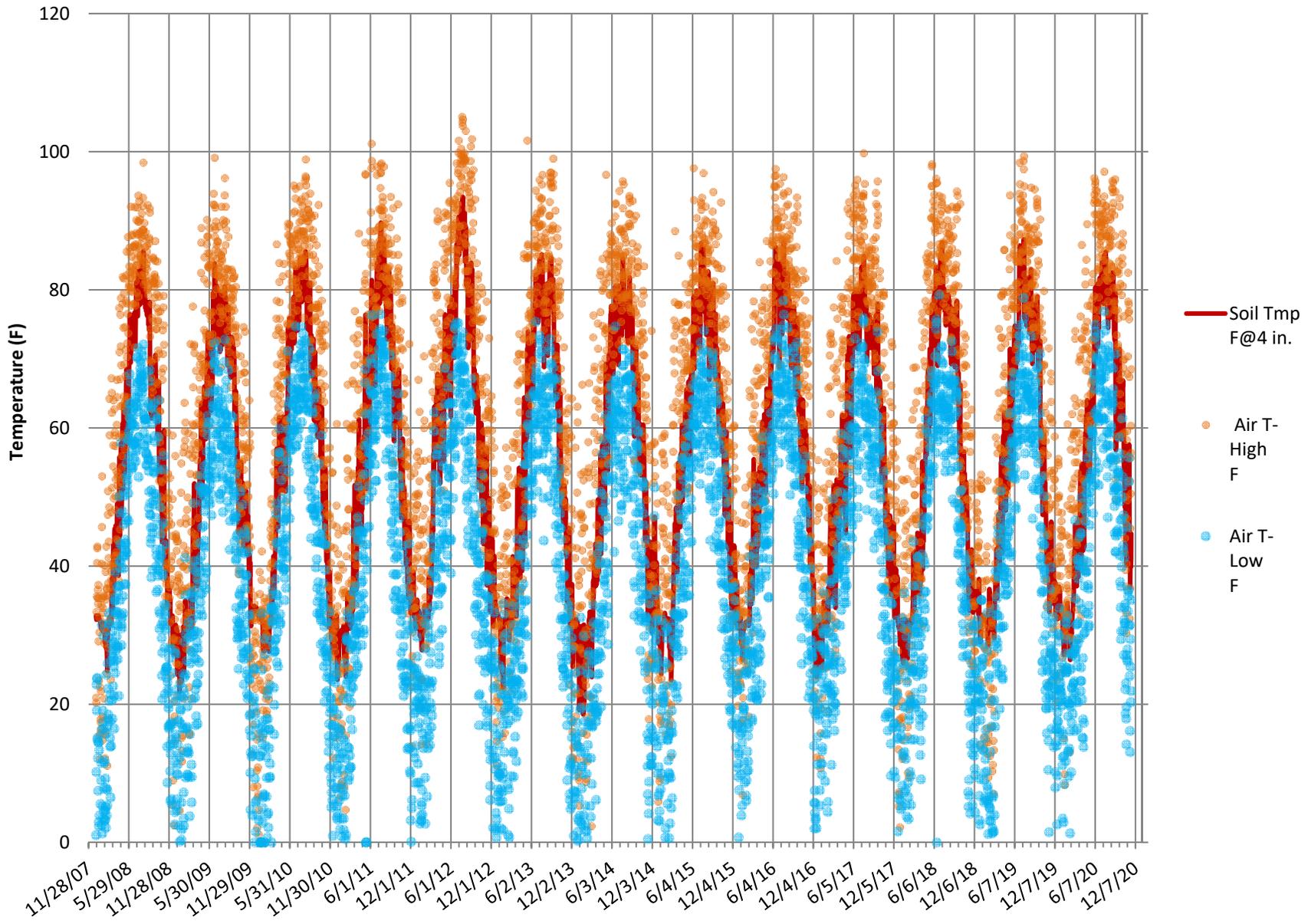
POWERS

Section 5.01

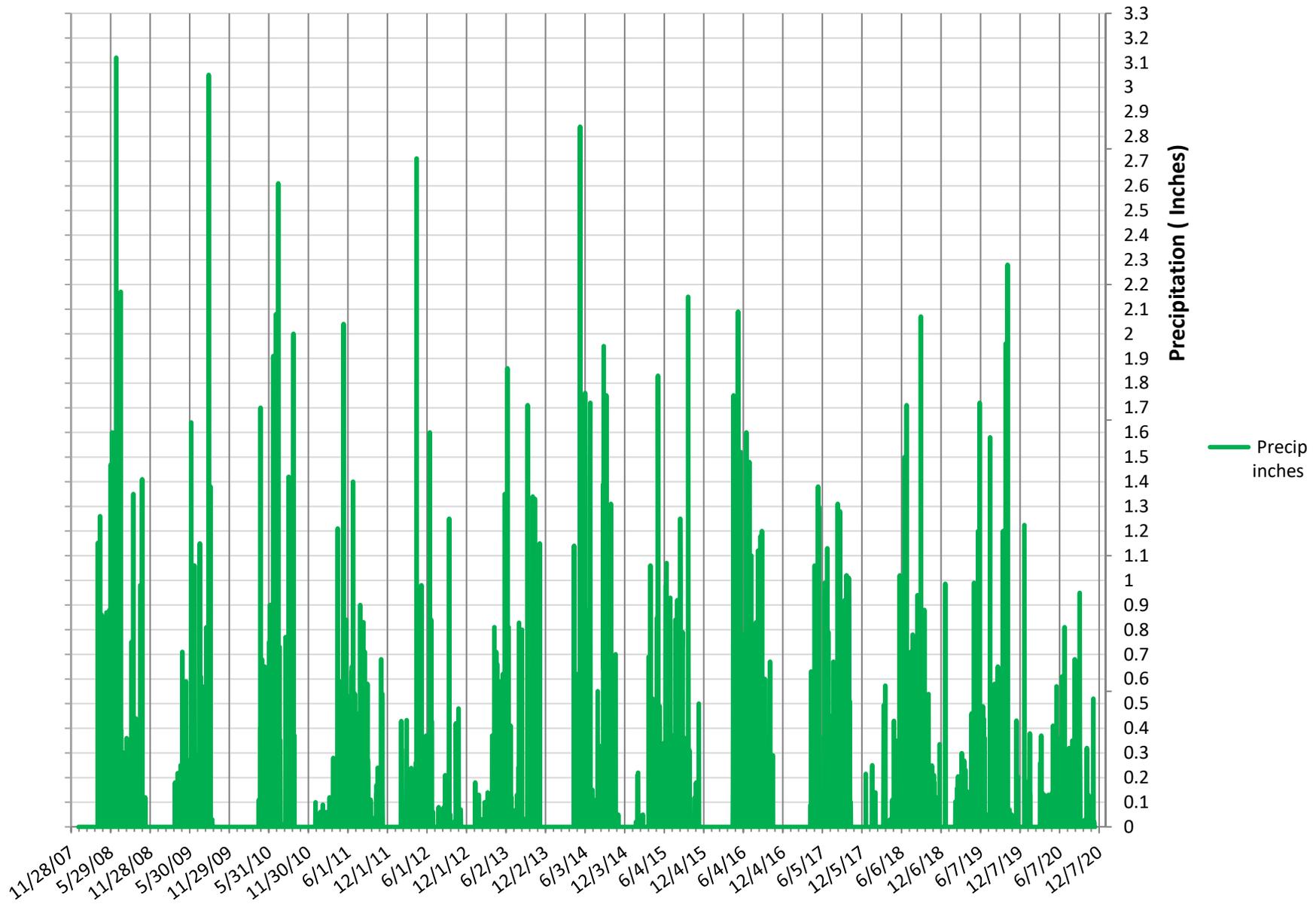
The DISTRICTS shall have all of the powers and authorities pursuant to state statutes that are necessary to carryout the stated objective and purpose on behalf of the NGC ICA joint and cooperative effort.

