CITY OF RAPID CITY

RAPID CITY, SOUTH DAKOTA 57701-2724

PUBLIC WORKS DEPARTMENT

300 Sixth Street

Dirk Jablonski, Public Works Director
City web: www.rcgov.org

Phone: 605-394-4165
Fax: 605-394-6636
e-mail: dirk.jablonski@rcgov.org

MEMORANDUM

TO: Public Works Committee

CC: Mayor Shaw
Ted Vore, Interim City Engineer

FROM: Dirk Jablonski, Public Works Director

DATE: February 7, 2007

RE: Federal Appropriation Request - Source Water Protection Initiative

There are approximately 2,400 on-site wastewater disposal systems, primarily septic tanks, in the Rapid City metropolitan area. A majority of these systems are located along the western edge of the City in the hills. This is also a primary area for the recharge of the City's groundwater supply.

Recent studies have shown that although the level of nitrates in the City's wells is considerably below the allowable level the levels of nitrates in the groundwater is rising. This is an indication the septic systems are having an adverse impact on the groundwater supply.

Most septic tanks are installed because municipal sanitary sewer service is not available. To protect the City's source of groundwater it is imperative to insure that those systems that are installed are operating properly; therefore, the City has initiated a program to manage those systems.

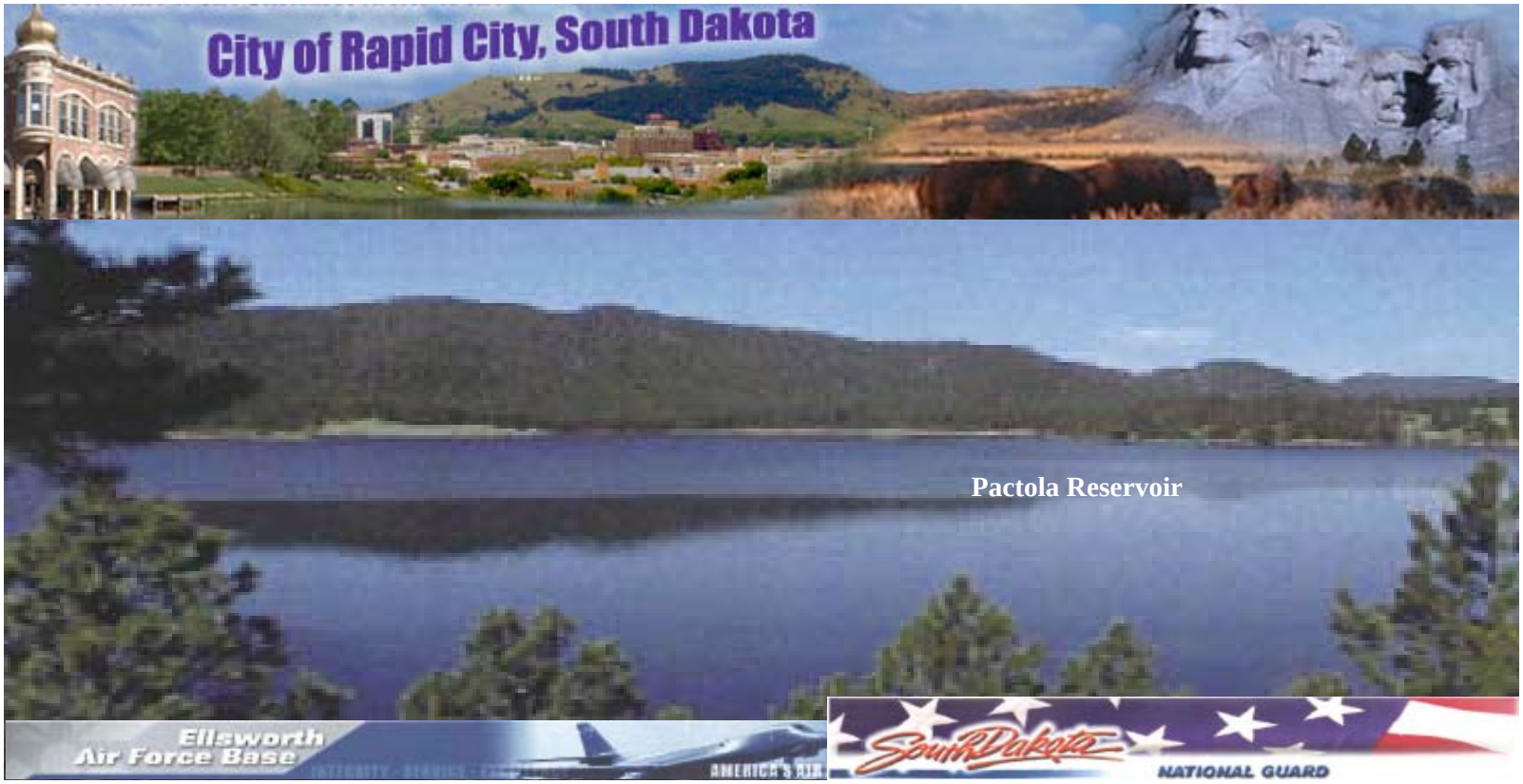
The ultimate solution is providing sewer service to those areas that are critical groundwater recharge areas. Many of these areas are in hilly, rocky areas which makes the installation of an underground utility costly. The high costs discourage residents and the City alike from installing the necessary sewers.

