



Environment and Natural Resources Trust Fund

M.L. 2025 Approved Work Plan

General Information

ID Number: 2025-330

Staff Lead: Erin Barton

Date this document submitted to LCCMR: February 11, 2026

Project Title: Emerging Issues Water Sustainability in the Era of Data Centers

Project Budget: \$336,000

Project Manager Information

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Project Reporting

Date Work Plan Approved by LCCMR: March 4, 2026

Reporting Schedule: March 1 / September 1 of each year.

Project Completion: June 30, 2028

Final Report Due Date: August 14, 2028

Legal Information

Legal Citation: M.L. 2025, First Special Session, Chp. 1, Art. 2, Sec. 2, Subd. 10a-1

Appropriation Language: \$2,984,000 the first year is from the trust fund to the Legislative-Citizen Commission on Minnesota Resources to an emerging issues account authorized in Minnesota Statutes, section 116P.08, subdivision 4, paragraph (d).

Appropriation End Date: June 30, 2028

Narrative

Project Summary: Develop a statewide framework based on established water budget models to identify sensitive areas and quantify the impacts of large withdrawals of surface and ground water in Minnesota.

Describe the opportunity or problem your proposal seeks to address. Include any relevant background information.

Managing water availability for human use is becoming increasingly difficult due to the confluence of increased public water demand, large demands from large data centers, and weather variability induced by climate change. Increased public water demand can result from increased population, increased agricultural water demand, increased demands from data centers and power generation, while climate change can lower water availability because of decreased precipitation and increased evaporation due to higher temperatures.

Water availability is shared and needs to be managed accordingly. However, in Minnesota, it is managed by many state agencies with no clear management framework and a bias towards water quality. Areas with mild water shortages should get more attention for resource protection, while areas with severe water shortages might need water restrictions or growth restrictions for high water users. Water-use data can be better organized, and analysis tools can be developed to prioritize watersheds and groundwater zones, so that those areas most affected by water deficits get the most attention.

We see the need to develop a proactive framework for water withdrawal management to enable the systematic identification of water stressed areas where the streamflow or groundwater has been or will be depleted.

What is your proposed solution to the problem or opportunity discussed above? Introduce us to the work you are seeking funding to do. You will be asked to expand on this proposed solution in Activities & Milestones.

We propose developing a statewide water budget framework for managing water withdrawals in Minnesota. The work will identify critical areas where the natural supply of water has been depleted creating water-stressed conditions. This framework will be complemented by a robust water budget model (WBM) suitable for local conditions and will follow the approach developed in the Massachusetts Sustainable Watershed Initiative, resulting in a framework unique to Minnesota. The proposed water budget model will be a comprehensive accounting of all inputs (e.g., precipitation) and outputs (e.g., evaporation, water withdrawals) of both the natural and the developed areas water cycles on a one-kilometer scale throughout Minnesota. This project will collate statewide data on water withdrawals and discharges, define the size of watershed for the streamflow analysis, define areas of concern for groundwater recharge analysis, develop a method to deal with agricultural consumptive use, develop a range of data center water demands as a function of energy demand and cooling design, use the chosen water budget model to estimate natural flow and recharge metrics to quantify current and future withdrawal impacts, and define the output format for public use. This framework could unify the efforts of state agencies managing water.

What are the specific project outcomes as they relate to the public purpose of protection, conservation, preservation, and enhancement of the state's natural resources?

The proposed framework, assisted by a water balance model, will identify areas with water deficits that warrant planning and action by communities to ensure the sustainability of their invaluable water resources. It will provide communities better understanding of the impact of current and future withdrawals and discharges on specific watersheds or groundwater zones. Using this framework communities will be enabled to consider the impact of large water users like data centers, and be able to seek ways to improve the overall natural balance of their water resources.

Project Location

What is the best scale for describing where your work will take place?

Statewide

What is the best scale to describe the area impacted by your work?

Statewide

When will the work impact occur?

During the Project and In the Future

Activities and Milestones

Activity 1: Data Acquisition, water budget modeling, and development of the conceptual framework

Activity Budget: \$120,000

Activity Description:

The statewide data needed for this project will include recent information on: land use, irrigated areas, private well/septic areas, and monthly withdrawals and discharges. We will also collect available data on the expected water demand of data centers with different energy demand and water cooling designs.

Peer-reviewed water budget models (WBM) will be evaluated for Minnesota conditions. At least, these will include the available WBM models from the USGS and the University of New Hampshire. A ranking table will be created to compare multiple features of the WBM models including the following capabilities: spatial resolution, land use type representations, groundwater aquifer details, water balance components included, point data like withdrawals and discharges, and output detail.