Section 5.02

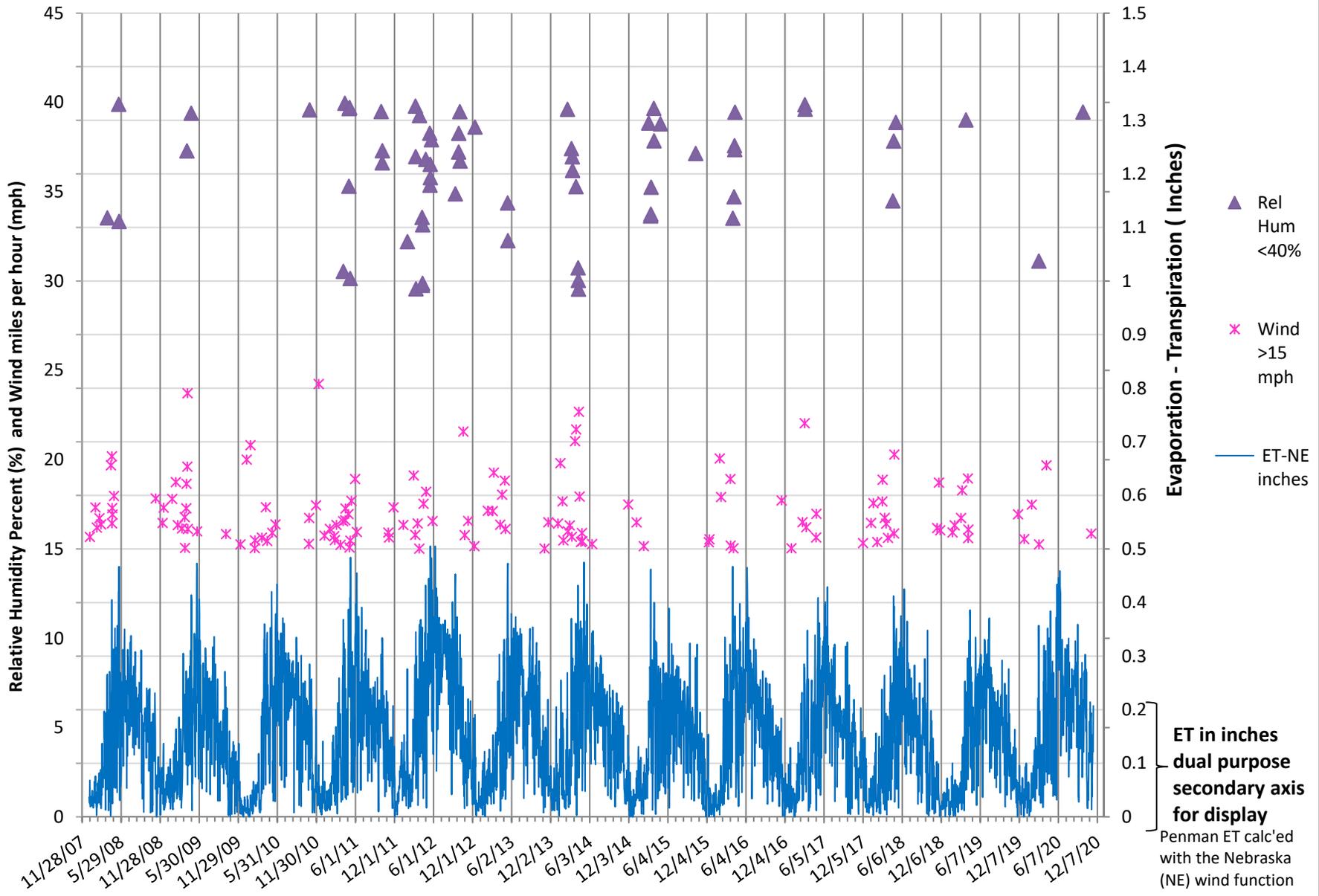
Memphis 5N Station A255367 Soil Temperature (F) at depth of 4 inches 2008 to Recent



