



Environment and Natural Resources Trust Fund (ENRTF)

M.L. 2019 ENRTF Work Plan (Main Document)

Today's Date: August 23, 2018

Date of Next Status Update Report: March 15, 2020

Date of Work Plan Approval: June 5, 2019

Project Completion Date: June 30, 2022

Does this submission include an amendment request? No

PROJECT TITLE: County Geologic Atlases - Part B

Project Manager: Paul Putzier

Organization: Minnesota Department of Natural Resources

College/Department/Division: Ecological and Water Resources Division

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Location: Statewide, with focus on these counties: Becker, Brown, Cass, Dodge, Hubbard, Isanti, Kanabec, Olmsted, Redwood, Wadena, and Washington.

Total Project Budget: \$2,400,000

Amount Spent: \$0

Balance: \$2,400,000

Legal Citation: M.L. 2019, First Special Session, Chp. 4, Art. 2, Sec. 2, Subd. 03o

Appropriation Language: \$2,400,000 the first year is from the trust fund to the commissioner of natural resources to continue producing county geologic atlases to inform management of surface water and groundwater resources for drinking water and other purposes. This appropriation is for Part B, which uses the geologic formations mapped in Part A of the county geologic atlases to characterize the potential water yields of aquifers and the aquifers' sensitivity to contamination.

I. PROJECT STATEMENT:

The county geologic atlas (CGA) program provides ‘Information Infrastructure’, at the county scale, including a report and series of accompanying maps, figures and tables that describe the location and size of an area’s aquifers and groundwater resources and other important information like direction of groundwater flow, sensitivity to pollution, age and chemistry of groundwater and connections to surface water resources. Information provided in an atlas is used in water, zoning and development planning and environmental protection efforts. Each county atlas (or report) is used by a wide variety of local, state and federal government agencies and by private citizens, companies and organizations. The complete atlas for each county is prepared in two parts:

- Part A – First, the geology of a county is mapped by the Minnesota Geological Survey (MGS).
- Part B – Next, the hydrogeology (groundwater) is mapped by the Department of Natural Resources (DNR).

This project supports continuing development of the Part B atlases by the DNR for counties across the state. The Part B atlas defines aquifer boundaries and helps identify the interconnection of aquifers, their sensitivity to pollution, and their connection to the land surface and surface water resources. Delineation and mapping of aquifers, recharge areas, and karst systems (sinkholes, caves) is an essential step to inform management for water supply planning, protecting water supplies, public health, ecological systems and the groundwater resource. Counties with a complete atlas (Part A & Part B) enjoy strong economic benefits especially with respect to water resource use and management. Some of the many typical applications and uses of the atlas are noted by the following selected resource managers:

Jim de Lambert, Senior Hydrogeologist, Carlson McCain, Inc: “As a consulting hydrogeologist, ...I can safely say that the State of Minnesota has an excellent hydrogeological data base compared the other states that I am familiar with. For most projects the initial information sources include the County Geologic Atlas. For Minnesota well siting projects, the County Atlas Series will be my first source of information to help define the project area and to give the area broad hydrogeologic context. This assists in identifying potential target aquifer(s). If an agricultural producer is considering irrigation on one or more parcels, the County Atlas can be used to quickly identify potential aquifers. If a public water supplier is considering a new source, the Atlas may be used to guide the search and develop specific search areas for more detailed exploration activities. If the supplier is a Rural Water System, there is often considerable flexibility with well field location and this type of county and regional information can be invaluable.”

Heather Cunningham, Zoning and Environmental Services Administrator, Carlton County: “I would say that I use the atlas on a monthly basis. In the last 6 months, I have used it for the review of an Environmental Assessment Worksheet (EAW), pollution sensitivity for a proposed mixed use development, groundwater contamination at our closed landfill, and in working with a lake association.”

Kristi Anderson, Hydrogeologist, Northwest AqwaTek Solutions: “The majority of what I do is working with the agricultural community for crop irrigation systems; I typically look to the County Geologic Atlas (CGA)....as the starting point for my work.”

Joe Hudak, Assistant Engineering Geologist, Minnesota Department of Transportation: “We typically use the county atlases for subsurface information prior to conducting any geophysical field work or drill rig borings/CPT soundings. Most of our investigations involve gathering geotechnical information for various transportation related foundations, such as bridges/structures/embankments over poor soils etc. We also use them (CGA) for areas where karst terrain may be present, areas with shallow water tables and for writing EAW reports for upcoming projects.”

Martin Larsen, Olmsted County Feedlot Technician, Landowner & Farmer, Olmsted County: “The County Geologic Atlas is an important tool for the Olmsted Soil and Water Conservation District. It is used for animal feedlot permitting and nutrient management planning to locate sinkholes, depth to bedrock and first encountered bedrock. The springshed maps included in some Part B atlases are utilized for local education and outreach. The maps of surface and groundwater interaction are shared with landowners and producers to encourage implementation of manure application setbacks and other best management practices for protection of groundwater resources.”