A probable cost to provide sanitary sewer service to these areas is $36,000,000. This cost is prohibitive. Without assistance the project is not feasible.

This Federal appropriation request is to request matching funding for 55% of the costs of improvements. It is not expected that if the request is granted, that the City would receive more that about $2,000,000 in any year. This would have to be a continuing request and there is no assurance successive years would be funded. However, any funding the City can acquire to help in the effort to protect our water source is beneficial.

Authorization is therefore requested to make a Federal appropriation request on behalf of the City of Rapid City for the Source Water Protection Initiative Project.

Federal Earmark Request



Source Water Protection Initiative

City of Rapid City

Rapid City, South Dakota

February 12, 2007

Stanley Consultants INC.

A Stanley Group Company
Engineering, Environmental and Construction Services - Worldwide

Federal Earmark Request
Source Water Protection Initiative
City of Rapid City
Rapid City, South Dakota
February 12, 2007

Request

The City of Rapid City, South Dakota respectfully requests a federal funding in the FY 2008 *State and Tribal Action Grant.* The funding earmark is for the installation of sanitary sewer systems in residential areas overlapping the sensitive Madison Aquifer, the primary drinking water source for Rapid City, Rapid Valley, and Ellsworth Air Force Base. The removal of over 2400 septic tanks and the subsequent residential connections and extension of existing city sanitary sewers is expected to cost $36,000,000. Rapid City will match earmark funds on a 55% Federal to 45% City level over the length of the project. Dependent on funding the city is using a construction period through 2020 to make the necessary improvements.

Background

Rapid City lies on the edge of the legendary Black Hills, an area with the world's highest concentration of public parks, monuments, and memorials. The Rapid City area is also home to three military installations: Ellsworth Air Force Base, the South Dakota National Guard, and the South Dakota Civil Air Patrol. The Rapid City metropolitan area is a growing region with a current population of approximately 112,000 residents.

Mount Rushmore National Memorial is known all over the world for its dedication to the hopes, dreams, will, and determination of a nation. Carved from a mountainside of solid granite, the gigantic busts of four great American presidents—Washington, Jefferson, Roosevelt, and Lincoln—stand above the land they loved.

The unique geology of this area is also displayed in the otherworldly moonscape of the Badlands—with its jagged cliffs, deep canyons, and flat-topped buttes. Wind Cave National Park and its 44 miles of underground tunnels and caverns, Devils Tower National Park, an ancient volcanic core, and Jewel Cave national monument complete the list of fascinating geological treasures in the Rapid City area.

Components of the distinctive geology that creates these national wonders are also present in the bedrock drinking water aquifers of the area. These bedrock aquifers, particularly those made of limestone, may contain fractures, small cracks, pore spaces, spaces between layers and solution openings—all which can hold water and be connected. Vertical fractures may intersect horizontal openings, enabling water to move from one layer to another. Both the Wind and Jewel caves are examples of large solution openings. The components of a typical aquifer are depicted in Figure 1.

In and around Rapid City, outcroppings of the Madison Aquifer occur naturally (Figure 3). An outcropping is a limestone layer of the aquifer formed near the land surface instead of confined deeper in the ground. With outcroppings, surface contaminants can more readily be conveyed by the rainwater and snowmelt, as they flow to the recharge the aquifer. In cases where the geology of an aquifer is different, the recharge water (rain and snow) is filtered by soils and sediments on its way to replenishing the aquifer. Water source protection involves the removal or mitigation of the surface contamination to preserve the natural aquifer as depicted in Figure 2.

A source of surface contamination in the Rapid City area is on-site wastewater disposal systems, commonly known as septic tanks. The particular constituents from septic tanks are nitrate, bacteria, and viruses.

Problem

With the coincidence of residential development, limestone geology, and on-site wastewater disposal systems, preventative measures must be taken to safeguard the primary source of drinking water of the Rapid City metropolitan area from pollutants. Data from the United States Geological Survey (USGS) indicate elevated levels of nitrate in monitoring and private wells drawn from the Madison Aquifer. These wells are located west of the City of Rapid City.