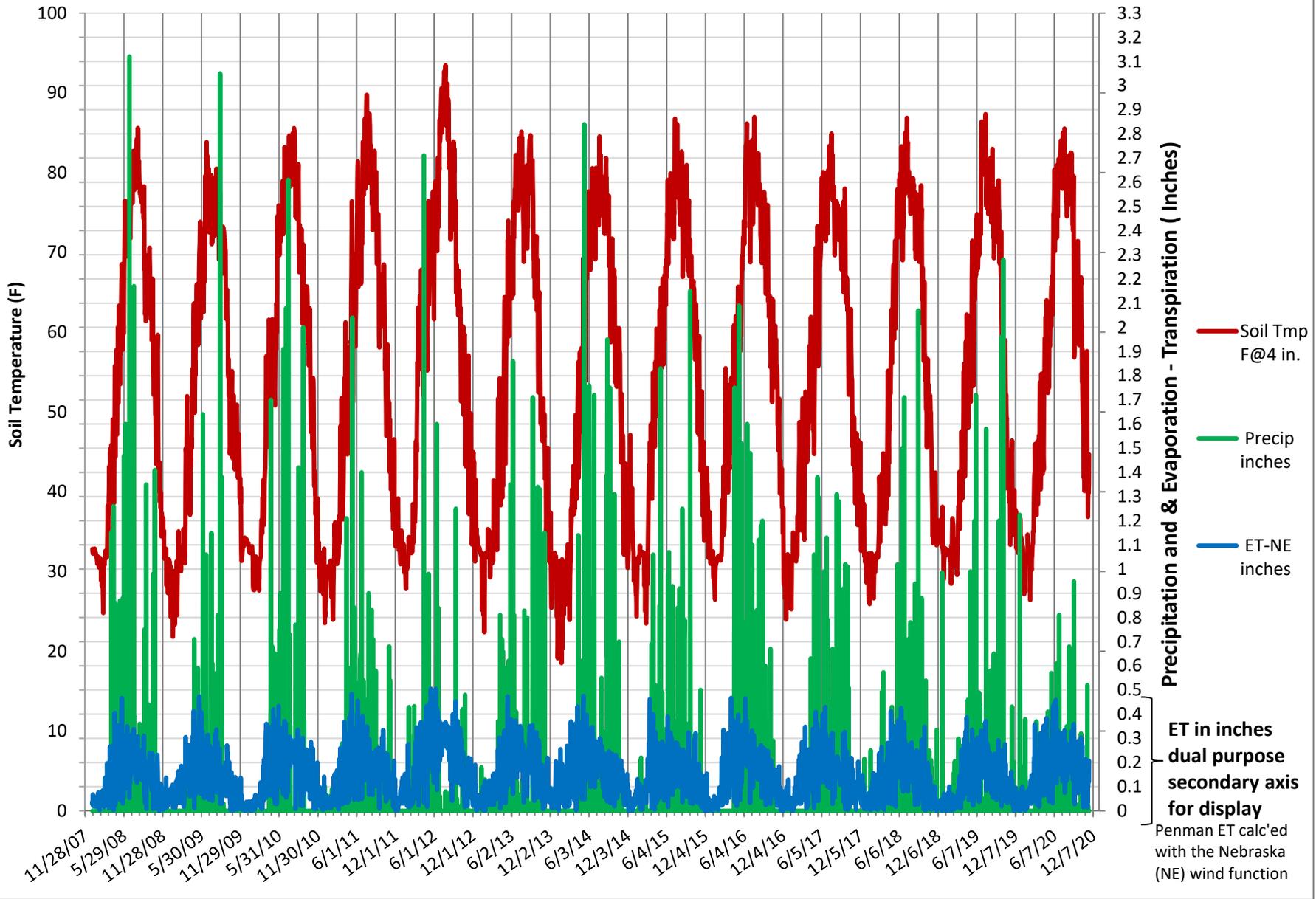
Memphis 5N Station A255367 Precipitation in Inches for 2008 to Recent



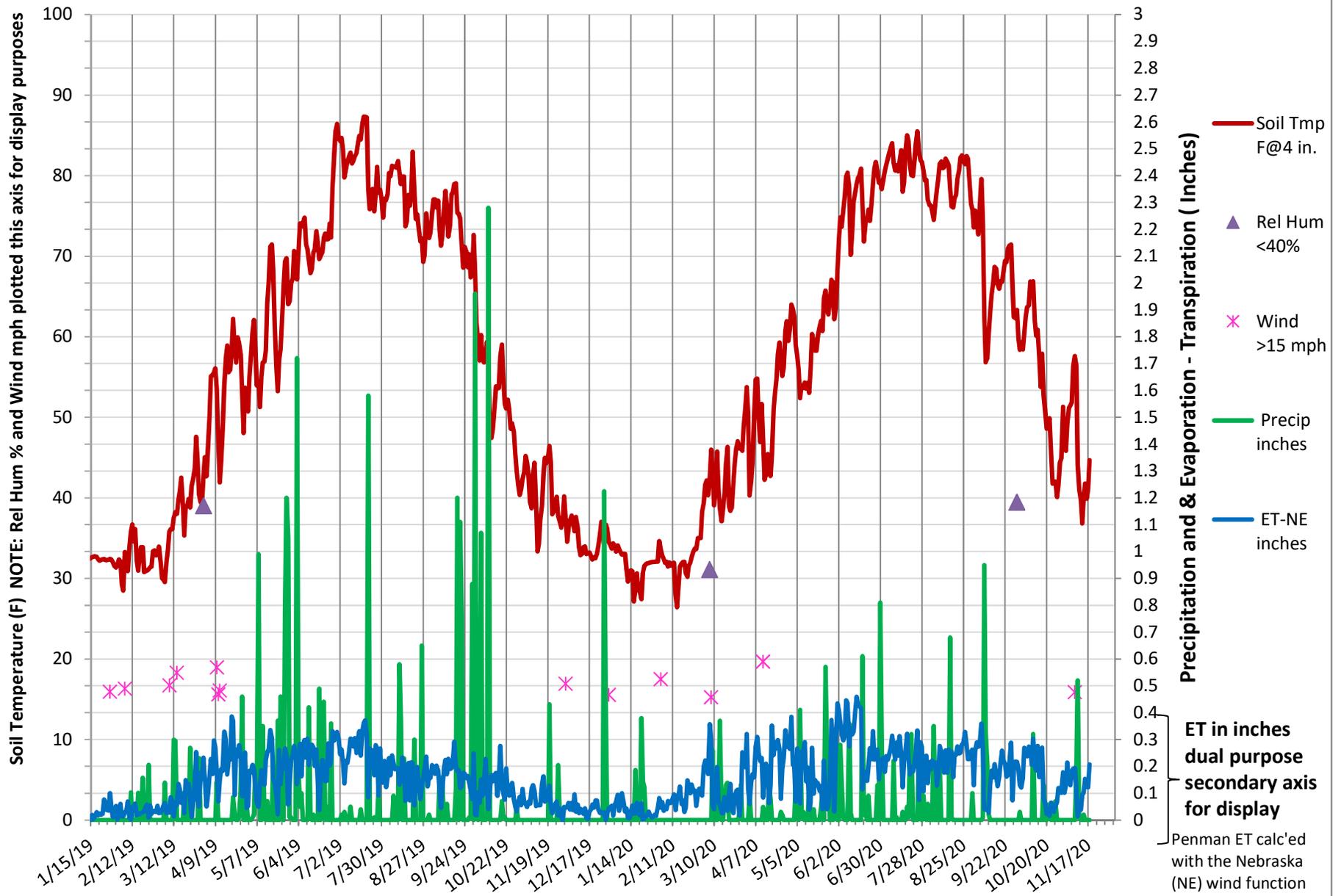
Memphis 5N Station A255367 Evapotranspiration (ET), Wind >15 mph, Rel Hum <40%



