Environment and Natural Resources Trust Fund
2020 Request for Proposals (RFP)

Project Title: **ENRTF ID: 108-B**

Vermillion River Surface Water and Groundwater Nitrate Impacts

Category: B. Water Resources

Sub-Category:

Total Project Budget: $ 268,000

Proposed Project Time Period for the Funding Requested: June 30, 2022 (2 yrs)

Summary:

Identify ways to improve surface water and groundwater quality along the Vermillion River by developing better understanding of surface water-groundwater interaction; and identifying significant sources contributing nitrate to the subwatershed

Name: Valerie Grover

Sponsoring Organization: Dakota County

Job Title: Dakota County Groundwater Protection Supervisor

Department: Environmental Resources Department

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Web Address:

Location:

Region: Southeast

County Name: Dakota

City / Township:

Alternate Text for Visual:

Vermillion River Surface Water and Groundwater Study Areas

_____ Funding Priorities	_____ Multiple Benefits	_____ Outcomes	_____ Knowledge Base
_____ Extent of Impact	_____ Innovation	_____ Scientific/Tech Basis	_____ Urgency
_____ Capacity Readiness	_____ Leverage	_____ TOTAL	_____%

PROJECT TITLE: Evaluating Groundwater – Surface Water Interaction and Impact of Nitrate Contamination Contributing to the Vermillion River

I. PROJECT STATEMENT

The Vermillion River is a well-known and well-studied river that flows from Scott County through the center of Dakota County to the Mississippi River. Significant sections of the western river are designated as trout stream because it is largely fed by groundwater. Uniquely, the eastern portion of the river contributes back to groundwater in and around the City of Hastings. Surface water quality is threatened by increasing levels of nitrate that are a concern to both aquatic organism health and the drinking water supply. Groundwater is the primary source of drinking water for residents and the surface water is potentially impacting municipal and private well drinking water supplies in the area. Specifically, Dakota County monitoring indicates that the South Branch sub-watershed appears to be a major contributor to rising nitrate levels. The drinking water standard for nitrate is 10 mg/L and nitrate levels in the Hasting's public wells recently measured a maximum concentration of 8.2 mg/L. In addition, private well sampling completed by the County and the Minnesota Department of Agriculture (MDA) shows nitrate levels in the area are well above the drinking water standard.

This project will focus on addressing two concerns in order to identify and prioritize targeted efforts to improve surface water and groundwater quality along the Vermillion River, and address the serious problem of nitrate contamination: (1) Develop a better understanding of the Vermillion River surface water impacts to the groundwater; and (2) Identify significant sources contributing nitrate to the South Branch Vermillion River subwatershed. This project supports the County's goal to achieve **sufficient and sustainable high quality water resources and water supplies**; and supports Vermillion River Watershed Management Plan goals.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Determine surface water impacts to the groundwater **Budget: $ 170,000**

The Hastings Drinking Water Supply Management Area (DWSMA) is the largest DWSMA in the state (close to 60,000 acres), with the majority of the area falling outside the city limits. It encompasses the Vermillion River South Branch subwatershed. Based on the proposed state Groundwater Protection Rule (Rule 1573), the Hastings DWSMA would fall under Mitigation Level 2 due to its high nitrate concentrations (greater than 8 mg/L). The City of Hastings currently has six municipal wells, and the City of Vermillion has two municipal wells that are potentially impacted by surface water quality, in addition to the hundred plus private wells located in the area. Therefore, it's important to better understand the surface water – groundwater interaction and the impact the Vermillion River has on the groundwater and the drinking water supply quality. This will be completed by developing a detailed surface water – groundwater flow model using current hydrogeological data and real-time field data to better define and quantify the impact to groundwater quality. A field monitoring program will be implemented to validate the groundwater model. Development of the model will result in a better understanding of the nitrate fate and transport from surface water to groundwater in the municipal wells and private drinking water wells. Determining the source of nitrates in the groundwater will help the MDA, Minnesota Department of Health (MDH), Dakota County, and the City of Hastings determine where to focus efforts to reduce nitrate contamination.

