# Spring Creek
# Watershed Management and Project Implementation Plan
# Segment 2

## 319 Watershed Project
## January 2012

Sponsored By:

Pennington County
315 St. Joseph Street
Suite 118
Rapid City, South Dakota 57701

Submitted to:

South Dakota Department of
Environment and Natural Resources
Pierre, South Dakota 57501

## PROJECT SUMMARY SHEET

**PROJECT TITLE:** Spring Creek Watershed Management and Project Implementation Plan Segment 2

**NAME AND ADDRESS OF LEAD PROJECT SPONSOR:**

Pennington County
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Suite 118
Rapid City, SD 57701

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**STATE:** South Dakota **WATERSHED**: Cheyenne River

**HYDROLOGIC UNIT CODE:** 10120109

**HIGH PRIORITY WATERSHED** (yes/no) Yes

**PROJECT TYPES: [ ] BASE [ X ] WATERSHED [ ] GROUNDWATER [ ] I&E**

| WATERBODY TYPES | NPS CATEGORY |
|---|---|
| [ ] GROUNDWATER | [ X ] AGRICULTURE |
| [ X ] LAKES/RESERVOIRS | [ X ] URBAN RUNOFF |
| [ ] RIVERS | [ X ] SILVICULTURE |
| [ X ] STREAMS | [ X ] CONSTRUCTION |
| [ ] WETLANDS | [ ] RESOURCE EXTRACTION |
| [ ] OTHER | [ ] HYDRAULIC MODIFICATION |
| | [ ] OTHER |

**Project Location: Latitude:** 43.9751974 **Longitude:**–103.4705745

**SUMMARIZATION OF GOALS:** The project goal is to bring Spring Creek into compliance for fecal coliform bacteria by implementing the recommended Best Management Practices (BMPs) by 2021. The goal of this project segment, as set forth in the Spring Creek/Sheridan Lake Total Maximum Daily Load (TMDL), is to continue:

- Implementation of riparian, manure management, and on-site wastewater treatment system (OWTS) BMPs in the watershed to reduce fecal coliform bacteria from the headwaters of Spring Creek to Sheridan Lake.
- Demonstration of BMP projects for stormwater, forestry, and lake rehabilitation that will help encourage BMP implementation and expand public outreach efforts.
- Conduct significant public education and outreach to stakeholders within the Spring Creek Watershed.
- Perform water-quality monitoring to aid in tracking watershed conditions that will ensure that the BMPs are effective and the proper BMPs are being implemented.

**PROJECT DESCRIPTION:** Pennington County is the project sponsor for this 2-year 319 and Clean Water State Revolving Fund (CWSRF) project. This is the second of six planned segments. This project would continue implementation of the BMPs identified in the TMDL reports for the Spring Creek Watershed. Completion of the activities planned for this

segment would advance the BMP implementation for fecal coliform bacteria to 8 percent completed. These BMPs include management of riparian zones, stormwater, forestry, grazing, lake improvement, and on-site wastewater treatment systems.

| | |
|---|---|
| **FISCAL YEAR** | 2012–2014 |
| **319 FUNDS:** | $ 350,000 |
| **CWSRF FUNDS:** | $ 100,000 |
| **TOTAL PROJECT COST:** | $ 796,000 |
| **MATCH**: | $ 346,000 |
| **319 FUNDED FULL-TIME PERSONNEL:** | 1.00 |

## 2.0 STATEMENT OF NEED

**2.1** The South Dakota School of Mines & Technology (SDSM&T), along with the South Dakota Department of Environment and Natural Resources (SD DENR), developed and implemented an assessment project to determine the fecal coliform Total Maximum Daily Load (TMDL) for Spring Creek and the Sheridan Lake TMDL for Trophic State Index (TSI). The project started during 2002. The purpose of the assessment was to address rural and urban nutrient, sediment, and fecal coliform problems in the watershed. The overall goal was to produce a TMDL for fecal coliform in Spring Creek and a TSI TMDL in Sheridan Lake to improve water quality by reducing fecal coliform, nutrient, and sediment loading in Spring Creek. The Sheridan Lake TSI TMDL and the Spring Creek fecal coliform bacteria TMDL were approved by the Environmental Protection Agency (EPA) in 2006 and 2008, respectively.

Spring Creek was assigned the following beneficial uses: cold-water permanent fish life propagation (above Sheridan Lake), cold-water marginal fish life propagation (below Sheridan Lake), immersion recreation, limited contact recreation, fish and wildlife propagation, recreation and stock watering, and irrigation. Sheridan Lake was assigned the following beneficial uses: cold-water permanent fish life propagation, immersion recreation, limited contact recreation, fish and wildlife propagation, and recreation and stock watering. When multiple criteria exist for a particular parameter, the most stringent criterion is used.

In addition to the EPA approved TMDLs on Spring Creek and Sheridan Lake, the SD DENR's 2010 Integrated Report and 303d list states that Spring Creek's coldwater permanent fish life beneficial use is impaired because of temperature, Sheridan Lake's coldwater permanent fish life beneficial use is impaired because of dissolved oxygen and temperature, and Sylvan Lake's coldwater permanent fish life beneficial use is impaired because of temperature. Spring Creek, Sheridan Lake, and Sylvan Lake are scheduled for additional TMDL development to address these impairments in 2018, 2020, and 2020, respectively.

Individual parameters determine the support of these beneficial uses. South Dakota has narrative standards that may be applied to the undesired eutrophication of lakes and streams. Administrative Rules of South Dakota (ARSD) Article 74:51 contains language that prohibits the presence of materials causing pollutants to form, visible pollutants,

taste- and odor-producing materials, and nuisance aquatic life. Reduction of nutrients in Spring Creek, specifically phosphorus, was addressed in the TSI TMDL developed for Sheridan Lake and is included in the scope of this watershed implementation project.

The numeric TMDL target established for the beneficial uses for Spring Creek is based on the current daily maximum criteria for fecal coliform bacteria. Water-quality criteria for the immersion recreation beneficial use requires that (1) no sample exceeds 400 colony-forming units (cfu)/100 milliliters (mL) and (2) during a 30-day period, the geometric mean of a minimum of five samples collected during separate 24-hour periods must not exceed 200 cfu/100 mL. This criteria is applicable from May 1 to September 30.

Of all the assessed parameters for which surface water-quality criteria are established, fecal coliform and water temperature exceed criteria for the cold-water permanent fish life propagation beneficial use on Spring Creek. During the TMDL study, ten samples collected from several sites within the assessed stream segment exceeded the total suspended solids (TSS) criterion. However, TSS was not included as a cause of impairment for this reach in the 2008 Impaired Waterbodies List because less than 10 percent of the TSS samples collected during the period of record considered for the 2008 report (October 1, 2002, to September 30, 2007) exceeded the numeric criterion.

The impaired (303(d) listed) segment, because of fecal coliform, of Spring Creek has a length of 31 miles and flows through Mitchell Lake, which has a surface area of about 7 acres. This segment ends where Spring Creek empties into Sheridan Lake, approximately 4 miles downstream of Mitchell Lake. The impaired (303(d) listed) segment, because of temperature, also begins at the headwaters and ends where Spring Creek crosses Highway 79, south of Rapid City. The drainage area of the 303(d) listed segment is approximately 425 square miles.