A short-term approach to protection of the drinking water source is City inspection, and monitoring and control of the estimated 2400 septic tanks in the area. Orders for maintenance and/or reconstruction (in the case of failure) must be enforced. The City of Rapid City has a full time employee to handle this task. The long-term solution is the elimination of septic tanks by connecting homes to the City's sanitary sewer collection system.

The 2400 septic tanks are located in older sections within the city limits of Rapid City as well as new additions on the outskirts of the city in the hills (Figures 4, 5, and 6). In the case of new homes, a septic system can be more cost effective than connecting to existing sanitary sewers, particularly when it is further than 400 feet away. In all new subdivision developments within the city limits, the developers of the projects are responsible for building and obtaining permits for sanitary sewer extensions for connection to the existing city sewer.

Objective

The funding will be utilized for the installation of sanitary sewer systems to provide long-term protection of the Madison Aquifer, the primary drinking water source for Rapid City and its surrounding area. New and existing homes with septic systems will be connected to the existing and extended sanitary sewer collection system of the city.

Scope

In order to preserve the water quality of the Madison Aquifer, it is imperative that action be taken immediately. This process has already begun with a city-funded master planning effort to investigate, study, and ultimately rank the most susceptible areas of the aquifer.

Features of the earmark project include:

- Preparation of plans and specifications for connections to the new and existing sanitary sewer system of the city.
- Construction of the residential connections.
- Construction of city sanitary sewer extensions.
- Construction management and inspection to ensure quality of workmanship and public health.

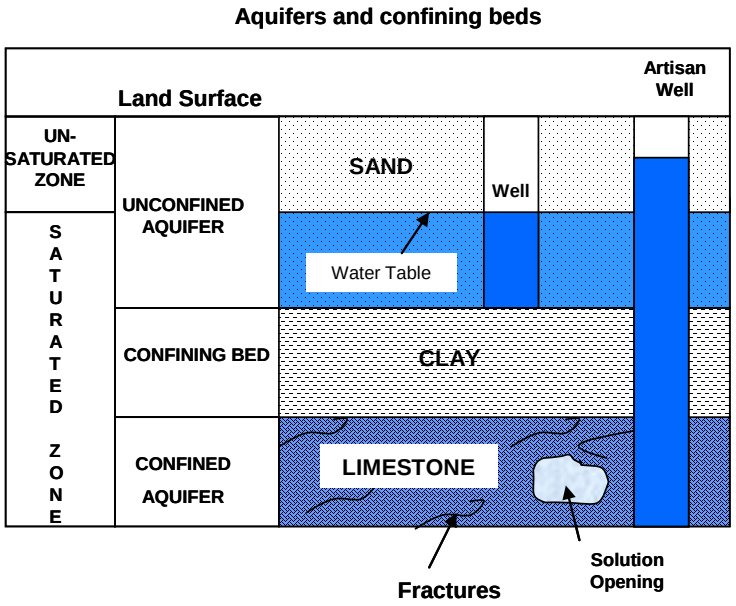


Figure 1: Confined and unconfined groundwater with a standard well and artisan well installation. Fractures and solution openings, common in limestone geology.

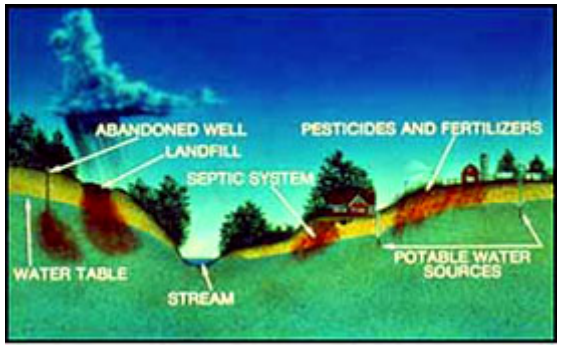


Figure 2: Sources of surface contamination can range from landfills to septic systems.

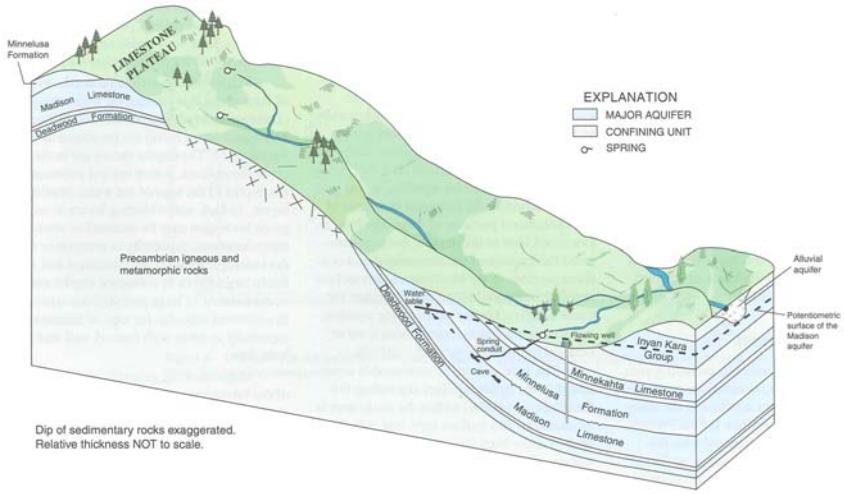


Figure 3: Limestone outcropping near land surface.

