NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

SPRING DEVELOPMENT
(No.)
CODE 574

DEFINITION

Collection of water from springs or seeps to provide water for a conservation need.

PURPOSE

Improve the quantity and/or quality of water for livestock, wildlife or other agricultural uses.

CONDITIONS WHERE PRACTICE APPLIES

In areas where a spring or seep will provide a dependable supply of suitable water for the planned use.

CRITERIA

General Criteria Applicable to All Purposes

Spring developments shall be planned, designed, and constructed in compliance with Federal, State and Local laws and regulations.

Impacts to existing wetland functions shall be assessed. USDA wetland conservation provisions apply. The practice must comply with NRCS wetland technical assistance policy contained in GM 190, Part 410.26.

An investigation of site conditions shall be made, including:

a. Soil borings
b. Water quality for the intended purpose
c. Water quantity for the intended purpose
d. Suitability of the spring location for the intended purpose
e. A determination that the farmer has the appropriate water rights or permits to develop the spring
f. An assessment to determine existing ecological functions and potential losses from the spring development
g. An assessment of the cultural resource associated with the spring.

Develop springs by removing obstructions to the flow, collecting the water flow and storing the water, if flow from the spring is not sufficient to meet the peak demand of the intended use.

Remove obstructions to spring flow such as fine-grained sediments, rock, slope-wash materials and vegetation to allow the spring to flow freely. Design the development of the spring to prevent obstructions from reoccurring.

Fracture and tubular springs. This type of spring is associated with cavernous rock. If water issues from rock fractures, the individual openings shall be cleaned and enlarged, as needed, to improve flow. The water from these individual openings shall be collected by means of tile or perforated pipeline or by a gravel-filled ditch. The collection works shall be constructed an adequate distance below the elevation of the openings to permit free discharge.

If water issues from a single opening, such as a solution channel in a soluble rock formation, the opening shall be cleaned or enlarged as needed. A collection system usually is not required.

If a spring box or sump is used, it shall be installed at an elevation low enough that water yield is not restricted.

Perched or contact springs. Perched or contact springs occur when an impermeable layer lies beneath a water-bearing permeable layer. Collection trenches shall be used to intercept and divert flows from the water-bearing formation.

Artesian springs. Artesian springs normally occur at a fissure or break in the impervious stratum with the water source being an under-lying pervious water-bearing layer so positioned that the water surface elevation (water table) is always above the outlet point of the spring. Remove obstructions, clean or enlarge joints or fractures, or lower the outlet elevation as needed to improve flow. Sumps or spring boxes shall be located as needed. Free outlet discharge or minimum restriction to the spring flow is required to protect and maintain yield.

Collection systems. The type of collection system used for the spring development is dependent upon the type of spring and site geology. Design the collection system to collect sufficient water for the intended purpose of the spring. Collection systems generally consist of a restrictive barrier that forces water to collect in a perforated pipe that flows to an outlet. Include measures in the collection system to prevent sediment from entering the system and/or provisions to trap and remove sediment that does enter the system.

If a collection trench is used, the trench shall be excavated so that it extends into the impervious layer. Minimum length of the trench shall be based on site conditions, preferably the entire length of the water-bearing outcrop.

A cutoff wall shall be constructed along the downstream side of the trench if needed to ensure that the flow enters the collection system. The cutoff wall may be constructed of plastic sheeting, well-tamped clay, masonry, concrete, or other impervious materials.

The collection system shall consist of subsurface drainage tubing or perforated pipe not less than 4-inch diameter, or other suitable manufactured system. Surrounding the collector with geotextile fabric or a sand-gravel filter is recommended. Cleanouts are recommended for all collection systems.

Crushed rock or gravel backfill, not less than 1 foot thick, may be used as a collection system if site conditions warrant, in lieu of other materials.

Sand, gravel, and crushed rock shall be composed of clean, hard, durable particles.

Spring boxes. Include a spring box, if necessary, to allow sediment to settle out of the spring flow or to provide storage to meet peak demands on the water from the spring. Locate the spring box to allow water to flow by gravity from the spring to the spring box. Construct the spring box of a durable material such as concrete, plastic, galvanized steel or naturally rot resistant wood.

The spring box shall be of sufficient size to provide for the storage of sediment and any required storage of water. The cross-sectional area of the spring box shall be large enough to allow access for periodic cleaning. Provide the spring box with a tight fitting cover to prevent trash and surface runoff from entering. To prevent freezing, bury the spring box in the soil.