Project implementation of the Best Management Practices (BMPs) recommended in the Spring Creek fecal coliform bacteria TMDL began in 2010. The first year of implementation included funding from local residential property owners, commercial property owners, and agricultural property owners, Pennington County, City of Hill City, West Dakota Water Development District, South Dakota Game, Fish, and Parks (SDGFP), SDSM&T, City of Rapid City, Black Hills FlyFishers, Pennington Conservation District, Black Hills RC&D Association, U.S. Forest Service – Black Hills National Forest, Custer County, National Resource Conservation Service (NRCS), and the U.S. Geological Survey. Five products of the Segment 1 project were the 2010 Spring Creek Water-Quality Monitoring Plan, 2011 Spring Creek Water-Quality Monitoring Plan, Spring Creek Watershed On-site Wastewater Management Plan, the Spring Creek Watershed Stormwater Management Plan, and the Spring Creek Watershed Strategic Implementation Plan. These plans outline the work that has been completed and would be accomplished during the next several years to meet the TMDL.

During Segment 1, Pennington County and their partners conducted baseline multiparty monitoring in 2010 for fecal coliform bacteria, *E. coli*, total suspended solids (TSS), total phosphorus (TP), and nitrate+nitrite (NO3+NO2) on 17 monitoring sites and again in 2011, Pennington County along with SDSM&T students, local civic groups, and project participants collected ambient and storm event water-quality samples on 16 monitoring sites. These monitoring efforts are described in more detail in Section 2.5.

Since June 2010, Pennington County has held 3 cost-share application signups and received 87 cost-share applications from Spring Creek Watershed property owners requesting approximately $520,000 for riparian, manure management, and on-site wastewater treatment systems (OWTS) improvements. The Spring Creek Watershed Advisory Group (SCWAG) reviewed the cost-share applications and application ranking worksheets; then made recommendations to the Pennington County Board of Commissioners. During Segment 1, Pennington County approved 12 riparian and manure management project applications and agreements totaling $98,808 and 14 OWTS applications and agreements totaling $87,600. The County Board has obligated 82% of the BMP funds in Task 1–Riparian Vegetation and Manure Management Improvements and 97% of the BMP funds in Task 2–Septic System Improvements.

There are 6 completed riparian and OWTS BMP projects in the watershed. Project participants have contracts to install the remaining BMPs by June 2012 and include: 12 on-site wastewater treatment systems, 8 acres of riparian buffers, 27 acres of riparian access control, 178 acres of grazing management, 6 livestock watering facilities, 3,500 feet of livestock water pipeline, 300 feet of streambank protection, 1 animal waste facility, and 1 vegetated treatment area. Table 2-1 lists the BMPs that have been installed during the first project segment. The table also shows the total contracted amount of each BMP to be installed. Segment 1 is on schedule, within budget, and anticipated to be completed by June 2012.

Also during Segment 1, some unique outreach activities were completed with the Spring Creek 319 Watershed Project website launched and can be accessed at **www.springcreekblackhills.com**. This website received more than 1,300 unique visitors. Three direct mailings to over 1,000 watershed residents were conducted to inform them about the implementation project, water-quality monitoring, and BMP cost-share signups. Along with these efforts, Pennington County, NRCS, SDSM&T, SD DENR and watershed consultant staff met with over 200 watershed residents and property owners. Three public meetings and two field tours were held in the watershed. Presentations were made to the Pennington County Board of Commissioners, National Forest Advisory Board, South Dakota Lakes and Streams Association, WDWDD, Black Hills Mayors' Conference, Western South Dakota Hydrology Conference, and the SDACD's NACD Northern Plains Region Leaders Meeting. Also during this segment, over 14 SCWAG meetings were held to review progress and make recommendations to the Pennington County Board of Commissioners.

**Table 2-1. Fecal Coliform Bacteria BMPs Scheduled to Be Installed in Segment 2**

| Best Management Practices | BMP Units | Contracted in Segment 1 | Planned for Segment 2 |
|---|---|---|---|
| OWTS – Single Family Residence | Each | 11 | 2 |
| OWTS – Residential/Seasonal Cluster | Each | 2 | 0 |
| OWTS – Small Commercial/Industrial | Each | 0 | 0 |
| OWTS– Medium Commercial/Industrial | Each | 1 | 0 |
| OWTS – Large Commercial/Industrial | Each | 0 | 0 |
| OWTS – Aerobic Treatment Unit (ATU) | Each | 0 | 0 |
| OWTS – Mounds | Each | 2 | 0 |
| OWTS – Cluster, Advanced, or Comm. Mgt Plan | Each | 4 | 0 |
| Access Control | Acre | 27 | 20 |
| Channel Vegetation | Feet | 900 | 800 |
| Conservation Cover | Acre | 0 | 4 |
| Critical Area Planting | Acre | 0 | 3 |
| Dam, Diversion | Each | 0 | 1 |
| Diversion | Feet | 200 | 300 |
| Fence, 4-Wire | Feet | 1,000 | 2,000 |
| Fence, 2-Wire Electric | Feet | 500 | 500 |
| Fence, Corral Panel | Each | 6 | 10 |
| Filter Strip | Acre | 1 | 2 |
| Forest Stand Improvement | Acre | 0 | 10 |
| Irrigation System | Acre | 1 | 2 |
| Grade Stabilization Structure | Each | 0 | 1 |
| Nutrient Management | Acre | 5 | 15 |
| Pasture and Hayland Management | Acre | 0 | 10 |
| Pest Management | Acre | 25 | 40 |
| Pipeline, PVC, HDPE, PE Pipe 1.25”- 8” | Feet | 3,500 | 3,000 |
| Pond | Each | 1 | 2 |
| Prescribed Grazing | Acre | 178 | 250 |
| Pumping Plant for Water Control | Each | 1 | 2 |
| Range Planting | Acre | 0 | 20 |
| Riparian Forest Buffer | Acre | 2 | 5 |
| Riparian Herbaceous Cover | Acre | 0 | 3 |
| Spring Development | Each | 1 | 2 |
| Stream Crossing | Feet | 100 | 60 |
| Stream Bank and Shoreline Protection | Feet | 300 | 150 |
| Structure for Water Control | Each | 1 | 1 |
| Vegetated Treatment Area | Acre | 0 | 1 |
| Waste Storage Facility | Each | 1 | 1 |
| Water and Sediment Control Basin | Each | 0 | 2 |
| Water Well | Feet | 0 | 150 |
| Watering Facility | Each | 6 | 6 |
| Wetland Enhancement | Acre | 1 | 1 |

**2.2** Spring Creek is a perennial mountain stream located in Pennington and Custer Counties in the Black Hills of South Dakota. Spring Creek is a tributary of the Cheyenne River, which flows into the Missouri River. The drainage area of Spring Creek is approximately 425 square miles at the confluence with the Cheyenne River.

