



Environment and Natural Resources Trust Fund

2027 Request for Proposal

General Information

Proposal ID: 2027-432

Proposal Title: Geologic Atlases for Water Resource Management-FY27

Project Manager Information

Name: Barbara Lusardi

Organization: U of MN - MN Geological Survey

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Project Basic Information

Project Summary: Geologic atlases provide maps/databases essential for improved management of groundwater, surface water, and other natural resources. This proposal will continue efforts and start new counties equaling about 3 atlases.

ENRTF Funds Requested: \$1,455,000

Proposed Project Completion: June 30, 2030

LCCMR Funding Category: Water (B)

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?

In the Future

Narrative

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

With seventy-five percent of Minnesotans obtaining their drinking water from groundwater, it is essential that the distribution and composition of subsurface materials controlling water flow and storage are mapped in detail. The distribution of geologic materials not only defines aquifer boundaries, but also aquifer connections to the land surface and to surface water. The distribution of geologic materials also impacts groundwater quality, both through rock-water interaction and by providing pathways for contaminant infiltration from the land surface.

Geologic atlases provide maps and databases that are essential for improved ground and surface water management. This foundational data supports drinking water management, domestic and industrial supply, irrigation, and aquatic habitats. Atlases enhance education, provide technical assistance for management and regulation, and facilitate wise use of natural resources. They support permitting, land-use planning, wellhead protection, remediation, nutrient management, monitoring, modeling, and well construction. Atlas information is used by citizens and government agencies.

Atlases are complete/underway for 81 of Minnesota's 87 counties. This proposal will continue efforts in counties that are underway and start up to 2 new counties.

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.

A complete atlas consists of Part A by the Minnesota Geological Survey (MGS)—focused on geology and the state water well database County Well Index (CWI), and Part B by the DNR (funded separately) focused on groundwater. By defining the "container," County Geologic Atlas Part A maps provide foundational data on aquifer extent and the presence or absence of protective layers above them. Associated CWI data updates provide an aquifer-specific framework for interpreting well water quality data. Geologic interpretations, added to CWI as part of the CGA program, link water quality information to well construction information, addressing extent of contamination in aquifers.

As a first step, MGS collaborates with county and tribal stakeholders to establish accurate digital water well locations. Concurrently, geologists visit the project area to describe and sample rock and sediment. Additional data collection includes shallow and deep drilling programs along with geophysical, geochemical, and geochronologic surveys. Once analysis is completed, maps and associated databases are formalized and prepared for use in geographic information systems and distribution via print and digital means.

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?

This proposal will continue efforts in counties that are underway and start up to 2 new counties. Atlases provide foundational data that can be used to plan, protect, and preserve Minnesota's natural resources. Specific outcomes include:

1. Update and append CWI to support the mapping, to document water use in specific aquifers, and to help resolve issues with well construction, water supply, and potential contamination.
2. Complete unfinished County Geologic Atlas projects in progress (e.g., from 2025 appropriation)
3. Make progress on maps of bedrock geology, surficial geology, subsurface Quaternary geology, bedrock topography, and thickness of glacial deposits.

Activities and Milestones

Activity 1: Initiate up to 2 new county geologic atlases; continue existing projects—equivalent of about 3 atlases total

Activity Budget: \$1,000,000

Activity Description:

Atlases begin with compilation of a database of subsurface information including well records. The local project partner establishes accurate digital locations for these wells. Concurrently, geologists visit the project area to describe and sample landforms, and exposures of rock or sediment.

An initial assessment of the geologic data is then completed to focus additional data gathering including shallow and deep drilling programs and geophysical, geochemical, and geochronologic surveys. Analysis of the data set is then completed and maps and associated databases are formalized and prepared for use in geographic information systems and distribution via print and web. The number of counties we can map with these funds will be affected by the size, geologic complexity, and data availability of the counties that are chosen.

Recent graduates and undergraduate students are hired to assist geologists in the field and laboratories. This provides practical experience and opportunities for a diversity of young people to explore and pursue careers in the environment and natural resources.