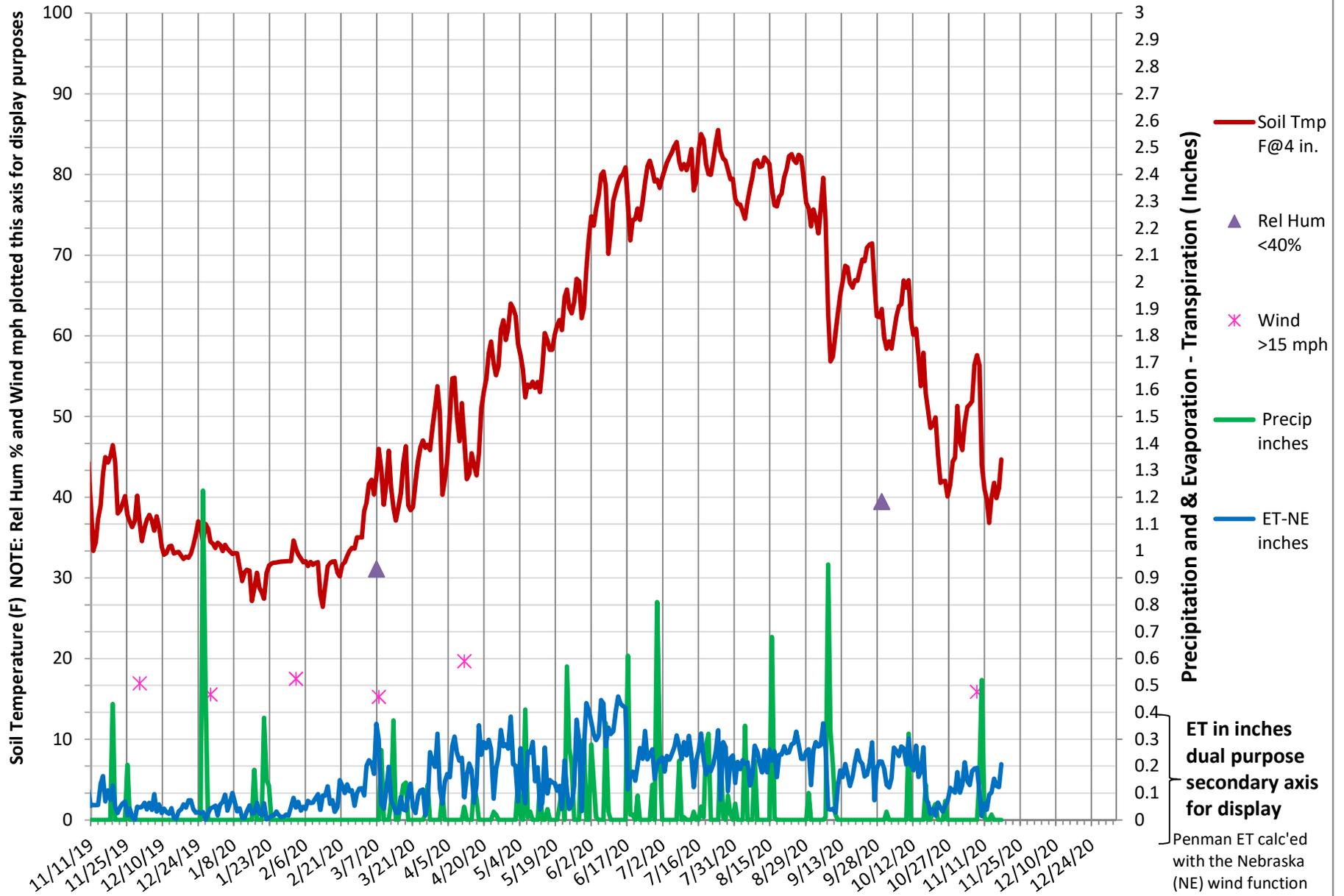
Memphis 5N Station A25367 Precipitation and Soil Temperature and ET for 2008 to Recent



