



Environment and Natural Resources Trust Fund (ENRTF)

M.L. 2020 ENRTF Work Plan (Main Document)

Today's Date: 2-18-20

Date of Next Status Update Report: April 1, 2021

Date of Work Plan Approval:

Project Completion Date: June 30, 2023

Does this submission include an amendment request? __

PROJECT TITLE: Quantifying A New Urban Precipitation/Water Reality

Project Manager: Joe Wagner

Organization: University of Minnesota

College, Department, or Division: Bioproducts and Biosystems Engineering

Mailing Address: 1390 Eckles Ave

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Project Manager Direct Telephone Number: 612-626-0875

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Location: Minneapolis

Total Project Budget: \$500,000

Amount Spent: \$0

Balance: \$500,000

Legal Citation: M.L. 2020, Chp. xx, Sec. xx, Subd. xx

Appropriation Language:

PROJECT STATEMENT: In recent years the Twin Cities Metro Area (TCMA) has been experiencing significant extremes in meteorological and hydrological events. One issue that has arisen recently has been the phenomenon of high-water tables leading to damaging of home basements and buried infrastructure in the Lake Nokomis Area. High water tables can probably be attributed to significantly more precipitation than has occurred in the previous hundred years and a greater amount of impervious surface. Infrastructure, including water lines, sewer lines, and private residences, were built during a period of relatively dry conditions compared to the current climatic conditions. In response to the higher precipitation and resulting surface runoff, most municipalities have begun adopting stormwater best management practices that not only reduce downstream flooding but also reduce negative water quality impacts. The application of these practices also may be causing higher water tables resulting in damage to above ground and underground infrastructures, including basements, roadways, and pipelines. To address this issue, it is necessary to better understand the pathways of groundwater recharge at varying scales within the TCMA.

II. OVERALL PROJECT STATUS UPDATES:

First Update April 1, 2021

Second Update October 1, 2021

Third Update April 1, 2022

Fourth Update October 1, 2022

Fifth Update April 1, 2023

Final Report between project end (June 30) and August 15, 2023

III. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1 Title: Define geologic system

Description: Quantify geologic and hydrogeologic features and constraints that influence groundwater elevation including perched conditions in the Lake Nokomis area. Provide up-to-date information on the distribution and hydraulic properties of geologic materials from land surface to bedrock. Provide information on the physical container(s) for water and subsurface infrastructure. MGS will lead and be assisted by USGS.

ACTIVITY 1 ENRTF BUDGET: \$71,183

Outcome	Completion Date
1. Geologic datasets (maps and databases) of near-surface, unconsolidated and bedrock topography/geology compiled from recent or updated County Geologic Atlases in the Hennepin County (2018).	<i>September 2021</i>
2. Hydraulic properties of geologic materials – ranges of horizontal and vertical hydraulic conductivities compiled from existing data in the Lake Nokomis area	<i>December 2022</i>
3.	

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ACTIVITY 2 Title: Data collection, modeling and final report

Description: To protect and preserve future water resources, investigate reasons for high-water-levels in the Lake Nokomis area in context with surrounding Hennepin County systems using geoprobe technology (USGS will lead with UMN assistance). Provide detailed evaluations of groundwater and surface water interactions and establish relations between precipitation and groundwater and surface water interactions in the Lake Nokomis area using water-quality metrics, geochemical and stable isotope samples (end-member mixing analysis). Evaluate the effects of urban hydrologic management on lake and groundwater-level responses to precipitation. These evaluations will be conducted using conventional hydrogeologic analysis techniques as well as applying groundwater flow (MODFLOW and or Metro Model, USGS will lead) and hydrologic water balance models that include the detailed processes of infiltration and evapotranspiration, as well as snowmelt and soil freezing. Dr. Nieber will use HYDRUS 3-D and/or COMSOL-MP to model water movement.

ACTIVITY 1 ENRTF BUDGET: \$428,817 (also \$129,273 match from USGS)

Outcome	Completion Date
1. Define data collect methods and locations and place equipment, collect data and manage data.	<i>May 2021</i>
2. Water-level datasets (maps and databases) of upper-most water table in the selected areas. Map would include polygons showing where Platteville Formation, Decorah Shale, peat deposits are present and other geologic features	<i>December 2022</i>
3. Maps showing locations of stormwater connections, infiltration basins, rain gardens and stormwater detention ponds at selected study sites and a report documenting performance and unattended consequences.	<i>June 2023</i>

IV. DISSEMINATION:

Description: A Minnehaha Creek Watershed District (MCWD) funded White Paper will be the starting point for stakeholder communicate in 2020. A peer reviewed journal publication will be produced (end of 2023), and presentations will be given at the Water Resources Conference and other key Minnesota events. Data will be shared with DNR, Hennepin County, City of Minneapolis, Minneapolis Park and Recreation Board and MCWD (AKA, Lake Nokomis technical advisory group). We will create YouTube videos to communicate more broadly to the public. The Minnesota Environment and Natural Resources Trust Fund (ENRTF) will be acknowledged through use of the trust fund logo or attribution language on project print and electronic media, publications, signage, and other communications per the [ENRTF Acknowledgement Guidelines](#).

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Fifth Update April 1, 2023

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V. ADDITIONAL BUDGET INFORMATION:

A. Personnel and Capital Expenditures: Personnel will be UMN (including MGS); a separate contract will be set up for USGS personnel. Capital expenses include data loggers, wells, pump, batteries, enclosure and sensors.

Explanation of Capital Expenditures Greater Than \$5,000: Water Sondes by YSI or other vender at \$12,000/unit provide important field data that will inform users how to water moves above, through and into the ground. We anticipate this equipment will be used into the future for climate change data collection beyond 2023. We will need to maintain the equipment and purchase replacement parts at the end of 2023. We will purchase other equipment, such as data loggers but the capital costs will be below \$5,000.

