

December 30, 2015



Mr. Jeff Fassett and members of the Nebraska Natural Resources Commission
Nebraska Department of Natural Resources
301 Centennial Mall South
Lincoln, Nebraska 68509-4676

Re: P-MRNRD Platte and Elkhorn River Valley Integrated Water Monitoring Project Water Sustainability Fund (WSF) Application

Dear Director and Reviewers:

The P-MRNRD is excited to submit this Water Sustainability Fund (WSF) application for an important monitoring and data analysis project which has the ability to impact how integrated groundwater and surface water is managed in the Lower Platte and Elkhorn Rivers. A brief overview of the project as stated in the application is as follows:

Discussions amongst the Lower Platte River Basin Coalition have focused on mitigating very low streamflow conditions in the Lower Platte River to address municipal water supplies and instream flow rights. Upstream of the confluence with the Elkhorn River, the Platte River is topographically higher in elevation than the Elkhorn River, see enclosed Figure 2, and this leads to the hypothesis that flows lost from the Platte River eventually become increased flows in the Elkhorn River. The purpose of this project is to obtain real-time monitoring of groundwater levels between the Platte River streamflow gage near Leshara and the Elkhorn River streamflow gage at Waterloo. It is anticipated that analysis of groundwater elevations and gradients between the two rivers can provide a predictable relationship for streamflow gains or loses based on river level and flow. The enclosed Figure 1 shows a map of the proposed area and the use of five real-time monitoring wells. Figure 1 also represents an overall study area in which water level surveys will be conducted during various times of the year to create groundwater contour maps. Also included in the project is a bed and bank conductance permeameter test in the Elkhorn River.

The duration of this proposed study is for two years; however, funding from the WSF in the amount of \$64,200 is only requested for the first year beginning in July 2016. The U.S. Geological Survey (USGS) will conduct all the monitoring and reporting for the project for a total cost of \$245,000. Several other funding partners are participating in the project:

Agency	Year 1 Funding	Year 2 Funding	TOTAL
USGS	\$21,400	\$44,600	\$66,000
NDNR IDEP	\$36,000	\$36,000	\$72,000
WSF	\$64,200	\$0	\$64,200
LPNNRD	\$10,700	\$10,700	\$21,700
P-MRNRD	\$10,700	\$10,700	\$21,700
Total	\$143,000	\$102,000	\$245,000

All of the wells proposed for monitoring currently exist except for one to be installed right near the Platte River streamflow gage at the P-MRNRD's Platte River Landing recreation site just south of Highway 64. The other monitoring wells are owned by project partners, including USGS, Lower Platte North NRD (LPNNRD), and Metropolitan Utilities District (MUD). However, none of these existing monitoring wells currently have automatic recorders or telemetry equipment to monitor the data in real-time.

This project will help address the threat of low flows in the Lower Platte and Elkhorn River which can impact the drinking water supply to approximately 790,000 Nebraskans, including Lincoln and Omaha. Obtaining real-time data and analyzing streamflow gains or losses will provide very important information for future conjunctive management projects wishing to increase flows in the Platte or Elkhorn River to meet municipal water needs or instream flow rights for endangered species. If the relationship in the alluvial aquifer between these two rivers is not better understood through physical data and analysis, it may impact the effectiveness of future efforts to mitigate drought conditions in the Lower Platte and Elkhorn Rivers.

Please find enclosed with this letter a complete WSF application for this project with associated supporting documents. If you have questions at any time, please contact Paul Woodward, P-MRNRD Groundwater Management Engineer, at 402.315.1772 or pwoodward@papiionrd.org.

Thank you for your work in supporting this effort.

Sincerely,

A handwritten signature in blue ink that reads "Paul W. Woodward". The signature is written in a cursive, flowing style.

Paul W. Woodward, PE, CFM
Groundwater Management Engineer

Enclosure - 2015 WSF Grant Application

NEBRASKA NATURAL RESOURCES COMMISSION

Water Sustainability Fund

Application for Funding

Section A.

ADMINISTRATIVE

PROJECT NAME: *Platte and Elkhorn River Valley Integrated Water Monitoring*

PRIMARY CONTACT INFORMATION

Entity Name: *Papio-Missouri River Natural Resources District*

Contact Name: *Paul W. Woodward, PE, CFM*

Address: *8901 South 154th Street, Omaha, NE 68138-3621*

Phone: *402.315.1772*

Email: *pwoodward@pacionrd.org*

Partners / Co-sponsors, if any: *U.S. Geological Survey, Lower Platte North Natural Resources District, Metropolitan Utilities District*

1. Dollar amounts requested: (Grant, Loan, or Combination)

Grant amount requested. \$ *64,200.00*

Loan amount requested. \$ *0.00*

If Loan, how many years repayment period? [Click here to enter text.](#)

If Loan, supply a complete year-by-year repayment schedule.

[Click here to enter text.](#)

2. Permits Needed - Attach copy for each obtained (N/A = not applicable)

Nebraska Game & Parks Commission
(G&P) consultation on Threatened and
Endangered Species and their Habitat

N/A Obtained: YES NO

Surface Water Right	N/A <input checked="" type="checkbox"/>	Obtained: YES <input type="checkbox"/>	NO <input type="checkbox"/>
USACE (e.g., 404 Permit)	N/A <input checked="" type="checkbox"/>	Obtained: YES <input type="checkbox"/>	NO <input type="checkbox"/>
Cultural Resources Evaluation	N/A <input checked="" type="checkbox"/>	Obtained: YES <input type="checkbox"/>	NO <input type="checkbox"/>
Other (provide explanation below)	N/A <input type="checkbox"/>	Obtained: YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>

Monitoring well registration – NDNR (obtained after construction)

3. Are you applying for funding for a combined sewer over-flow project?

YES NO

If yes, do you have a Long Term Control Plan that is currently approved by the Nebraska Department of Environmental Quality?

YES NO

If yes attach a copy to your application. [Click here to enter text.](#)

If yes what is the population served by your project? [Click here to enter text.](#)

If yes provide a demonstration of need. [Click here to enter text.](#)

If yes and you were approved for funding in the most recent funding cycle, then resubmit the above information updated annually but you need not complete the remainder of the application.

4. If you are or are representing an NRD, do you have an Integrated Management Plan in place, or have you initiated one?

N/A YES NO

5. Has this application previously been submitted for funding assistance from the Water Sustainability Fund and not been funded?

YES NO

If yes, have any changes been made to the application in comparison to the previously submitted application? [Click here to enter text.](#)

If yes, describe the changes that have been made since the last application. [Click here to enter text.](#)

No, I certify the application is a true and exact copy of the previously submitted and scored application. (Signature required) [Click here to enter text.](#)

6. Complete the following if your project has or will commence prior to next July 1st.

As of the date of submittal of this application, what is the Total Net Local Share of Expenses incurred for which you are asking cost share assistance from this fund? \$ [Click here to enter text.](#)

Attach all substantiating documentation such as invoices, cancelled checks etc. along with an itemized statement for these expenses. [Click here to enter text.](#)

Estimate the Total Net Local Share of Expenses and a description of each you will incur between the date of submittal of this application and next July 1st for which you are asking cost share assistance from this fund.
\$ [Click here to enter text.](#)

Section B.

DNR DIRECTOR'S FINDINGS

Does your project include physical construction (defined as moving dirt, directing water, physically constructing something, or installing equipment)?

YES NO

- 1(a). If yes (structural), submit a feasibility report (to comply with Title 261, CH 2) including engineering and technical data and the following information:

A discussion of the plan of development (004.01 A);

No feasibility report is attached as this project is a proposed study that involves the installation of monitoring equipment. The plan for this project was developed in cooperation with USGS to create a groundwater and surface-water monitoring network and associated static water level measurements that would provide the best representative data set to determine the groundwater and surface-water interaction between the Platte River and Elkhorn River in western Douglas County. A technical description of the proposed monitoring and associated investigations was prepared by USGS and is enclosed as part of Exhibit 1. Where available, existing monitoring wells were considered first and their respective owners, including USGS, MUD, and LPNNRD, were contacted to provide permission to install real-time static water level monitoring equipment during the two year evaluation. These owners are in support of this project as documented in the attached letters labeled Exhibit 1, 2, and 3. Only one new monitoring well will be added at the P-MRNRD's Platte River Landing recreation area (located directly southwest of Highway 64 and the Platte River) in order to utilize the existing telemetry equipment at the stream gage. Additional synoptic water level readings will be taken by USGS staff at appropriate times of the year to produce water level contour maps of the study area. Owner permissions for access to these various wells will be obtained directly prior to completing the readings. Evaluation and analysis of the results will be conducted by USGS prior to producing a final interpretive report.

