

USDA
NATURAL RESOURCES
CONSERVATION SERVICE

DELAWARE CONSERVATION
PRACTICE STANDARD

SPRING DEVELOPMENT

CODE 574
(Reported by No.)

DEFINITION

Utilizing springs and seeps to provide water for a conservation need.

PURPOSES

This practice may be applied as part of a resource management system to support one or more of the following purposes:

- improve the distribution of water.
- increase the quantity and quality of water for livestock, wildlife, or other uses.
- obtain water for irrigation if water is available in a suitable quantity and quality.

**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.

CONSIDERATIONS

Considerations when determining the suitability of a site for development shall include the need

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

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.

This practice has the potential to affect National Register listed cultural resources or eligible (significant) cultural resources. These may include archeological, historic, or traditional cultural properties. Care should be taken to avoid adverse impacts to these resources. Follow NRCS state policy for considering cultural resources during planning.

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, 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

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

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 1½ ft², and the floor of the box shall be not less than 6 inches below the outlet of the collection system.

Spring box overflows, if needed, shall meet the requirements found in NRCS Conservation Practice Standard, Trough or Tank, Code 614.

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

The outlet pipe shall have minimum 1¼ inch (3 cm) 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. 1¼ inches inside diameter for line grades greater than 1.0 percent.
2. 1½ inches inside diameter for line grades greater than or equal to 0.5 percent but less than or equal to 1.0 percent.

3. 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, Pipelines, Code 516.

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 Conservation Practice Standard Critical Area Planting, Code 342.

PLANS AND SPECIFICATIONS

Plans and specifications for installing spring developments shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

OPERATION AND MAINTENANCE

The Operation and Maintenance (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, and other site specific items as needed.

SUPPORTING DATA FOR DOCUMENTATION

The following is a list of the minimum data and documentation to be recorded in the case file:

Planning Information, Field Data and Survey Notes

1. Location of the spring development. Also note the location of the practice on the conservation map.
2. Description of the objectives of the practice, including the desired functions which the spring development is expected to provide.
3. Soils investigation logs and notes, as appropriate for site conditions and the proposed design.
4. Topographic survey of the site, as appropriate for site conditions and the proposed design.

Design Data

1. Location map with the site identified.
2. Soil survey map with the site identified.
3. Computations establishing the design capacity of the spring development.
4. A set of plans and specifications for the spring development including the collection system and the delivery system.
5. Description and details of the measures protecting the components of the system from freezing, flooding, sedimentation, contamination, vehicular traffic and livestock.

Construction Check Data/As Built Plans

1. Check notes recorded during and after completion of construction showing the as-built measurements of the practice.
2. Red line the construction plans to indicate the construction's conformance to the design.
3. Sign and date check-notes and plans by someone with appropriate approval authority. Include statement that practice

meets or exceeds plans and NRSC practice standards.

REFERENCES

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