Each Part B county atlas project includes some or all of the following work components: assembly of data layers (from Part A atlas); development of conceptual hydrogeologic models; development of flow direction maps of the water table and deeper aquifers; groundwater sample collection for analysis and interpretation of water age and chemistry data (including arsenic and chlorides); geophysics field data collection and analysis; construction of hydrogeologic cross sections; construction of maps of pollution sensitivity; preparation and publication of the final atlas report, training of local atlas users, and dissemination of information. Depending on the geologic or hydrologic setting of a specific county, other data or field data may also be assembled or collected. The karst landscape of southeast Minnesota is an example where additional data may be collected to further define the hydrogeologic system and could include defining additional related karst features and karst system analysis (including dye traces and karst system maps).

This project will provide approximately 18 – 24 months of funding to complete, continue, or initiate Part B atlas projects for the following counties: Becker, Brown, Cass, Dodge, Hubbard, Isanti, Kanabec, Olmsted, Redwood, Wadena, and Washington.

Counties with a complete atlas (Part A & Part B) enjoy strong economic benefits especially with respect to water resource use and management. This project includes the assembly of atlas groundwater maps and data into geospatial (GIS) data layers. These online assembled data layers, maps and electronic tools make the information more accessible for local, county and state decision makers, scientists and citizens.

II. OVERALL PROJECT STATUS UPDATES:

First Update: March 15, 2020

Second Update: September 15, 2020

Third Update: March 15, 2021

Fourth Update: September 15, 2021

Fifth Update: March 15, 2022

Final Report: Between project end (June 30) and August 15, 2022

III. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1 Title: County Geologic Atlas Part B

Description: Building on the Part A atlases prepared by the MGS, this project will provide approximately 24 months of funding to complete, continue, or initiate Part B atlas projects for the following counties: Becker, Brown, Cass, Dodge, Hubbard, Isanti, Kanabec, Olmsted, Redwood, Wadena, and Washington. The goal is to complete Activity 1 work in approximately two years.

DNR will obtain the MGS GIS files, evaluate and modify those GIS files to reflect county groundwater resources, plan for and collect groundwater samples, compile field water chemistry, analyze groundwater samples for natural chemistry and age-dating isotopes at specialized analytical laboratories, and assemble the aquifer characteristics data.

Following collection and evaluation of all the data, a final Part B atlas report will be prepared, which includes a detailed description of the groundwater resources in the county, groundwater maps, groundwater cross sections, and interpretations of pollution sensitivity of aquifers in the county. As data are finalized and new reports are completed, the project will continue to add and assemble GIS and other data onto statewide data layers to be available online to everyone who needs the information.

Project design and data collection for counties in southeast Minnesota may include specialty karst system mapping and field studies in support of the completed or in-progress Part B report. As part of this engagement, county geologic atlas staff will provide support, training and consultation to local resources managers in understanding special features and concerns related to the karst geology in southeast Minnesota as established in the CGAs.

Following completion of each Part B atlas, DNR will disseminate the information (see Dissemination section below), and be available to assist stakeholders in the application and use of the atlas.

ACTIVITY 1 ENRTF BUDGET: \$2,400,000

Outcome	Completion Date
1a. Publish completed Part B reports (up to four counties per year).	June 30, 2022
1b. Continue ongoing work on Part B projects (up to eight counties).	June 30, 2022
1c. As new projects are completed, continue to add data to compiled GIS data layers.	June 30, 2022
1d. Start new Part B projects (up to four per year).	June 30, 2022

First Update: March 15, 2020

Second Update: September 15, 2020

Third Update: March 15, 2021

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IV. DISSEMINATION:

Description: At the completion of a Part B atlas, DNR provides notification to LCCMR staff and to approximately 3,000 email recipients (listserv: <http://www.dnr.state.mn.us/emailupdates>) who have signed up to receive such notifications. DNR also uses official news releases that are picked up by media outlets across the state. Additional dissemination outlets include articles or updates in newsletters for organizations such as the Legislative Water Commission, the Minnesota Ground Water Association, internal DNR agency news releases, and presentations at conferences across Minnesota.

Each completed county geologic atlas Part B is printed in paper format (approximately 300 copies) 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. Project data, including water chemistry data and GIS data are available on the DNR web site. Water chemistry data are also incorporated into an interagency Equis database that can be used by all state government entities. Printed copies are available for sale at the MGS. 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 Part B 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 answer questions and assist in the continued application and use of the atlas.

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](#).