A description of all field investigations made to substantiate the feasibility report (004.01 B);

No feasibility report is attached as this project is a proposed study that involves the installation of monitoring equipment. Available groundwater level data from the Nebraska Department of Natural Resources well registration database and the USGS National Water Information System (<http://waterdata.usgs.gov/nwis>) were used to estimate water levels. Driller's logs from the registered wells were used to estimate the base of the alluvial aquifer (bedrock depth) shown in Figure 2. Figure 1 is a study area map and shows the approx. location of the profile in Figure 2.

Maps, drawings, charts, tables, etc., used as a basis for the feasibility report (004.01 C);

Figures 1 and 2 are attached to describe the project location/study area and

display the vertical extent of the alluvial aquifer along a profile between the Platte and Elkhorn Rivers.

A description of any necessary water and land rights and pertinent water supply and water quality information, if appropriate (004.01 D);
No new water rights are required for this project and all land rights for the continuous monitoring well locations are secured through the project partners or project sponsors. No other data is applicable.

A discussion of each component of the final plan including, when applicable (004.01 E);

Required geologic investigation (004.01 E 1); NA

Required hydrologic data (004.01 E 2); NA

Design criteria for final design including, but not limited to, soil mechanics, hydraulic, hydrologic, structural, embankments and foundation criteria (004.01 E 3). NA

- 1(b). If no (non-structural), submit data necessary to establish technical feasibility including, but not limited to the following (004.02):

A discussion of the plan of development (004.02 A);
Click here to enter text.

A description of field or research investigations utilized to substantiate the project conception (004.02 B); Click here to enter text.

A description of the necessary water and/or land rights, if applicable (004.02 C); Click here to enter text.

A discussion of the anticipated effects, if any, of the project upon the development and/or operation of existing or envisioned structural measures including a brief description of any such measure (004.02 D).
Click here to enter text.

2. Provide evidence that there are no known means of accomplishing the same purpose or purposes more economically, by describing the next best alternative.

One of the primary purpose of this project is to produce actual physical, monitored data that can be used to develop theoretical relationships between surface water flow in the Platte and Elkhorn Rivers and the alluvial aquifer between them. No specific alternative exists for obtaining this monitored data. However, a comparison can be made for the analysis portion of this project in which a complex groundwater model could be used to simulate different variations of groundwater level responses to river flows. A groundwater model similar in size to this project's study area was developed by USGS for the Lower

Platte River area around Ashland, but was not fully completed. The total cost of this model would have been approximately \$525,000 once completed (more than double the cost of this project). The results of this project will be based on actual monitored data and should provide further information for groundwater model calibration if needed in the future.

3. Document all sources and report all costs and benefit data using current data, (commodity prices, recreation benefit prices, and wildlife prices as prescribed by the Director) using both dollar values and other units of measurement when appropriate (environmental, social, cultural, data improvement, etc.). The period of analysis for economic feasibility studies shall be fifty (50) years or with prior approval of the Director, up to one hundred (100) years [T261 CH 2 (005)].

- Describe any relevant cost information including, but not limited to the engineering and inspection costs, capital construction costs, annual operation and maintenance costs, and replacement costs. Cost information shall also include the estimated construction period as well as the estimated project life (005.01).

Estimated costs for the project, including equipment installation (construction cost) and all other monitoring, analysis, and documentation (study costs) are documented in the attached letter from USGS dated December 3, 2015, labeled as Exhibit 1. The total estimated cost is \$245,000, of which \$47,000 is equipment and construction and \$198,000 is for USGS monitoring, analysis, and reporting. No long-term operation and maintenance cost is assumed beyond the two year study period.

- Only primary tangible benefits may be counted in providing the monetary benefit information and shall be displayed by year for the project life. In a multi-purpose project, estimate benefits for each purpose, by year, for the life of the project. Describe any intangible or secondary benefits separately. In a case where there is no generally accepted method for calculation of primary tangible benefits describe how the project will increase water sustainability, such that the economic feasibility of the project can be approved by the Director and the Commission (005.02).

No current method is available to determine specific primary tangible benefits for this project; however, the project will improve water sustainability by providing a better understanding of the groundwater and surface-water interaction in the alluvial aquifer between the Platte and Elkhorn Rivers. Results from this real-time groundwater level monitoring and synoptic water-level survey could help determine if this section of the Platte River is a losing reach. With this data, an estimate of the quantity and the timing of the water lost from the Platte and received in the Elkhorn can be estimated. Obtaining these results will provide very important information for future conjunctive water management projects wishing to increase flows in the Platte or Elkhorn River to meet municipal water needs or instream flow rights. Historic issues have arose when flows in the Lower Platte River reached critical levels (less than 1,000 cfs) greatly reducing the ability of municipal wells and pumps to provide the necessary supply during times of peak demand and potentially

affecting available water in the aquifer during long periods of drought. Such low flows have occurred more than 100 days during the past 27 years. If the relationship in the alluvial aquifer between these two rivers is not better understood through physical data and analysis, it may impact the effectiveness of future efforts to mitigate times of low flow. Overall, the project is justified as cost effective due to the fact that it provides real-time data and analysis which is necessary to understand and design future conjunctive management or recharge/retiming projects. These larger projects are likely cost effective when compared to their benefits to municipal, domestic, fish and wildlife, and industrial water supply.

- All benefit and cost data shall be presented in a table form to indicate the annual cash flow for the life of the proposal, not to exceed 100 years (005.03).

No primary tangible benefit versus cost analysis is provided for this project.

- In the case of projects for which there is no generally accepted method for calculation of primary tangible benefits and if the project will increase water sustainability, the economic feasibility of such proposal shall be demonstrated by such method as the Director and the Commission deem appropriate (005.04).

No current method is available to determine specific primary tangible benefits for this project; however, the project will improve water sustainability by providing a better understanding of the groundwater and surface-water interaction in the alluvial aquifer between of Platte and Elkhorn Rivers.

Results from this real-time groundwater level monitoring and synoptic water-level survey could help determine if this section of the Platte River is a losing reach. With this data, an estimate of the quantity and the timing of the water lost from the Platte and received by the Elkhorn can be estimated. Obtaining these results will provide very important information for future conjunctive water management projects wishing to increase flows in the Platte or Elkhorn River to meet municipal water needs or instream flow rights. Historic issues have arose when flows in the Lower Platte River reached critical levels (less than 1,000 cfs) greatly reducing the ability of municipal wells and pumps to provide the necessary supply during times of peak demand and potentially affecting available water in the aquifer during long periods of drought. Such low flows have occurred more than 100 days during the past 27 years. If the relationship in the alluvial aquifer between these two rivers is not better understood through physical data and analysis, it may impact the effectiveness of future efforts to mitigate times of low flow. Overall, the project is justified as cost effective due to the fact that it provides real-time data and analysis which is necessary to understand and design future conjunctive management or recharge/retiming projects. These larger projects are likely cost effective when compared to their massive benefits to municipal, domestic, fish and wildlife, and industrial water supply.

4. Provide evidence that sufficient funds are available to complete the proposal.

The P-MRNRD's budget for July 1, 2015 to June 30, 2016 is \$71.8 million with a property tax levy of 0.038034 resulting in approximately \$22 million of local property taxes. Income from cash on hand (from general carry over and general obligation (GO) bonds) of approximately \$27.5 million and outside revenue from

other grants and partners of \$22.3 million make up the difference between total budget and property tax revenue. This proposed project is considered part of our surface and groundwater quality program and would be budgeted for P-MRNRD funding beginning in the July 1, 2016 to June 30, 2017 (FY 2017) budget year. Budgeted amounts in the District's FY 2017 and FY 2018 budgets can be revised dependent upon available grants in order to ensure sufficient funding. The USGS has obligated \$66,000 of their cooperative water programs budget over two federal fiscal years.