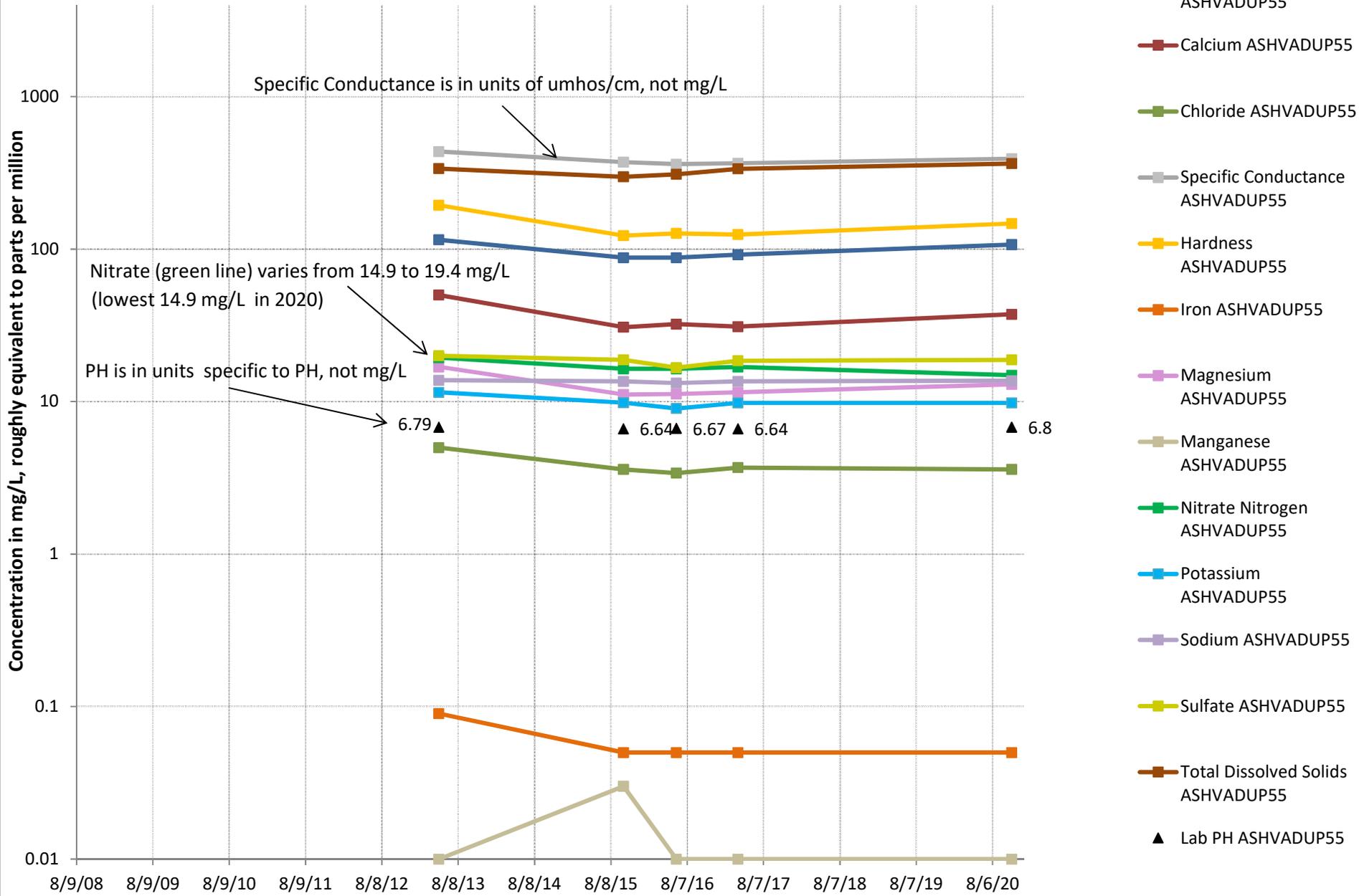
Memphis 5N Station A255367 Precipitation and Soil Temperature and ET - 2019 and 2020



