

UNIVERSITY OF MINNESOTA

*Sponsored Projects Administration
200 Oak Street SE
450 McNamara Alumni Center
Minneapolis, MN 55455
612-624-5599*

November 18, 2025

Legislative-Citizen Commission on Minnesota Resources

RE: Proposal Title: "Water sustainability in the era of data centers"
University of Minnesota PI: John Nieber
Proposed dates: 1/15/2026 – 06/30/2027
Funding Requested: \$335,867

Hello,

The above referenced proposal is hereby endorsed, and submitted, on behalf of the Board of Regents of the University of Minnesota.

The University of Minnesota is registered in the FDP FCOI Clearinghouse certifying it has an active and enforced Conflict of Interest policy that is consistent with the provisions of 42 CFR part 50, Subart F, and 42 CFR part 94.

The University of Minnesota's frequently requested institutional information, including EIN, DUNS, and SAM information can be found on our website at <https://research.umn.edu/units/spa/proposals/proposal-development/frequently-requested-institutional-information>. The current negotiated F&A rate agreement can be found on our website at <https://research.umn.edu/units/oca/fa-costs/fa-rate-agreements>.

Information regarding the University of Minnesota's Annual Audits and Financial Reports can be found here: <https://controller.umn.edu/annual-reports>

Questions concerning programmatic aspects of the project should be directed to the Principal Investigator. Those having to do with contract and budgetary matters should be directed to me by e-mail at fletc070@umn.edu in the Office of Sponsored Projects Administration.

Sincerely,

Riana Fletcher

Riana Fletcher
Principal Grant and Contract Officer
Authorized Organizational Representative
Sponsored Projects Administration

Title: Water Sustainability in the Era of Data Centers

1. The regional sustainability of freshwater resources is dependent on the demand made on water resources by humans. Many freshwater uses, like water withdrawals, involve relatively short-term utilization of the water and then release the water back into the environment. This type of use of water is defined as non-consumptive use because the water is returned in liquid form back to the environment even though the water might not be returned to the source location, that is, the water use is essentially a water transfer. In contrast, some uses of water resources include those categorized as being consumptive, meaning that the water is not returned in liquid form back to the environment, but instead the water is evaporated in the process of its use. Examples of consumptive use of water include the growth of crops where evapotranspiration puts the water into the atmosphere. Another example is the evaporative cooling process as seen in many power plants and industries that need to cool their power/manufacturing equipment.

Both water transfers and consumptive use of water are an issue with respect to the sustainability of local and regional water resources. An emerging use of water is evolving from the burgeoning development of large data centers all over the United States. Big tech companies are planning establishment of data centers to promote the growth of the artificial intelligence (AI) revolution. There is concern in Minnesota that these large water users will transfer and/or consume large quantities of our valuable water resources. A large number of data centers in the region could have irreversible impacts on our current water resources and threaten water sustainability.

2. Knowledge about the enormous use of water by data centers is not new, but it is receiving increasing attention this year because of the interests by private industry and political figures to promote the AI revolution. While the subject of sustainability of water resources is very well established and of great interest, the threat to the sustainability of water resources by the introduction of super-water users like data centers is now receiving close attention. The subject of our new LCCMR project (2025-233, July 1, 2025 – June 30, 2026), “Pilot Water Budget Framework for Managing Water Withdrawals” implies the need to examine the effect of water withdrawals on the functioning of water resource systems both locally and regionally. When that project was proposed in March 2024, we did not know about the proposals for so many data centers to be in Minnesota. Project 2025-233 was conceived as a pilot project, to identify the required data sources for the analysis, and assess select locations in Minnesota, with the full intention of following up with a proposal for a statewide project based on the knowledge and success of the pilot project. Considering that data center planning and proposals are now a ‘hot’ item, we feel that there is a need to accelerate and expand our current approach to assess the impact of data centers on the sustainability of our Minnesotan water resources. Using the typical LCCMR proposal framework, there is insufficient time to complete the current pilot project and then follow up to produce results useful for evaluating new data center projects statewide.

3. We propose adopting an established Water Balance Model (WBM) developed at the University of New Hampshire. The WBM conducts water balance determinations across an entire landscape based on a rectangular grid landscape representation, and accounts for all components of the hydrologic cycle, including human water withdrawals. The model is considered an excellent tool for tracking where water is being used and determining areas of deficits or excesses of water within the landscape. Our proposed objective is to implement this model for Minnesota, then test it and evaluate how well it performs for the evaluation of the impact of data center water uses on water resources. We also envision a significant educational component to this effort to train state agency personnel, consultants, and educators on the use of the WBM.

4. The issue is that the demand for establishing the location of data centers is currently extremely high and there is a dire need for a tool to rapidly and accurately evaluate the impact of water use on local and regional water resources. Our reasoning is that we need to get ahead of this emerging issue and not be taken by surprise. The advantage will be that the proposed approach can be utilized now for evaluating data center water demands but can also be used for managing water demands in the future.