5. Provide evidence that sufficient annual revenue is available to repay the reimbursable costs and to cover OM&R (operate, maintain, and replace). *No reimbursable costs prior to July 1, 2016 are anticipated and there will be no OM&R following the two year project schedule.*
6. If a loan is involved, provide sufficient documentation to prove that the loan can be repaid during the repayment life of the proposal.
NA
7. Describe how the plan of development minimizes impacts on the natural environment.
The monitoring of groundwater levels as part of this project will not have any adverse impact to existing environmental conditions. The new shallow monitoring well proposed along the east bank of the Platte River will meet the most recent well construction standards for aquifer protection and be registered with NDNR. Proper precautions and protocols while obtaining groundwater levels will be taken.
8. Explain how you are qualified, responsible and legally capable of carrying out the project for which you are seeking funds.
The P-MRNRD will serve as the local sponsor by collecting funds and paying USGS on a quarterly schedule. The P-MRNRD has the legal authority to enter into an Interagency Agreement with USGS to complete the proposed project. The USGS was contacted by the P-MRNRD to develop a proposal for this study as they are the only organization with the real-time telemetry system already in place and they have the expertise and past experience necessary to evaluate the data once it is obtained. USGS has also previously completed water level surveys and contour maps and have written procedures for performing bed and bank conductance and permeameter testing.
9. Explain how your project considers plans and programs of the state and resources development plans of the political subdivisions of the state.
This project meets the objectives under Data Acquisition in the Annual Report and Plan of Work for the Nebraska State Water Planning and Review Process dated September 2014. Specifically, data acquired and evaluated as part of this project will support NDNR's ongoing water planning under INSIGHT and the numerical groundwater modeling for the Lower Platte River and Missouri Tributaries. The Papio-Missouri River NRD has also enacted Groundwater Management Program Rules and Regulations for the entire study area of this

project which includes the hydrologically connected area between the Platte and Elkhorn Rivers. These rules and regulations specify an annual limit on the expansion of irrigated acres. Similarly, NDNR has adopted a limit on new surface water rights as part of the Voluntary Integrated Management Plan adopted in August of 2014. The P-MRNRD also has an adopted Groundwater Management Plan (GWMP), last revised in 1994. This project specifically helps carry out the objectives of the GWMP to maintain a static water level monitoring program. The P-MRNRD has conducted a static groundwater level monitoring program since 1978. In addition, the P-MRNRD is just beginning the process to completely update its current GWMP over the next two years and the concurrent collection and interpretation of data from this project will help to establish measurable goals and targets for managing this large alluvial aquifer.

10. Are land rights necessary to complete your project?

YES NO

If yes, provide a complete listing of all lands involved in the project.

[Click here to enter text.](#)

If yes, attach proof of ownership for each easements, rights-of-way and fee title currently held.

[Click here to enter text.](#)

If yes, provide assurance that you can hold or can acquire title to all lands not currently held.

[Click here to enter text.](#)

11. Identify how you possess all necessary authority to undertake or participate in the project.

The P-MRNRD has the authority under Nebraska State Statute Chapter 2 Article 32 to carry out this project under its authorized purposes relating to the development, management, utilization, and conservation of ground water and surface water. This includes the P-MRNRD's authorities to enter into contracts or agreements, budget and expend levied property taxes, and own and operate property or equipment.

12. Identify the probable environmental and ecological consequences that may result as the result of the project.

No adverse environmental or ecological consequences are anticipated as a result of this project. Dedicated monitoring wells will either be returned to their intended use and owners prior to the project, or if not needed, will be properly abandoned to prevent any future pathway for potential contamination into the groundwater.

Section C.

NRC SCORING

In the NRC's scoring process, points will be given to each project in ranking the projects, with the total number of points determining the final project ranking list.

The following 15 criteria constitute the items for which points will be assigned. Point assignments will be 0, 2, 4, or 6 for items 1 through 8; and 0, 1, 2, or 3 for items 9 through 15. Two additional points will be awarded to projects which address issues determined by the NRC to be the result of a federal mandate.

Notes:

- The responses to one criterion *will not* be considered in the scoring of other criteria. Repeat references as needed to support documentation in each criterion as appropriate. The 15 categories are specified by statute and will be used to create scoring matrixes which will ultimately determine which projects receive funding.
- There is a total of 69 possible points, plus two bonus points. The potential number of points awarded for each criteria are noted in parenthesis. Once points are assigned, they will be added to determine a final score. The scores will determine ranking.
- The Commission recommends providing the requested information and the requests are not intended to limit the information an applicant may provide. An applicant should include additional information that is believed will assist the Commission in understanding a proposal so that it can be awarded the points to which it is entitled.

Complete any of the following (15) criteria which apply to your project. Your response will be reviewed and scored by the NRC. Place an N/A (not applicable) in any that do not apply, an N/A will automatically be placed in any response fields left blank.

1. Remediates or mitigates threats to drinking water;
 - Describe the specific threats to drinking water the project will address.
 - Identify whose drinking water, how many people are affected, how will project remediate or mitigate.
 - Provide a history of issues and tried solutions.
 - Provide detail regarding long range impacts if issues are not resolved.

This project will help address the threat of low flows in the Lower Platte and Elkhorn River which can impact drinking water available for the Metropolitan Utilities District, Lincoln Water System and the Cities or Villages of Fremont, Valley, Waterloo, Yutan, Gretna, Louisville,

Ashland, South Bend and Papillion. The estimated population served by these water systems is approximately 790,000. The purpose of this project is to better understand and document the relationship between flows in the Platte and Elkhorn River and the hydraulic gradients created in the alluvial aquifer between them. Results from this real-time monitoring and evaluation may tell us if the reach of the Platte River between Fremont and the Elkhorn River confluence is a losing reach, and if so, how much and when will groundwater be recharged as increased flow in the Elkhorn River, see Figure 1 and 2. Obtaining these results will provide very important information for future conjunctive management projects wishing to increase flows in the Platte or Elkhorn River to meet municipal water needs or instream flow rights. Historic issues have arisen when flows in the Lower Platte River reached critical levels (less than 1,000 cfs) greatly reducing the ability of municipal wells and pumps to provide the required supply during times of peak demand and potentially affecting available water in the aquifer during long periods of drought. Such low flows have occurred 105 days during the past 27 years. If the relationship in the alluvial aquifer between these two rivers is not better understood through physical data and analysis, it may impact the effectiveness of future efforts to mitigate times of drought.

2. Meets the goals and objectives of an approved integrated management plan or ground water management plan;
 - Identify the specific plan that is being referenced including date, who issued it and whether it is an IMP or GW management plan.
 - Provide the history of work completed to achieve the goals of this plan.
 - List which goals and objectives of the management plan the project provides benefits for and how the project provides those benefits.

The Pappio-Missouri River NRD (P-MRNRD) has a Voluntary Integrated Management Plan dated August 2014, adopted by both the P-MRNRD Board of Directors and the Nebraska Department of Natural Resources (NDNR) in August 2014. The plan has only been in place for approximately one year, however, actions to meet the goals and objectives are underway. Goal 1 is to develop and implement water use policies and practices which better protect existing surface and groundwater uses while allowing for future development. The P-MRNRD and NDNR have adopted rules and regulations restricting the amount of groundwater and surface water development each year and the P-MRNRD is beginning the process of updating our existing Groundwater Management Plan (date March of 1994) to be more consistent with our V-IMP and create new groundwater sub-areas to more effectively manage the entire NRD. Goal 2 is to maintain a water supply and use inventory. The P-MRNRD is in the process of determining certified irrigated acres for the IMP area and will report municipal and other documented water uses for 2015. Goal 3 is to implement water use education programs to promote urban and rural water conservation. This is ongoing, but additional meetings are needed with public and stakeholders. Goal 4 is to work with upstream NRDs and help develop the Lower Platte River Basin Water Management Plan. This is also progressing with a draft of the plan expected early next year. This particular real-time surface and groundwater monitoring project will address objectives and action items that support Goals 1, 2 and 4 in our IMP by: (1) collecting and documenting water supply data, (2) evaluating aquifer properties and connectivity, (3) evaluating potential conjunctive management programs, and (4) coordinating with other entities in the Platte River Basin on water management activities. A voluntary integrated management plan for the Lower Platte North NRD is also now nearly complete with adoption anticipated before July 2016 and this project will support similar goals of that IMP. In addition to the V-IMP, the P-MRNRD has an adopted Groundwater Management Plan (GWMP), last revised in 1994. This project specifically helps carry out the objectives of the GWMP to maintain a static water

level monitoring program. The P-MRNRD has conducted a static groundwater level monitoring program since 1978. In addition, the P-MRNRD is just beginning the process to completely update its current GWMP over the next two years and the concurrent collection and interpretation of data from this project will help to establish measurable goals and targets for managing this large alluvial aquifer in the Platte and Elkhorn River Valley.