Activity Milestones:

Description	Approximate Completion Date
Conduct field work for counties in years 1 and 2 (surficial and bedrock) ~2 counties	June 30, 2030
Drill/log cores for counties in years 2 and 3 (subsurface and bedrock) ~2 counties	June 30, 2030
Collect bedrock data (seismic, drill logs, etc) (topography, depth to bedrock) (~3 counties)	June 30, 2030
Compile and draft surficial, bedrock, topography and thickness maps (years 2-4)(~3 counties)	June 30, 2030
Compile, draw, and process cross sections and sand models (subsurface geology; Sand Distribution models)(~3)	June 30, 2030

Activity 2: Compile, edit and print atlas plates

Activity Budget: \$385,000

Activity Description:

In order to convey the meaning of the data we've collected; geologists must write text that describes the geologic framework of the county and why certain materials are important to map and identify. The associated text and figures help to add context to the map and associated data. Once all the pieces for a particular plate are assembled (map, text, figures, data, etc.) they are submitted for internal and external review. Upon revision and acceptance, the pieces are edited and formatted to fit the page. Professional printing and posting digital files are the final steps.

MGS disseminates atlas products and data in a variety of ways to make them easily accessible and understandable to different audiences. To complement GIS data distribution, online story maps are one of the newest methods that MGS has employed to reach out and educate people about the geology of the state. MGS also hosts workshops and field trips upon request to help state and local agencies utilize our products to protect, conserve, restore, enhance, and manage our natural resources. MGS acknowledges our funding sources on all paper, digital, and oral communications.

Activity Milestones:

Description	Approximate Completion Date
Draft text and figures for plates (~3 counties)	June 30, 2030
Submit materials for peer review, editing, and production (~3 counties)	June 30, 2030
Print final CGA plates and process files for DVD and digital posting (~3 counties)	June 30, 2030

Activity 3: Update and append database of well construction records supporting public and private well initiatives

Activity Budget: \$45,000

Activity Description:

Drilling records are the most numerous data available. Water-well records are required by the state and include a description of the materials that were drilled through. This information is vital to our geologists as they interpret and map the sediment and rock layers. Well construction records are also used to interpret the depth to bedrock (and drift thickness), draw the cross sections that are used to create the Quaternary stratigraphy (plate 4) and sand distribution models (plate 5) of the County Geologic Atlases. County and/or tribal staff perform the locating of water wells in their county.

Our goal is to ensure every county has an atlas so everyone can enjoy similar drinking water protection standards as well as ongoing maintenance of this information infrastructure. The program also supports private well initiatives by MDH Water Policy Center and the UMN Water Resources Center through well inventory projects and geologic interpretations added to CWI. These updates provide the means to link water quality information to aquifer-specific well construction information for private well owners, addressing extent of contamination in aquifers.

Activity Milestones:

Description	Approximate Completion Date
Mentor county staff to locate water wells (pre-MGS field work) (~2 counties)	June 30, 2030
Compile location data and collect subsurface data from other agencies; Enter stratigraphic interpretations (~2 counties)	June 30, 2030
Update water well (CWI) database and compile CGA database plate (~3 counties)	June 30, 2030

Activity 4: Sample and construct statewide geochemistry and geochronology database to aid in stratigraphic interpretation and correlation of glacial units

Activity Budget: \$25,000

Activity Description:

Identification of the glacial sediment layers is a key step to correlating those layers from place to place. This is important because geogenic contaminants may be associated with specific sediments. To mitigate the effect of these contaminants in drinking water, a driller needs to know the provenance and thickness of the glacial sediment. Geochemical analyses of the sediments will help correlate the aquifers and delineate their extent. Identifying glacial aquifers is done as part of the Quaternary Stratigraphy and sand model distribution (plates 4 and 5 of the County Geologic Atlas). This is an ongoing effort whereby we analyze samples from current drilling and compare with samples from other parts of the state.

Activity Milestones:

Description	Approximate Completion Date
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Collect samples from new or existing drill cores for geochemical and geochronological analyses (ongoing)	June 30, 2030
Compile and interpret geochemical and geochronological results county by county (~2 counties)	June 30, 2030
Compile and interpret regional/statewide stratigraphy (ongoing)	June 30, 2030

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
MN Counties	MN Counties	The counties are required to provide in-kind service to help us build our water well database. Counties establish accurate well locations and identify specific project needs.	No
Vanessa Barrata	MN Dept. of Natural Resources- Ecological and Water Resources	A complete geologic atlas consists of Part A constructed by the Minnesota Geological Survey (MGS) and focused on geology and the County Well Index, and Part B constructed by the DNR Eco-Waters Division (funded separately) and focused on groundwater--water levels, water chemistry, and sensitivity.	No

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.