The surface area of the watershed that impacts the impaired reach of Spring Creek above Sheridan Lake encompasses approximately 93,124 acres and includes Hydrologic Units 101201090901, 101201090902, 101201090903, 101201090904. The city of Hill City (population ~950) is the only municipality located in the watershed.

The BMPs that will be installed during this project segment are consistent with the schedules contained in the Spring Creek Watershed On-site Wastewater Management Plan, the Spring Creek Watershed Stormwater Management Plan, and the Spring Creek Watershed Strategic Implementation Plan. Fecal coliform bacteria reductions will be presented in the Ten-Year Watershed Strategic Implementation Plan.

**2.3** The location of the Spring Creek Watershed is shown in Figure 2-1.

**2.4** Land use in the watershed is primarily silviculture, recreation, residential, and grazing. Metamorphic slates and schists, along with granite rock, underlie a large portion of the basin and form the Central Crystalline Area of the Black Hills that covers the majority of the watershed area.

The watershed's major soil types are Pactola, Buska, Mocmont, and Stovho. The Pactola series of soils, which cover most of the watershed, were formed by the weathering of materials in steeply tilted metamorphic rock. The Buska series descends from micaceous schist while the Mocmont formed from material weathered from granite. Those two series generally occur in the upper reaches of the watershed in the Harney Peak area. The Stovho series formed from the weathering of limestone and calcareous sandstone and is found in the upper reaches of the watershed in the area underlain by the Madison Limestone Formation.

Digital Elevation Models (DEMs) of the area show the average slope to be approximately 20 percent. Much of the land is located within the Black Hills National Forest and is predominantly forested with ponderosa pine. Other cover includes grasslands and hardwoods. The average annual precipitation in the watershed is 20.8 inches; 80 percent usually falls in April through September. Tornadoes and severe thunderstorms strike occasionally. These storms are local and of short duration and occasionally produce heavy rainfall events. The average seasonal snow pack is 27.3 inches per year.

Modeling results of the initial TMDL assessment estimated that more than half (63.5 percent) of the bacteria load originates from livestock and other agricultural land uses. The remaining load originates from urban runoff (13.7 percent) and other human sources (14.8 percent), including failing septic and leaking sanitary sewer systems. During Segment 1, questions were raised and concerns expressed by the Spring Creek Watershed Advisory Group (SCWAG) members regarding the accuracy of the modeling results so additional data including water-quality monitoring, land use, septic locations and failure rates, livestock and wildlife populations, and installed BMPs within the

watershed have been collected to improve the watershed model and its results for future implementation segments.

These modeling results would be incorporated and discussed in detail in the Spring Creek Watershed Stormwater Management Plan and the Spring Creek Watershed Strategic Implementation Plan. Critical conditions occur within the watershed during the summer. Typically, greatest numbers of livestock and tourist activities (i.e., trail rides, camping) occur in the watershed during summer months. Combined with the peak in bacteria sources, high-intensity storm events also occur during the spring, summer, and fall and produce a significant amount of fecal coliform load because of bacterial washoff in the watershed.

During the first segment, Pennington County and their partners conducted baseline multiparty monitoring in 2010 for fecal coliform bacteria, *E. coli*, total suspended solids (TSS), total phosphorus (TP), and nitrate+nitrite (NO3+NO2). From April through October, approximately, 145 grab samples were collected at 17 sites and ISCO automatic samplers at 4 mainstem sites collected 24 storm event samples. During 2010, 845 analyses were completed for fecal coliform, *E. coli*, TSS, TP, and NO3+NO2 by Energy Labs in Rapid City. Additionally, 170 analyses were completed for fecal coliform, *E. coli*, TSS, TP, and NO3+NO2 for quality assurance and quality control (QA/QC).

Fecal coliform concentrations from grab and composite samples collected during all baseflow and storm events sampling at 4 monitoring sites on Spring Creek with 17% to 42% of the samples exceeding the single-sample criterion of 400 cfu/100 mL during the 2010 recreation season (May 1st to Sept 30th). Fecal coliform concentrations at the other twelve sites had no exceedances of the single-sample criterion. *E. coli* samples collected during baseflow did not exceed the single-sample criterion of 235 cfu/100ml.

Samples collected during storm events show *E. coli* concentrations decrease from a monitoring site near Hill City downstream to a site near US Highway 16, while concentrations increase from this US Highway 16 site downstream to a monitoring site above Sheridan Lake. In 2010, 46% to 62% of the storm event samples exceeded the *E. coli* single-sample criterion. TSS samples collected during baseflow at 7 sites on Spring Creek exceeded the single-sample TSS criterion of 53 mg/L, ranging from 14% to 29% exceedances. No tributary sites exceeded the TSS criterion during baseflow. TSS samples collected during storm events are consistent from Hill City downstream to Mitchell Lake, then decrease near US Highway 16 downstream to Sheridan Lake.

Total phosphorus (TP) samples collected during baseflow gradually increase from the uppermost monitoring site on Spring Creek downstream to Mitchell Lake, except for a slight decrease at Hill City. Below Mitchell Lake, TP concentrations increase slightly downstream to Sheridan Lake and decrease below Sheridan Lake. TP samples collected during storm events show concentrations are consistent from site Hill City downstream to Mitchell Lake, while concentrations decrease near US Highway 16 downstream to Sheridan Lake. No exceedances were calculated since no TP criteria are assigned for Spring Creek. Samples collected during baseflow show NO3+NO2 concentrations increase from Hill City remain consistent downstream to Sheridan Lake and then decrease below Sheridan Lake. NO3+NO2 samples collected during storm events show

concentrations increase slightly from Hill City to Mitchell Lake while concentrations remain consistent near US Highway 16 downstream to Sheridan Lake. Exceedances were not calculated since no NO3+NO2 criteria are assigned for Spring Creek.

In 2011, Pennington County expanded their monitoring efforts in the watershed to include local volunteers and project participants in sampling water quality and help assess the project's effectiveness and ensure future implementation funding is properly prioritized. Pennington County staff and SDSM&T students worked with local civic groups to collect water samples from June through September and submitted them for analysis of total phosphorus, nitrate, total suspended sediment, *E. coli* and *Enterococcus* bacteria.

From June to September, Pennington County and its partners have conducted 4 ambient monthly sampling events on 16 monitoring sites and submitted over 70 ambient water-quality samples for lab analysis. Additionally, over 60 storm event mean concentration (EMC) and discrete water-quality samples were collected during 4 storm events from June through September by SDSM&T students at 5 locations in the watershed. Also in 2011, two project participants that are implementing BMPs collected water-quality samples above and below their BMP projects in coordination with Pennington County staff and SDSM&T students during monthly ambient monitoring.