3. Contributes to water sustainability goals by increasing aquifer recharge, reducing aquifer depletion, or increasing streamflow;

List the following information that is applicable:

- The location, area and amount of recharge;
- The location, area and amount that aquifer depletion will be reduced;
- The reach, amount and timing of increased streamflow. Describe how the project will meet these objectives and what the source of the water is;
- Provide a detailed listing of cross basin benefits, if any.

This project will only study existing recharge or depletion, but may help identify new methods to recharge or retune flows between the Lower Platte and Elkhorn Rivers. The results and information from this project could help support any future Lower Platte, Central Platte, or Upper Platte River Basin projects intending to conjunctively manage river flows in order to meet minimum municipal drinking water needs or instream flow rights in the Lower Platte River.

4. Contributes to multiple water supply goals, including, but not limited to, flood control, agricultural use, municipal and industrial uses, recreational benefits, wildlife habitat, conservation of water resources, and preservation of water resources;

- List the goals the project provides benefits.
- Describe how the project will provide these benefits
- Provide a long range forecast of the expected benefits this project could have versus continuing on current path.

The results of this project will contribute to multiple water supply benefits including agricultural, municipal and industrial uses as well as the conservation of water resources. Groundwater level data from the study will document how much and how quickly water within the alluvial aquifer between the Platte and Elkhorn River responds to a range of flows in the rivers and local precipitation. Information on the direction and timing of groundwater level gradients will provide a baseline of data with which to calculate timing and quantity of groundwater movement and base flow to the rivers. These results will document the reliability and possible recharge for groundwater uses between the two rivers including agricultural irrigation, industrial uses such as Valmont, and the municipal supply for approximately 790,000 Nebraskans. Knowing how quickly water can be added to or taken away from the large alluvial aquifer in the Platte and Elkhorn River valley will also support the design of actions that may be taken to conserve water resources in order to increase supply at specific times during drought or to allow more beneficial uses over a longer period of time. Long term benefits may lead to conjunctive management projects that can retune water from the spring to the late summer

months or conserve water in the rivers during critical times by preventing it from recharging the aquifer.

5. Maximizes the beneficial use of Nebraska's water resources for the benefit of the state's residents;

- Describe how the project will maximize the increased beneficial use of Nebraska's water resources.
- Describe the beneficial uses that will be reduced, if any.
- Describe how the project provides a beneficial impact to the state's residents.

It is anticipated that information and analysis resulting from this project will improve future integrated management projects and efforts aimed at increasing the beneficial uses of the water resources available in the Lower Platte and Elkhorn River Valley. Domestic water supply is considered to have the highest preference in use under Nebraska Revised Statute 46-613 and it is vitally important that we are able to design safeguards in our water supply systems that can maintain water for basic human needs in times of shortage and drought. Through this project, no direct beneficial uses will be increased or decreased. This project will allow water resource managers and water users to predict how groundwater elevations and gradients will react between the Platte and Elkhorn River given varying streamflow conditions in each. This will result in a beneficial impact to the state's residents by allowing managers and users to anticipate flows lost or gained in each river reach and plan for projects or retimed streamflow.

6. Is cost-effective;

- List the estimated construction costs, O/M costs, land and water acquisition costs, alternative options, value of benefits gained.
- Compare these costs to other methods of achieving the same benefits.
- List the costs of the project.
- Describe how it is a cost effective project or alternative.

Estimated costs for the project, including equipment installation (construction cost) and all other monitoring, analysis, and documentation (study costs) are documented in the attached letter from USGS dated December 3, 2015, labeled as Exhibit 1. The total estimated cost is \$245,000, of which \$47,000 is equipment and construction and \$198,000 is for USGS monitoring, analysis, and reporting. No land rights will be required as part of this project, all access for water level monitoring or surveys will be done by temporary owner permissions. One of the primary purpose of this project is to produce actual physical, monitored data that can be used to develop theoretical relationships between surface water flow in the Platte and Elkhorn Rivers and the alluvial aquifer between them. No specific alternative exists for obtaining this monitored data. However, a comparison can be made for the analysis portion of this project in which a complex groundwater model could be used to simulate different determining the variations of groundwater level responses to river flows. A groundwater model similar in size to this project's study area was developed by USGS for the Lower Platte area around Ashland, but was not fully completed. The total cost of this model would have been approximately \$525,000 once completed (more than double the cost of this project). The results of this monitoring project will be based on actual monitored data and should provide further information for groundwater model calibration if needed in the future.

7. Helps the state meet its obligations under interstate compacts, decrees, or other state contracts or agreements or federal law;

- Identify the interstate compact, decree, state contract or agreement or federal law.
- Describe how the project will help the state meet its obligations under compacts, decrees, state contracts or agreements or federal law.
- Describe current deficiencies and document how the project will reduce deficiencies.

The results of this project will assist the State in managing water to meet its obligation under the instream flow appropriation permit granted to the Nebraska Game and Parks Commission for the central and lower Platte River on June 26, 1998 (with a instream flow priority date of November 30, 1993). Conclusions from this project should allow water managers to account for instream flow lost along the reach of the Platte River between Fremont and the Elkhorn River confluence, and conversely determine when and how much of the water lost is added back into the Elkhorn River. Understanding this retiming effect could help forecast or at least better understand the causes when instream flows are not met. The current deficiency is the lack of this data and analysis.

8. Reduces threats to property damage or protects critical infrastructure that consists of the physical assets, systems, and networks vital to the state or the United States such that their incapacitation would have a debilitating effect on public security or public health and safety;

- Identify the property that the project is intended to reduce threats to.
- Describe and quantify reductions in threats to critical infrastructure provided by the project and how the infrastructure is vital to Nebraska or the United States.
- Identify the potential value of cost savings resulting from completion of the project.
- Describe the benefits for public security, public health and safety.

Information resulting from this project will help reduce threats to critical infrastructure in the Platte and Elkhorn River Valley; primarily the municipal drinking wells which serve the Metropolitan Utilities District, Lincoln Water System and the Cities or Villages of Fremont, Valley, Waterloo, Yutan, Gretna, Louisville, Ashland, South Bend and Papillion. This data can help protect these drinking water supplies by allowing municipal systems to plan for and potentially operate with different strategies to better utilize the retiming of water to the Elkhorn River or deal with lower flows in the Platte River. The supply of drinking water to these systems is vital to the wellbeing and economy of the Lincoln and Omaha areas. Cost savings of potential municipal management strategies resulting from the completion of this project are unknown at this time.

9. Improves water quality;

- Describe what quality issue(s) is/are to be improved.

- Describe and quantify how the project improves water quality, what is the target area, what is the population or acreage receiving benefits, what is the usage of the water: residential, industrial, agriculture or recreational.
- Describe other possible solutions to remedy this issue.
- Describe the history of the water quality issue including previous attempts to remedy the problem and the results obtained.

The data and information resulting from this project has indirect benefits to water quality as the understanding of the surface water and groundwater interaction may be able to be used for future nitrate or other pollutant studies. Moderate to high nitrate levels (5 to 10 ppm) have been detected within this study area at various times during periodic groundwater quality sampling and testing between 1992 and 2013. Any future groundwater or surface water quality concerns would be able to utilize the results of this study to make informed estimates for pollutant travel path and time.

10. Has utilized all available funding resources of the local jurisdiction to support the program, project, or activity;

- Identify the local jurisdiction that supports the project.
- List current property tax levy, valuations, or other sources of revenue for the sponsoring entity.
- List other funding sources for the project.

The Papio-Missouri River NRD (P-MRNRD) is the sponsor for this project. The P-MRNRD's budget for July 1, 2015 to June 30, 2016 is \$71.8 million with a property tax levy of 0.038034 resulting in approximately \$22 million of local property taxes. Income from cash on hand (from general carry over and general obligation (GO) bonds) of approximately \$27.5 million and outside revenue from other grants and partners of \$22.3 million make up the difference between total budget and property tax revenue. Over 60% of the budget is dedicated to Flood Control and local Watershed Projects with nearly \$17 million of this coming from current cash on hand in the form of GO Bonds. Other ongoing P-MRNRD Programs and Projects which require the remaining available budget include rural water service, trails and recreation, conservation and erosion control, surface and groundwater quality, information and education, and forestry and wildlife. This proposed project is considered part of our surface and groundwater quality program and would be budgeted for P-MRNRD funding in the July 1, 2016 to June 30, 2017 budget year. The U.S. Geological Survey is proposed to be the contracting agency to carry out this project and would provide Cooperative Water Program funding of \$66,000, or approx. 27% of the \$245,000 total project cost. Other sources of funding include the NDNR INSIGHT Data Enhancement Program (IDEP) and local cost-share from the Lower Platte North Natural Resources District (LPNRNRD). The P-MRNRD has applied for IDEP funding in the amount of \$72,000 (~29.4%). Subtracting these federal and state funds from the \$245,000 project total, the 60% of eligible costs applied for in this application are \$64,200 (~26.2%), leaving \$42,800 for the P-MRNRD (~8.7%) and LPNRNRD (~8.7%) to split over the two year study. A summary of project costs over the two year study period and utilization of the proposed funding sources is presented in table format in Exhibit 4.