Memphis 5N Station A255367 Precipitation and Soil Temperature and ET - 2020



Ashland Vadose Station Water Quality Graph 2013-2020



Added Parameters in 2020



Midwest Laboratories
 13611 B Street
 Omaha, NE 68144
 P 402-334-7770
 F 402-334-9121
 www.midwestlabs.com

EAST NE WATER RES ASSESS. - 22712
 PO BOX 83581
 LINCOLN, NE 68501-3581

Project: ENWRAASH Full List
 Project Number: ENWRA Project
 Project Manager: KATHLEEN CAMERON

Reported:
 2020-12-04 08:47

Sample ID: ASH Vad_up 55
Laboratory ID: 1562562-01
Sampled Date/Time: 2020-11-06 14:00

Analyte	Result	Reporting Limit	Units	Method	Prepared	Analyzed	Analyst	(Container) / Notes
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Dissolved Metals

Arsenic	<	0.001	mg/L	EPA 200.8	2020-11-30	2020-12-01	ras7	(D)
Barium	0.263	0.050	mg/L	EPA 200.7	2020-11-30	2020-12-01	erw9	(D)
Cadmium	<	0.020	mg/L	EPA 200.7	2020-11-30	2020-12-01	erw9	(D)
Calcium	37.43	1.00	mg/L	EPA 200.7	2020-11-30	2020-12-02	erw9	(D)
Chromium	<	0.10	mg/L	EPA 200.7	2020-11-30	2020-12-01	erw9	(D)
Hardness	147.0	6.62	mg Eq CaCO3/L	Calculation	2020-11-30	2020-12-02	erw9	
Iron	<	0.50	mg/L	EPA 200.7	2020-11-30	2020-12-01	erw9	(D)
Lead	<	0.0005	mg/L	EPA 200.8	2020-11-30	2020-12-01	ras7	(D)
Magnesium	12.99	1.00	mg/L	EPA 200.7	2020-11-30	2020-12-02	erw9	(D)
Manganese	<	0.10	mg/L	EPA 200.7	2020-11-30	2020-12-01	erw9	(D)
Mercury	<	0.0004	mg/L	EPA 245.1	2020-11-30	2020-12-01	pjd8	(D)
Potassium	9.81	1.00	mg/L	EPA 200.7	2020-11-30	2020-12-01	erw9	(D)
Selenium	0.002	0.001	mg/L	EPA 200.8	2020-11-30	2020-12-01	ras7	(D)
Silver	<	0.10	mg/L	EPA 200.7	2020-11-30	2020-12-01	erw9	(D)
Sodium	13.71	1.00	mg/L	EPA 200.7	2020-11-30	2020-12-01	erw9	(D)
Uranium	0.0016	0.0001	mg/L	EPA 200.8	2020-11-30	2020-12-01	ras7	(D)

Environmental Chemistry

Alkalinity, Total (as CaCO3)	107	20	mg/L	SM 2320 B-1997	2020-11-25	2020-11-25	mgn8	(A)
Chloride	3.6	1.0	mg/L	EPA 300.0	2020-11-27	2020-11-27	MGN8	(A)
Specific conductance	392	2	umhos/cm	SM 2510 B	2020-11-24	2020-11-24	wib1	(A)
Nitrate/Nitrite Nitrogen	14.9	0.40	mg/L	EPA 353.2	2020-12-01	2020-12-01	jaj4	(B)
Total Dissolved Solids	364	10	mg/L	SM 2540 C-1997	2020-11-30	2020-12-01	wib1	(A)
Sulfate	18.8	1.5	mg/L	EPA 300.0	2020-11-27	2020-11-27	MGN8	(A)

Table 1. Summary of proposed funding for the period October 1, 2020 -- September 30, 2021 for the operation of two streamgages and one real-time groundwater level monitoring site that are currently supported by the Lower Platte North Natural Resources District.