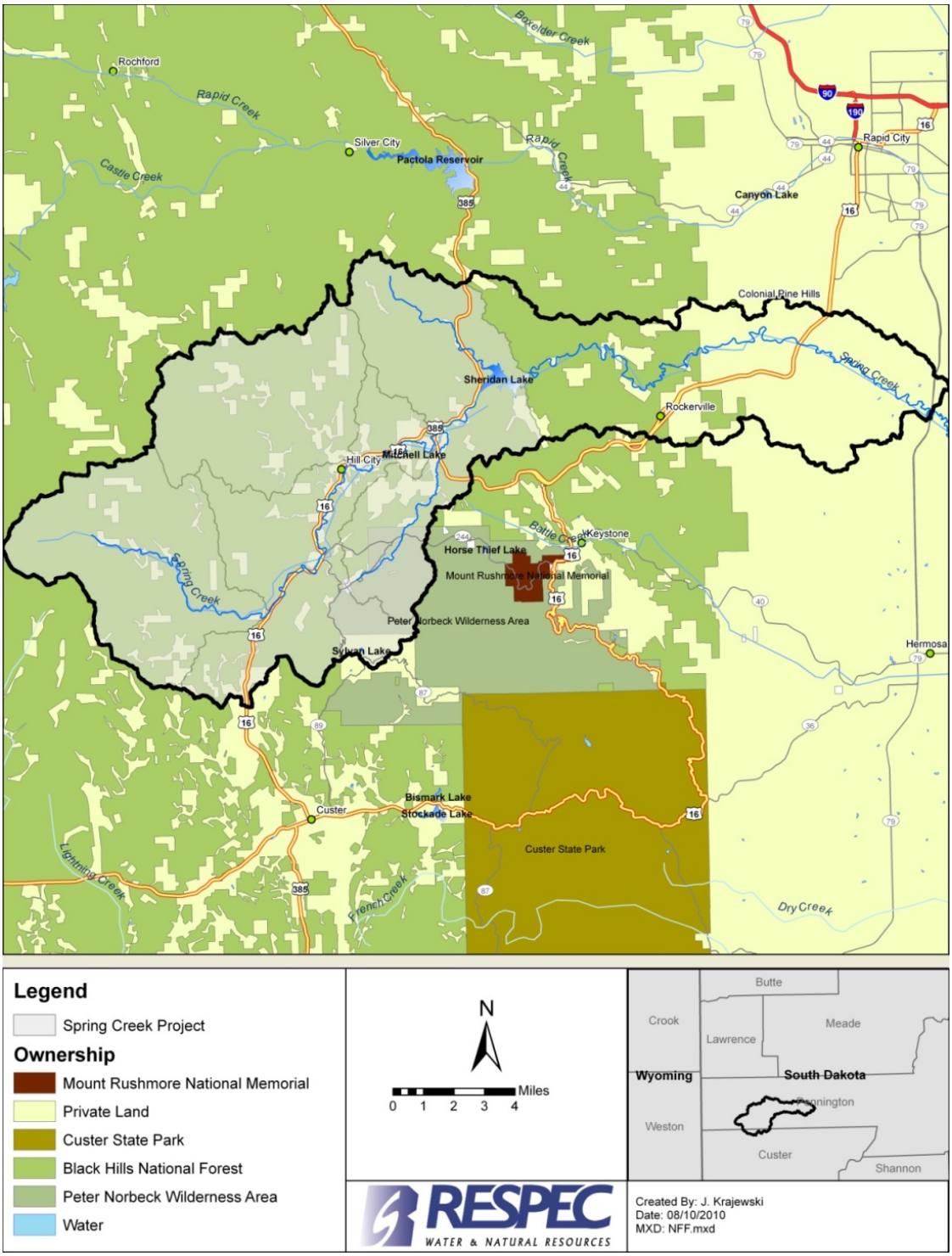


**Figure 2-1.** Location of the Spring Creek Watershed.

## 3.0 PROJECT DESCRIPTION

The subsections below describe the overall project goals, objectives, and tasks for Segment 2 of the Spring Creek Watershed Management and Project Implementation Plan.

## 3.1 GOALS

The project goal is to bring Spring Creek into compliance for fecal coliform bacteria by implementing the recommended Best Management Practices (BMPs) by 2021. The goal of this project segment, as set forth in the Spring Creek/Sheridan Lake Total Maximum Daily Load (TMDL), is to continue:

- Implementation of riparian, manure management, and on-site wastewater treatment system (OWTS) BMPs in the watershed to reduce fecal coliform bacteria from the headwaters of Spring Creek to Sheridan Lake.
- Demonstration of BMP projects for stormwater, forestry, and lake rehabilitation that will help encourage BMP implementation and expand public outreach efforts.
- Conduct significant public education and outreach to stakeholders within the Spring Creek Watershed.
- Perform water-quality monitoring to aid in tracking watershed conditions that will ensure that the BMPs are effective and the proper BMPs are being implemented.

## 3.2 OBJECTIVES AND TASKS

The strategy of the Spring Creek Watershed Implementation Team is to progressively and efficiently implement BMPs within watershed to bring the creek back into compliance with its assigned beneficial uses. This project segment focuses heavily on BMP implementation and public outreach that would ensure the proper prioritization and adoption of BMPs. Ambient and storm event monitoring would be conducted to assess implementation effectiveness and measure improvements. The project strategy would be reviewed annually to measure overall success, to determine adjustments, and to obtain funding for the future project segments. Federal, state, and private funding would be used to fund BMPs. A final report would be produced for each 319 project segment completed. Additional projects and funding proposals would be submitted during the next several years to continue installing BMPs that reduce fecal coliform bacteria to meet the TMDL.

### OBJECTIVE 1: Implement BMPs Recommended in the Spring Creek Watershed TMDL

The strategy outlined in the Spring Creek Strategic Implementation Plan to address reductions identified in the Spring Creek TMDL recommends BMPs focused on improving riparian management, reducing stormwater, forest, and rangeland runoff, repairing defective OWTS systems, increasing stream habitat, improving grazing and forest land health, and removing sediment in Mitchell and Major Lakes. The TMDL identifies a load reduction of

90 percent needs to be achieved in the high flow zone (48–525 cfs), 16 percent reduction in the moist flow zone (14–47 cfs), and 38 percent reduction in the low flow zone (0–2.1 cfs) for the stream to meet its assigned beneficial uses. BMPs implemented in this segment would be focused on critical areas in the watershed and would be prioritized based on pollutant reduction potential.

Task 1 **Riparian, Stormwater, Livestock, Grazing, Forest, and Lake Management Improvements**

Types of BMPs suggested in the strategic implementation plan include livestock and manure management, riparian buffers, streambank stabilization, stormwater runoff and detention, grazing and forest management, and stream and lake habitat improvement. The focus of this project segment would be to continue to implement and assess the effectiveness of riparian, stormwater, livestock, grazing, and forestry improvement projects. During this Task 1, 13 BMP projects would be completed which include: 4 riparian vegetation/streambank protection; 2 stormwater; 4 manure/grazing management; 2 forest stormwater; and 1 dam/lake improvement. These projects would be selected for their impact on water-quality and monitored for BMP effectiveness to aid in assessing those impacts. Land managers in the watershed are comprised of federal and state agencies, and private individuals. Livestock producers in the watershed often have federal grazing leases and maintain their herds on both public and private lands. In the case of livestock grazing, it is paramount that these groups cooperate to maintain healthy riparian systems. This segment would assist one private livestock operation and work in cooperation with the U.S. Forest Service in developing a coordinated grazing system that would improve riparian buffers to reduce fecal coliform in Spring Creek and its tributaries. This would include conducting plant and soil health condition inventories, improved grazing systems demonstrations, and implementing BMPs including livestock watering facilities, fencing, livestock water pipelines, spring developments, and other facilitating practices.