11. Has a local jurisdiction with plans in place that support sustainable water use;

- List the local jurisdiction and identify specific plans being referenced that are in place to support sustainable water use.
- Provide the history of work completed to achieve the goals of these plans.
- List which goals and objectives this project will provide benefits for and how this project supports or contributes to those plans.
- Describe and quantify how the project supports sustainable water use, what is the target area, what is the population or acreage receiving benefits, what is the usage of the water: residential, industrial, agriculture or recreational.
- List all stakeholders involved in project.
- Identify who benefits from this project.

The Pappio-Missouri River NRD has enacted Groundwater Management Program Rules and Regulations for the entire study area of this project which includes the hydrologically connected area between the Platte and Elkhorn Rivers. These rules and regulations specify an annual limit on the expansion of irrigated acres. Similarly, NDNR has adopted a limit on new surface water rights as part of the Voluntary Integrated Management Plan adopted in August of 2014. In addition to the V-IMP, the P-MRNRD has an adopted Groundwater Management Plan (GWMP), last revised in 1994. This project specifically helps carry out the objectives of the GWMP to maintain a static water level monitoring program. The P-MRNRD has conducted a static groundwater level monitoring program since 1978. In addition, the P-MRNRD is just beginning the process to completely update its current GWMP over the next two years and the concurrent collection and interpretation of data from this project will help to establish measurable goals and targets for managing this large alluvial aquifer. The results of this project will support sustainable water use by creating an understanding of how groundwater is connected between the Platte and Elkhorn Rivers, allowing better management of conjunctive water and drought mitigation in the future. For example, results may be able to tell us how quickly and how much water can be retimed between the two rivers or give us insight on how to use conjunctive management projects between the two rivers in order to manipulate groundwater gradients and keep more water in the river during specific times. The target area is shown as the Study Area in Figure 1, attached, and is generally described as the Lower Platte and Elkhorn River Valley between Fremont and the confluence. Benefits of the project will address the threat of low flows in the Lower Platte and Elkhorn River which can impact drinking water available for the Metropolitan Utilities District, Lincoln Water System and the Cities or Villages of Fremont, Valley, Waterloo, Yutan, Gretna, Louisville, Ashland, South Bend and Papillion. The estimated population served by these water systems is approximately 790,000. Industrial use and agricultural use is also benefited by this enhanced data including Valmont and roughly 16,000 irrigated acres of cropland. Stakeholders involved in the project will include many of those from the development of the V-IMP; including the Boards and staff of the P-MRNRD and LPNNRD, NDNR staff, MUD, LWS, Waterloo, Valley, Valmont, UNL, Fish and Wildlife Service, Nebraska Game and Parks Commission, agricultural producers and local residents. Beneficiaries from the results of the project will include all stakeholders.

12. Addresses a statewide problem or issue;

- List the issues or problems addressed by the project and why they should be considered statewide.
- Describe how the project will address each issue and/or problem.

- Describe the total number of people and/or total number of acres that would receive benefits.
- Identify the benefit, to the state, this project would provide.

The problem addressed by this project stems from discussions and questions raised during the ongoing development of the Lower Platte River Basin-wide Management Plan; in which, the seven NRD Coalition (Upper Loup, Lower Loup, Upper Elkhorn, Lower Elkhorn, Lower Platte North, Lower Platte South and P-MRNRD) has worked together to not only determine what to do with excess flow in the basin, but what to do during very low streamflow conditions in the Lower Platte River to meet the needs of public water supplies for over half of Nebraska's population and instream flow rights. Conjunctive water management ideas to store groundwater or surface water in upstream portions of the Basin have been preliminarily examined to retime excess water to meet these shortages. However, the Coalition then questioned how much of that water released into the river would actually make it to the lower reach of the Platte River and past the streamflow gage at Louisville. One particular area of interest for potential streamflow losses in the Platte River is between approximately Fremont and the confluence with the Elkhorn River. In this reach, the Platte River is topographically higher in elevation than the Elkhorn River, see Figure 2, and it has been shown in river bed and bank conductance studies, conducted on behalf of LPNNRD, that the Platte River loses flow to the alluvial aquifer. This leads to the hypothesis that flows lost in the Platte River eventually become increased base flows in the Elkhorn River, but how and when this occurs is completely unknown. Determining how this natural recharge and retiming system works may be a key component to retime or keep flow in the Platte and Elkhorn River during shortages. The estimated population which could benefit from available water during droughts is approximately 790,000. Industrial use and agricultural use is also benefited by this enhanced data including Valmont and roughly 16,000 irrigated acres of cropland. The State of Nebraska would realize benefits from the results of this study supporting their ongoing water data enhancement program and by gaining powerful information with which to better mitigate drought affects in Eastern Nebraska.

13. Contributes to the state's ability to leverage state dollars with local or federal government partners or other partners to maximize the use of its resources;

- List other funding sources or other partners, and the amount each will contribute, in a funding matrix.
- Describe how each source of funding is made available if the project is funded.
- Provide a copy or evidence of each commitment, for each separate source, of match dollars and funding partners.
- Describe how you will proceed if other funding sources do not come through.

The U.S. Geological Survey is proposed to be the contracting agency to carry out this project and would provide joint funding of \$66,000, or approx. 27% of the \$245,000 total project cost. A copy of the letter from USGS dated December 3, 2015 is attached as Exhibit 1. Other sources of funding may include the NDNR INSIGHT Data Enhancement Program (IDEP) and local cost-share from the Lower Platte North Natural Resources District (LPNNRD). The P-MRNRD has applied for IDEP funding in the amount of \$72,000 (~29.4%) and will be notified in January if this application was successful. Subtracting these federal and state funds from the \$245,000 project total, the 60% of eligible costs applied for in this application are \$64,200

(~26.2%), leaving \$42,800 for the P-MRNRD (~8.7%) and LPNNRD (~8.7%) to split over the two year study. A summary of project costs over the two year study period and utilization of the proposed funding sources is presented in table format in Exhibit 4. The P-MRNRD and LPNNRD will formalize an interlocal agreement through their respective Board of Directors once available grant funding is known. A support letter from LPNNRD is attached as Exhibit 3. The P-MRNRD would serve as the local sponsor for all grants and the local administrator, collecting all funds and paying USGS on a quarterly schedule based on work completed. If other state and federal funding is not available, the P-MRNRD would evaluate reducing the scope of the project or providing additional funding with a future application for Water Sustainability Funding.

14. Contributes to watershed health and function;

- Describe how the project will contribute to watershed health and function in detail and list all of the watersheds affected.

Results from the monitoring and investigations during this project may be able to provide information on the processes with which surface water in the Platte River may be transferred via groundwater and retimed to the Elkhorn River. Potential insights this may have to surface water quality is the filtering that can occur in the alluvial aquifer between the two rivers or potential residual contaminants which remain in the Platte River bed sediments during various levels of flow in the river. Results may also be beneficial to any future groundwater quality investigations knowing how and when groundwater gradients between the two rivers will react and where potential contaminants may be transported to. This analysis can be provided for future water quality evaluations. Instream flow rights on the Lower Platte River are in place to protect endangered species and meeting these requirements would enhance ecological health and function.

15. Uses objectives described in the annual report and plan of work for the state water planning and review process issued by the department.

- Identify the date of the Annual Report utilized.
- List any and all objectives of the Annual Report intended to be met by the project
- Explain how the project meets each objective.

This project meets the objectives under Data Acquisition in the Annual Report and Plan of Work for the Nebraska State Water Planning and Review Process dated September 2014. Specifically, data acquired and evaluated as part of this project will support NDNR's ongoing water planning under INSIGHT and the numerical groundwater modeling for the Lower Platte River and Missouri Tributaries. This project meets these objectives by providing real-time groundwater levels and synoptic water-level surveys and interpretation which may be used as calibration information for the groundwater modeling.