Outcome	Completion Date
1. Detailed Groundwater Flow Model that will determine surface water impact to groundwater, and quantify nitrate contribution from the Vermillion River.	June 30, 2021

Activity 2: Identify significant nitrate sources in the South Branch subwatershed **Budget: $98,000**

Surface water sampling indicates that the South Branch subwatershed is significantly impacted by nitrates, but does not exceed the state standard of 10 mg/L. The South Branch subwatershed is characterized by agricultural land use, course-textured soils, and a high water table. Due to the high water table, agricultural lands are generally drained through tile line outlets and ditches in order to lower the water table and make agricultural production more viable. This study will help determine why nitrate concentrations are increasing in the subwatershed, which could be a result of several factors: increase in drain tiling and/or ditches, increases or changes in agricultural uses, or inadequate nutrient management. The study will help identify and prioritize areas where targeted efforts can protect and improve water quality, as well as wildlife and aquatic habitat. It will also help the MDA focus Best Management Practices or Alternate Management Tools for better implementation of the Nitrogen Fertilizer Management Plan and the proposed Groundwater Protection Rule. Project scope may include identification of existing drain tile, classification of agricultural land use, and sampling artificial drainage areas and surface water within the entire South Branch subwatershed in order to determine source contribution.

Outcome	Completion Date
1. Identification of significant sources of nitrates from point and non-point sources by geographic areas within the subwatershed.	June 30, 2022

III. PROJECT PARTNERS AND COLLABORATORS:

This project was developed in coordination with, and complementary to, a "sister" project that will be submitted by the St. Croix Watershed Research Station. ***Neither of these projects is dependent on the other; however, each will be enhanced by the other.*** This project was also developed in collaboration with the MDA, MDH, Vermillion River Watershed Joint Powers Organization (VRWJPO), and the City of Hastings. The VRWJPO has contributed funds or in-kind services on similar past projects and is likely to continue its support during this project phase. The Dakota County Soil and Water Conservation District (SWCD) is also a critical partner in providing outreach and technical assistance since they currently conduct surface water sampling for the VRWJPO.

IV. LONG-TERM IMPLEMENTATION AND FUNDING:

The combined outcomes of Activities 1 and 2 will result in a model that estimates changes in nitrate concentrations in surface water and groundwater, based on different land management scenarios. More detailed implementation plans will be developed based on project findings, which will be used to recommend strategies to reduce nitrate in surface water and groundwater, and improve aquatic habitat. Costs for future projects cannot be estimated until this phase is completed, but this initial funding could leverage millions for future investments. Reducing nitrate concentrations in the drinking water supply will not only minimize health impacts to Dakota County residents, but will also help reduce the costs associated with municipal and private well water treatment.

V. SEE ADDITIONAL PROPOSAL COMPONENTS:

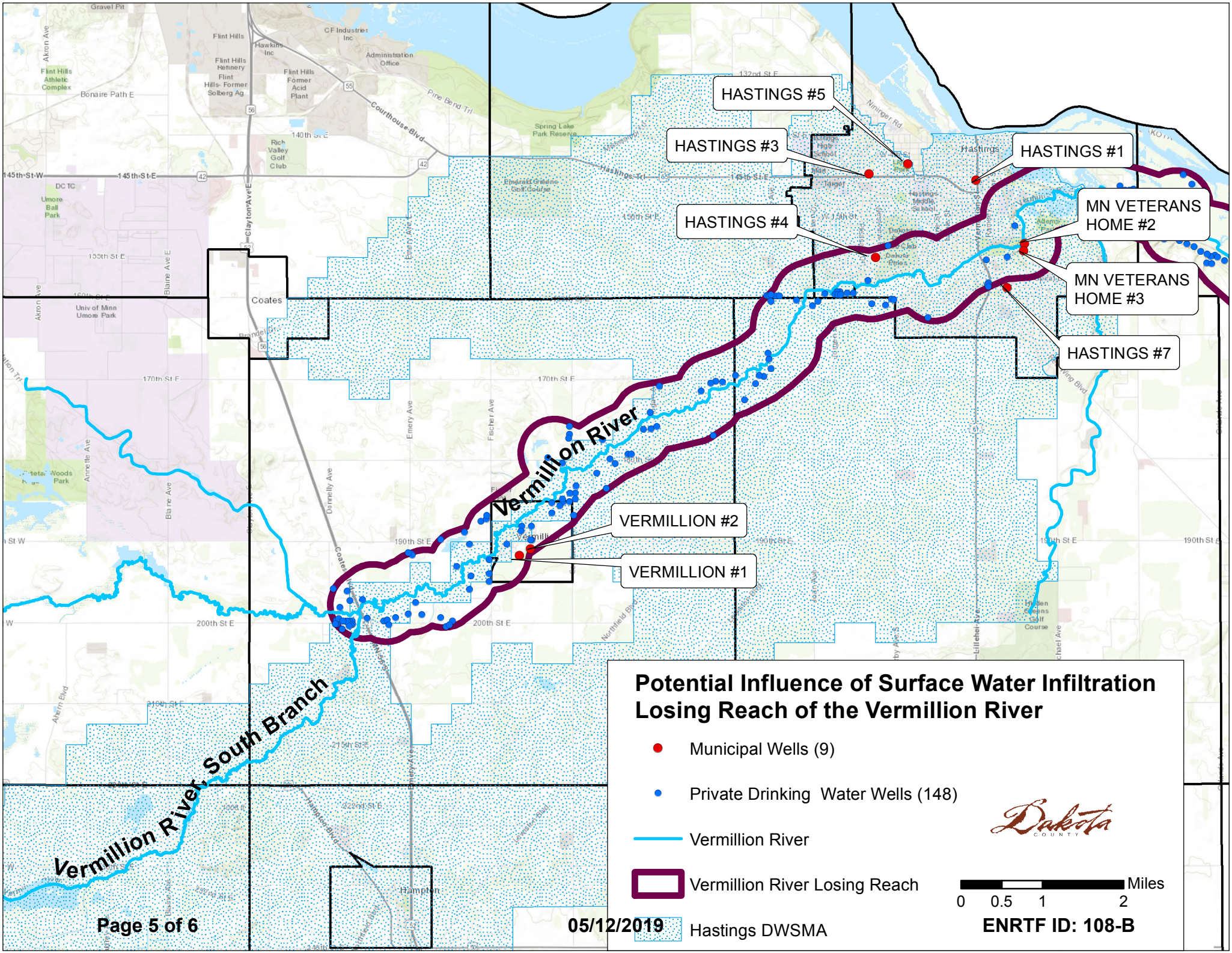
A. Proposal Budget Spreadsheet
B. Visual Component or Map
C. Project Manager Qualifications and Organization Description
D. Letter or Resolution