Stormwater management BMP projects would also be implemented during this segment to reduce the negative effects of stormwater discharge on fecal bacteria levels in Spring Creek. Stormwater BMPs would be demonstrated on two impervious areas, such as: an existing, developed campground; a developed, municipal drainage area; a residential home site; or a road district or highway project identified in the Spring Creek Watershed Stormwater Management Plan.

Also, this segment would propose to demonstrate stormwater BMPs on private forest lands to protect and improve stormwater runoff on two projects and educate owners about silviculture activities on water quality in conjunction with interagency forest management efforts on mountain pine beetle impacted areas within the watershed.

Additionally, this segment and task would focus on dam and lake improvement projects and enhance the aquatic ecosystem by dredging sediment that has been deposited into Major and Mitchell Lakes. This segment would assist project partners, the Black Hills RC&D, U.S. Forest Service, Black Hills National Forest, and the South Dakota Game, Fish, and Parks to implement alternatives for improving dam safety, modifying capacity, and enhancing aquatic habitat. Improvement work is scheduled for 2012 and would conduct sediment removal to restore reservoir volume and improve aquatic habitat.

Products:

1. Riparian, Stormwater, Livestock, Grazing, Forest, and Lake Management Improvements.
    1a. Four Riparian Vegetation/Streambank Protection Projects
    1b. Two Stormwater Projects (campground, municipal, road district, or residential)
    1c. Four Manure/Grazing Management Projects (1 AFO, 2 access control, 1 coordinated grazing)
    1d. Two Forest Stormwater Projects
    1e. One Dam and Lake Improvement Project (Mitchell or Major Lakes)

- Product Cost: $246,000, 319 Cost: $146,000
  CWSRF Cost: $100,000
- Lead: Local Citizens, Spring Creek Watershed Advisory Group, Watershed Coordinator Consultants
- Other Groups: Natural Resources Conservation Service (NRCS), U.S. Forest Service (USFS-Black Hills National Forest), Game, Fish & Parks (GF&P), U.S. Fish and Wildlife Service (USFWS), Pennington County
- Milestone: June 2014, four complete riparian vegetation/ streambank stabilization projects, two stormwater projects, four manure management and grazing management projects, two forest management projects, and one dam and lake management improvement projects
- (see timeline, Figure 3-2)

Task 2 **On-site Wastewater Treatment System (OWTS) Improvements**

Human sources, including failing septic systems and leaking sanitary sewer systems, contribute to the existing bacteria load according to the HSPF model used in the initial TMDL assessment project. The area contains over 750 septic systems that are mostly located near Spring Creek and its tributaries on limited soil conditions. Information has been collected about the age and condition of these systems. The goal of this task would be to implement the priority strategies in critical areas outlined in the Spring Creek Watershed On-site Wastewater Management Plan and continue to identify OWTS systems that are in need of repair and require upgrades while investigating

alternative funding. Water-quality monitoring above and below OWTS projects would continue to aid in assessing impacts and outreach efforts.

Products:

2. On-site Wastewater Treatment System (OWTS) Improvements.

- Product Cost: $ 12,000 319 Cost: $ 6,000
- Lead: Local Citizens, Spring Creek Watershed Advisory Group, Watershed Coordinator Consultants
- Other Groups: Pennington County
- Milestone: June 2014, 2 completed OWTS improvement projects (see timeline, Figure 3-2)

**OBJECTIVE 2: Public Outreach and Project Management**

Public outreach is an essential part of this project. Public meetings and tours keep the community informed and encourage involvement in the project. Local citizen implementation project planning and record keeping is important for efficient report writing. Grant writing for future projects involving water-quality issues in the watershed would further assist in the Spring Creek Watershed improvement efforts.

Task 3 **Public Outreach, Cultural Resources, Engineering Design, Implementation Record Keeping, Report and Future Grant Writing**

Two public meetings, two tours, and eight advisory group meetings would be held during this project segment. The function of the meetings will be to update the status of the project for the landowners, citizens, and stakeholders and educate and encourage them to become involved with implementing BMPs and solicit volunteers for citizen monitoring activities. These meetings would provide an avenue for input from the residents in the area. Notifications of meetings would be made to local agencies, businesses, and organizations through direct mailings to 1,000 watershed residents; and advertisements in local/regional newspapers. In addition, the project's public web page (**www.springcreekblackhills.com**), which is averaging over 100 visitors per month, would be updated to provide the latest available data as well as an overview of the project and status of work activities.

Implementation projects require working with the property owners, residents, and agriculture producers in completing applications, project planning, engineering design completion, regulatory permit assistance, and certifying practices when completed along with organizing and filing applications and bills. All Segment 1 projects have completed cultural resource effects submitted and approved by the SD DENR and the State Historical Society–State Historic Preservation Office (SHPO).

Grant Reporting and Track System (GRTS) Reports will be completed as required by the EPA. A final report would be submitted to the EPA at the

conclusion of the project. This report will cover all work completed during this segment and the effects BMPs have on the water quality.

In the first segment, Pennington County and their partners collaboratively submitted project proposals to the National Forest Foundation (NFF), South Dakota Discovery Center, National Wild Turkey Federation, and the US Forest Service for project implementation. During this segment, additional grants would continue to be pursued and proposals written to assist in resolving water-quality issues and supports the cost of BMP implementation.

Products:

3. Public Outreach, Cultural Resources, Engineering Design, Implementation Record Keeping, Report and Future Grant Writing.

   Total Product Cost: $150,000 319 Cost: $ 138,000
   - Lead: Pennington County, Spring Creek Watershed Advisory Group, Watershed Coordinator Consultants
   - Other Groups: Pennington Conservation District, City of Hill City, Black Hills RC&D, US Forest Service, SD GF&P
   - Milestone: June 2014, GRTS reports, one final report, two public meetings, two tours, eight advisory group meetings, one project website
   - (see timeline, Figure 3-2)

**OBJECTIVE 3: Complete Water-Quality and BMP Effectiveness Monitoring**

Task 4 **Evaluation and Monitoring**

Water-quality monitoring in conjunction with BMP implementation is critical in evaluating the progress toward meeting the TMDL. The purpose of the multi-party water-quality sampling as part of this project segment is to (1) continue to monitor water-quality conditions on Spring Creek and its tributaries, primarily related to fecal coliform bacteria, sediment, temperature, and nutrients; (2) further identify sources of impairments in the watershed; and (3) focus BMP efforts in the future and (4) determine BMP implementation effectiveness. The monitoring results collected as part of this segment would be compared to previous sampling conducted during the TMDL assessment project and the first segment, and as part of the state's ambient water-quality monitoring program, to identify any changes in water quality related to changing watershed condition, land cover, or climatic patterns. Ambient water-quality sampling would occur monthly during the recreation season in 2012 and 2013 at 16 locations and storm event sampling would occur during 6 storm events at 5 locations in the watershed.