Every atlas is produced in portable document format (PDF), as geographic information system files (GIS), and in printed form. The digital files are available from the University of Minnesota Digital Conservancy, and via link from the MGS web page <https://cse.umn.edu/mgs/county-geologic-atlas>. Funding support by Environment and Natural Resources Trust Fund is acknowledged through use of the trust fund logo or attribution language on project print and electronic media, publications, signage, and other communications. Each project culminates with a meeting held in the project area to present the results to the county staff, and any other interested parties. At these meetings the products are described, access to the products is explained, and examples of applications of the products to common resource management situations are demonstrated. The printed copies are shared with the county, who in turn can distribute them to libraries, schools, townships, and other agencies. They are also distributed by the MGS map sales office. Products are also made available to earth science teachers and other educators for classroom exercises. Atlas products are also displayed and explained at educational events for agencies and organizations such as SWCD staff, sewage treatment system contractors, well drillers, and even hazardous materials management (HAZMAT) responders. In addition, the MGS hosts an Open Data Portal on which many of our county geologic atlases are presented as “Story Maps” that allow for direct access of the data without any special software or interface. Representatives from MGS and DNR participated in various field trips, meetings, and strategic planning sessions highlighting aspects of the CGA program and discussing geology and groundwater issues.

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?

Most atlases require 5-6 years to complete, so some projects started in this proposal may not be finished and will require additional funding. This funding level is sized to continue the overall funding of geologic atlases (Part A) that are currently underway while initiating about 2 new atlases for an equivalent of about 3 atlases total. At this pace, we estimate that we will complete statewide coverage by about 2035. Funds from this proposal may be applied, but are not limited to, the following counties: Murray, Freeborn, Koochiching, Stevens, Traverse, Beltrami, Le Sueur, Itasca, Clearwater, Cottonwood, Marshall and Mille Lacs.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
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Geologic Atlases For Water Resource Management	M.L. 2021, First Special Session, Chp. 6, Art. 5, Sec. 2, Subd. 03a	\$2,000,000
Geologic Atlases for Water Resource Management	M.L. 2021, First Special Session, Chp. 6, Art. 6, Sec. 2, Subd. 03g	\$3,092,000
Geologic Atlases for Water Resource Management	M.L. 2024, , Chp. 83, Art. , Sec. 2, Subd. 03w	\$1,236,000
Geologic Atlases for Water Resource Management	M.L. 2025, First Special Session, Chp. 1, Art. 2, Sec. 2, Subd. 03p	\$1,260,000

Project Manager and Organization Qualifications

Project Manager Name: Barbara Lusardi

Job Title: Associate Director

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

Barbara Lusardi has been with the Minnesota Geological Survey for over 32 years. Thus, she has decades of experience implementing all aspects of the County Geologic Atlas program from scientist to supervisor. Barbara received a Master's degree in Geology from the University of Maine at Orono in 1992. She started working at the Minnesota Geological Survey that same year. A brief outline of Barbara's professional experience is listed below.

Professional Experience

MINNESOTA GEOLOGICAL SURVEY, University of Minnesota, St. Paul, MN

Associate Director (2018 – present)

Participate in strategic planning, budget development, program administration, project management, personnel administration, purchasing, facilities management, information systems planning, search and hiring procedures, contract development, grants administration, and client relations.

Geologist (1992 – present)

Map glacial sediments at the surface and in the subsurface; Conduct fieldwork and laboratory analyses; compile, analyze and interpret data; create surficial geologic maps, stratigraphic cross sections, and digital databases that provide geologic framework necessary to manage land and water resources.

Outreach Coordinator (1994 – present)

Communicate to external audiences (government agencies, county officials, news media, and general public) to provide geologic information and to promote MGS initiatives and programs.

Organization: U of MN - MN Geological Survey

Organization Description:

The Minnesota Geological Survey is the geologic mapping agency for the State of Minnesota, as directed by its enabling legislation. Its goal is to produce comprehensive geologic mapping and related databases statewide at a scale of 1:100,000 or more detailed. This mapping supports informed land use management and decision-making that protects and wisely allocates resources. The MGS is part of the N.H. Winchell School of Earth and Environmental Sciences in the College of Science and Engineering at the University of Minnesota. It has existed since 1872 and has a current staff of approximately 30.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
16 Geologists		Create geologic maps; collect and interpret data, draw map, write text, draft figures , present results			35%	11.19		\$770,000
3 GIS/computer/web development specialists		Create GIS products leading to final print and digital versions of maps, cross sections and sand distribution models; finalize and archive GIS data; develop web accessible content			35%	1.92		\$132,000
2 field assistants		Assist geologists with collection and processing of geologic information in the laboratory, field and office			35%	0.63		\$44,000
3 Database specialists		Database development and support: database development for existing and new projects; train and supervise internal and external staff in well location; data collection of downhole geophysical data			35%	1.59		\$110,000
1 editor		Edit maps, text, and figures for publication; coordinates printing			35%	0.63		\$44,000
							Sub Total	\$1,100,000
Contracts and Services								
TBD	Service Contract	Laboratory analyses; includes but not limited to geochemistry (rock and glacial materials), thin sections, pollen counts, geochronology (OSL, radiocarbon, rock); laboratories will be evaluated based on cost and capabilities in accordance with U of M purchasing rules. Contracts or bids as necessary. Includes \$500 for sample shipping.				0		\$25,000
TBD	Service Contract	Rotary sonic test hole drilling (competitive bid). Generally, 3-6 holes per county. Rotary sonic method yields 4" undisturbed core of unconsolidated deposits. The average hole cost is \$16,500 but varies with depth. Depth corresponds to depth of bedrock surface				0		\$235,000
							Sub Total	\$260,000