First Update: March 15, 2020

Second Update: September 15, 2020

Third Update: March 15, 2021

Fourth Update: September 15, 2021

Fifth Update: March 15, 2022

Final Report: Between project end (June 30) and August 15, 2022

V. ADDITIONAL BUDGET INFORMATION:

A. Personnel and Capital Expenditures

Explanation of Capital Expenditures Greater Than \$5,000:

Explanation of Use of Classified Staff:

Total Number of Full-time Equivalent (FTE) Directly Funded with this ENRTF Appropriation:

Enter Total Estimated Personnel Hours for entire duration of project: 18,200	Divide total personnel hours by 2,080 hours in 1 yr. = TOTAL FTE: 8.75
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Total Number of Full-time Equivalent (FTE) Estimated to Be Funded through Contracts with this ENRTF Appropriation:

Enter Total Estimated Contract Personnel Hours for entire duration of project: N/A	Divide total contract hours by 2,080 hours in 1 yr. = TOTAL FTE: 0
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VI. PROJECT PARTNERS:

A. Partners outside of project manager’s organization receiving ENRTF funding

B. Partners outside of project manager’s organization NOT receiving ENRTF funding

VII. LONG-TERM- IMPLEMENTATION AND FUNDING:

The County Geologic Atlas program is the primary vehicle to provide comprehensive geologic and groundwater system mapping and associated databases at appropriate scales statewide. The goal is to complete an atlas for all 87 counties. Counties with a complete atlas (Part A & Part B) enjoy strong economic benefits especially with respect to water resource use and management. Once the atlas is completed for a county, updates (GIS, web

access, etc.), if needed, could be funded by a combination of the individual counties in conjunction with DNR general funds, and other funds as become available.

The MGS receives funding from DNR and also leverages federal dollars from the National Cooperative Geologic Mapping Program of the USGS. The MGS competes annually for these federal cost-share dollars. MGS Part A atlas development is also supported by ENRTF and Clean Water Fund through direct appropriation. DNR is a cooperator and funding partner with the MGS. The Part B atlases are currently supported by a combination of state general fund, Clean Water Fund and ENRTF appropriations to DNR. Springshed mapping and research to investigate and understand groundwater flow in the complex geologic systems in southeast Minnesota has been supported by ENRTF; the results of that work will be utilized in the completion of atlases in southeast Minnesota.

VIII. REPORTING REQUIREMENTS:

- Project status update reports will be submitted March 15 and September 15 each year of the project.
- A final report and associated products will be submitted between June 30, 2022 and August 15, 2022.

IX. SEE ADDITIONAL WORK PLAN COMPONENTS:

- A. Budget Spreadsheet**
- B. Visual Component or Map**
- C. Parcel List Spreadsheet**
- D. Acquisition, Easements, and Restoration Requirements**
- E. Research Addendum**

Attachment A:

Environment and Natural Resources Trust Fund

M.L. 2019 Budget Spreadsheet

Legal Citation: M.L. 2019, First Special Session, Chp. 4, Art. 2, Sec. 2, Subd. 03o