Attachment A: Project Budget Spreadsheet
Environment and Natural Resources Trust Fund
M.L. 2020 Budget Spreadsheet
Legal Citation:
Project Manager: Valerie Grover
Project Title: Evaluating Groundwater – Surface Water Interaction and Impact of Nitrate Contamination Contributing to the Vermillion River
Organization: Dakota County, Environmental Resource Department
Project Budget: $268,000
Project Length and Completion Date: 2-years, June 2022
Today's Date: 4/12/2019

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Budget	Amount Spent	Balance
BUDGET ITEM			
Personnel (Wages and Benefits)			
County staff labor hours to install 6 continuous nitrate loggers and conduct quarterly maintenance (assume 1 Intern at $20/hour)	$ 2,000	$ -	$ -
County Staff labor hours to install 2 weather stations along river to monitor rain fall, and conduct quarterly checks/maintenance (assume 1 Intern at $20/hour)	$ 1,000	$ -	$ -
Professional/Technical/Service Contracts			
TBD based on Request for Proposal (RFP)	N/A	$ -	$ -
Equipment/Tools/Supplies			
6 continuous nitrate loggers	$ 8,000	$ -	$ -
2 weather stations along river to monitor rain fall (to determine water flux)	$ 2,000	$ -	$ -
Sampling equipment and materials (well sampling pump)	$ 1,000	$ -	$ -
Capital Expenditures Over $5,000			
None Identified	N/A	$ -	$ -
Fee Title Acquisition			
Not Applicable	N/A	$ -	$ -
Easement Acquisition			
Not Applicable	N/A	$ -	$ -
Professional Services for Acquisition			
Contractor will be sought with technical expertise in hydrogeology, groundwater modeling, and surface water and groundwater sampling. Contractor will be selected through a RFP, competitive bid process. Contractor will develop a detailed groundwater flow model for the Vermillion River. This includes a nitrate fate and transport simulation model from the surface water source to the drinking water wells.	$ 120,000	$ -	$ -
Either the same contractor developing the groundwater model, Dakota County Soil and Water Conservation District (SWCD), or County Staff will complete the following field monitoring program to validate/calibrate the model. Estimated tasks include the following: (a) 10, 12-hr flow monitoring test; (b) 25 Surface water samples, 75 groundwater samples (sampling for nitrate-nitrite, cations/anions, sulfate, sodium, chloride, bromide, etc.); (c) Installation of 4 monitoring wells	$ 36,000		
The following work is anticipated to be contracted with the Dakota County SWCD. Estimated tasks include: (a) Identification of drain tile, ditches, and other artificial drainage systems entering the South Branch Vermillion River subwatershed using remote surveying/ sensing technology, eyes-on visual identification, or through land owner interviews. (estimated 80 hrs at $80/hr) (b) Classification of agricultural land uses within the South Branch watershed using remote surveying technology, record research, or through land owner interviews. (estimated 80 hrs at $80/hr) (c) Landowner outreach, to include coordinating access to private lands for sampling efforts, possible surveys regarding land use/crop rotations and location of drain tiles (estimate 38 hrs at $80/hr) (d) Complete representative sampling of artificial drainage areas (drain tiles, ditches, etc.) to determine estimated nitrate contribution. Assume 5 routine samples and 5 runoff samples at 30 locations, per year for 2 year monitoring period. *Note, the number of samples and locations will be dependent upon areas identified in previous steps.* (e) Collect estimated, per year for 2 year monitoring period: 10, 12-hr flow monitoring test; 15 routine nitrate-nitrite surface water samples at 10 locations; 5 runoff samples at 10 locations Cost is inclusive of professional labor, material costs for equipment calibration, sample collection, data entry, analysis, and reporting for 2 years of monitoring.	$ 98,000	$ -	$ -
Other			
None Identified	N/A	$ -	$ -
COLUMN TOTAL	$ 268,000	$ -	$ -