Sixteen sites were selected for water-quality monitoring and are shown in Figure 3-1. These sites include background sampling sites near the headwaters of Spring Creek and key tributaries, upstream and downstream of Hill City and Rushmore Products Sawmill, and upstream/downstream of small impoundments in the watershed that act as effective water-quality BMPs. Sites were chosen on each of the main tributaries to Sheridan Lake.

Many sites were selected based on previous data collection efforts (USGS gaging, SD DENR water-quality monitoring (WQM), and SDSM&T TMDL stations). Constituents to be sampled include: total phosphorus; nitrate nitrogen, total suspended solids, total and *E. coli,* and *Enterococcus.* Pennington County and their partners initiated volunteering monitoring in the watershed and would continue to expand the volunteer monitoring during this segment. Residents would learn about the monitoring results through volunteer training, e-mail, mailings, public meetings, tours, and **www.springcreekblackhills.com**.

RSI-996-10-102

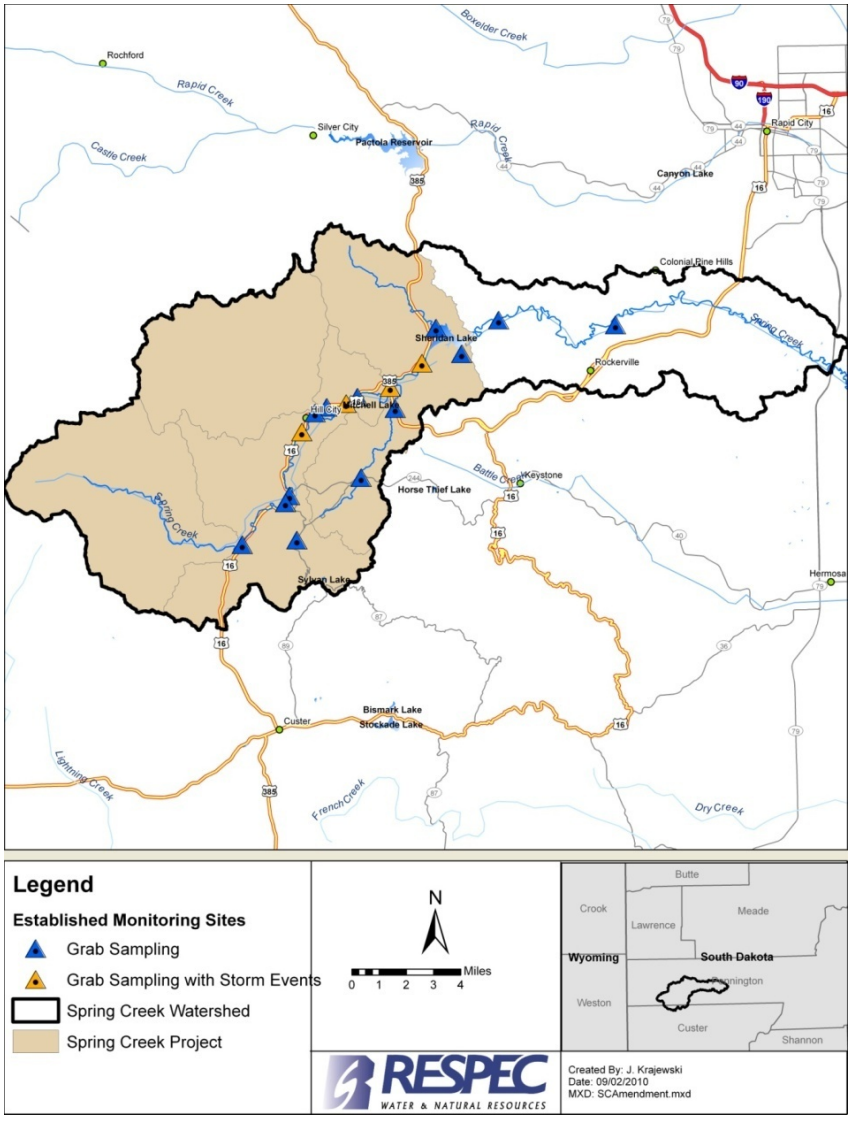


**Figure 3-1.** Established Water-Quality Monitoring Sites in the Spring Creek Watershed.

Products:

4. Compile Water-Quality Monitoring Data.

Total Product Cost: $125,000 319 Cost: $60,000

- Lead: Pennington County, SDSM&T, and Watershed Consultants
- Other Group: City of Hill City, WDWDD, US Forest Service, SD GF&P, Spring Creek Watershed Advisory Group
- Milestone: June 2014, complete water-quality monitoring and analysis
- (see timeline, Figure 3-2)

## 3.3 SCHEDULE

The project milestone schedule is shown in Figure 3-2. The milestone schedule is based on work approval by June 2012 and completion by May 2014.

RSI-996-10-113

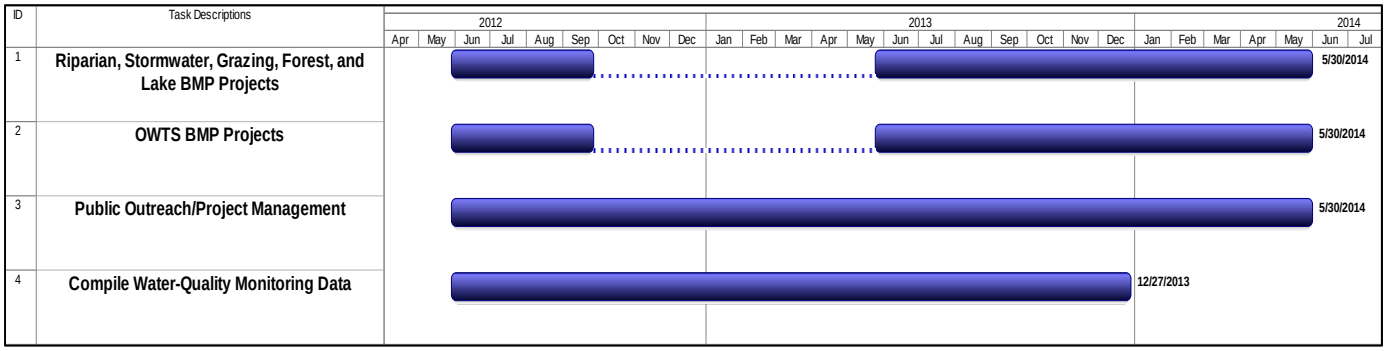


**Figure 3-2.** Project Timeline.

## 3.4 PERMITS

Before any new construction, required permits will be obtained. Permits that may be needed to be obtained for any stream, OWTS, and stormwater construction work include, but are not limited to, floodplain development, OWTS, 401 and 404 stream, and construction permits from local, state, and federal agencies.

## 3.5 LEAD PROJECT SPONSOR

Pennington County, a government entity, is the lead local sponsor for this implementation project and is experienced in administering 319 implementation projects; they are actively involved in several watershed, water-quality improvement, and resource conservation management projects.

