Environment and Natural Resources Trust Fund

2024 Request for Proposal

General Information

Proposal ID: 2024-078

Proposal Title: DNR County Groundwater Atlas

Project Manager Information

Name: Paul Putzier

Organization: MN DNR - Ecological and Water Resources Division

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Project Basic Information

Project Summary: This project supports continuing development of the County Groundwater Atlases for approximately two years. The goal is to provide this valuable water and resource management “information infrastructure” to every county.

Funds Requested: $3,200,000

Proposed Project Completion: June 30, 2027

LCCMR Funding Category: Foundational Natural Resource Data and Information (A)

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

Narrative

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

Groundwater is one of our most valuable natural resources; it is also one of our most overlooked and misunderstood, due in part to it being largely hidden from view. Our state is experiencing more demands and threats to our limited groundwater resources every year. We need clean and plentiful groundwater to sustain the ecosystems we treasure, provide for our homes, and to support our economy. The challenge of balancing all of these uses and needs depends greatly on making informed decisions on how we use water, where we use it, and how we protect the quality of that water. Minnesota's healthy natural environment, growing economy, and vibrant quality of life requires informed use, management and planning related to all the state's natural resources, including groundwater. The Groundwater Atlas is an important tool that professional planners, resource managers, researchers, industry, agriculture and citizens rely on to help make informed decisions.

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.

To address this pressing need, our goal is an atlas for all Minnesota counties as soon as possible. This appropriation will support atlas work at various phases of development in up to eight counties (most likely Aitkin, Lac qui Parle, Lake, Lincoln, Otter Tail, Pennington, Pipestone, and St. Louis). The specific counties will depend upon completion Part A Atlas by Minnesota Geological Survey (MGS) and DNR's progress with ongoing atlas work. The atlas is used by resource managers, planners, scientists, citizens for a wide variety of projects. For example, groundwater researcher Dr. Peter Kang from the University of Minnesota recently said, "My research group develops predictive models for groundwater systems, and the County Atlas provides critical information for those models. Recently, our team studied the feasibility of aquifer storage and recovery in four Minnesota study areas. Thanks to the County Atlas, my research team was able to successfully estimate the amount of water that can be safely stored in groundwater systems. Also, the atlases are excellent resources for groundwater related courses that I teach at the University of Minnesota. Since 2018, when I started my current position, I continue to be impressed by the MGS and DNR atlas products."

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 atlases will provide valuable information and training to future resource managers who, in the decades ahead, will be grappling with the many challenges of balancing use and preservation of groundwater resources. The atlases will provide important data for maintaining long-term stable water supplies for growing economies, and help protect ecological systems that rely on groundwater.

For example. Amanda Guertin, Benton County, noted that they used map overlays from the atlas to help "create a Sensitive Areas Management Plan to identify sensitive areas to be protected from development or disturbance due to critical, vulnerable, or rare water resources."

Activities and Milestones

Activity 1: Groundwater & surface water sampling and laboratory analysis

Activity Budget: $783,406

Activity Description:
The DNR will analyze Geologic Atlas (Part A) data from the Minnesota Geological Survey; prepare a sampling plan for up to 110 wells and up to ten selected surface water bodies in each of up to eight counties; collect and compile field chemistry; send collected samples to analytical laboratories to analyze samples for natural chemistry and stable isotopes of oxygen and hydrogen and the age-dating isotopes of tritium, carbon-14, and potentially Ultra Low Tritium.

Larger counties will be treated as the equivalent of two smaller counties and up to 220 wells and twice the number of surface water features may be sampled to provide adequate geographic distribution for the atlas analysis. Additionally, county specific conditions and needs may call for modified sampling and analysis plans in order gain the most relevant data for resource managers.

Project design and data collection for counties in southeast Minnesota may include specialty mapping of the karst groundwater conditions, including dye tracing to help understand complex groundwater flow conditions in this area of vulnerable natural resources. Mapping in northeast Minnesota may also require specialized sampling and analysis techniques in order to gain the most relevant data for resource managers in this unique geologic and hydrogeologicltra

Activity Milestones:

Description	Approximate Completion Date
Complete water sampling & analysis in the equivalent of 2 - 4 counties	June 30, 2025
Complete water sampling & analysis in the equivalent of 2 - 4 counties	June 30, 2026

Activity 2: Groundwater Atlas preparation and publication

Activity Budget: $2,268,994

Activity Description:
The activity includes analyzing data, preparing GIS files, drafting plates and figures, and preparing and publishing the atlas. Data analysis involves analyzing collected data (geology, water chemistry, water usage, groundwater flow, and others), preparing groundwater flow direction maps, groundwater cross sections and pollution sensitivity maps of relevant aquifers, drafting water chemistry plates, and preparing and publishing reports (hardcopy and web). This activity includes providing GIS data layers for use in decision-support systems, such as county and state land use planning, and county and state environmental programs. The assembled GIS layers and electronic files also make the information usable for local, regional, and state decision makers, scientists, educators, researchers, industry, and citizens.

Each Groundwater Atlas includes web and hard-copy publication. This includes digital posting as well as off-set printing of approximately 100 copies: 1) One 40-60 page bound report with up to 40 color figures, maps and tables, 2) Three to four full color map plates that are each approximately 24-inches by 36-inches in size. Some atlases require a second, figures only, bound report. Printing costs also includes vendor preparation of approximately 1,000 post cards for each county equivalent and postage to mail to citizens for permission for well sampling.

Activity Milestones:

Description	Approximate Completion Date
Preparation and publication of up to the equivalent of 2 - 3 complete Groundwater Atlases	June 30, 2025
Preparation and publication of up to the equivalent of 2 - 3 complete Groundwater Atlases	June 30, 2026

Activity 3: Atlas stakeholder workshop and dissemination activities

Activity Budget: $147,600

Activity Description:
To introduce local resource managers and professionals, county staff and others to the atlas when complete, DNR provides hands-on workshops and potentially field trips in cooperation with county staff. Workshops include introduction to the atlas, summary of findings and several real-world exercises demonstrating some of the critical and creative ways to use the atlas to manage resources. As partners, counties agree to provide 'in kind' support by organizing and hosting the workshops, and providing venues, notifications and support materials.

DNR will also offer to make a brief presentation to the County Board of Commissioners if invited. After one such presentation Alison Holland, Kanabec County Commissioner, recently stated, "Mr. Putzier, thank you for your presentation to our board last week. I appreciate the information you shared, and am even more grateful for the work your team did on our atlas. Our County Engineer pointed me to (the atlas) within the first month in my new role last year when I was approached by a constituent about a concern for our drinking water. Your work enabled me to easily provide evidence-based reassurance. Thank you for taking the time to share with my (mostly new) colleagues about this very useful resource."

Activity Milestones:

Description	Approximate Completion Date
Complete workshops for two completed county groundwater atlases	December 31, 2024
Complete workshops for two completed county groundwater atlases	December 31, 2026

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?

The DNR provides training and support to atlas users, through data-pulls, workshops, field trips, user guides, conference and media presentations and importantly, ongoing support to individual county, local resource managers, citizens and researchers on specific projects and challenges. Additionally, DNR uses data from each newly completed atlas to update state-wide atlas products like the Groundwater Provinces Maps, Pollution Sensitivity of the Bedrock Surface (HG-01), Near Surface Materials (HG-02), springshed mapping and the extensive chemistry database. With ongoing funding from DNR, atlas groundwater professional staff will continue to provide atlas-related support as needed after each county atlas is completed.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
County Geologic Atlases - Part B	M.L. 2015, Chp. 76, Sec. 2, Subd. 03b	$2,000,000
County Geologic Atlases - Part B, Mapping Aquifer Hydrology	M.L. 2019, First Special Session, Chp. 4, Art. 2, Sec. 2, Subd. 03o	$2,400,000
County Groundwater Atlas	M.L. 2021, First Special Session, Chp. 6, Art. 5, Sec. 2, Subd. 03c	$1,125,000
County Groundwater Atlas	M.L. 2021, First Special Session, Chp. 6, Art. 6, Sec. 2, Subd. 03c	$1,875,000

Project Manager and Organization Qualifications

Project Manager Name: Paul Putzier

Job Title: Hydrogeologist Supervisor, County Groundwater Atlas Program

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

Paul has been the Supervisor for the Minnesota Department of Natural Resources County Groundwater Atlas Program since 2016. He leads the team responsible for completing detailed mapping of groundwater and other resources in each of Minnesota's 87 counties. Prior to assuming the supervisor position, Paul was a Lead Hydrogeologist at the DNR developing the agency's Groundwater Management Area program and the Project Manager for the North & East Metro Groundwater Management Area, evaluating groundwater sustainability issues. Before joining the DNR in 2011, Paul held positions as Operations Manager, Project Manager and Senior Hydrogeologist for over 25 years for several national consulting firms (HDR, STS, RETEC, GTI). He earned a Bachelor of Science in Geology/Geophysics from the University of Wisconsin, Madison and a Master of Science in Geology with a hydrogeology emphasis from the University of South Florida, Tampa.

Organization: MN DNR - Ecological and Water Resources Division

Organization Description:

The mission of the Minnesota DNR is to work with Minnesotans to conserve and manage the state's natural resources, to provide outdoor recreation opportunities, and to provide for the commercial uses of natural resources in a way that creates a sustainable quality of life. The DNR has extensive experience administering and coordinating projects funded by the ENRTF.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
Hydrogeologist Supervisor		Project Manager/Senior Technical			20%	1	X	$187,500
Information Officer 2		Technical Editor			20%	0.4	X	$117,000
Hydrogeologist 2		Hydrogeologist/Author			20%	1.8	X	$317,250
Hydrogeologist 2		Hydrogeologist/Author			20%	1.8	X	$208,750
Hydrogeologist 2		Hydrogeologist/Author			20%	1.8	X	$218,750
Hydrogeologist 3		Hydrogeologist/Lead Author			20%	1.8	X	$260,000
Senior Groundwater Specialist		Project Lead/Karst Geology Specialist			20%	1	X	$176,900
Research Analyst Senior		Lead GIS			20%	1	X	$132,700
Hydrogeologist 1		Hydrogeologist/Fieldwork Lead			20%	1.8		$275,000
Hydrogeologist 3		Hydrogeologist/Author			20%	1.8	X	$353,750
							Sub Total	**$2,247,600**
Contracts and Services								
Minnesota Department of Agriculture Chemistry Laboratory	Professional or Technical Service Contract	MDA Laboratory provides comprehensive chemical analysis of approximately 110 groundwater samples from equivalent of each county included in the atlas schedule. With ML2024 appropriation, groundwater from equivalent of eight counties would be analyzed by the MDA for approximately 880 samples analyzed, at a total cost of approximately $386,400		X		2		$386,400
University of Waterloo	Professional or Technical Service Contract	The University of Waterloo provides unique laboratory analytical services that are not readily available from other vendors for Carbon14, tritium and stable isotopes in groundwater. Cost per county		X		0.4		$224,800

		for C14, tritium and stable isotope analysis is approximately $28,100, or a total cost for eight counties of approximately $224,800.						
							Sub Total	**$611,200**
Equipment, Tools, and Supplies								
	Tools and Supplies	Supplies, including expendable water sampling supplies. Approx. 880 samples total: high volume micro filters; valves and tubing for each well sampled, titration supplies. Shipping costs for water samples to laboratories.	Disposable supplies used for approximately 110 samples in each of the equivalent of eight counties sampled as part of this proposal.					$60,000
	Equipment	Non-capital equipment including: water sampling and measurement tools and field analytical meters and equipment (individual instruments/equipment cost less than $5000 each). Estimate includes replacement of multiple, individual meters as needed: Trimble GPS, Eureka Manta water quality meters and probes and titration instruments. .	Necessary equipment and instruments for groundwater sampling.					$21,036
							Sub Total	**$81,036**
Capital Expenditures								
							Sub Total	**-**
Acquisitions and Stewardship								
							Sub Total	**-**
Travel In Minnesota								
	Miles/ Meals/ Lodging	In-state vehicle mileage (est. $45,000) and travel expenses for meals and lodging (est. $45,000), primarily for groundwater sampling and field data collection in up to equivalent of eight counties. All travel per the DNR travel policy.	Groundwater sampling in up to equivalent of eight counties.					$90,719
							Sub Total	**$90,719**
Travel Outside Minnesota								

							Sub Total	**-**
Printing and Publication								
	Printing	Each Groundwater Atlas includes hard-copy publication. This includes digital posting as well as off-set printing of approximately 100 copies: 1) One 40-60 page bound report with up to 40 color figures, maps and tables, 2) Three to four full color map plates that are each approximately 24-inches by 36-inches in size. Some Atlases require a second, figures only, bound report. Printing costs also includes vendor preparation of 1,000 post cards for each county equivalent and postage to mail to citizens to obtain permission for water-well sampling. Total anticipated printing costs per county equivalent (cards, atlases, postage) estimated to be $4,000. Printing costs for equivalent of eight atlas estimated to be ~$32,000.	Post cards are used to request permission from well owners to collect samples from their wells. Approximately 100 copies of the Groundwater Atlas are printed in hard copy for each county for distribution to stakeholders and resource managers. Postage costs are included for post cards and sending copies of the atlas to stakeholders.					$32,000
							Sub Total	**$32,000**
Other Expenses								
		*Direct and Necessary Expenses: People Support (~$26,052), Safety Support (~$5,416), Financial Support (~$35,040), Communication Support (~$2,123), IT Support (~$67,778), and Planning Support (~$1,036) necessary to accomplish funded programs/projects.	*Direct and Necessary Expenses includes all Department Support Services.					$137,445
							Sub Total	**$137,445**
							Grand Total	**$3,200,000**

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
Personnel - Hydrogeologist Supervisor		Project Manager/Senior Technical	**Classified :** Because the atlas program represents a longer-term project (decades) to complete an atlas for each county, most staff paid for with ENRTF funds are in classified positions hired specifically to accelerate the completion of the atlas work. Staff in these positions generally did not have and currently do not have other assignments. The positions will be canceled and the approved complement of the agency reduced accordingly once the appropriation has been spent.
Personnel - Information Officer 2		Technical Editor	**Classified :** Because the atlas program represents a longer-term project (decades) to complete an atlas for each county, most staff paid for with ENRTF funds are in classified positions hired specifically to accelerate the completion of the atlas work. Staff in these positions generally did not have and currently do not have other assignments. The positions will be canceled and the approved complement of the agency reduced accordingly once the appropriation has been spent.
Personnel - Hydrogeologist 2		Hydrogeologist/Author	**Classified :** Because the atlas program represents a longer-term project (decades) to complete an atlas for each county, most staff paid for with ENRTF funds are in classified positions hired specifically to accelerate the completion of the atlas work. Staff in these positions generally did not have and currently do not have other assignments. The positions will be canceled and the approved complement of the agency reduced accordingly once the appropriation has been spent.
Personnel - Hydrogeologist 2		Hydrogeologist/Author	**Classified :** Because the atlas program represents a longer-term project (decades) to complete an atlas for each county, most staff paid for with ENRTF funds are in classified positions hired specifically to accelerate the completion of the atlas work. Staff in these positions generally did not have and currently do not have other assignments. The positions will be canceled and the approved complement of the agency reduced accordingly once the appropriation has been spent.
Personnel - Hydrogeologist 2		Hydrogeologist/Author	**Classified :** Because the atlas program represents a longer-term project (decades) to complete an atlas for each county, most staff paid for with ENRTF funds are in classified positions hired specifically to accelerate the completion of the atlas work. Staff in these positions generally did not have and currently do not have other assignments. The positions will be canceled and the approved complement of the agency reduced accordingly once the appropriation has been spent.
Personnel - Hydrogeologist 3		Hydrogeologist/Lead Author	**Classified :** Because the atlas program represents a longer-term project (decades) to complete an atlas for each county, most staff paid for with ENRTF funds are in classified positions hired specifically to accelerate the completion of the atlas work. Staff in these

			positions generally did not have and currently do not have other assignments. The positions will be canceled and the approved complement of the agency reduced accordingly once the appropriation has been spent.
Personnel - Senior Groundwater Specialist		Project Lead/Karst Geology Specialist	**Classified :** Because the atlas program represents a longer-term project (decades) to complete an atlas for each county, most staff paid for with ENRTF funds are in classified positions hired specifically to accelerate the completion of the atlas work. Staff in these positions generally did not have and currently do not have other assignments. The positions will be canceled and the approved complement of the agency reduced accordingly once the appropriation has been spent.
Personnel - Research Analyst Senior		Lead GIS	**Classified :** Because the atlas program represents a longer-term project (decades) to complete an atlas for each county, most staff paid for with ENRTF funds are in classified positions hired specifically to accelerate the completion of the atlas work. Staff in these positions generally did not have and currently do not have other assignments. The positions will be canceled and the approved complement of the agency reduced accordingly once the appropriation has been spent.
Personnel - Hydrogeologist 3		Hydrogeologist/Author	**Classified :** Because the atlas program represents a longer-term project (decades) to complete an atlas for each county, most staff paid for with ENRTF funds are in classified positions hired specifically to accelerate the completion of the atlas work. Staff in these positions generally did not have and currently do not have other assignments. The positions will be canceled and the approved complement of the agency reduced accordingly once the appropriation has been spent.
Contracts and Services - Minnesota Department of Agriculture Chemistry Laboratory	Professional or Technical Service Contract	MDA Laboratory provides comprehensive chemical analysis of approximately 110 groundwater samples from equivalent of each county included in the atlas schedule. With ML2024 appropriation, groundwater from equivalent of eight counties would be analyzed by the MDA for approximately 880 samples analyzed, at a total cost of approximately $386,400	As a State Agency, the MDA is given preference for this contract.
Contracts and Services - University of Waterloo	Professional or Technical Service Contract	The University of Waterloo provides unique laboratory analytical services that are not readily available from other vendors for Carbon14, tritium and stable isotopes in groundwater.	This is unique laboratory analytical work not readily available from other contractors.

		Cost per county for C14, tritium and stable isotope analysis is approximately $28,100, or a total cost for eight counties of approximately $224,800.	

Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
Cash	DNR General Funds appropriated by the legislature and distributed by the commissioner of the DNR.	DNR General Funds to support salaries for atlas staff (~3 FTE) and related support resources for the 2-year project period to support completion of groundwater atlases.	Pending	$1,200,000
			State Sub Total	**$1,200,000**
Non-State				
In-Kind	In-Kind county/local government assistance through staff, resources, facilities and goods.	County/local government assistance to arrange water sampling access, arrange and sponsor local training workshops, field trips and training. Approximately $2,000/county for up to eight counties.	Potential	$16,000
			Non State Sub Total	**$16,000**
			Funds Total	**$1,216,000**

Attachments

Required Attachments

Visual Component

File: f71fdebb-92d.pdf

Alternate Text for Visual Component

Map shows the status of groundwater atlases by county in March 2023. Counties are shaded according to their status as either, 1) not yet started, 2) complete/anticipated completion, or 3) counties included in proposal ML2024-078. Page two is a list of all eighty-seven (87) counties grouped by atlas status....

Optional Attachments

Support Letter, Photos, Media, Other

Title	File
Support for the County Atlas Program	e3f5a4c9-f25.pdf

Administrative Use

Does your project include restoration or acquisition of land rights?

No

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

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?

Yes

Does the organization have a fiscal agent for this project?

No

Does your project include the design, construction, or renovation of a building, trail, campground, or other capital asset costing $10,000 or more?

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?

No