Figures 4 and 5: Development in the hills surrounding the city—increases potential for aquifer contamination if not connected to city sewer.

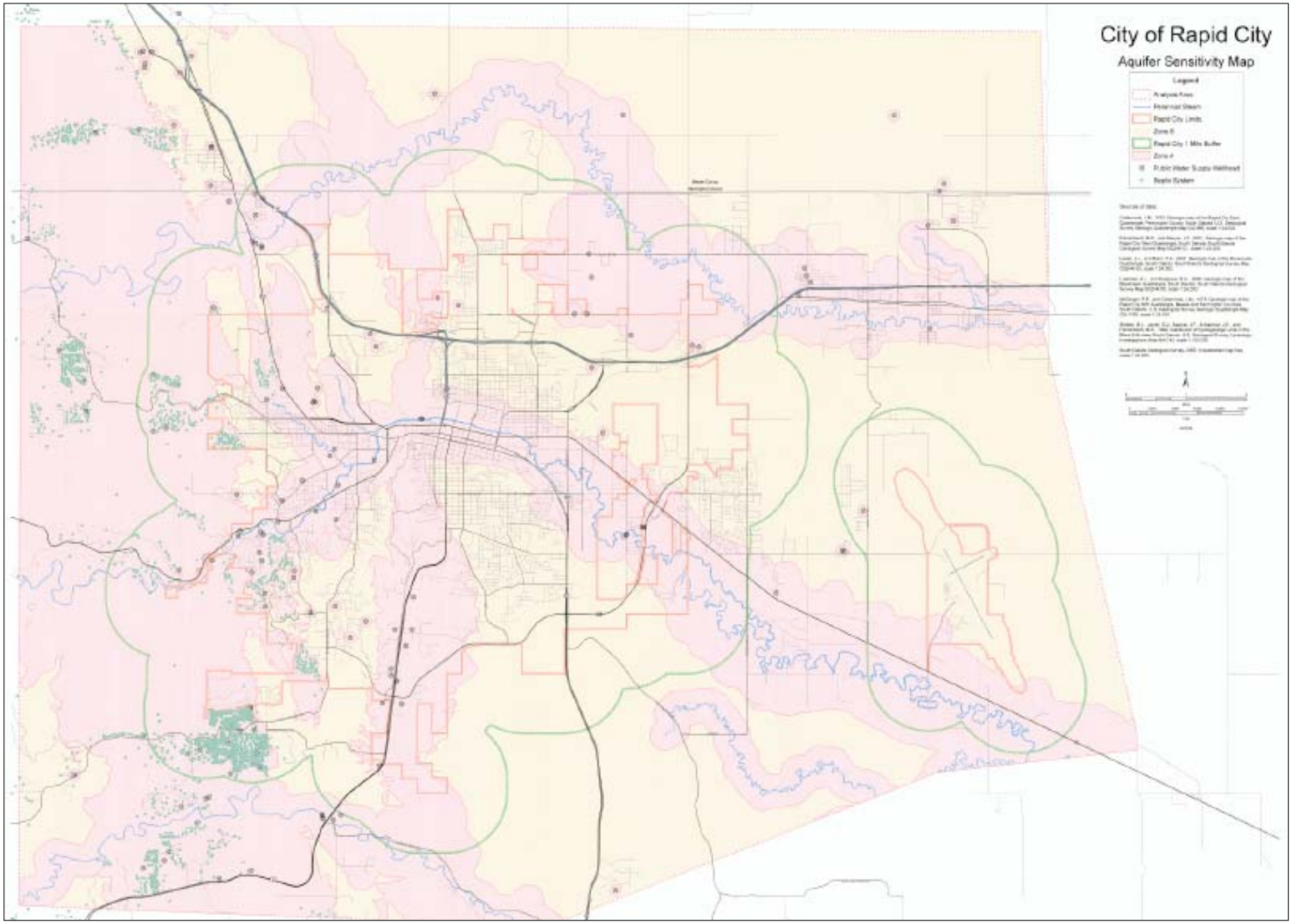


Figure 6: Pink areas represent Madison Aquifer outcropping or areas of sensitivity; green circles represent septic tanks.