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

An investigation of site conditions shall be made, including the following:

- Soil borings
- Water quality for the intended purpose
- Water quantity for the intended purpose
- Suitability of the spring location for the intended purpose
- A determination that the landowner has the appropriate water rights or permits to develop the spring
- An assessment to determine existing ecological functions and potential losses from the spring development
- An assessment of the cultural resource associated with the spring
- A certified wetland determination - The site is considered to meet wetland criteria unless a certified wetland determination documents that the area does not meet wetland criteria. The following requirements concerning livestock exclusion or location and operation of the associated watering facility (tank) will provide adequate mitigation of potential losses of the ecological functions of the wetland. The as-built conditions will be noted as documentation of the required mitigation.
  - The tank must be removed from the wetland seep to the maximum extent allowed by design criteria and landform.
    - When the tank is installed a minimum distance of 100 feet from the edge of the wetland seep and 50 feet from the edge of wet contiguous areas downstream from the wetland seep, no additional mitigation assessments or compensation activities will be required or implemented. Overflow discharge from the tank should be routed back to the original drainage flow-way.
    - If the tank will be installed less than 100 feet from the wetland seep and less than 50 feet from the edge of wet contiguous areas downstream from the wetland seep, a float valve or livestock exclusion from the seep area will be required.
  - For wetland seeps with very marginal water flow and where the technical person determines the wetland seep has sufficient water flow for spring development, a float valve will be required.

- If the spring development is used for over-winter water supply, the float valve can be fixed open after the first fall killing frost until the frost-free date in 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.

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 slotted or perforated pipe that flows to an outlet. Construct the restrictive barrier of plastic sheeting, compacted clay, masonry, concrete, or other impervious materials. 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.

Collection Trench

A collection trench is generally used to develop side hill seeps that have an impermeable layer beneath a water-bearing permeable layer. The trench shall be excavated into, but not through, the impermeable layer. The length of the trench shall be adequate to provide the required water supply. The collection system in the trench shall consist of a subsurface collection pipe not less than 4 inches in diameter or other suitable manufactured system. Use a suitable sand-gravel filter or geotextile fabric to prevent sediment from entering the collection pipe.

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. A minimum cross-sectional area of 1.5 square feet (18-inch diameter pipe) is required. Provide the spring box with an impervious floor of constructed or natural material and a tight-fitting cover to prevent trash and surface runoff from entering. To prevent freezing, bury the spring box in the soil.

Riser - Flush Valve System

On installations where 3 or less collection lines are used, a 4-inch diameter or larger riser may be used in place of a spring box at the junction point of the collection lines. The riser should be capped and vented. The pipe from the riser to the point of delivery shall be designed as an outlet pipe as described below.

To remove sediments that may enter the system, a flush valve must be installed in the delivery line past the watering facility or point of water delivery. Locate the valve a minimum of 30 feet past the inlet pipe entrance to the watering facility to allow for sediment storage in the line. Connect the overflow pipe from the facility to the drain line below the flush valve. Refer to the “Tank with flush valve option” sheet that is part of the Spring Development Job Sheet or Section KS650.1280 of National Engineering Handbook Part 650, *Engineering Field Handbook*.

The flush valve must be opened periodically (at least twice during the watering season) and the lines must be flushed out for this system to operate properly.

Outlet Pipe

The spring development shall have an outlet pipe that carries the water to its intended use. Design the outlet pipe according to Conservation Practice Standard 516, Pipeline. If the outlet is from a spring box, the outlet pipe shall be a minimum of 6 inches off the floor to allow for sediment collection.

The outlet pipe should be at a lower elevation than the collection pipe inlet to prevent reduced spring flow. It shall be connected to the spring box with a watertight fitting.

The outlet pipe must have positive grade away from the spring box unless a vent system is installed to prevent air locks. The minimum diameter of the outlet pipe will be 1¼ inches or as required by Conservation Practice Standard 516, Pipeline, depending on the grade of the pipeline.

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 or spring box, an overflow is required. Size the overflow on the spring box to carry the maximum flow expected from the spring during periods of wet weather. Manage the overflow water so that it does not create a resource problem.

Design the spring development so that it is protected from damage by freezing, flooding, livestock, excess sediment, vehicular traffic, and water quality contamination.

Follow Conservation Practice Standard 614, Watering Facility, to design facilities to provide access for livestock and wildlife to water from the developed spring. Locate the facilities in accordance with the general criteria to minimize impacts to the ecological functions of the seep area.

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

CONSIDERATIONS

A shutoff valve and vent system on the outlet pipe from the spring box should be considered for winter shutdown, flow control, and maintenance. A flush valve installed at the watering facility should also be considered.

Provide a screen on the intake of the outlet pipe in the spring box as needed to prevent debris or trash from entering the outlet pipe.

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 the wetland and stream flows in the watershed.

Consider the opportunity to use filter fabric in lieu of an impervious barrier along the wall(s) of the collection trench. This option will minimize the effect of the spring development on the hydrology functions of the wetland area.

Aquatic habitat quality may be conserved when a spring is developed near surface waters (or on a flood plain) 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 operation and maintenance (O&M) plan shall contain a schedule for the periodic monitoring of the following items:

- Sediment buildup in the spring box
- Clogging of outlet and overflow pipes
- Diversion of surface water from the collection area and spring box
- Erosion from overflow pipes
- Rodent damage
- The flush valve on the riser system should be opened after initial installation and on a periodic basis to clean out the pipeline. After the sediments have been flushed out of the system, the valve can be closed, and the tank can be filled.

Any problems discovered shall be immediately repaired.

REFERENCES

General Manual Title 190, Section KS410.26F(1)(i), Protection of Wetlands, U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS).

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

The Restoration and Management of Small Wetlands of the Mountains and Piedmont in the Southeast. Somers, A.B. et al. USDA NRCS, Watershed Science Institute. November 2000.

National Engineering Manual, Section 531.31, USDA NRCS.

Ground Water and Wells, Fletcher Driscoll, Johnson Division.

Water Supply Paper 2220, Basic Ground Water Hydrology, U.S. Geological Survey.