16. Federal Mandate Bonus. If you believe that your project is designed to meet the requirements of a federal mandate which furthers the goals of the WSF, then:

- Describe the federal mandate.
- Provide documentary evidence of the federal mandate.

- Describe how the project meets the requirements of the federal mandate.
- Describe the relationship between the federal mandate and how the project furthers the goals of water sustainability.

NA

Section D.

PROJECT DESCRIPTION

1. Overview

In 1,000 characters or less, provide a brief description of your project including the nature and purpose of the project and objectives of the project.

Discussions amongst the Lower Platte River Basin Coalition have focused on mitigating very low streamflow conditions in the Lower Platte River. Upstream of the confluence with the Elkhorn River, the Platte River is topographically higher in elevation than the Elkhorn River, see Figure 2, and this leads to the hypothesis that flows lost in the Platte River eventually become increased flows in the Elkhorn River. The purpose of this project is to obtain real-time monitoring of groundwater levels between the Platte River streamflow gage near Leshara and the Elkhorn River streamflow gage at Waterloo. It is anticipated that analysis of groundwater elevations and gradients between the two rivers can provide a predictable relationship for streamflow gains or losses based on river level and flow. The attached Figure 1 shows a map of the proposed area and the use of five real-time monitoring wells. Figure 1 also represents an overall study area in which water level surveys will be conducted during various times of the year to create groundwater contour maps. Also included in the project is a bed and bank conductance permeameter test in the Elkhorn River.

2. Project Tasks and Timeline

Identify what activities will be conducted by the project. For multiyear projects please list what activities are to be completed each year.

The proposed project will be conducted over a two year period. All the funding requested from this application will be utilized in year one. Year one activities will include the following work by USGS: the installation of one new monitoring well near the Platte River streamflow gage, purchase and installation of the real-time groundwater level recorders at the five wells, purchase and installation of telemetry equipment, record keeping and annual maintenance of equipment, two synoptic water level surveys and interpretation, field work for bed and bank conductance permeameter tests at several sites along the Elkhorn River, and documentation of year one results in water-level contour maps and an interpretive report. Funding from USGS, IDEP, LPNNRD and P-MRNRD will also be available in year one. Year two activities include much of the same except for the purchase and installation of equipment, and instead of field work for the bed and bank conductance, lab tests will be completed. Year two funding will be available from USGS, IDEP, LPNNRD and P-MRNRD. A summary of project costs over the two year study period and utilization of the proposed funding sources is presented in table format in Exhibit 4.

3. Partnerships

Identify the roles and responsibilities of agencies and groups involved in the proposed project regardless of whether each is an additional funding source. List

any other sources of funding that have been approached for project support and that have officially turned you down. Attach the rejection letter.

The P-MRNRD will serve as the local sponsor for all grants and the local administrator, collecting all funds and paying USGS on a quarterly schedule based on work completed. The U.S. Geological Survey is proposed to be the contracting agency to carry out this project and would provide joint funding of \$66,000, or approx. 27% of the \$245,000 total project cost. The LPNNRD will provide a portion of the local cost-share requirement and assist in completing technical review of the data and analysis completed by USGS. A letter documenting their support is attached as Exhibit 3. LPNNRD will also be providing use of their monitoring well on the west side of the Platte River and historic water level data in the study area. MUD is a non-funding partner, but has agreed to share historic water level data, even from continuous water level recorders in the area, and provide use of one of the five monitoring wells, which they currently own but does not have a continuous water level recorder. A letter documenting their support is attached as Exhibit 2. None of the other stakeholders, including municipalities or industries, have been requested to provide funding. However, while completing the synoptic water level readings in the study area, USGS will be in contact with multiple existing well owners, including existing industrial, irrigation, domestic, monitoring, or municipal supply wells, to obtain permission for water level readings to support contour mapping.

4. Other Sources of Funding

Identify the costs of the entire project, what costs each other source of funding will be applied to, and whether each of these other sources of funding is confirmed. If not, please identify those entities and list the date when confirmation is expected. Explain how you will implement the project if these sources are not obtained.

The U.S. Geological Survey is proposed to be the contracting agency to carry out this project and would provide joint funding of \$66,000, or approx. 27% of the \$245,000 total project cost. A copy of the letter from USGS dated December 3, 2015 is attached as Exhibit 1. Other sources of funding include the NDNR INSIGHT Data Enhancement Program (IDEP) and local cost-share from the Lower Platte North Natural Resources District (LPNNRD). The P-MRNRD has applied for IDEP funding in the amount of \$72,000 (~29.4%) and will be notified in January if this application was successful. Subtracting these federal and state funds from the \$245,000 project total, the 60% of eligible costs applied for in this application are \$64,200 (~26.2%), leaving \$42,800 for the P-MRNRD (~8.7%) and LPNNRD (~8.7%) to split over the two year study. A summary of project costs over the two year study period and utilization of the proposed funding sources is presented in table format in Exhibit 4. The P-MRNRD and LPNNRD will formalize an interlocal agreement through their respective Board of Directors once available grant funding is known. A support letter from LPNNRD is attached as Exhibit 3. The P-MRNRD would serve as the local sponsor for all grants and the local administrator, collecting all funds and paying USGS on a quarterly schedule based on work completed. If other state and federal funding is not available, the P-MRNRD would evaluate reducing the scope of the project or providing additional funding with a future application for Water Sustainability Funding.

5. Support/Opposition

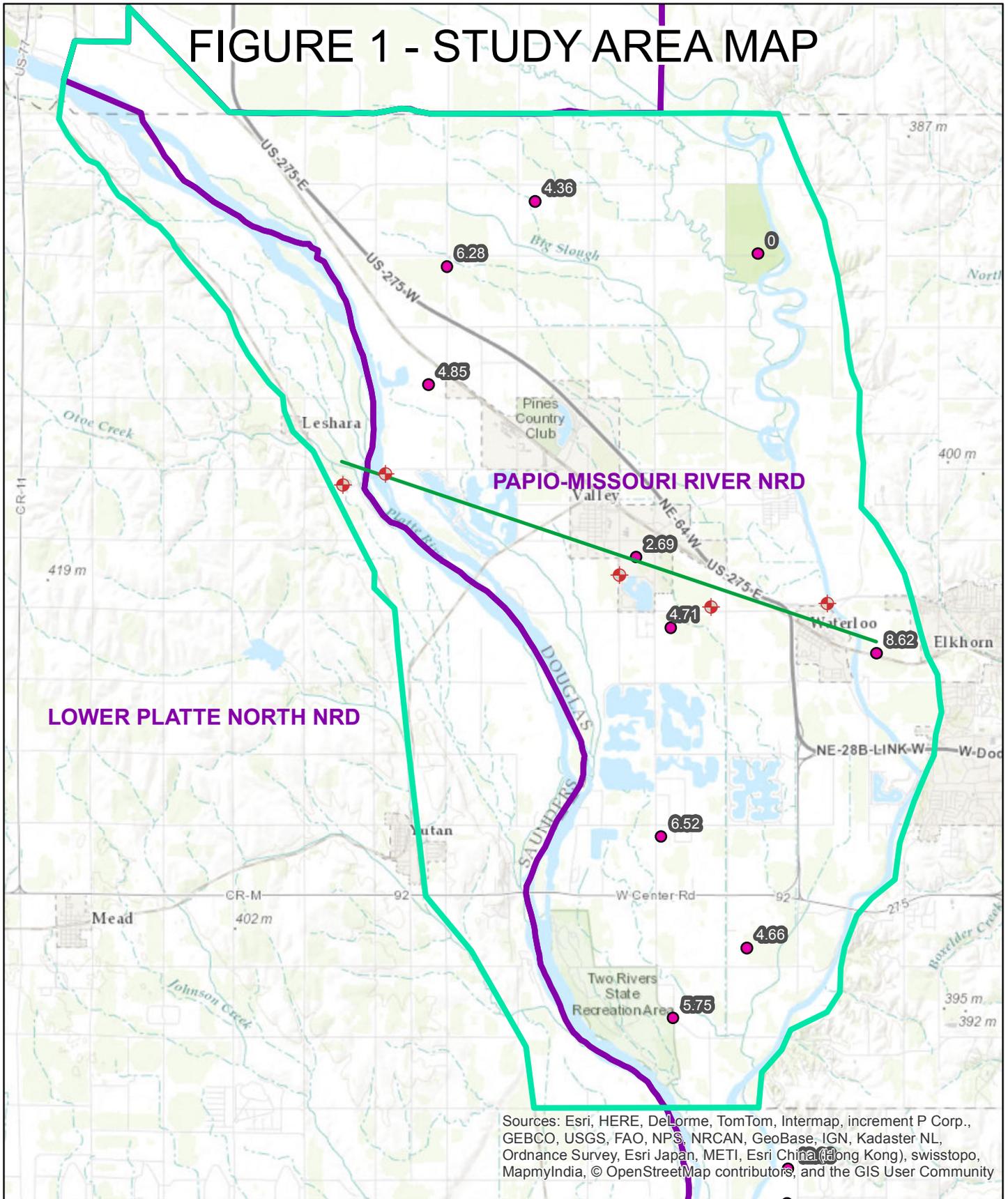
Discuss both support and opposition to the project, including the group or interest each represents.

