



Environment and Natural Resources Trust Fund

2027 Request for Proposal

General Information

Proposal ID: 2027-168

Proposal Title: Aggregate Resource Mapping

Project Manager Information

Name: Heather Arends

Organization: MN DNR - Lands and Minerals Division

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Project Basic Information

Project Summary: Aggregate resource mapping identifies Minnesota's finite sand and gravel resources, helping reduce greenhouse gas emissions through local sourcing while supporting climate-resilient infrastructure and strategic flood recovery planning for 4-6 counties.

ENRTF Funds Requested: \$653,000

Proposed Project Completion: June 30, 2030

LCCMR Funding Category: Resiliency (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.

Aggregate resource maps and databases provide essential information to local governments to guide land-use decisions and support climate-resilient infrastructure planning. Demand for aggregate continues to grow due to significant investments in transportation, water, and recreation infrastructure. Since 2020, sixteen counties have requested mapping assistance, contributing to a waitlist of 24 counties.

Without current mapping, communities risk losing strategically located deposits to incompatible development, increasing long-haul transport and associated greenhouse gas emissions from state-funded projects. Recent MnDOT requirements for Environmental Product Declarations highlight the importance of locally sourced materials to reduce lifecycle carbon impacts. Access to appropriate septic sand resources is also critical to protect groundwater quality, particularly in growing rural areas. Mapping helps manage competing land uses by directing development away from sensitive natural systems and toward suitable geologic resources.

Locally mapped aggregate resources are critical for emergency response and climate resilience. Over the past 25 years, mega-rains are 2.5 times more common resulting in approximately \$40B in weather-related damage. Washed-out roads, damaged culverts, and eroded streambanks require immediate access to construction aggregates for stabilization and reconstruction. Maintaining access to local sources reduces transportation costs and emissions and supports rebuilding stronger and more sustainably.

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.

This proposal will complete aggregate resource mapping in four to six counties currently on the DNR waitlist. Work will include compilation of existing geologic data, field investigations, drilling where necessary, and GIS-based resource modeling to identify and classify sand and gravel deposits, including septic sand resources.

Mapping products will be delivered in standardized digital and print formats and incorporated into publicly accessible databases to ensure consistent data standards statewide. Counties will receive technical briefings to support integration of mapping results into comprehensive plans, transportation planning, groundwater protection strategies, emergency response planning, and climate resilience initiatives.

Counties will be prioritized based on recommendations from the 2017 Aggregate Resources Task Force and the Office of the Legislative Auditor, as well as documented factors such as limited access to construction materials for flood recovery and resilient infrastructure. Additional priority will be given to areas experiencing land use pressures where loss of strategically located deposits would increase transportation emissions. By identifying locally available aggregate and septic sand resources, updated mapping supports emergency response planning, reduces lifecycle greenhouse gas impacts in transportation projects, and strengthens long-term, land-use decision-making.

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 complete current projects and start new projects to equal 4-6 complete counties with the following outcomes:

1. A complete survey of active, inactive and abandoned aggregate mines, which will aid in reclamation efforts (abandoned mines can be a source of storm water runoff and pollution from illegal dumping).
2. Complete any unfinished ENRTF supported Aggregate Mapping projects in progress started with 2021 appropriations.
3. Provide technical data and maps that are accessible to the public, easily understood by non-geologists, and shows the distribution of sand, gravel, and crushed stone resources compiled at 1:50,000 scale.

Activities and Milestones

Activity 1: Initiate or complete 4-6 aggregate resource maps

Activity Budget: \$653,000

Activity Description:

DNR geologists use county-scale geologic mapping techniques to identify sand, gravel, and crushed stone resources and characterize their relative quality. This information is foundational to natural resource stewardship and is used by local governments and the public. The aggregate mapping process includes:

1. Compiling and evaluating gravel pit data, historic geologic information, GIS datasets, and remotely sensed layers (e.g. LiDAR).
2. Conducting fieldwork to describe and analyze deposits, survey gravel pits and bedrock quarries, and collect geologic observations.
3. Drafting aggregate resource potential maps based on office and field-based data, and facilitating technical peer review.
4. Publishing county-specific data products including free GIS data packages, countywide PDF maps, and interactive aggregate map services.
5. Co-sponsoring a workshop with local partners to educate users on how to apply project data to local resource stewardship, while continuing to provide ongoing technical support.

DNR's Aggregate Resource Mapping Program coordinates with Minnesota Geologic Survey and Minnesota Department of Transportation, as well as local partners, to produce geologically accurate and publicly accessible maps and information.

Activity Milestones:

Description	Approximate Completion Date
Compile data for 4-6 counties	June 30, 2029
Conduct fieldwork, collect field observations, inventory active, inactive, and reclaimed pits/quarries, and collect samples.	December 31, 2029
Develop and manage subaward with UMD to map Cook County	June 30, 2030
Complete aggregate maps of 4-6 counties (including Cook County through subaward)	June 30, 2030

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Howard Mooers	University of Minnesota - Duluth	Project Geologist and will oversee the mapping of Cook County.	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.

Every aggregate map is produced in portable document format (PDF), an interactive web map, as geographic information system files (GIS), and in printed form. The digital files are available to download from the Department of Natural Resources as well as the Minnesota Geospatial Commons. Each completed county as its own webpage that links to the above mentioned formats of dissemination:

https://www.dnr.state.mn.us/lands_minerals/aggregate_maps/index.html. Each project culminates in a workshop hosted by the DNR for county staff, and any other interested parties; and a presentation to the county commissioners at a regularly scheduled board meeting. At these workshops, the products are described, access to the products is explained, and examples of applications of the products to common resource management situations are demonstrated. Printed copies are shared with the county, who in turn can distribute them to libraries, schools, townships, and other agencies. Any member of the public may request a map, free of charge.