5. Our funded project proposal (Project 2025-233) submitted in March 2024 was in the spirit of this new proposal presented here. However, at the time we were not aware of the rapidly increasing demands for water that are being imposed by new data center developments.

6. We had already conceived and developed the idea of evaluating water withdrawals using a water budget approach as articulated in our current LCCMR project, Project 2025-233. We now have a better comprehension of the data available and have discovered an advanced water budget tool (the WBM) that will accelerate our progress and allow us to expand to the spatial extent beyond the original pilot project scope.

7. The first step for the project will be to start applying the proposed WBM to locations in Minnesota to demonstrate how the model can be used to evaluate the impact of data center water use on local and regional water resources sustainability. The model is available on GitHub and there is sufficient documentation for use of the model. An immediate output will be a demonstration of how the WBM works in an identified critical region. Other outputs will be a report on the use of the model, example applications of the model to data center water assessments in key regions of the state of Minnesota, and two or three workshops for training practitioners on the use of the model. A desired outcome could be the statewide adoption of this tool for water resources planning and managing water withdrawals in Minnesota. The project will be completed within 18 months of the start of the project.

Attachment A:
Environment and Natural Resources Trust Fund Budget
Emerging Issues Budget Addendum

Legal Citation:

Project Manager: John L. Nieber

Project Title: Water sustainability in the era of data centers

Organization: University of Minnesota

Project Budget: \$335,867

Project Length and Completion Date: 18 months, July 1, 2027

Current Date: 11/13/2025



BUDGET ITEM	Budget	Amount Spent	Balance	Justification for Generally Ineligible Expenses (if applicable)
Personnel (Wages and Benefits)	\$0	\$0	\$0	
John L. Nieber	\$20,763	\$0	\$20,763	
Post-doc researcher	\$138,004	\$0	\$138,004	
undergraduate student assistant	\$7,600	\$0	\$7,600	
	-	-	-	
	-	-	-	
Services and Subawards				
Geosynthec	\$153,000	\$0	\$153,000	
workshop	\$10,000	\$0	\$10,000	
	\$0	\$0	\$0	
	\$0	\$0	\$0	
	\$0	\$0	\$0	
Equipment/Tools/Supplies				
	\$0	\$0	\$0	
	\$0	\$0	\$0	
	\$0	\$0	\$0	
	\$0	\$0	\$0	
	\$0	\$0	\$0	
Capital Expenditures Over \$5,000				
	\$0	\$0	\$0	
	\$0	\$0	\$0	
	\$0	\$0	\$0	
Printing and Publication				

	\$3,500	\$0	\$3,500	
	\$0	\$0	\$0	
	\$0	\$0	\$0	
Travel Expenses In Minnesota				
	\$3,000	\$0	\$3,000	
	\$0	\$0	\$0	
	\$0	\$0	\$0	
Travel Expenses Outside Minnesota				
	\$0	\$0	\$0	
	\$0	\$0	\$0	
	\$0	\$0	\$0	
Other				
	\$0	\$0	\$0	
	\$0	\$0	\$0	
	\$0	\$0	\$0	
COLUMN TOTAL	\$335,867	\$0	\$335,867	

SOURCE AND USE OF OTHER FUNDS CONTRIBUTED TO THE PROJECT	Budget	Spent	Balance	Status (secured, pending, or potential)
Non-State:	\$0	\$0	\$0	
State:	\$0	\$0	\$0	
In kind:	\$0	\$0	\$0	

OTHER ENRTF APPROPRIATIONS AWARDED IN THE LAST SIX YEARS	Budget	Spent	Balance	Amount legally obligated but not yet spent
Setting realistic nitrate BMP goals in sout	350,00	\$350,000	\$0	\$ -

Project Manager and Organization Qualifications

Project Manager Name: John Nieber

Job Title: Professor

Provide description of the project manager's qualifications to manage the proposed project.

John Nieber has 45 years conducting research and teaching at major research universities (40 years at the University of Minnesota). He has conducted research in hydrology and water quality problems during that time. He has published over 100 refereed journal manuscripts and is a license professional engineering and certified professional hydrologist.

Organization: U of MN - College of Food, Agricultural and Natural Resource Sciences

Organization Description:

In the College of Food, Agricultural and Natural Resources Sciences (CFANS) at the University of Minnesota, we look at the bigger picture. When we envision a better tomorrow, it includes disease-resistant crops, products that protect our health, lakes free from invasive species, and so much more. We use science to find answers to Minnesota's and the world's grand challenges and solve tomorrow's problems. Almost 93 percent of students who earn CFANS undergraduate degrees find jobs in their career field or enter graduate school within six months of graduation.

The Department of Bioproducts and Biosystems Engineering, in CFANS, discovers and teaches solutions for the sustainable use of renewable resources and the enhancement of the environment. We discover innovative solutions to address challenges in the sustainable production and consumption of food, feed, fiber, materials, and chemicals by integrating engineering, science, technology, and management into all degree programs.