NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

SPRING DEVELOPMENT

(No.)

CODE 574

DEFINITION

Collection of water from springs or seeps to provide for livestock and wildlife.

PURPOSE

Improve the quantity and/or quality of water for livestock and wildlife.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where a spring or seep will provide a dependable supply of suitable water for the planned use.

CRITERIA

General Criteria Applicable to All Purposes

Design the spring development based on site conditions, to collect sufficient water for the intended purpose of the development while protecting ecological functions of the site.

- Identify and evaluate alternative water sources before considering the development of a spring.
- Document the need for spring development in either a grazing or wildlife management plan.

Spring development for livestock water may cause adverse impacts to fish and wildlife habitat. Develop only as much water as is needed to facilitate the planned use.

- Conduct an investigation of the site conditions that provides the following information:
- Measurement of the water quantity to ensure it meets the intended purpose;
- Determination of the water quality to ensure it meets the intended purpose;
- Determination of the suitability of the spring development location for the intended purpose;
- Soil and geologic suitability;
- Effects on existing ecological functions of the spring and potential losses from the development, including effects of the impoundment and/or diversion of spring water on local wildlife and wildlife habitat, and the effects of consumptive use on riparian health and function, stream flow, water temperature, and local aquifer recharge.
- If the site is determined to be a wetland, appropriate actions must be taken to avoid, minimize, or mitigate adverse impacts.
- Evaluate impacts to wetland function and value using Wildlife Habitat Evaluation Guides and/or functional assessment tools, where available.
- Design the spring development so that it is protected from damage by freezing, flooding, livestock, excess sediment, vehicular traffic and water quality contamination.

Source area. Design the spring development to preserve existing morphology of the spring as much as possible. Locate the collection site down slope of the point where the spring or seep emerges.

Exclude livestock from the source area.

Maintain fish and wildlife access to water from the spring development where applicable.

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

Collection system. A collection system generally consists of tile, perforated pipe, or gravel trench collectors installed upstream of a cutoff wall. Perforated pipe shall have a minimum diameter of four inches with a minimum of one foot of gravel surrounding the pipe on all sides. These collectors convey the spring flow to either a spring box or directly to a pipeline, which conveys the flow to the point of use.

Gravel collection trenches shall be excavated to extend into an impervious layer and include a cutoff wall constructed along the downstream side of the trench to ensure that the flow enters the collection system.

All sand, gravel, and crushed rock used in connection with this practice shall be composed of clean, hard, durable particles.

The cutoff wall may be constructed of concrete, clay, masonry, plastic sheeting or sheet pile.

If the point of use is above the spring, base the type and size of the pump on available power sources and water delivery needs. The pump shall meet the criteria of Conservation Practice Standard (CPS) Pumping Plant (533) .

Include measures as needed to prevent sediment from entering the collection system such as surrounding the pipe with geotextile fabric or a clean well graded gravel filter, and/or include a spring box to trap and remove accumulated sediment.

Spring box. Locate the spring box downhill from the source if possible. Protect the spring box from freezing by burying in the soil or other methods suitable for the site. The floor of the spring box may be omitted if the underlying material is stable and impervious. A six-inch gravel base shall be placed under the spring box.

Size the spring box to provide sufficient storage of both sediment and any required water storage. Ensure that the cross-sectional area of the spring box is large enough to allow access for periodic cleaning. Use a minimum cross-sectional area of 1.5 ft^2.

Construct the spring box of concrete, rock, plastic, galvanized steel, wood that is untreated or rot resistant, or other durable materials.

Provide the spring box with a tight fitting cover to prevent surface runoff, animals or trash from entering.

Locate the outlet pipe a minimum of 6 inches above the floor of the spring box to allow for sediment collection.

Outlet. Provide the spring development with a means to carry the water to its intended use. If a pipe is used, design the pipe according to CPS Livestock Pipeline (516). Alternative outlet structures shall meet the criteria of CPS Structure for Water Control (587). The spring outlet pipe at the point leaving the spring box shall be a minimum of three inches below the collector pipe outlet to prevent reduced spring flow. A six-inch long vent pipe must be installed at the outlet intake in the spring box. The outlet pipe must have positive grade away from the spring box and collection system unless additional vent pipe(s) are installed to prevent air locks. Spring outlet pipes operating at very low pressure must have a minimum pipe size of 1 1/4 inch diameter and must be on a uniform slope of 0.2 percent or steeper.

Facilities intended to provide access to water from the developed spring shall be designed according to CPS Watering Facility (614).

Spring flow management. When flow from the spring, whether intermittent or continuous, will exceed the capacity of the collection system, an overflow is required and shall meet the criteria specified in the CPS Watering Facility (614). Size the overflow to carry the maximum flow expected from the spring. Locate the overflow so that it does not cause erosion, degrade water quality or create wet conditions near the watering facility.

To minimize potential adverse impacts to wetlands, one of the following measures should be implemented (listed in order of priority):

- Install a float valve on the tank/trough, if applicable, and leave all excess water in the spring.
- Direct overflow back as close to the source as possible to enhance existing wetlands.
- Create new wetland habitat that is capable of providing similar wetland functions as those being lost.

Smooth and grade areas disturbed by construction of the spring development as needed, to properly manage runoff from natural spring flow, collected water, and overflow.

Re-establish vegetation on disturbed areas as soon as possible after construction following the CPS Critical Area Planting (342) requirements. Consider the use of native plant materials where possible and appropriate.

CONSIDERATIONS

Springs often contain rare flora and fauna. Development should minimize disturbance to these species. Policy regarding impact to threatened, endangered, or special concern species must be followed.

A shutoff valve on the spring outlet pipe should be considered for winter shutdown, flow control and maintenance. Open pipe vents should be screened to prevent wildlife entrapment and potential water contamination.

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

Prior to construction, identify and control any undesirable plant species that may be spread by seed or vegetatively.

Consider how other conservation practices applied within the spring recharge area may increase infiltration of precipitation or snowmelt to augment spring flows.

To the degree possible, exclude livestock access to existing wet and constructed overflow areas to protect water quality and quantity.

Natural springs and seeps tended to attract prehistoric and historic settlements and activities, which correspondingly increases the likelihood that cultural resources are present in and around the spring.

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.

As a minimum the plans and specifications shall include:

- Location of the spring development
- Materials to be used including pipe diameter and class, collection system, etc.
- Elevations of pertinent components such as collection system, pipes, etc.

OPERATION AND MAINTENANCE

An Operation and Maintenance (O&M) shall be provided to, and reviewed with, the landowner. The 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
- Winter freeze protection
- Protection from overland flooding
- Erosion from overflow pipes including valve operation
- Rodent damage
- Vandalism and theft

Any problems discovered shall be immediately repaired. When cleaning out sediment from the spring box, place all sediments in the uplands away from the spring and any associated wetlands.

REFERENCES

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USDA-NRCS, Jan. 2010, Well Design and Spring Development: National Engineering Handbook (210-NEH), Part 631 – Geology, Chapter 32, 55 p.

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