The floor of the box shall be not less than 6 inches below the outlet of the collection system.

Outlets. The spring development shall have an outlet pipe that carries the water to its intended use.

The outlet pipe from a spring box shall be placed not less than 6 inches above the floor, to provide a sediment trap. The spring outlet pipe should be at the same elevation or lower than the collector pipe outlet to prevent reduced spring flow. The intake to the outlet pipe shall be screened as necessary, and installed to the box with a watertight connection.

The outlet pipe must have positive grade away from the spring box or collection system unless vent pipe(s) are added to prevent air locks or the water is pumped.

The outlet pipe shall have capacity to provide sufficient water for the intended purpose of the spring. The outlet pipe shall have a minimum 1¼ inch diameter. In lieu of site-specific spring flow and pipe vent calculations, the outlet pipe shall have the following minimum size based on line grades:

- 1¼ inches inside diameter for line grades greater than 1.0 percent.
- 1½ inches inside diameter for line grades greater than or equal to 0.5 percent but less than or equal to 1.0 percent.
- 2 inches inside diameter for lines grades less than 0.5 percent.

Minimum outlet pipe material and strength requirements shall equal those found in NRCS Conservation Practice Standard Pipeline, Code 516.

When flow from the spring, whether intermittent or continuous, will exceed the capacity of the collection system, an overflow is required. Size the overflow to carry the maximum flow expected from the spring during periods of wet weather. Manage the overflow so that it does not create a resource problem.

Follow Conservation Practice Standard 614, Watering Facility to design facilities to provide access for livestock and wildlife to water from the developed spring.

A pump will be needed if gravity will not carry water from the spring to where the water will be used. Base the type and size of the pump upon available power sources and the water delivery needs.

Facility Protection. Measures shall be included to protect the installed facility from damage by freezing, flooding, sedimentation, water quality contamination, vehicular traffic, and livestock.

Regrade areas disturbed by construction of the spring development to keep surface flow out of the spring. Vegetate disturbed areas as soon as possible after construction.

CONSIDERATIONS

A shutoff valve and vent system on the spring outlet pipe should be considered for winter shutdown, flow control and maintenance.

Native vegetation adapted to wet conditions should be considered on wet sites as an alternative to introduced grasses to stabilize areas after construction.

Consider how other conservation practices properly applied on the spring recharge area may increase infiltration of precipitation in order to conserve the spring's flows.

Consider how diversion of water from spring developments affects stream flows in the watershed.

Aquatic habitat quality may be conserved when a spring is developed near surface waters, or on a floodplain, by incorporating a float valve that shuts off flow to the tank, and returns overflow via a stable outlet to the same watershed where it was collected.

Springs may represent islands of unique habitat in the landscape, supporting plant and animal populations that only occur in an area of a high water table. Consider options for developing the spring or seep that preserve the conditions that support these unique habitats.

Springs are sources of water for fish and wildlife. Maintain fish and wildlife access to water from the spring development where possible.

Brush removal, excavation, clean out and withdrawal of water are manipulations that may affect wildlife habitat and wetland functions and values. However, selective removal of undesirable brush and management for desirable native plants may reduce evaporative losses and conserve biodiversity.

PLANS AND SPECIFICATIONS

Plans and specifications shall provide details of planned location, materials and construction requirements for the installation of the practice to meet its intended purpose.

OPERATION AND MAINTENANCE

The O&M plan shall contain a schedule for the periodic monitoring of the following items:

- Winter freeze and flooding protection
- Sediment buildup in the spring box
- Clogging of outlet and overflow pipes
- Valve operations
- Diversion of surface water from the collection area and spring box
- Erosion from overflow and outlet pipes
- Rodent damage
- Vegetative cover

Any problems discovered shall be immediately repaired.

REFERENCES

National Engineering Handbook - Part 650, Engineering Field Handbook, Chapter 12, Springs and Wells, USDA, Natural Resources Conservation Service

The Restoration & Management of Small Wetlands of the Mountains & Piedmont in the Southeast. Somers, A. B. et al. USDA, Natural Resources Conservation Service, Watershed Science Institute. November 2000.

National Engineering Manual, Part 531 Geology 531.31, USDA, Natural Resources Conservation Service,

Groundwater & Wells, Fletcher Driscoll, Johnson Division.

Water Supply Paper 2220, Basic Ground-water Hydrology, US Geological Survey.