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?

As provided by MN Statute 84.94, counties who receive this data must consider the information in their land use decision. This work will be undertaken by county and township planning and zoning authorities. No additional funding will be required.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Accelerated Aggregate Resource Mapping	M.L. 2019, First Special Session, Chp. 4, Art. 2, Sec. 2, Subd. 03h	\$700,000
Aggregate Resource Mapping	M.L. 2022, , Chp. 94, Art. , Sec. 2, Subd. 10a	\$500,000
Continued Aggregate Resource Mapping	M.L. 2025, First Special Session, Chp. 1, Art. 2, Sec. 2, Subd. 03y	\$621,000

Project Manager and Organization Qualifications

Project Manager Name: Heather Arends

Job Title: Mineral Potential Section Manager

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

Heather Arends is a natural resource professional with more than 25 years of experience at the Minnesota Department of Natural Resources (DNR). She manages a team of geologists within the Division of Lands and Minerals and oversees several statewide geoscience initiatives, including the Aggregate Resource Mapping Program and management of the Minnesota Drill Core Library, one of the largest publicly accessible drill core repositories in the United States.

Heather has extensive experience managing state and federal grant-funded scientific projects. She has successfully managed multiple projects funded by the Legislative-Citizen Commission on Minnesota Resources (LCCMR) as well as federal grants from the U.S. Geological Survey, including the Earth Mapping Resources Initiative (Earth MRI) and the National Geological and Geophysical Data Preservation Program (NGGDPP). These projects involve coordinating multidisciplinary teams, managing budgets and timelines, and ensuring timely delivery of scientific data and reports.

Her work focuses on improving the understanding of Minnesota's geologic resources through mapping, data preservation, and public access to geoscience information. These efforts support land-use planning, natural resource stewardship, and informed decision-making by local governments, researchers, and the public.

Heather holds both a Bachelor of Science and a Master of Science in Geology from the University of Minnesota. Her academic training and extensive professional experience provide a strong foundation for managing complex geoscience projects and delivering high-quality scientific information that benefits Minnesota's citizens and natural resource management efforts.

Organization: MN DNR - Lands and Minerals Division

Organization Description:

The Minnesota Department of Natural Resources works to integrate and sustain the interdependent values of a healthy environment, a sustainable economy, and livable communities. DNR's integrated resource management strategy shares stewardship responsibility with Minnesotans and partners to manage for multiple interests. DNR protects the state's natural heritage by conserving the diversity of natural lands, waters, and fish and wildlife that provide the foundation for Minnesota's recreational and natural resource-based economy. DNR manages natural lands such as forests, wetlands, and native prairies; maintains healthy populations of fish and wildlife; and protects rare plant and animal communities throughout the state. DNR manages the state's water resources, sustaining healthy waterways and ground water resources. DNR provides access to enrich public outdoor recreational opportunities, such as hunting, fishing, wildlife-watching, camping, skiing, hiking, biking, motorized recreation, and conservation education through a state outdoor recreation system that includes parks, trails, wildlife management areas, scientific and natural areas, water trails, and other facilities. DNR supports natural resource-based economies, managing state forest lands for multiple forest values, ensuring the maximum long-term economic return from school trust lands, and providing other economic opportunities in a manner consistent with sound natural resource conservation and management principles.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
Geologist 1		Project Geologist			28%	2		\$168,000
Geologist 2		Project Geologist			28%	2		\$168,000
							Sub Total	\$336,000
Contracts and Services								
University of Minnesota, Duluth	Subaward	Providing additional mapping services through contract				3		\$250,000
							Sub Total	\$250,000
Equipment, Tools, and Supplies								
	Equipment	Field equipment such as augers, shovels, safety equipment and related items.	Equipment needed to conduct geologic fieldwork.					\$2,340
	Tools and Supplies	Supplies includes fieldnote books, field clothing and boots, sample bags, and related items.	Supplies for conducting fieldwork.					\$2,000
							Sub Total	\$4,340
Capital Equipment								
							Sub Total	-
Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
	Miles/ Meals/ Lodging	Lodging, meals, mileage for 90 days	Travel expenses for MN travel related to field survey in Activities 1 & 2. Travel expenses are subject to State of MN labor agreements					\$17,450

							Sub Total	\$17,450
Travel Outside Minnesota								
							Sub Total	-
Printing and Publication								
							Sub Total	-
Other Expenses								
		Direct and Necessary Cost - Safety Support	To support DNR internal services associated with projects					\$1,272
		Direct and Necessary Cost - People Support	To support DNR internal services associated with projects					\$9,703
		Direct and Necessary Cost - Financial Support	To support DNR internal services associated with projects					\$4,302
		Direct and Necessary Cost - Communication Support	To support DNR internal services associated with projects					\$2,086
		Direct and Necessary Cost - IT support	To support DNR internal services associated with projects					\$26,304
		Direct and Necessary Cost - Planning Support	To support DNR internal services associated with projects					\$1,543
							Sub Total	\$45,210
							Grand Total	\$653,000

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	General Fund	Salary for classified employee	Potential	\$200,000
			State Sub Total	\$200,000
Non-State				
			Non State Sub Total	-
			Funds Total	\$200,000

Total Project Cost: \$853,000

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: [12828345-9ab.pdf](#)

Alternate Text for Visual Component

Map showing the current status of aggregate resource mapping in the state, with 31 completed counties, 24 counties that have requested this information, and 4 counties in progress....

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 Commissioner's Plan 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?

No

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:

Dr. Howard Mooers, University of Minnesota, Duluth

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

N/A