Protecting Public Water Supply Wells in Remsen, Iowa
Plymouth County Soil & Water Conservation District partners with the City of Remsen, Iowa to reduce nitrate in municipal drinking water wells

The Problem
The city of Remsen, Iowa provides drinking water to a population of about 2000 people, and was mixing water from deep and shallow municipal wells in an effort to keep nitrate levels within health standards. Levels in the shallow wells continued to rise. Nitrate levels in the well that was receiving most of the contaminant sometimes reached nearly three times the federal drinking water standard (10 mg/L). The city could not afford the cost of treatment necessary to remove the nitrate (over 2 million dollars to install, and annual operation and maintenance cost of approximately $50,000).

The Approach
The city requested the Iowa Department of Natural Resources (DNR) to help design a solution to its water supply's nitrate problem. The agency’s Source Water Protection (SWP) for Targeted Communities Water Supply (CWS) Program assisted the city in several ways. First, a local planning team was organized. The team included local landowners, DNR, city officials, USDA-NRCS, the Plymouth County Soil and Water Conservation District (SWCD), Iowa Dept. of Agriculture, local Iowa State University Extension, county sanitarian, the area Resource Conservation & Development District, and the Plymouth County Pheasants Forever Chapter. Local data was gathered from this SWP Team by the DNR SWP program. The SWP program then prepared a groundwater site investigation plan utilizing well log data, soil types, contaminant information, land use data, etc.

The Targeted SWP Program then conducted the groundwater site investigation to determine the source of nitrates in the municipal wells. Through an in-depth groundwater site investigation, the Program better identified the land area of concern around the well (capture zone) and the source of the nitrates. The most immediate challenge the SWP Team faced was to rectify the over-application of manure and commercial fertilizer on a small farm field near the public wells. Local landowners, Plymouth County Pheasants Forever Chapter (PF), city officials, and Plymouth County NRCS staff participating on the Remsen SWP planning team used the site investigation report to direct their planning toward land use practices that could reduce nitrate contribution in the identified priority area. From here the team could focus their limited resources to the area of concern and develop a natural, economically feasible plan to decrease the nitrate load into Remsen’s source water through the establishment of native grasses effective at taking up nitrogen in soil. Once the SWP plan was completed the Remsen SWP Team then applied for grants and low interest loans as well as utilizing local, state and federal programs to implement their SWP plan.

The Plymouth County SWCD played a key role in the development of the SWP plan. The district made the contacts with local people in the community that initiated the planning process. Once initiated, the district provided substantial technical support in the plan’s development, including identifying and providing a GIS map of the critical lands near the public wells, making
initial contact with the lands’ owners, contacting the local Pheasants Forever president and chapter members, developing and providing cost estimates of a native grass seeding plan for the critical lands, enrolling eligible Conservation Reserve Program acreage, and providing information on proper maintenance of the lands.

The Outcome
The city purchased the 21-acre field with a grant from the state Watershed Improvement Review Board and used a zero percent interest loan from the State Drinking Water Revolving Fund to purchase an additional 35 acres adjacent to the well field. PF planted native grasses on both the acquired properties and Remsen’s existing 40-acre well field that was previously in alfalfa. The prairie plants’ deep roots take up more nitrogen than the more shallow-rooted crops. PF donated the seed and labor to provide excellent habitat for wildlife. The Remsen Fire Department and PF help with controlled burns to keep weeds in check and the local farmers’ co-op is helping control Canadian thistle. The local source water protection team has formed three subcommittees to further develop plans for the area. The plans include: outdoor classrooms, nature trails, and a long-term system for native grassland management. Another bonus of the Remsen SWP planning is that the local city burn pile was relocated outside the well field.

Monitoring results show that Remsen has steadily reduced nitrate levels in its highest production water supply well by 40 percent since the practices were installed. This is an innovative, environmentally pleasing, and economically feasible project that has been a win-win for the community. It should be noted that the results are not immediate but consistently declined over a five-year timeframe.

For More Information
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Key Collaborators
Remsen Utilities Board
Local landowners
Plymouth County Sanitation
Plymouth Soil & Water Conservation District
USDA Natural Resources Conservation Service
Plymouth County Pheasants Forever with Youth Council
Iowa Department of Natural Resources
Iowa Department of Agriculture & Land Stewardship, Division of Soil Conservation
Watershed Improvement Review Board
Sioux Rivers Resource Conservation & Development
Iowa DNR Drinking Water State Revolving Fund