[CMF, USGS, Cooperative matching funds; LPN NRD, Lower Platte North Natural Resources District; GWSIP, Groundwater Streamflow Information Program; USGS, U.S. Geological Survey]

Station number	Station name	Station funding			Total	Footnote Code
		USGS GWSIP	USGS CMF	LPN NRD		
Streamflow Stations						
06795500	Shell Creek near Columbus	\$9,660		\$5,645	\$15,305	1
06804700	Wahoo Creek at Ashland		\$6,290	\$9,015	\$15,305	
	Subtotal	\$9,660	\$6,290	\$14,660	\$30,610	
Groundwater Station						
411005096281502	14N 8E 24 ACD2 Mead		\$620	\$2,680	\$3,300	
	Subtotal	\$0	\$620	\$2,680	\$3,300	
	Funding partner totals	\$9,660	\$6,910	\$17,340	\$33,910	

1 USGS GWSIP funds used in place of CMF funds as match with LPN NRD



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

September 11, 2020

Eric Gottschalk
Lower Platte North Natural Resources District
PO Box 126
Wahoo, NE 68066

Dear Mr. Gottschalk:

Enclosed are two copies of Joint Funding Agreement No. 21NRJFA00170 for the operation of two streamgages at Shell Creek near Columbus and Wahoo Creek at Ashland and one real-time groundwater level monitoring site as listed in the enclosed summary of proposed funding. The total amount of the agreement is \$24,250 or \$6,910 for the U.S. Geological Survey and \$17,340 for the Lower Platte North Natural Resources District. Funds in the amount of \$9,660 from the Groundwater and Streamflow Information Program (GWSIP), which are not included in the above amounts, have been used as a supplement to or in place of Cooperative Matching Funds. Please sign the agreement and return by email to Idietsch@usgs.gov. Work cannot be continued 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 annually in July, 2021. 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 Jason Lambrecht at 402-328-4124.

Sincerely,

Steven M. Peterson, Director
USGS Nebraska Water Science Center

3 Enclosures

DUNS No. 949286512

Fixed Cost Agreement YES[X] NO[]

THIS AGREEMENT is entered into as of October 1, 2020, by the U.S. GEOLOGICAL SURVEY, Nebraska Water Science Center, UNITED STATES DEPARTMENT OF THE INTERIOR, party of the first part, and the LOWER PLATTE NORTH NATURAL RESOURCES DISTRICT, party of the second part.

1. The parties hereto agree that subject to the availability of appropriations and in accordance with their respective authorities there shall be maintained in cooperation **streamgages at Shell Creek near Columbus and Wahoo Creek at Ashland, and one real-time groundwater level monitoring site**, 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) include In-Kind-Services in the amount of \$0.00

- (a) \$6,910 by the party of the first part during the period October 1, 2020 to September 30, 2021
- (b) \$17,340 by the party of the second part during the period October 1, 2020 to September 30, 2021
- (c) Contributions are provided by the party of the first part through other USGS regional or national programs, in the amount of: \$9,660

Description of the USGS regional/national program:
Groundwater Streamflow Information 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.

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 cost, 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. The Parties acknowledge that scientific information and data developed as a result of the Scope of Work (SOW) are subject to applicable USGS review, approval, and release requirements, which are available on the USGS Fundamental Science Practices website <https://www.usgs.gov/about/organization/science-support/science-quality-and-integrity/fundamental-science-practices>

Form 9-1366
(May 2018)

U.S. Department of the Interior
U.S. Geological Survey
Joint Funding Agreement
FOR
Water Resource Investigations

Customer #: 600000136
Agreement #: 21NRJFA00170
Project #: NR00GS1
TIN #: 47-0542716

9. Billing for this agreement will be rendered **annually**. Invoices not paid within 60 days from the billing date will bear Interest, Penalties, and Administrative cost at the annual rate pursuant the Debt Collection Act of 1982, (codified at 31 U.S.C. § 3717) established by the U.S. Treasury.

USGS Technical Point of Contact

Name: Jason Lambrecht
Hydrologic Data Section Chief
Address: 5231 South 19th
Lincoln, NE 68512
Telephone: (402) 328-4124
Fax: (402) 328-4101
Email: jmlambre@usgs.gov

Customer Technical Point of Contact

Name: Eric Gottschalk
General Manager
Address: PO Box 126
Wahoo, NE 68066
Telephone: (402) 443-4675
Fax:
Email: egottschalk@lpnrd.org

USGS Billing Point of Contact

Name: Lisa Dietsch
Administrative Officer
Address: 5231 South 19th
Lincoln, NE 68512
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U.S. Geological Survey
United States
Department of Interior

Lower Platte North Natural Resources District

Signature

Signatures

By _____ Date: 9/11/20
Name: Steven M. Peterson
Title: Director

By _____ Date: _____
Name:
Title:

By _____ Date: _____
Name:
Title:

By _____ Date: _____
Name:
Title: