Environment and Natural Resources Trust Fund

M.L. 2021 Approved Work Plan

General Information

ID Number: 2021-071

Staff Lead: Corrie Layfield

Date this document submitted to LCCMR: July 21, 2021

Project Title: County Groundwater Atlas

Project Budget: $1,875,000

Project Manager Information

Name: Paul Putzier

Organization: MN DNR - Ecological and Water Resources Division

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Project Reporting

Date Work Plan Approved by LCCMR: July 20, 2021

Reporting Schedule: February 1 / August 1 of each year.

Project Completion: June 30, 2024

Final Report Due Date: August 14, 2024

Legal Information

Legal Citation: M.L. 2021, First Special Session, Chp. 6, Art. 6, Sec. 2, Subd. 03c

Appropriation Language: $1,875,000 the first year is from the trust fund to the commissioner of natural resources to continue producing county groundwater atlases to inform management of surface water and groundwater resources for drinking and other purposes. This appropriation is for Part B, to characterize the potential water yields of aquifers and aquifers' sensitivity to contamination.

Appropriation End Date: June 30, 2024

Narrative

Project Summary: This project supports continuing development of the County Groundwater Atlases. The goal is to provide this valuable water and resource management "information infrastructure" to every county in Minnesota.

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

Groundwater is one of the most valuable, often overlooked, and misunderstood of our natural resources. Our state is placing more demands on our groundwater every year. The challenge to balance wise-use for the benefit of our citizens and economy and resource protection will only increase over time. 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. Industry, researchers, state and local governments and others need comprehensive and accurate information about those resources to do their jobs on behalf of all Minnesotans. The Groundwater Atlas in one important tool for professional planners, resource managers, researchers and citizens to help make these critical informed judgments.

What is your proposed solution to the problem or opportunity discussed above? i.e. What are you seeking funding to do? You will be asked to expand on this in Activities and 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 on six or more counties (Chippewa, Lake, Lincoln, Pennington, Pipestone, St. Louis) depending upon completion of the Part A Atlas by the MGS and when they are provided to DNR.

The atlas is a critical tool for a broad range of resource managers. It provides comprehensive geologic and groundwater mapping and associated information for planners, managers, scientists and citizens statewide for a wide variety of projects such as: water supply planning, land use decisions, resource development, resource protection, transportation planning, agricultural water supply, groundwater research/studies, and Environmental Impact Statements.

Jerry Spetzman, Administrator Chisago Lakes Lake Improvement District, Chisago County stated, "Chisago County uses the atlas to help inform land use policy decisions. Specific examples include: the Pollution Sensitivity of Near-Surface Materials map was used to help determine the location of a natural burial cemetery; the Bedrock Geology map was used to determine if sufficient quantities of ground water was available to cool a natural gas power plant; the sand distribution model was used to inform frac sand."

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 their groundwater resources. The atlases will provide an important tool 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."

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: Groundwater & surface water sampling and analysis

Activity Budget: $484,256

Activity Description:
The DNR will analyze Geologic Atlas data (from the Minnesota Geological Survey), prepare a sampling plan for up to 100 wells in each of up to four counties and selected surface water bodies, compile field chemistry; and analyze groundwater samples for natural chemistry and age-dating isotopes.

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.

Activity Milestones:

Description	Completion Date
Complete water sampling & analysis in 2-3 counties	October 31, 2022
Complete water sampling & analysis in 2-3 counties	October 31, 2023

Activity 2: Groundwater Atlas preparation and publication

Activity Budget: $1,300,744

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

Activity Milestones:

Description	Completion Date
Preparation and publication of up to 2-3 complete County Groundwater Atlases	March 31, 2023
Preparation and publication of up to 2-3 complete County Groundwater Atlases	March 31, 2024

Activity 3: Atlas Stakeholder Workshop & Dissemination Activities

Activity Budget: $90,000

Activity Description:
To introduce local resource professionals to the atlas when complete, for this activity DNR will provide hands-on workshops and potentially field trips in cooperation with county staff. Workshops include real-life exercises that demonstrate some of the critical and creative ways to use the groundwater atlas to manage resources. DNR will conduct other dissemination activities as detailed in that section of this work plan.

Activity Milestones:

Description	Completion Date

Complete workshops for 2-3 completed county groundwater atlases	June 30, 2023
Complete workshops for 2-3 completed county groundwater atlases	June 30, 2024

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.
At the completion of a Groundwater Atlas for a county, DNR provides direct personal notification to county partners of the availability of the atlas. DNR also notifies LCCMR staff and approximately 4,000 email recipients (listserv: http://www.dnr.state.mn.us/emailupdates) who have signed up to receive such notifications. DNR uses official news releases that are picked up by media outlets across the state, and targeted news releases to county media. Additional dissemination outlets include articles or updates in newsletters for organizations such as the Legislative Water Commission, Association of Minnesota County's, the Minnesota Ground Water Association, internal DNR agency news releases, and presentations at technical and local conferences across Minnesota.

Each completed atlas is printed in paper format and distributed to the county, libraries, state agencies, and other organizations. County representatives are provided with up to 100 paper (hard) copies of the final atlas to distribute to local stakeholders at no charge. Project data, including water chemistry data and GIS data are available on the DNR web site. Water chemistry data are also incorporated into the interagency EquiS database that can be used by all state government entities. PDF versions of the complete report are posted to the DNR web site: https://www.dnr.state.mn.us/waters/groundwater_section/mapping/status.html.

Following the publication of each atlas, a local workshop is held to introduce the report contents and train users in its application. County representatives host the workshop, inviting interested parties. Real-life exercises based on the specific groundwater resources of the county are used to walk stakeholders through the use of the comprehensive information provided in the CGA for their county. Following dissemination and the local workshop, DNR staff are available to the counties and others to answer questions and assist in the continued application and use of the atlas.

The Minnesota Environment and Natural Resources Trust Fund (ENRTF) is 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 be funded?
The DNR provides training and support to atlas users, through workshops, field trips, user guides, conference and media presentations and importantly, ongoing support to individual county and local resource managers 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), spring shed 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

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
Hydrogeologist Supervisor		Project Manager/Senior Technical			20%	0.75	X	$101,250
Information Officer 2		Technical Editor			20%	0.75	X	$72,250
Hydrogeologist 2/Engineer		Hydrogeologist/Author			20%	1.5	X	$114,000
Hydrogeologist 2		Hydrogeologist/Author			20%	1.5	X	$171,000
Hydrogeologist 2		Hydrogeologist/Author			20%	1.5	X	$123,000
Hydrogeologist 3		Hydrogeologist/Lead Author			20%	0.75	X	$93,750
Senior Groundwater Specialist		Project Lead/Karst Geology Specialist			20%	0.45	X	$56,250
Research Analyst Senior		Lead GIS			20%	0.75	X	$65,250
Hydrogeologist 1		Hydrogeologist/Fieldwork Lead			20%	1.5		$136,500
Hydrogeologist 2		Hydrogeologist/Author			20%	1.5	X	$120,000
Research Scientist/Hydrogeologist		Chief Author/Senior Technical			20%	1.5	X	$204,000
							Sub Total	**$1,257,250**
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 each county included in the atlas schedule. With ML2021 appropriation, groundwater from six counties would be analyzed by the MDA for approximately 660 samples analyzed, at a total cost of approximately $240,000.		X		2		$240,000
University of Minnesota Chemistry Laboratory	Professional or Technical Service Contract	UM Chemistry Laboratory provides carbon-14 analysis of groundwater samples collected for each county to understand groundwater residence time and groundwater-surface water connections. Analytical costs are approximately $8,000 per county, or $48,000 for six counties.		X		0.2		$48,000
University of Waterloo	Professional or Technical	The University of Waterloo provides unique laboratory analytical services that are not		X		0.4		$108,000

	Service Contract	readily available from other vendors for tritium and stable isotopes in groundwater. Cost per county for tritium and stable isotope analysis is approximately $18,000, or a total cost for six counties of approximately $108,000.						
							Sub Total	**$396,000**
Equipment, Tools, and Supplies								
	Tools and Supplies	Supplies, including expendable water sampling supplies. Approx. 660 samples total @ $30/sample: high volume micro filters; valves and tubing for each well sampled, titration supplies (est. $19,000). Shipping costs for water samples to laboratories (est. $1,000).	Disposable supplies used for approximately 110 samples in each of the six counties sampled as part of this proposal.					$20,000
	Equipment	Non-capital equipment including: water sampling and measurement tools and field analytical meters and equipment (individual instruments/equipment cost less than $5000 each). Estimated total is $13,256 for replacement of multiple, individual meters as needed: Trimble, Hack water quality meters, Rugged Pro field probes and titrate system.	Necessary equipment and instruments for groundwater sampling.					$13,256
							Sub Total	**$33,256**
Capital Expenditures								
							Sub Total	**-**
Acquisitions and Stewardship								
							Sub Total	**-**
Travel In Minnesota								
	Miles/ Meals/ Lodging	In-state vehicle mileage (est. $25,000) and travel expenses for meals and lodging (est. $30,000), primarily for groundwater sampling and field data collection in up to six counties. All travel per the DNR travel policy.	Groundwater sampling in up to six counties.					$55,000
							Sub Total	**$55,000**

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 200 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 and postage to mail to citizens to obtain permission for water-well sampling. Total anticipated printing costs per county (cards, atlases, postage) estimated to be $8,000. Printing costs for six (6) county atlas estimated to be ~$48,000.	Post cards are used to request permission from well owners to collect samples from their wells. Approximately 200 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.					$48,000
							Sub Total	**$48,000**
Other Expenses								
		*Direct and Necessary Expenses: HR Support (~$20,680), Safety Support (~$3,842), Financial Support (~$16,812), Communication Support (~$1,324), IT Support (~$41,687), and Planning Support (~$1,149) necessary to accomplish funded programs/projects.	*Direct and Necessary Expenses includes all Department Support Services.					$85,494
							Sub Total	**$85,494**
							Grand Total	**$1,875,000**

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/Engineer		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 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 - Research Scientist/Hydrogeologist		Chief Author/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.
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 each county included in the atlas schedule. With ML2021 appropriation, groundwater from six counties would be analyzed by the MDA for approximately 660	As a State Agency, the MDA is given preference for this contract. **This is a single source contract.**

		samples analyzed, at a total cost of approximately $240,000.	
Contracts and Services - University of Minnesota Chemistry Laboratory	Professional or Technical Service Contract	UM Chemistry Laboratory provides carbon-14 analysis of groundwater samples collected for each county to understand groundwater residence time and groundwater-surface water connections. Analytical costs are approximately $8,000 per county, or $48,000 for six counties.	This is unique laboratory analytical work not readily available from other contractors, and as a state entity, the University of Minnesota Laboratory Is given preference for this work. **This is a single source 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 tritium and stable isotopes in groundwater. Cost per county for tritium and stable isotope analysis is approximately $18,000, or a total cost for six counties of approximately $108,000.	This is unique laboratory analytical work not readily available from other contractors. **This is a single source contract.**

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 (~2 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 $4,000/county for up to six counties.	Pending	$24,000
			Non State Sub Total	**$24,000**
			Funds Total	**$1,224,000**

Attachments

Required Attachments

Visual Component

File: c7fece3d-809.pdf

Alternate Text for Visual Component

The first page is a Minnesota map which shows the estimated status of groundwater atlases for each county as of July 2022. Counties are shaded according to their status as either, 1) not yet started, 2) complete/anticipated completion, or as 3) 2021-071 counties. This appropriation includes work on portions of a groundwater atlas for the six counties shown as 2021-071 counties: : Chippewa, Lake, Lincoln, Pennington, Pipestone, St. Louis. Page two is a list of all eighty seven (87) counties g...

Optional Attachments

Support Letter or Other

Title	File
County Support for Groundwater Atlas	e762306d-9b8.pdf
Background Check Certification	6bef3935-d88.pdf

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

The recommended funding is 75% of the original proposal request (from $2,500,000 to $1,875,000). To achieve this reduction, the work plan was reduced by approximately 25% in all categories. The number of counties planned for this work (including groundwater sampling) was reduced by 25% from eight to six. Polk and Red Lake counties, which were in the original proposal, have been removed from the work plan. The personnel funding was reduced from approximately two (2) years of support to one and one-half (1.5) years, a 25% reduction.

DNR added more detailed activities and milestones per LCCMR staff recommendations. The activities and milestones had to be revised to account for overlapping appropriations (2020-009, 2021-071) resulting from the legislative process in 2020/2021. We selected state-wide work and impacts from new drop downs because our plans call for work across the state and we update statewide coverages (near surface and bedrock sensitivity and water table) every time a new county atlas is completed. No changes to budget or scope were made.

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 agree travel expenses must 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 agree to the Commissioner's Plan.

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

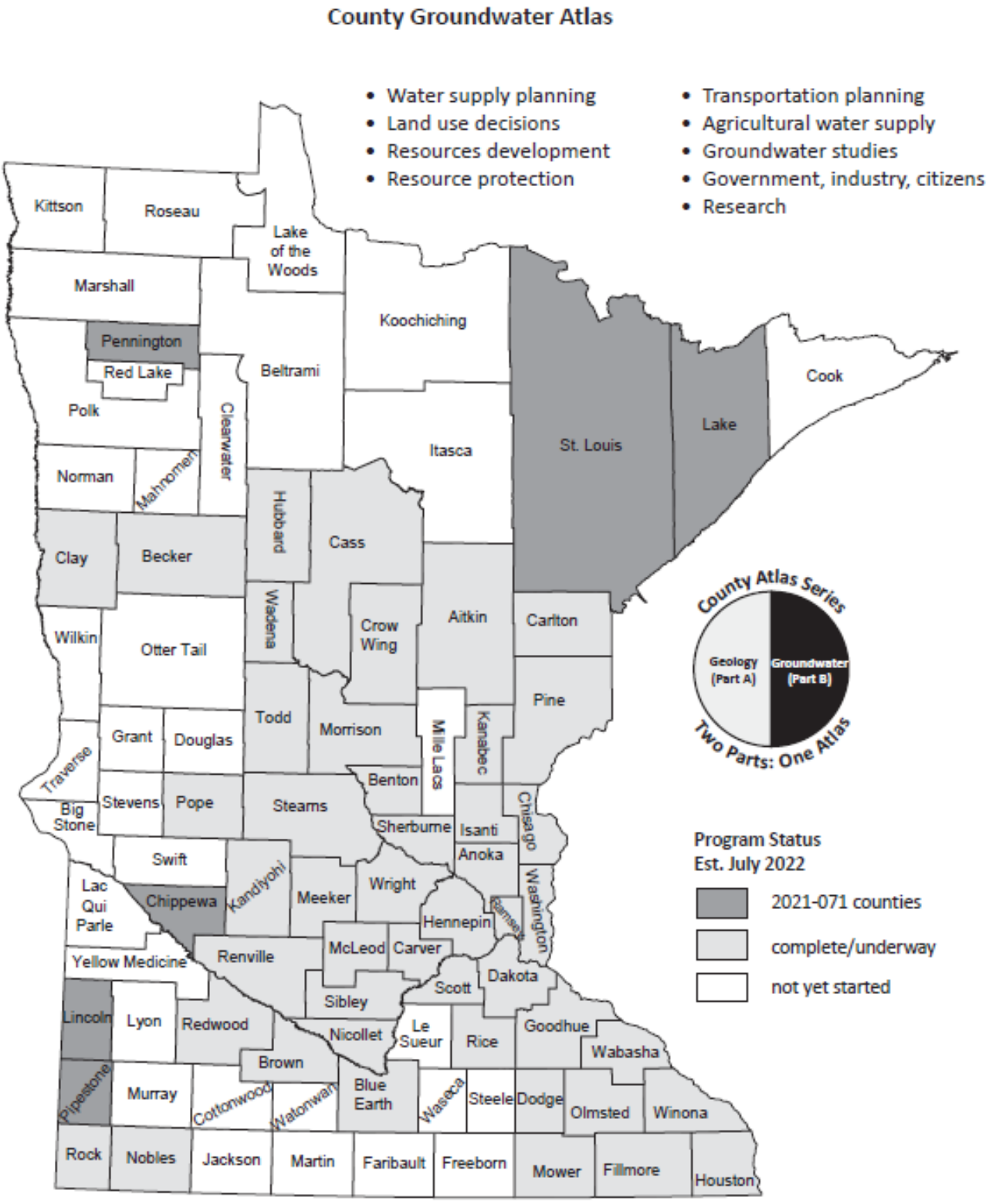
Does the organization have a fiscal agent for this project?

No

County Groundwater Atlas

DEPARTMENT OF NATURAL RESOURCES

• Water supply planning • Transportation planning • Land use decisions • Agricultural water supply • Resources development • Groundwater studies • Resource protection • Government, industry, citizens • Research



2021 -071 counties

1. Chippewa
2. Lake
3. Lincoln
4. Pennington
5. Pipestone
6. St. Louis

Complete/Underway*

1. Anoka
2. Becker
3. Benton
4. Blue Earth
5. Brown
6. Carlton
7. Cass
8. Carver
9. Chisago
10. Clay
11. Crow Wing
12. Dakota
13. Dodge
14. Fillmore
15. Goodhue
16. Hennepin
17. Houston
18. Hubbard
19. Isanti
20. Kanabec
21. Kandiyohi
22. McLeod
23. Meeker
24. Morrison
25. Mower
26. Nicollet
27. Nobles
28. Olmsted
29. Pine
30. Pope
31. Ramsey
32. Redwood
33. Renville
34. Rice
35. Rock
36. Scott
37. Sherburne
38. Sibley
39. Stearns
40. Todd
41. Wabasha
42. Wadena
43. Washington
44. Winona
45. Wright

Not yet started

1. Beltrami
2. Big Stone
3. Clearwater
4. Cook
5. Cottonwood
6. Douglas
7. Fairbault
8. Freeborn
9. Grant
10. Itaska
11. Jackson
12. Kittson
13. Koochiching
14. Lac Qui Parle
15. Lake of the Woods
16. Le Sueur
17. Lincoln
18. Lyon
19. Mahnomen
20. Marshall
21. Martin
22. Mille Lacs
23. Murray
24. Norman
25. Otter Tail
26. Polk
27. Red Lake
28. Roseau
29. Steele
30. Stevens
31. Swift
32. Traverse
33. Waseca
34. Watonwan
35. Wilkin
36. Yellow Medicine

*Includes counties completed prior to current Part B style.