A copy of the letter of support from USGS dated December 3, 2015 is attached as Exhibit 1. Support for the project is documented in enclosed letters from Metropolitan Utilities District and Lower Platte North NRD, attached as Exhibits 2 and 3 respectively. During planning for the project, the Homeowners Association at Ginger Cove along the Platte River was contacted as well and they are willing to provide the use of existing monitoring wells they have constructed for groundwater level measurements. No opposition to the project has been recorded at open meetings of the P-MRNRD or LPNDRD Board of Directors.

ATTACHMENTS

- 1) FIGURE 1 – STUDY AREA MAP**
- 2) FIGURE 2 – PLATTE RIVER TO ELKORN RIVER VALLEY INTEGRATED WATER MONITORING PROFILE VIEW**
- 3) EXHIBIT 1 – USGS SUPPORT LETTER AND TECHNICAL ATTACHMENT**
- 4) EXHIBIT 2 – MUD LETTER OF SUPPORT**
- 5) EXHIBIT 3 – LPNNRD LETTER OF SUPPORT**
- 6) EXHIBIT 4 – PROJECT COST AND FUNDING SUMMARY**

FIGURE 1 - STUDY AREA MAP



Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



-  Prop Real-Time Monitoring Wells
-  Approx Profile
-  Study_Area
-  GW_levels_Spring2015

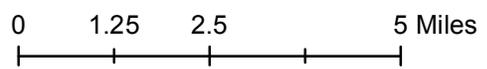
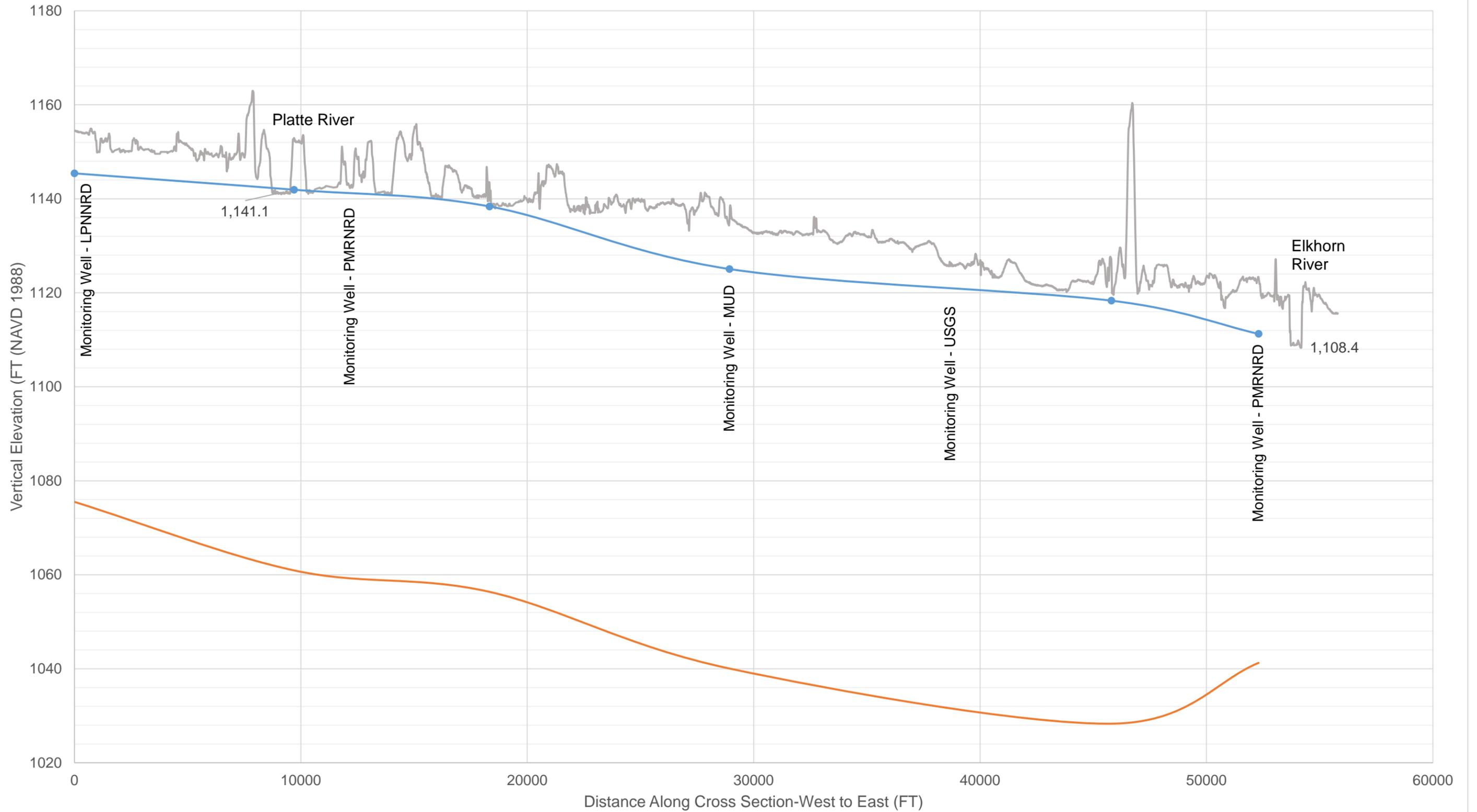


FIGURE 2. Platte River to Elkhorn River Valley Integrated Water Monitoring Profile View



— Approx Ground Elev ●— Approx Water Table — Approx Quaternary Base

EXHIBIT 1



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

December 3, 2015

Mr. Jeff Fassett and members of the Nebraska Natural Resources Commission
Nebraska Department of Natural Resources
700 South 16th St.
PO Box 94913
Lincoln, NE 68509-4913

Dear Mr. Fassett and members of the Nebraska Natural Resources Commission,

On behalf of the U.S. Geological Survey (USGS) Nebraska Water Science Center (NEWSC), we appreciate how the Nebraska Department of Natural Resources has significantly enhanced water management and water-resources monitoring across the state.

The protection of sustainable groundwater and surface-water resources for eastern Nebraska communities, businesses, and environmental needs is a high priority for the Pappio-Missouri River Natural Resources District (PMRNRD). The USGS NEWSC has partnered with the PMRNRD for many years on a number of projects collecting and interpreting water-resources data. The PMRNRD and the USGS NEWSC wish to collaborate on a study of groundwater/surface-water interaction between the Platte and Elkhorn rivers in western Douglas County, Nebr. The lower Platte River near the confluence of the Elkhorn River is an important stream reach that provides drinking water supplies to Lincoln and portions of Omaha and provides critical habitat for threatened and endangered species.

The funds requested in this grant will cover a portion of the cost to drill and instrument one monitoring well near the Platte River near Leshara stream gage and to instrument three monitoring wells with water-level recorders, data loggers, and satellite telemetry. The requested funds will also support two synoptic water-level surveys and a reconnaissance permeameter survey of the project area (budget and equipment summary attached). The USGS NEWSC has the ability, through its Cooperative Matching Funds Program, to match funds with State and local cooperators for water resources investigations that advance water-science information that is in the national interest. The PMRNRD in cooperation with the USGS is proposing a \$245,000 project of which the USGS NEWSC will provide \$66,000 to match. The additional information gathered from this project will provide a greater understanding on the timing and processes of groundwater recharge and discharge along critical reaches of the lower Platte River.

