**PROJECT TITLE: Geologic Atlases for Water Resource Management**

**1. PROJECT STATEMENT**

Geologic atlases provide maps and databases essential for improved management of ground and surface water. This is foundational data that supports management of drinking water, domestic and industrial supply, irrigation, and aquatic habitat. County Geologic Atlases are specifically identified as essential data in the Statewide Conservation Plan, and in the efforts of the Environmental Quality Board, DNR Eco-Waters, and the Water Resources Center at the University of Minnesota to design a sustainable water management process. The distribution of geologic materials defines aquifer boundaries and the connection of aquifers to the land surface and to surface water resources to enable a comprehensive water management effort. This proposal will complete current projects and start new projects to equal about 10 complete atlases.

Atlases are complete or underway for 57 of the 87 counties in Minnesota with recent starts in Cook, Yellow Medicine, and Red Lake counties. This project continues an effort to complete county geologic atlas coverage statewide. The current spending rate of about $2 million per year (all sources) would allow about 5 or 6 new starts each year, covering the entire state in about 7 years. Local participation is a primary factor in determining which counties are chosen for this work, while ground water sensitivity, water demand, and the size of the population served are also considerations. The counties are required to provide funds or in-kind service. Funds from this proposal are most likely to be applied to projects in southern, west-central, and northern Minnesota. Based on the factors listed above, potential counties include, but are not limited to:

 •LeSueur •Waseca •Freeborn •Grant •Douglas •Stevens

 •Beltrami •Itasca •Clearwater

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. Atlases enhance natural resource management and regulation, and facilitate wise use of water resources. They support: permitting, land use planning, wellhead protection, remediation, nutrient management, monitoring, modeling, and well construction. Atlas information is used by citizens, local government, counties, and state agencies (SWCDs, MDH, DNR, MPCA, Ag). The atlases document current water levels and quality so that changes in the water system can be recognized and evaluated. A User’s Guide to geologic atlases strives to make the products accessible to users of all backgrounds.

**II. PROJECT ACTIVITIES AND OUTCOMES**

|  |  |
| --- | --- |
| **Activity 1:****Initiate about 6 new county geologic atlases; continue** **existing projects***—***equivalent of about 10 atlases total ENRTF BUDGET: $ 4,121,625**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 DVD and web. Most of the products are also printed for use in the field, and by users who prefer this format. 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. |  |

|  |  |
| --- | --- |
| **Outcome** | **Completion Date** |
| *1. Create database of well construction records to support the mapping, to document water use in specific aquifers, and to help resolve well problems* | *June 30, 2023* |
| *2. Complete any unfinished ENRTF supported County Geologic Atlas projects in progress (ex; from 2018/2019 appropriations)* | *June 30, 2023* |
| *3. Make progress on maps of bedrock geology, surficial geology, subsurface Quaternary geology, bedrock topography, and thickness of glacial deposits* | *June 30, 2023* |
|  |  |

**III. PROJECT PARTNERS AND COLLABORATORS:**

* MGS team of as many as 20 staff members including database specialists, geologists, geophysicists, geographic information system specialists, and an editor.
* We will apply to federal geologic mapping cost-share programs to leverage additional funds (current estimate $145,000 pending)

**A. Partners receiving ENRTF funding**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** |  |  | **Role** |
| MN DNR |  |  | Will follow and construct Part B of the atlas which addresses water levels, water chemistry, and sensitivity (using separate funding) |

**B. Partners NOT receiving ENRTF funding**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** |  |  | **Role** |
| County office |  |  | Will establish accurate well locations and identify specific project needs |

**IV. LONG-TERM IMPLEMENTATION AND FUNDING:**

MGS is the geologic mapping agency of the state and is striving to provide comprehensive geologic mapping and associated databases at appropriate scales statewide as quickly as possible, primarily via the County Geologic Atlas Program. Atlases are complete or underway for 57 of the 87 counties in Minnesota. The completed atlases are used by townships, counties, state agencies, researchers, consultants, industries, and even homeowners. They support the activities and programs responsible for managing Minnesota resources in a sustainable manner. The attached chart of recent and future funding of the program illustrates how ENRTF appropriations have increased activity to a level of approximately $2,000,000 per year. At this level of spending statewide coverage could be achieved in approximately 7 years.

**TIME LINE REQUIREMENTS:**

Work will be initiated in 2020 and continue for three years*.* Most atlases require 3 to 4 years to complete, so some projects started in this proposal may not be finished and require additional funding. The funding level of this proposal is sized to continue the overall funding of atlases at the MGS to complete 5 counties per year, and covering the entire state by about 2026.