## 3.6 OPERATION AND MAINTENANCE QUALITY ASSURANCE

Responsibilities for operation and maintenance of 319 and CWSRF funded BMPs will be provided for through Pennington County's participant agreements, cooperative agreements and contracts. Reimbursable agreements developed for cost-sharing, not-to-exceed amounts, operations and maintenance, payments, procedures for BMP failure or abandonment, termination, ownership, and the life span BMP maintenance. The government-funding sponsor, if applicable, along with watershed coordinator consultants, would be responsible for completing operation and maintenance scheduling, on-site evaluations, and follow-up with project participants when actions need to be taken to ensure BMP operation for its designated life span. Construction and compliance for BMPs implemented with 319 and CWSRF funds will be in accordance with the applicable rules and regulations set forth in the South Dakota NRCS Conservation Practice Standards and NRCS' Environmental Quality Incentives Program (EQIP) Manual, Pennington County's On-Site Wastewater Treatment System Ordinance, and provisions of Chapter 74:53:01 (and any amendments thereto) of the Administrative Rules of South Dakota. Participants who do not maintain practices funded by this project for the length of the agreed contract term will be required to repay all cost-share funds and any liquidated damages incurred. Pennington County and watershed consultants would be responsible for participant contacts, developing a participant list, keeping records, submitting vouchers and reports, and recording match amounts as required in the SD DENR subgrant agreement.

# 4.0 COORDINATION PLAN

## 4.1 PARTICIPATING GROUPS AND AGENCIES

There has been strong local support for this project. The following groups/agencies have been participating and would continue to participate in the Spring Creek Watershed implementation project:

- **Spring Creek Watershed Advisory Group**
- **Black Hills Resource Conservation and Development (RC&D)**
- **City of Hill City**
- **City of Rapid City**
- **Pennington Conservation District**
- **Pennington County**
- **Custer County**
- **South Dakota Game, Fish, and Parks (SD GF&P)**
- **South Dakota School of Mines and Technology (SDSM&T)**
- **USDA Natural Resource Conservation Service (NRCS)**
- **USDA Forest Service (USFS), Black Hills National Forest**
- **West Dakota Water Development District (WDWDD)**
- **Black Hills FlyFishers**

## 4.2 LETTERS OF SUPPORT

Letters of support would be supplied by cooperating organizations to the SD DENR for the Spring Creek Watershed Management and Implementation Project – Segment 2 upon request.

## 4.3 COORDINATION WITH OTHER PROGRAMS

Pennington County and their Spring Creek Watershed Advisory Group (SCWAG) would continue to coordinate activities with local, state, and federal agencies through frequent communication and quarterly meetings. SD GF&P, USFS, NRCS, SD DENR, local organizations, and local government agencies would provide input and involvement in this project. Additional coordination with local City of Hill City, NRCS, USFS, and SD GF&P personnel will be necessary for riparian, streambank, stormwater, livestock, grazing, forestry, and lake management improvement projects, along with volunteer citizen monitoring, weed/pest management, and streambank stabilization projects.

## 4.4 SIMILAR ACTIVITIES IN THE WATERSHED

Practically all expected activities in the Spring Creek Watershed are included in the funding table. Additional partners and projects may be identified during this segment.

# 5.0 EVALUATION AND MONITORING PLAN

## 5.1 QUALITY CONTROL AND ASSURANCE

The collection of field data will be performed in accordance with the SD DENR's *Standard Operating Procedures for Field Samplers, Tributary and In-Lake Sampling Techniques,* the U.S. Forest Service's Monitoring Implementation Guide, and the South Dakota NRCS Electronic Field Office Tech Guide (EFOTG). Standard Operating Procedures (SOP) and a Quality Assurance Project Plan (QAPP) will also be developed.

## 5.2 DATA

Pennington County would provide the data to SD DENR upon request. The data and analysis for this project segment would be documented in a final report, and the Spring Creek Watershed Advisory Group (SCWAG) would review and make recommendations to the Pennington County Board of Commissioners for submittal of the final report to the SD DENR. Better Assessment Science Integrating Point and Nonpoint Sources (BASINS) and HSPF were used to model the Spring Creek Watershed when the TMDL was developed. To develop the TMDL and to determine the necessary load reductions, several BMPs were modeled in these programs to reduce bacteria concentrations in the streams within the watershed. The following activities would be completed to determine the progress made to achieving the goals of the TMDL plan:

1. Monitor Present Progress Against Plan in Midyear and Annual Reports (Load Reductions Reported Annually).

   Evaluation of project success in reaching the project objectives and goals would be accomplished by:

   - Measuring the scheduled versus the actual milestone completion dates.
   - Comparing water chemistry data and annual loads pre- and post-implementation.
   - Developing a sustainable watershed implementation project measured in part by the participation and approval of additional monies for BMP implementation.

   Project monitoring would be reviewed by the Spring Creek Watershed Advisory Group (SCWAG) in quarterly meetings and by Pennington County semi-annually to report progress toward the goals and objectives.

2. Monitor Water-Quality Improvement.

   Water-quality monitoring would use a targeted approach. Water-quality data would be collected at sites identified in Task 4 – Evaluation and Monitoring.

The SD DENR Surface Water-Quality Program also has two monitoring stations within the watershed, Spring Creek near Sheridan Lake (WQM 460654) and Spring Creek near Rapid City (WQM 460649). Comparisons over time would be performed using applicable sites to measure the large-scale changes in water quality.

## 5.3 MODELS

BASINS model, along with HSPF, were used to determine the contribution of fecal coliform bacteria from identified sources and to evaluate the implementation of BMPs to control these sources. The Spring Creek Watershed was represented using four subwatersheds in the model to represent the upper and lower Spring Creek and key tributaries (Palmer and Newton Fork Creeks). The nonpoint sources in the study area are modeled in HSPF by estimating per-acre fecal coliform accumulation rates and maximum fecal coliform storage rates for each source. The buildup and wash-off of fecal coliform is simulated based on these rates and precipitation. The values for the accumulation and storage rates were calculated using the Bacterial Indicator Tool (BIT) and the Bacteria Source Load Calculator (BSLC) may be used in future modeling efforts. Human sources (failing septic systems, leaking sanitary sewer lines, and leaking lagoons) and livestock in streams are nonpoint sources that are modeled as point sources because the coliform they produce cannot be adequately represented by buildup and accumulation rates. The BIT and BSLC calculate flow rates and fecal coliform counts per hour that are used in the simulation model to represent livestock and wildlife in streams and human sources.

Pennington County, SDSM&T, and watershed consultants are gathering additional data including water-quality monitoring, land use, septic location and failure rates, livestock and wildlife populations, and installed BMPs within the watershed to improve the Spring Creek Watershed model for the current and future implementation

segments. These modeling results would be incorporated and discussed in detail in the Spring Creek Watershed Stormwater Management Plan and the Spring Creek Watershed Strategic Implementation Plan.

## 5.4 LONG-TERM OPERATION AND MAINTENANCE (O&M) FUNDING

The long-term O&M funding for BMPs installed would be funded and maintained by the project participants.