The WBMs will be calibrated and tested for the three watershed and three groundwater areas identified with our ongoing pilot project (2025-233). The tested outputs will include comparisons of predicted monthly streamflow and groundwater levels versus monitoring data. A conceptual framework will be developed for assessments of the relative impacts of water withdrawals on downstream water availability. This framework will be explained graphically using a simple schematic and numerically with basic examples for both watershed and groundwater recharge areas.

Activity Milestones:

Description	Approximate Completion Date
Acquire statewide data needed for project; Geosyntec	September 30, 2026
Evaluate and test various WBMs; UMN and Geosyntec	December 31, 2026
Develop conceptual framework; Geosyntec	January 31, 2027
Test the framework on 3 watersheds and 3 groundwater areas; UMN and Geosyntec	March 31, 2027

Activity 2: Develop Tools for Managing Water Withdrawals

Activity Budget: \$180,000

Activity Description:

The main point of concern is the impact of cumulative water withdrawals large water users like data centers on the availability of water to other users downstream or within the same groundwater domain as the data centers.

The calibrated WBM will be used to estimate natural streamflow and recharge by using natural landscape conditions with zero withdrawals or discharges by human activities, then evaluate various drought statistics for streamflow or recharge. These natural conditions will be used as a denominator in evaluation of withdrawal impacts on a per month basis. For watersheds, the monthly relative impact (%) will be estimated by the cumulative net monthly withdrawals divided by cumulative monthly natural streamflow. For groundwater areas, the monthly relative impact (%) will be estimated by the net monthly withdrawals divided by natural monthly recharge. These impacts will be estimated statewide.

A statewide web-based reporting tool will be created for users to easily compare various scenarios either graphically or numerically including 1) natural versus current conditions, 2) the impacts of new development or water demand for large users like data centers, and 3) the estimated effects of climate change on water demand.

Activity Milestones:

Description	Approximate Completion Date
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Define watersheds and groundwater areas, define water stress metrics; Geosyntec	August 31, 2027
Run the WBM for watersheds and groundwater areas statewide; UMN	January 31, 2028
Develop web-based reporting tool; Geosyntec	April 30, 2028

Activity 3: Technology Transfer, Project Management and Reporting

Activity Budget: \$36,000

Activity Description:

The team will establish a Technical Advisory Committee (TAC) with experts from Minnesota Department of Health (MDH), Minnesota Pollution Control Agency (MPCA), and Minnesota Department of Natural Resources. The TAC will meet every six months while the full project team will meet monthly. Leveraging our existing relationships, we will establish a stakeholder group from cities, counties, watershed districts/organizations, and non-profits.

A final report will provide documentation of the project to clearly explain the details of the proposed water management framework, the use of the selected WBM, and the use of the web-based water withdrawal assessment tool. The Team will develop training slides for use in a two-hour recorded webinar on the proposed statewide water management framework and associated tools. The webinar activity will be supplemented by help from the Minnesota Extension Service.

A manuscript will be prepared for submission to a refereed journal. The content will cover an overall description of the work conducted and the outcomes.

Our team will provide periodic updates to the LCCMR as contracted. The updates will include documentation of the TAC meetings, status of the tasks, discussion of unexpected issues and resolutions, and any results to date.

Activity Milestones:

Description	Approximate Completion Date
Finalize proposed TAC members; UMN and Geosyntec	June 30, 2026
Present a two-hour training webinar; UMN, Geosyntec, Minnesota Extension	May 31, 2028
Final report; UMN and Geosyntec	June 30, 2028
Submit manuscript for publication in refereed journal; UMN	June 30, 2028
Followup questions from users; UMN	June 30, 2028

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Nigel Pickering	Geosyntec	Side-by-side data acquisition, data analysis, water budget modeling, report writing, technology transfer/dissemination	Yes

Dissemination

Describe your plans for dissemination, presentation, documentation, or sharing of data, results, samples, physical collections, and other products and how they will follow ENRTF Acknowledgement Requirements and Guidelines.

The results of this project will be disseminated by 1) interacting closely with practitioners in our TAC; and 2) presenting the results at conferences including the: Minnesota Water Resources Conference (local), Minnesota Watersheds Conference (local), the Central States Water Environment Association (CSWEA) Conferences (mid-west), and the American Geophysical Union Conference (national). We also have a component in the project for preparing training materials and conducting a webinar on use of the model.

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.

Long-Term Implementation and Funding

Describe how the results will be implemented and how any ongoing effort will be funded. If not already addressed as part of the project, how will findings, results, and products developed be implemented after project completion? If additional work is needed, how will this work be funded?

