

NATURAL RESOURCES CONSERVATION SERVICE
MONTANA CONSERVATION PRACTICE STANDARD

SPRING DEVELOPMENT (NUMBER)

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 **or** wildlife water may cause adverse impacts to fish and wildlife habitat. Develop only as much water as is needed to facilitate prescribed grazing.

- Conduct an evaluation of the site to determine:
 - Water quantity for the intended purpose
 - Water quality for the intended purpose
 - **Reliability of the spring. This can be determined by measuring the flow rate with a**

small Parshall Flume, V-Notch weir, or bucket and stopwatch during low-flow periods.

- Suitability of the spring location for the intended purpose.
- Soils and geologic investigations to determine soil type, soil depth, rock outcrops and other geologic features. Hand augers, power auger borings, and backhoe pits can be used to conduct investigations.
- 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. **Follow the steps in the NRCS Conservation Planning Technical Note, MT-13, Livestock Spring Developments and Wetland Policy, to assure compliance with wetland regulations when assisting with livestock spring developments.**
- 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 **and as close as possible to the spring or seep.**

Exclude livestock from the source area.

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

NOTE: This type of font (AaBbCcDdEe 123..) indicates NRCS National Standards.
This type of font (AaBbCcDdEe 123..) indicates Montana Supplement.

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 a perforated pipe **not less than 4 inches in diameter**, tile, or gravel collectors installed upstream of a cutoff wall. 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.

The perforated collection pipe shall be backfilled with 6-12 inches of compatible sand/gravel filter material or covered with a polyester filter sock. For fine-grained soils, a typical filter would meet the requirements of ASTM C-33 fine aggregate. For springs in rocky areas where penetration of fines is not a problem, a C-33 coarse aggregate, size 57 to size 357 can be used.

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 533, Pumping Plant.

Spring box. Include measures as needed to prevent sediment from entering the collection system, and/or include a spring box to trap and remove accumulated sediment. A spring box may also be used to store water to meet peak water demands.

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.

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. **If physical access is not required and cleaning and maintenance can be done from outside the box, a minimum diameter of 30" should be used. If physical access is required for cleaning or maintenance, then a minimum diameter of 48" should be used.**

Construct the spring box of a durable material such as concrete, **HDPE, or corrugated metal.**

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 Conservation Practice Standard 516, Livestock Pipeline. Alternative outlet structures shall meet the criteria of Conservation Practice Standard 587, Structure for Water Control.

Facilities intended to provide access to water from the developed spring shall be designed according to Conservation Practice Standard 614, Watering Facility.

Spring flow management. When flow from the spring, whether intermittent or continuous, will exceed the capacity of the collection system, an overflow is required. **Since the spring capacity is typically not known until the development is complete, an overflow will be required.** 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.

Spring developments are considered "groundwater" and may require water rights to be filed with the Montana Department of Natural Resources and Conservation.

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

- Direct overflow back as close as possible to the source to **maintain** 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 after construction with native plant materials where

possible. Where vegetation is difficult to re-establish, follow Conservation Practice Standard 342, Critical Area Planting.

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.

Cleanouts are recommended for all collection systems.

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 pre-historic and historic settlements and activities, which correspondingly increases the likelihood that cultural resources are present in and around the spring.

CULTURAL RESOURCES CONSIDERATIONS

NRCS policy is to avoid or minimize impact to cultural resources. Determine if installation of this practice or associated practices in the plan could have an effect on cultural resources. The National Historic Preservation Act may require consultation with the Montana State Historic Preservation Office. Contact the NRCS Archaeologist for further information or assistance.

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/mt/technical/ecoscience/cultural/> is the primary web site for cultural resource information in Montana.

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) **plan** 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
- Erosion from overflow pipes
- 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 associated wetlands.

REFERENCES

Heath, R.C., 1983, Basic Ground-water Hydrology: US Geological Survey Water Supply Paper 2220, 86 p., <http://pubs.er.usgs.gov/publication/wsp2220>.

Stevens, L.E., and Meretsky, V.J. 2008, Aridland Springs in North America - Ecology and Conservation: University of Arizona Press, Tucson, AZ, 432 p., <http://www.uapress.arizona.edu/Books/bid1963.htm>.

USDA-NRCS, 2011, Springs and Wells: National Engineering Handbook (210-NEH), Part 650-Engineering Field Handbook (EFH), Chapter 12, 24 p.

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

Montana Department of Natural Resources and Conservation, Water Resources Division
<http://dnrc.mt.gov/wrd/>

USDA-NRCS, Montana Conservation Planning Technical Note, MT-13 (Rev. 1), Livestock Spring Developments and Wetland Policy, May 2007.
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