Project Manager: Paul Putzier

Project Title: County Geologic Atlas - Part B

Organization: Minnesota Department of Natural Resources

Project Budget: \$2,400,000

Project Length and Completion Date: Three Years, June 30, 2021

Today's Date: August 23, 2018



ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Budget	Amount Spent	Balance
BUDGET ITEM			
Personnel (Wages and Benefits): All Positions are for two years.	\$ 1,618,000	\$ -	\$ 1,618,000
Hydrologist Supervisor (classified): \$126,000 (75% salary, 25% benefits); 0.5 FTE 2 Yrs. PAUL			
Res Sci 3 (classified): \$126,000 (75% salary, 25% benefits); 1 FTE 2 Yrs. JIM			
Hydrologist 3 (classified): \$119,000 (75% salary, 25% benefits); 0.75 FTE 2 Yrs. (Jeff)			
Hydrologist 3 (classified): \$106,000 (75% salary, 25% benefits); 1 FTE 2 Yrs. (John)			
Hydrologist 2 (unclassified or classified): \$88,000 (75% salary, 25% benefits); 2 FTE (Randy/Vanessa) 2			
Hydrologist 1 (classified or unclassified): \$70,000 (75% salary, 25% benefits); 2 FTE (wes/Rachel) 2 Yrs.			
Information Officer 2 (classified or unclassified): \$71,000 (75% salary, 25% benefits); 0.75 FTE (Ruth) 2			
Research Analyst Sn-GIS (classified or unclassified): \$74,000 (75% salary, 25% benefits); 0.75 FTE			
Professional/Technical/Service Contracts: Contracts: Laboratory analysis of approximately 110 water samples per county (Approx. 880 total) for primary analysis.	\$ 478,000		\$ 478,000
Lab budget for existing state contracts with MN Department of Agriculture (\$40,000/county)			
University of MN (\$6,500/county)			
University of Waterloo (\$13,250/county)			
Equipment/Tools/Supplies			
Water sampling and measurement tools and field analytical meters and equipment (est \$15,000 for replacement Trimble, Hack water quality meters, Rugged Pro field probes and titrate system). Supplies, including expendable water sampling supplies (Approx. 880 samples total. \$38/sample: high volumn mico filters; valves and tubing for each well sampled, titration supplies (est \$34,000). Shipping costs for water samples to laboratories (est \$3,000).	\$ 52,000	\$ -	\$ 52,000
Printing			
Each Atlas Part B includes printing (off-set and digital) of approximatley 300 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 approximatley 24-inches by 36-inches in size. Some Atlases require a second, figures only, bound report. Printing costs also includes preparing 1,000 post cards for each county mailed to citizens to obtain permission for water well sampling. Total anticipated per county printing costs estimated to be \$9,500. Printing costs for eight (8) county atlas estmated to be \$72,000.	\$ 76,000	\$ -	\$ 76,000
Travel expenses in Minnesota			
In-state vehicle mileage (est \$28,128) and travel expenses (est \$26,698), primarily for water sample and field data collection.	\$ 54,826	\$ -	\$ 54,826
Other			
Atlas Production: Upgrades for GIS and report publication specialty software (ex. Avenza Map Publisher) for three DNR Atlas production staff (est \$3,000). Specialty software training for DNR Atlas production staff, such as Adobe InDesign, Map Publisher, ArchGIS (est \$3,000).	\$ 6,000	\$ -	\$ 6,000
Direct & Necessary: *Direct and Necessary expenses: People Support (~\$25,856), Safety Support (~\$5,356), Financial Support (~\$23,093), Communication Support (~\$1,251), IT Support (~\$58,559), and Planning Support (~\$1,059) necessary to accomplish funded programs/projects.	\$ 115,174	\$ -	\$ 115,174
COLUMN TOTAL	\$ 2,400,000	\$ -	\$ 2,400,000

*Direct and Necessary expenses include Department Support Services (Human Resources, IT Support, Safety, Financial Support, Communications Support, and Planning Support). Department Support Services are described in the agency Service Level Agreement and billed internally to divisions based on rate that have been developed for each area of service. These services are directly related to and necessary for the appropriation. Department leadership services (Commissioner's Office and Regional Directors) are not assessed. Those elements of individual projects that put little or no demand on support services such as large single-source contracts, large land acquisitions, and funds that are passed through to other entities are not assessed Direct and Necessary costs for those activities.

OTHER FUNDS CONTRIBUTED TO THE PROJECT	Status (secured or pending)	Budget	Spent	Balance
Non-State: N/A		\$ -	\$ -	\$ -
State:		\$ 1,200,000	\$ -	\$ 1,200,000
DNR General Fund, atlas staff and support, estimated \$1,200,000 for 2-year project period to support completion of Part B atlases in base program. Pending approp.				
In kind:		\$ 16,000	\$ -	\$ 16,000
County/local government assistance to arrange water sampling access and sponsor local training workshop. Pending contributions.				
PAST AND CURRENT ENRTF APPROPRIATIONS	Amount legally obligated but not yet spent	Budget	Spent	Balance
Current appropriation: N/A		\$ -	\$ -	\$ -
All current appropriations will be spent prior to June 30, 2019.				
Past appropriations: County Geologic Alas Appropriations spent prior to July 1, 2019		\$ 5,715,000	\$ 5,715,000	\$ -
M.L. 1991 ENTRF to DNR \$600,000				
M.L. 1993 ENTRF to DNR \$425,000				
M.L. 2009 ENTRF Ch 143 Sec 2 Subd 3 to DNR \$890,000 (CGA portion)				
M.L. 2011, First Special Session, Chp. 2, Art. 3, Sec. 2, Subd. 03b2, \$600,000				
M.L. 2013, Chp. 52, Sec. 2, Subd. 03c, \$1,200,000				
M.L. 2015, Chp. 76, Sec. 2, Subd. 3b, \$2,000,000				

ML2019 \$2.4M
 Aug. 2018
 18 Months of Labor

	FTE		YR
HS (Paul)	126000	0.5	63000
RS3 (Jim)	126000	1	126000
H3 (Jeff)	119000	0.75	89250
H3 (John)	106000	1	106000
H2 (Randy/Vanessa)	88000	2	176000
H1 (Rachel/Wes)	70000	2	140000
IO2 (Ruth)	71000	0.75	53250
RAS (Holly)	74000	0.75	55500
H2 (Greg)	0	0	0
	8.75		809000
	13.125		1213500
	17.5		1618000
	21.875		2022500
	26.25		2427000
			1 Year
			1.5 years
			2 Years
			2.5 Yrs
			3 Yrs