SOURCE AND USE OF OTHER FUNDS CONTRIBUTED TO THE PROJECT	Status (secured or pending)	Budget	Spent	Balance
Non-State:		$ -	$ -	$ -
Dakota County Environmental Resource Department	Pending	$ 40,000		
State: TBD		$ -	$ -	$ -
In kind:		$ -	$ -	$ -
Dakota County Soil and Water Conservation District (SWCD)	Confirmed	$ 3,000		

Other ENRTF APPROPRIATIONS AWARDED IN THE LAST SIX YEARS	Amount legally obligated but not yet spent	Budget	Spent	Balance
None		$ -	$ -	$ -


HASTINGS #5
HASTINGS #3
HASTINGS #1
HASTINGS #4
MN VETERANS HOME #2
MN VETERANS HOME #3
HASTINGS #7
Vermillion River
VERMILLION #2
VERMILLION #1
Vermillion River, South Branch
Coates
Hampton
Potential Influence of Surface Water Infiltration
Losing Reach of the Vermillion River
Municipal Wells (9)
Private Drinking Water Wells (148)
Vermillion River
Vermillion River Losing Reach
Hastings DWSMA
Dakota COUNTY
Miles
0 0.5 1 2
ENRTF ID: 108-B
05/12/2019

Project Manager Qualifications for Valerie Grover

2003 to 2008 Environmental Science Officer, U.S. Army

- Planned and managed multiple environmental engineering projects for the U.S. Army Public Health Command in support of 20 military installations located throughout Europe, California, New Mexico, Alaska, Colorado, Utah, Oregon, Iowa, Kansas, and Washington State.
- Managed a three person team responsible for the completion of environmental assessments for over 30 forward operating bases in Iraq, and provided support on a variety of environmental and occupation health concerns.
- Coordinated and managed five major company projects for the Ramadi Level II Medical facility which resulted in the construction of additional medical buildings, improved safety through proper emergency ingress and egress lighting, laundry support, and an operational medical waste disposal program.

2011 to 2018 Environmental Analyst and Project Manager, CALIBRE

- Project Manager for an eight person team, $1.3M per year project assisting the Air Force Civil Engineer Center (AFCEC) with program management and acquisition consulting on a variety of environmental restoration programs. Provided AFCEC post award management support for 47 performance based remediation (PBR) contracts worth over $1.3B.
- Project Manager for a one person team, $100,000 per year project with the U.S. Navy Mare Island, Base Realignment and Closure (BRAC) early closure of environmental liabilities.

2018 to Present Groundwater Protection Supervisor, Dakota County

- Supervise and manage five personnel and the expenditure of approximately $700,000 per year.
- Project Manager for 2019 Dakota County Groundwater Plan update that will provide strategic direction for the County's involvement in groundwater issues over the next ten years.

Organizational Description

Dakota County is Local Government Unit bordered by the Minnesota, Mississippi and Cannon Rivers with almost the entire Vermillion River located within in its boundaries. Nearly 400,000 people live in the county that that is comprised of 14 fully developed and rapidly developing suburbs; six small, rural towns; and 13 mostly rural townships.