## 6.0 BUDGET

Table 6-1 identifies the funding sources and cash flow during the project. Tables 6-2 and 6-3 present the budget for the 319 and CWSRF funds as well as the matching funds for the project. EPA 319 funds represent approximately 44 percent and CWSRF funds represent about 13 percent of the total project budget.

**Table 6-1. Cash Flow**

| Budget | June 2012–May 2013 ($) | June 2013–May 2014 ($) | Total ($) |
|---|---|---|---|
| **319 and CWSRF Funds** | **180,000** | **270,000** | **450,000** |
| **Matching Funds** | | | |
| Participant | 50,000 | 118,000 | 168,000 |
| Pennington County | 29,000 | 29,000 | 58,000 |
| SDSM&T | 5,000 | 5,000 | 10,000 |
| City of Hill City | 10,000 | 10,000 | 20,000 |
| WDWDD | 10,000 | 10,000 | 20,000 |
| SDGF&P | 33,000 | 37,000 | 70,000 |
| **Subtotal** | **137,000** | **209,000** | **346,000** |
| **Total Budget** | **317,000** | **479,000** | **796,000** |

## Table 6-2. Budget of 319 and CWSRF Funds

| **Project Objective and Task Description** | **CWSRF** | **EPA 319** | | | |
|---|---|---|---|---|---|
| **Objective 1. Implement Recommended BMPs in the Spring Creek Watershed** | **Participants** | **Participants** | **SDGFP** | **Consultants** | **Total** |
| *Task 1. Riparian, Stormwater, Livestock, Grazing, Forest, and Lake Improvements*<br>Products 1a-1e. Riparian, Stormwater, Grazing, Forest, Lake BMPs | | | | | |
| 1a. **Four** Riparian Vegetation/Streambank Protection Projects | | $60,000 | | | $60,000 |
| 1b. **Two** Stormwater Projects (campground, municipal, road, or residential) | $50,000 | | | | $50,000 |
| 1c. **Four** Manure/Grazing Projects (**1** AFO, **2** access control, **1** grazing) | | $36,000 | | | $36,000 |
| 1d. **Two** Forest Stormwater Projects | $50,000 | | | | $50,000 |
| 1e. **One** Dam and Lake Improvement Project (Mitchell or Major Lake) | | | $50,000 | | $50,000 |
| ***Task 1 Totals*** | **$100,000** | **$96,000** | **$50,000** | | **$246,000** |
| *Task 2. On-site Wastewater Treatment System Improvements*<br>Product 2. **Two** OWTS BMP Projects | | | | | |
| ***Task 2 Totals*** | | **$6,000** | | | **$6,000** |
| **Objective 2. Public Outreach and Project Management** | | | | | |
| *Task 3. Public Outreach, Cultural Resources, Engineering, Record Keeping, Report/Grant Writing*<br>Products 3. Public Outreach/Project Management | | | | | |
| ***Task 3 Totals*** | | | | **$138,000** | **$138,000** |
| **Objective 3. Complete Essential Water-Quality Monitoring** | | | | | |
| *Task 4. Evaluation and Monitoring*<br>Product 4. Compile Water-Quality Monitoring Data (Sixteen sites for two years) | | | | | |
| ***Task 4 Totals*** | | | | **$60,000** | **$60,000** |
| **Project Totals** | **$100,000** | **$102,000** | **$50,000** | **$198,000** | **$450,000** |

## Table 6-3. EPA 319, CWSRF, and Matching Funds Budget by Task

| Project Objectives and Task Descriptions | Year 1 | Year 2 | Total | EPA 319 | CWSRF | Total Match | Matching Funds | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Participant | County | SDSM&T | Hill City | SDGFP | WDWDD |
| Objective 1. Implement Recommended BMPs in the Spring Creek Watershed | | | | | | | | | | | | |
| *Task 1. Riparian, Stormwater, Livestock, Grazing, Forest, and Lake Improvements*<br>Products 1a-1e. Riparian, Stormwater, Grazing, Forest, and Lake BMP Projects | | | | | | | | | | | | |
| 1a. Four Riparian Vegetation/Streambank Protection Projects @ $25,000 each | $34,000 | $66,000 | $100,000 | $60,000 | | $40,000 | $40,000 | | | | | |
| 1b. Two Stormwater Projects (campground, municipal, road, or residential) @ $50,000 each | $34,000 | $66,000 | $100,000 | | $50,000 | $50,000 | $50,000 | | | | | |
| 1c. Four Manure/Grazing Projects (1 AFO, 2 access control, 1 grazing) @ $15,000 each | $20,000 | $40,000 | $60,000 | $36,000 | | $24,000 | $24,000 | | | | | |
| 1d. Two Forest Stormwater Pilot Projects @ $50,000 each | $30,000 | $70,000 | $100,000 | | $50,000 | $50,000 | $50,000 | | | | | |
| 1e. One Dam and Lake Improvement Project (Mitchell or Major Lake) @ $100,000 each | $33,000 | $67,000 | $100,000 | $50,000 | | $50,000 | | | | | $50,000 | |
| *Task 1 Totals* | $151,000 | $309,000 | $460,000 | $146,000 | $100,000 | $214,000 | $164,000 | | | | $50,000 | |
| *Task 2. On-site Wastewater Treatment System Improvements*<br>Product 2. Two OWTS BMP Projects @ $6,000 each | $6,000 | $6,000 | $12,000 | $6,000 | | $6,000 | $4,000 | $2,000 | | | | |
| *Task 2 Totals* | $6,000 | $6,000 | $12,000 | $6,000 | $0 | $6,000 | $4,000 | $2,000 | | | | |
| Objective 2. Public Outreach and Project Management | | | | | | | | | | | | |
| *Task 3. Public Outreach, Cultural Resources, Engineering, Record Keeping, Report/Grant Writing*<br>Products 3. Public Outreach/Project Management | $75,000 | $75,000 | $150,000 | $138,000 | | $12,000 | | $12,000 | | | | |
| *Task 3 Totals* | $75,000 | $75,000 | $150,000 | $138,000 | $0 | $12,000 | | $12,000 | | | | |
| Objective 3. Complete Essential Water-Quality Monitoring | | | | | | | | | | | | |
| *Task 4. Evaluation and Monitoring*<br>Product 4. Compile Water-Quality Monitoring Data (Sixteen sites for two years) | $85,000 | $89,000 | $174,000 | $60,000 | | $114,000 | | $44,000 | $10,000 | $20,000 | $20,000 | $20,000 |
| *Task 4 Totals* | $85,000 | $89,000 | $174,000 | $60,000 | $0 | $114,000 | | $44,000 | $10,000 | $20,000 | $20,000 | $20,000 |
| Project Totals | $317,000 | $479,000 | $796,000 | $350,000 | $100,000 | $346,000 | $168,000 | $58,000 | $10,000 | $20,000 | $70,000 | $20,000 |

## 7.0 PUBLIC INVOLVEMENT

Communication with the major stakeholders in this project is critical to success. Public involvement in the project would be continued through coordination with the Spring Creek Watershed Advisory Group, public meetings with stakeholders, newsletters, word of mouth, and by the website **(*www.springcreekblackhills.com*)** that is in operation for this project.