In Minnesota water is managed by many state agencies with no clear framework. Our proposed statewide framework, guided by an existing water budget model, will provide a catalyst for future water quantity management and bring together the many state agencies that are currently involved with water management in Minnesota. It will also help define the water stressed areas, the projected impacts from large water users like data centers, and the best ways to manage water withdrawals to minimize impacts to surface water and groundwater resources. This project extends the scope of a currently funded pilot project to the entire state.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
Project manager		Will serve as project principal investigator. Will oversee all project activities and manage the project to meet proposed deadlines. Will provide expert advice to post-doc and to collaborators.			36.6%	0.1		\$20,763
post-doctoral fellow		Will work on applying the Water Budget Model to test locations in Minnesota. This will involve model calibration to local hydrologic conditions, and then apply the model to different realistic scenarios of consumptive water use by data centers. The post-doc will be responsible for working with Geosyntec in the preparation of the project report. Will also be responsible for preparing materials for the instruction/outreach part of the project.			26.1%	1.5		\$142,137
Undergraduate assistant		Assist the researchers with data acquisition/preparation, map making, and report preparation. The student will also assist with the outreach/training part of the project.			0%	0.22		\$8,600
Extension specialist		Provide expertise on information transfer for bringing the framework results to private, public and government organizations.			36.5%	0.02		\$5,000
							Sub Total	\$176,500
Contracts and Services								
Geosyntec	Service Contract	Geosyntec will work on acquisition of data to be used in the water balance model, development of the water management framework, and estimation of water use by data centers. Geosyntec and UMN will work with state agencies to develop the most suitable water stress metrics to sustainably manage water.				2		\$153,000
							Sub Total	\$153,000
Equipment, Tools, and Supplies								

							Sub Total	-
Capital Equipment								
							Sub Total	-
Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
	Other	Three trips around the state with 2 persons per trip; 2 nights per trip (\$880 total), meals (\$600), 2,338 miles @ \$0.65/mile.	Travel for researchers to visit various locations in the state to visualize conditions, and to acquire information from collaborators.					\$3,000
							Sub Total	\$3,000
Travel Outside Minnesota								
							Sub Total	-
Printing and Publication								
	Publication	Manuscript published in a refereed journal.	Intended to highlight the results of the project.					\$3,500
							Sub Total	\$3,500
Other Expenses								
							Sub Total	-
							Grand Total	\$336,000

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
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Non ENRTF Funds

Category	Specific Source	Use	Status	\$ Amount
State				
			State Sub Total	-
Non-State				
			Non State Sub Total	-
			Funds Total	-

Total Project Cost: \$336,000

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: [bae91d51-455.pdf](#)

Alternate Text for Visual Component

View of data center locations in Minnesota as of 2025...

Supplemental Attachments

Capital Project Questionnaire, Budget Supplements, Support Letter, Photos, Media, Other

Title	File
Geosyntec services justification	c6219b41-255.pdf
proposal approval from SPA	6a1771d7-f20.pdf

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

The emerging issues proposal was of different format than the workplan document. The workplan document was prepared to contain all information needed for the project.

Additional Acknowledgements and Conditions:

The following are acknowledgements and conditions beyond those already included in the above workplan:

Do you understand and acknowledge the ENRTF repayment requirements if the use of capital equipment changes?

N/A

Do you understand that travel expenses are only approved if they follow the "Commissioner's Plan" promulgated by the Commissioner of Management of Budget or, for University of Minnesota projects, the University of Minnesota plan?

Yes, I understand the UMN Policy on travel applies.

Does your project have potential for royalties, copyrights, patents, sale of products and assets, or revenue generation?

No

Do you understand and acknowledge IP and revenue-return and sharing requirements in 116P.10?

N/A

Do you wish to request reinvestment of any revenues into your project instead of returning revenue to the ENRTF?

N/A

Does your project include original, hypothesis-driven research?

No

Does the organization have a fiscal agent for this project?

Yes, Sponsored Projects Administration

Does your project include the pre-design, design, construction, or renovation of a building, trail, campground, or other fixed capital asset costing \$10,000 or more or large-scale stream or wetland restoration?

No

Do you propose using an appropriation from the Environment and Natural Resources Trust Fund to conduct a project that provides children's services (as defined in Minnesota Statutes section 299C.61 Subd.7 as "the provision of care, treatment, education, training, instruction, or recreation to children")?

No

Provide the name(s) and organization(s) of additional individuals assisting in the completion of this project:

All individuals involved in the project have been identified in the workplan

Do you understand that a named service contract does not constitute a funder-designated subrecipient or approval of a sole-source contract? In other words, a service contract entity is only approved if it has been selected according to the contracting rules identified in state law and policy for organizations that receive ENRTF funds through direct appropriations, or in the DNR's reimbursement manual for non-state organizations. These rules may include competitive bidding and prevailing wage requirements

Yes, I understand