Explanation of Use of Classified Staff:

Total Number of Full-time Equivalents (FTE) Directly Funded with this ENRTF Appropriation:

Enter Total Estimated Personnel Hours for entire duration of project:	Divide total personnel hours by 2,080 hours in 1 yr. = TOTAL FTE: 2.3
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Total Number of Full-time Equivalents (FTE) Estimated to Be Funded through Contracts with this ENRTF Appropriation:

Enter Total Estimated Contract Personnel Hours for entire duration of project:	Divide total contract hours by 2,080 hours in 1 yr. = TOTAL FTE: 0.75
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VI. PROJECT PARTNERS:

Partners outside of project manager’s organization receiving ENRTF funding

- Dr. Joe Magner, UMN, Dept. Bioproducts and Biosystems Engineering (ENRTF supported) Project Manager/Soil Scientist/Hydrogeologist.
- Dr. John Nieber, UMN, Dept. Bioproducts and Biosystems Engineering (no ENRTF support) Project Engineer/Modeler
- Dr. Tony Runkle, MGS, Chief Geologist (ENRTF supported) Project Geologist
- Tim Cowdery, USGS, Hydrologist (ENRTF supported) Project Hydrologist/Modeler
- Dr. Bob Tipping, MDH, Hydrogeologist (No ENRTF support) Project Reviewer
- Dr. Kenny Blumenfeld, State Climatologist, DNR (No ENRTF support) Project Reviewer

LNTAG, including: DNR, Hennepin County, City of Mpls, Mpls, Park and Rec Board, and MCWD.

VII. LONG-TERM- IMPLEMENTATION AND FUNDING: Improving our understanding of the hydrologic flow pathways, in a changing climate, on the land surface and in the subsurface will be of key importance to providing guidance to TCMA municipalities. The results of this work will help start the conversation. Given, more precipitation, there may be better ways to management stormwater as well as permitting of various land uses that construct vulnerable infrastructure zones. Work in the Lake Nokomis area will likely benefit the greater TCMA to changes in precipitation, water storage and potential adverse environmental outcomes. The TAG defined above will help the project adjust and serve as ongoing peer review of activity actions and outputs.

VIII. REPORTING REQUIREMENTS:

- Project status update reports will be submitted April 1 and October 1 each year of the project
- A final report and associated products will be submitted between June 30 and August 15, 2023

IX. SEE ADDITIONAL WORK PLAN COMPONENTS:

A. Budget Spreadsheet

B. Visual Component or Map

C. Parcel List Spreadsheet

D. Acquisition, Easements, and Restoration Requirements

E. Research Addendum

Attachment A: Project Budget Spreadsheet
Environment and Natural Resources Trust Fund
M.L. 2020 Budget Spreadsheet



Legal Citation:

Project Manager: Dr. Joe Wagner

Project Title: Quantifying A New Urban Precipitation/Water Reality

Organization: Regents of the University of Minnesota

Project Budget: \$500,000

Project Length and Completion Date: Start: 7/1/20; Completion: 6/30/2023

Today's Date: September 27th, 2019

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET		Budget	Amount Spent	Balance	
BUDGET ITEM					
Personnel (Wages and Benefits)		\$ 278,889	\$ -	\$ 278,889	
Research Professor (PI), 7.5% FTE, \$38,918, 73.5% salary, 26.5% fringe					
Professor, Co PI, (Nieber is a fully funded faculty)					
Chief Geologist 5% FTE, \$16,762, 78% salary, 22% benefits					
Quaternary Geologist 12% FTE, \$29,421 78% salary, 22% benefits					
Post-doc/Grad/Civil service 1.0 FTE @ \$176,488, 75% salary and 25% benefit					
Undergrad student (3), 0.3 FTE, \$17,300 (\$16/hr x 1800 hours) , 100% salary					
Professional/Technical/Service Contracts					
Sub contract with USGS for labor		\$ 118,187	\$ -	\$ 118,187	
USGS Geoprobe drilling (\$1,554 per 20 foot hole x 6 wells)		\$ 9,324	\$ -	\$ 9,324	
transducers, perisaltic pump, water sampling supplies		\$ 4,000	\$ -	\$ 4,000	
Major cation /anion and isotope analysis		\$ 12,000	\$ -	\$ 12,000	
Equipment/Tools/Supplies					
Batteries, enclosures, solar panels and wiring materials		\$ 26,115		\$ 26,115	
OTT Bubble Level Sensors and data logger - 3		\$ 14,485		\$ 14,485	
Capital Expenditures Over \$5,000					
YSI multi-parameter probe - 2 @ \$12,000		\$ 24,000		\$ 24,000	
Fee Title Acquisition					
Easement Acquisition					
Professional Services for Acquisition					
Printing					
Report prep and graphic designer and Journal publication		\$ 10,000		\$ 10,000	
Travel expenses in Minnesota					
We anticipate travel from UMN to south Minneapolis with no over night lodging to collect data and attend meetings. The funds will be for van rental and travel to south Minneapolis.		\$ 3,000		\$ 3,000	
Other					
COLUMN TOTAL		\$ 500,000	\$ -	\$ 500,000	
SOURCE AND USE OF OTHER FUNDS CONTRIBUTED TO THE PROJECT		Status (secured or pending)	Budget	Spent	Balance
Non-State: USGS		To be secured	\$ 73,424	\$ -	\$ 73,424
State:			\$ -	\$ -	\$ -
In kind: Unrecovered F&A		Secured		\$ -	
Other ENRTF APPROPRIATIONS AWARDED IN THE LAST SIX YEARS		Amount legally obligated but not yet spent	Budget	Spent	Balance
			\$ -	\$ -	\$ -