

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD**

**WATERING FACILITY**

(No.)

**CODE 614**

**DEFINITION**

A permanent or portable device to provide an adequate amount and quality of drinking water for livestock and or wildlife.

**PURPOSE**

To provide access to drinking water for livestock and/or wildlife in order to:

- Meet daily water requirements
- Improve animal distribution

**CONDITIONS WHERE PRACTICE APPLIES**

This practice applies to all land uses where there is a need for new or improved watering facilities for livestock and/or wildlife.

**CRITERIA**

**General Criteria Applicable To All Purposes**

Design watering facilities with adequate capacity and supply to meet the daily water requirements of the livestock and/or wildlife planned to use the facility. Include the storage volume necessary to provide water between periods of replenishment. Refer to the National Range and Pasture Handbook for guidance on livestock water quantity and quality requirements. For wildlife, base water quantity and quality requirements on targeted species needs. Table 1 gives minimum daily requirements, capacities and depths of individual watering facilities.

Locate facilities to promote even grazing distribution and reduce grazing pressure on sensitive areas.

Design the watering facility to provide adequate access to the animals planned to use the facility. Incorporate escape features into the watering facility design where local knowledge and experience indicate that wildlife may be at risk of drowning.

Include design elements to meet the specific needs of the animals that are planned to use the watering facility, both livestock and wildlife.

Protect areas around watering facilities where animal concentrations or overflow from the watering facility will cause resource concerns. Use criteria in NRCS Conservation Practice Standard 561, Heavy Use Area Protection to design the protection.

Install permanent watering facilities on a firm, level, foundation that will not be subject to differential settlement. Examples of suitable foundation materials are bedrock, compacted gravel and stable, well compacted soils.

Design and install watering facilities to prevent overturning by wind and animals.

**Components.** Provide automatic water level control and/or overflow facilities provided as appropriate. Protect valves or pipes with shields or covers to prevent damage by livestock. Pipe overflow to a stable or suitable point of release. Protect the trough and outlet pipes from freezing and ice damage. Freeze-proof troughs or electric heaters may be used.

Watering facilities with a capacity greater than 100 gallons shall be equipped with a minimum 1-inch dia. drain plug to facilitate maintenance of the watering facility.

Use galvanized or ultraviolet protected material for all exposed pipes, fittings, as appropriate.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact your Natural Resources Conservation Service [State Office](#), or download it from the [electronic Field Office Technical Guide](#).

Install gravity fed Watering Facilities at locations with sufficient head to supply water for the design animal numbers. When water is controlled by a valve, set the minimum elevation head to 4 feet (planned permanent water surface of pond or spring box to lip of watering facility). When water flows through the facility, set the minimum elevation head to 1 foot.

**Materials.** Specify materials whose life expectancy meets or exceeds the planned useful life of the installation. Common construction materials are reinforced concrete, steel, fiberglass, and plastic. Prepare all designs based on the industry standards for the material being used. Refer to generally applicable design requirements and procedures found in the documents referenced at the end of this standard.

Specify at least 3-inch thick walls and 4-inch thick floor with a minimum of 8-gauge welded wire for reinforced concrete facilities. Construct them from a concrete mix producing a minimum compressive strength of 3,000 psi at 28 days.

Specify galvanized steel tanks with a minimum thickness of 20 gauge.

Specify plastic and fiberglass structures made of ultraviolet resistant materials or have a durable coating to protect the structure from deterioration due to sunlight. The minimum thickness of the walls and floor shall be ¼ inch.

When a large equipment tire is used as a watering facility, require suitable quality to perform as intended for the useful life of the practice. Require the tire to have no chemicals injurious to livestock. Provide an approved standard drawing to prepare site specific designs for this type of tank.

**Water supply and outlet pipe.** Equip the watering facility with a suitable water supply pipe, drainage outlet, and overflow outlet, either as individual outlets or a combination of outlets. Drainage outlets for systems with flow-through water must extend at least 10 feet from the watering facility. Use new galvanized steel, copper, bronze, or plastic pipe and plumbing fittings in conformance with

Conservation Practice Standard, Pipeline, Code 516. Require water supply pipelines with a minimum inside diameter of 1 1/4 inch for gravity flow systems or 3/4 inch for pressurized systems. Connect the supply lines in a manner to prevent leakage and provide proper sanitary protection (i.e., backflow prevention).