Equipment, Tools, and Supplies								
	Tools and Supplies	Field and lab expendables (field notebooks, batteries, sample bags, gloves, face masks, distilled water); Giddings probe repairs and parts; maps, core boxes. None of these items will exceed \$5,000 per unit.	These items are needed to collect, process, and store samples					\$10,000
							Sub Total	\$10,000
Capital Equipment								
							Sub Total	-
Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
	Miles/ Meals/ Lodging	Vehicle rental as needed (weekly and mileage); meals; lodging; amounts cannot be calculated until specific project locations are known	Geologists must travel to each county in order to collect samples, identify rocks and sediment, interpret landforms, drill and log core, and to train county staff. In order to be most efficient, geologists may spend several days to weeks in the field.					\$75,000
							Sub Total	\$75,000
Travel Outside Minnesota								
							Sub Total	-
Printing and Publication								
	Printing	Initial print run of 100 copies of each of 6 plates (each 3' by 3' and four color) per county, current prices about \$4,000 per county. Subsequent printing on demand via online contractor.	Map plates are best viewed on a printed page. Digital files are also made available (PDF, GIS, web browser)					\$10,000
							Sub Total	\$10,000
Other Expenses								

							Sub Total	-
							Grand Total	\$1,455,000

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				
Cash	MN Department of Natural Resources Professional Services Contract FY26-27 contract: \$500,000; we anticipate renewal in FY28 for additional 2 years at a similar funding level	The MGS will work on the following program elements and associated activities during the biennium: 1) Completion and printing of the Part A portion of current atlas projects. 2) Continuation of current and new CGAs. 3) Initiation of preliminary work on new county geologic atlases, if funds are available. 4) Scientific drilling to augment county geologic atlas projects. Funds may be distributed to any or all categories above with at least \$50,000 for item #4.:	Potential	\$500,000
Cash	Clean Water Funds FY26 distribution: \$400,000 FY27=28 proposed: \$800,000 Balance as of February 17, 2026	Used to supplement other funding sources to complete County Geologic Atlases (Part A) for the entire state; funding to continue ongoing atlases and to start new atlas projects (including but not limited to database development, mapping, drilling, sample analyses, editing and production (print and digital files)	Pending	\$725,000
			State Sub Total	\$1,225,000
Non-State				
In-Kind	Individual counties; value varies with the number of records and the size of the county; estimated to be \$10,000 to \$50,000	Individual counties are required to establish accurate locations for water wells with construction records. This helps MGS build a database of geologic information that is vital to our mapping process.	Pending	\$25,000
Cash	USGS Statemap program USGS Great Lakes Geologic Mapping Coalition (estimate pending) \$100,000 Funds listed are for CGA related work and are estimated based on current request and prior awards. THIS FUNDING IS NOT LIKELY DUE TO FEDERAL BUDGET CONSTRAINTS.	MGS competes for federal cost-sharing of geologic mapping through the STATEMAP Program, the Great Lakes Geologic Mapping Coalition, and the USGS Earth MRI Program. MGS has used these programs to fund map elements of geologic atlases, or improvement of databases utilized in geologic atlas work. The figure provided is an estimate based on pending proposals.	Potential	-
			Non State Sub Total	\$25,000
			Funds Total	\$1,250,000

Total Project Cost: \$2,705,000

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: [6a2baf6c-e8d.pdf](#)

Alternate Text for Visual Component

Status map showing the counties for which CGA is complete (53) or underway (27) and not yet been started (7).

Funding graph showing spending history by sponsor in 5-year increments and estimated amount to complete the remaining counties. Future funding is not specified by sponsor nor timeframe....

Supplemental Attachments

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

Title	File
MGS authorization letter	63bbb080-2ea.pdf

Administrative Use

Does your project include restoration or acquisition of land rights?

No

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 proposal:

None

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