

**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 spring or seep development will provide a dependable supply of suitable water for the planned times of use, and where the intended purpose can be achieved by using this practice alone or combined with other conservation practices.

CRITERIA

General Criteria Applicable to All Purposes

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. A certified wetland determination
- h. An assessment of the cultural resource associated with the spring.

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, including soil borings, shall be made. Water quality shall be determined to the extent required for the intended purpose. Water quantity shall be measured from existing flows, as practicable, to determine if the development will meet requirements.

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 or a tunnel in lava, 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 underlying 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. 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 insure 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, wood box drain, 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. Spring boxes, if needed, shall be made of plastic, concrete, or other durable material, with a tight access cover and impervious floor. A "shoebox" type access cover or manhole attachment, with gasket, is recommended for tightness. The floor may be omitted when the underlying material is stable and impervious.

The boxes shall have a minimum cross-sectional area of $1 \frac{1}{2} \text{ ft}^2$, and the floor of the

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

Spring box outflows, if needed, shall meet the requirements found in NRCS Practice Stand 614, Trough or Tank.

Outlets. 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 slope downward, away from the spring box or collection system unless vent pipe(s) are added to prevent air locks.

The outlet pipe shall be a minimum of $1 \frac{1}{4}$ inch (3 cm) in 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:

1 $\frac{1}{4}$ inches inside diameter for the grades greater than 1.0 percent.

1 $\frac{1}{2}$ inches inside diameter for the grades greater than or equal to 0.5 percent but less than or equal to 1.0 percent.

2 inches inside diameter for line grades less than 0.5 percent.

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.

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.

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

Appurtenance protection. Measures shall be included to protect appurtenances from damage by freezing, flooding, sedimentation, contamination, vehicular traffic, and livestock.

Wildlife habitat protection. Spring developments with potential to jeopardize wetlands, bogs, fens, or other unique ecological sites shall be designed with measures required to maintain the existing habitat, unless acceptable mitigation is provided. A functional assessment will be made at potential spring development areas to determine existing ecological functions and/or potential losses.

Operation and maintenance plans for ecologically sensitive sites shall include specific valve installation and operation requirements to protect existing site habitat values.

Vegetative establishment. Establishing vegetation on disturbed areas shall be in accordance with NRCS Practice Standard 342, Critical Area Planting.

Environmental. When planning a site for development the following must be considered:

- Need and feasibility of protection from contaminants, and
- Potential damage to cultural resource areas, wetlands, woody cover, and existing wildlife habitat.

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 may be used as an alternative to introduced grasses on some wet sites.

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 include such items as:

- Winter freeze and flooding protection
- Overflow and valve operations
- Spring box sediment removal
- Rodent damage repair
- Maintaining vegetative cover and stable outlet
- Other site specific items as needed

Any problems discovered shall be immediately repaired.

REFERENCES

National Engineering Handbook - Part 650, Engineering Field Handbook, Chapter 12, Springs and Wells.

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