Sincerely,

Robert B. Swanson

Director, USGS Nebraska Water Science Center

EXHIBIT 1

U.S. Geological Survey Equipment and Budget Summary

A water-level recording pressure transducer will be placed inside of the three existing wells to measure the groundwater level and groundwater temperature every 15 minutes. The transducer will be wired to a data collection platform (DCP) that will record the measured data internally and transmit the data using satellite telemetry on a real-time basis. All recorded data will be publicly available through the World Wide Web on the USGS National Water Information System (<http://waterdata.usgs.gov/ne/nwis/>) webpage. The DCP will be housed in a steel enclosure placed over or near the monitoring well. The approximate cost for the pressure transducer, DCP, and other miscellaneous equipment (solar panel, voltage regulator, etc) to instrument the three wells will cost approximately \$15,000. Construction materials and labor costs for equipment installation will cost approximately \$10,000. Both estimates are based on actual costs from previous water-level monitoring projects.

A shallow monitoring well is proposed near the Platte River near Leshara USGS stream gage. The monitoring well will be constructed from 2.5 inch diameter polyvinyl-chloride (PVC) flush-threaded pipe and completed with a concrete pad and a locking protective cover. All construction specifications will be completed to State of Nebraska standards and the work will be performed by a licensed contractor. The contractor will be selected based from a competitive bidding process initiated by the Papio-Missouri River Natural Resources District. The estimated cost listed in the budget was based on the cost of the monitoring well drilled near the Elkhorn River at Waterloo USGS stream gage and recent drilling work with other contractors. As with other monitoring wells instrumented with this project, a water-level recording pressure transducer will be placed inside the monitoring well. Since the monitoring well will be in close proximity to the existing USGS stream gage, the pressure transducer will be wired to the DCP already in place at the USGS stream gage. A water temperature sensor will be placed in the river and will record stream water temperature data at 15-minute intervals. Collecting groundwater temperature and stream water temperature simultaneously will provide additional information to support groundwater/surface-water interaction interpretations. The cost for the pressure transducer and the water temperature sensor will be approximately \$2,000. Construction materials and labor costs for equipment installation will cost approximately \$1,000. This estimate is based on previous actual costs from previous groundwater/surface-water interaction projects.

Elevations for all instrumented wells will be established with a survey-grade Global Navigation Satellite System (GNSS) using the methods outlined in Rylund and Densmore (2012). The basic procedure will involve installing a stable benchmark cap in the concrete pad of the well and setting up a GNSS single stationary receiver (known as a base station) to collect satellite information for a minimum of four hours. After post-processing with the online positioning user system (OPUS) an elevation can be established with a standard error of less than 1 centimeter. The cost associated with this portion of the project is included in the equipment installation and labor costs given above.

Discreet water levels will also be measured as part of the synoptic water-level portion of this project. To create water-level contour maps that can be used to determine groundwater flow directions, all groundwater-level data will need to be tied to the same elevation datum. Elevations of each well can be surveyed by setting up a base station over an established benchmark. The base station provides a real-time differential correction from signals received at the base and applied to those signals received by a mobile unit (known as a rover) by way of radio as each well is surveyed in. This type of surveying is known as a real-time kinematic global positioning survey (RTK GPS). An elevation within 5 cm can be established in a few minutes at each well using this technique. The cost associated with this portion of the data collection is included in the synoptic water-level survey budget item.

A reconnaissance study to assess and quantify the degree of groundwater/surface-water interaction along the lower Elkhorn and Platte rivers will also be completed as part of this project. Understanding the variability of hydraulic conductivity and the potential presence of fine-grained restrictive layers within the shallow streambed is critical to understanding the groundwater/surface-water relationships within the study area. A permeameter will be used to estimate the vertical hydraulic conductivity of the shallow streambed sediments. A permeameter is a piece of cylindrical pipe driven into the streambed. Water is poured into the pipe to a known distance above the stream water line and allowed to settle. Water-level and time are recorded through the duration of the test. Based on these data the hydraulic conductivity of the streambed sediments can be calculated. Depending on site

EXHIBIT 1

conditions, other techniques may be used, such as those outlined in Rosenberry and LaBaugh (2008) or Rus and others (2001) to provide permeability estimates. All equipment needed for this part of the project is currently owned by the USGS Nebraska Water Science Center. The cost of field supplies will total approximately \$4,000. Labor costs for data collection and interpretation make up the remainder of the total for the reconnaissance permeameter study budget item.

References

Rosenberry, D.O., and LaBaugh, J.W., 2008, Field techniques for estimating water fluxes between surface water and ground water: U.S. Geological Survey Techniques and Methods 4-D2, 128 p.

Rus, D.L, McGuire, V.L., Zurbuchen, B.R., and Zlotnik, V.A., 2001, Vertical profiles in streambed hydraulic conductivity determined using slug tests in central and western Nebraska: U.S. Geological Survey Water Resources Investigations Report 2001-4212, 32 p.

Rydlund, P.H., Jr., and Densmore, B.K., 2012, Methods of practice and guidelines for using survey-grade global navigation satellite systems (GNSS) to establish vertical datum in the United States Geological Survey: U.S. Geological Survey Techniques and Methods, book 11, chap. D1, 102 p. with appendixes.

December 3, 2015

Mr. Paul W. Woodward, PE, CFM
Ground Water Management Engineer
Papio- Missouri NRD
8901 South 154th Street
Omaha, NE 68138-3621

RE: Letter of Support for the Platte and Elkhorn River Valley Integrated Water Monitoring Project

Mr. Woodward:

On behalf of the Metropolitan Utilities District of Omaha (MUD), I submit this letter of support for the Platte and Elkhorn River Valley Integrated Water Monitoring Project. MUD, like the funding partners of this Project, share a desire to increase our understanding of the groundwater/surface water interaction in the Platte and Elkhorn valley and we strongly support this Project.

Although MUD would be a non-“direct” funding partner in this Project, MUD will make “indirect” contributions to the Project by making available to the NRD and its partners any existing monitoring well that it owns along with any existing historical groundwater data. I will also note that MUD has participated in the funding of several gaging stations within the lower Platte River and Loup River basins. This includes the Leshara Gage which has been jointly funded by MUD, USGS, and the City of Lincoln since 2009.

Again, MUD strongly supports the Project and extends its appreciation to the Papio-MO NRD, the Lower Platte North NRD, and USGS for development of this project proposal. If you have any questions please feel free to contact me.

Sincerely,



Kevin P. Tobin, PE

Plant Manager, Platte West Water Treatment Facility



Lower Platte North Natural Resources District

PO Box 126 511 Commercial Park Road Wahoo, NE 68066
402.443.4675 Fax 402.443.5339 Toll-free 888.764.0543
lpnrd@lpnrd.org www.lpnrd.org

December 29, 2015

Kent Zimmerman
Nebraska Department of Natural Resources
301 Centennial Mall South, 4th Floor
Lincoln, NE 68509-4676

RE: Water Sustainability Fund – P-MRNRD Application

Dear Kent,

Please accept this letter of support for the Papio-Missouri River NRD's Application to the Water Sustainability Fund for improved data collection efforts.

We have long followed Platte River stream gages and have been puzzled by the large losses of surface water between the North Bend and Ashland gages. Occasionally, as we saw this fall the trend reversed for four to six weeks when we saw abnormal increases between the North Bend and Ashland gages.

We feel understanding why this occurs and where the water is going is important and very good use of WSF funds. We support the application made by P-MRNRD and by board motion have pledged to financially support this project if funded.

Thank you for the opportunity to apply for funding to assist us with keeping our water supply and needs in balance.

Sincerely,

John R. Miyoshi
General Manager

cc: Paul Woodward – P-MRNRD



EXHIBIT 4 – PROJECT COST AND FUNDING SUMMARY

TABLE 1 – PROPOSED PROJECT COST

Budgeted Activity	Year 1	Year 2	TOTAL
Installation of real-time recorders and record-working	\$58,000	\$30,000	\$88,000
Synoptic water-level survey and interpretation	\$30,000	\$23,000	\$53,000
Reconnaissance permeameter study	\$30,000	\$19,000	\$49,000
Water-level mapping and interpretive report	\$25,000	\$30,000	\$55,000
TOTAL	\$143,000	\$102,000	\$245,000

TABLE 2 – PROPOSED PROJECT FUNDING

Agency	Year 1 Funding	Year 2 Funding	TOTAL
USGS	\$21,400	\$44,600	\$66,000
NDNR IDEP	\$36,000	\$36,000	\$72,000
WSF	\$64,200	\$0	\$64,200
LPNNRD	\$10,700	\$10,700	\$21,700
P-MRNRD	\$10,700	\$10,700	\$21,700
TOTAL	\$143,000	\$102,000	\$245,000