**Ram pumps.** Ram pumps require falling water to pump water uphill. Set the minimum vertical fall from drive pipe inlet to the ram at two feet. In order to provide a constant supply and uniform head of water, collect the water in a durable trash-resistant device (inverted PVC pipe, concrete or galvanized metal) before it enters the drive pipe to the ram. Use a ratio of five feet of drive pipe length to one foot of fall to ensure proper operation. Bury the pipe on a constant grade with no turns to the ram. Locate the ram pump on a concrete foundation and appropriately protect or house it. Install a gate valve near the ram entrance for periodic maintenance.

**Nose pumps.** Anchor nose pumps to concrete or other approved device to prevent damage by livestock.

**Water Supply** Where water supplies are dependable and livestock are checked daily, troughs with little water storage capacity may be used. Troughs or tanks must provide the daily water requirement of the livestock and provide access to the entire herd within a short period of time.

Use 3 days as minimum storage time where water is supplied by undependable means (i.e., solar, RAM, etc.). However, if an alternate permanent water source (i.e., pond, lake, stream, etc.) is available and readily accessible, then the 3-day storage period is not required.

**Replenishment rate.** The inflow of water in a 3-hour period plus the individual watering facility (watering facility/tank) capacity shall equal or exceed one-half the daily requirement for the livestock using the facility.

**Backflow Protection.** On watering facilities that have a potential to cross-connect with the public water supply system, the requirements of the local water utility's cross-connection control program must be met. Include measures to prevent backflow or back-

siphoning on watering facilities connected to potable water well systems. Acceptable measures to prevent backflow may include the use of an air gap or double check valve.

**Air gap.** Set air gaps a minimum of 2 times the diameter of the supply line above the crest or overflow device of the watering facility. (Example: If the supply line is 1 inch, then the minimum air gap required is 2 inches above the crest of the overflow device.) Protect the supply line and air gap from contact by livestock. Include measures to protect the air gap from inadvertent splashing by the livestock during watering.

#### **Additional Criteria to Provide Water for Wildlife**

This practice shall not be utilized in lieu of conservation practice Shallow Water Development and Management (646) where water is developed to provide the primary habitat for a targeted species (i.e. amphibians).

Watering facilities for wildlife refer to excavated or relatively small embankment type facilities where wildlife is the targeted consumer of water.

Facilities should be placed in soils suitable for "pond" development according to the county soil survey or onsite investigation.

Because each facility is unique to species, habitat, and topography; wildlife watering facilities must be planned and installed according to a site specific plan and adapted to a target species or guild of species.

Facilities shall be designed and installed in compliance with all State and Federal laws and permits if needed.

The facility must provide permanent, accessible, dependable, and suitable quality water for the desired specie(s) during critical period(s). Only clean unpolluted sources of water shall be used.

The distribution and spacing of facilities should be based on topography, required travel distance to water and the home range or territory size and distribution of the species.

To maximize wildlife use, facilities should be placed in suitable types of habitat including but

not limited to forested settings, native grasslands or idle areas where wildlife are desired.

The facility must be protected from domestic livestock. If necessary and appropriate, permanent fences may be constructed at a minimum distance of 50 feet from the facility's water edge and shall not be exclusionary to wildlife. Refer to conservation practice standards Fence (382) and/or Access Control (472).

#### Design

The facility shall have a minimum depth of 2.5 feet and a maximum depth of 4 feet.

The pool area shall be a maximum of 1,600 square feet

Side slopes shall be flat enough to maintain stability, but not steeper than 2 horizontal to 1 vertical (2:1). At least 25% of one slope of the facility shall be 4:1 or flatter and permit wildlife to enter and leave the water.

Small earth embankments should be designed according to the Pond (378) standard with the exception of size and depth.

Any resulting spoil from excavated type water facilities shall be spread uniformly to a height of 3 feet or less, with the top graded to a continuous slope away from the facility. Any spoil should be spread below the embankment, if necessary, but not above the pool area.

Rock lined outlets are desirable where concentrated flow of water is expected. Outlets shall conform to conservation practice standard Lined Waterway or Outlet (468). If frequent overflow is expected, an appropriate pipe, lined waterway, or other stable outlet shall be provided. Surface water catchments shall be designed according to practice standard Pond (378) or other appropriate standards.

#### Vegetation Establishment

Methods used will be designed to protect the soil resource from erosion.

Vegetate any disturbed areas according to the Critical Area Planting standard (342) using only wildlife friendly species.

## CONSIDERATIONS

Design fences associated with the watering facilities to allow safe access and exit for area wildlife species. To protect bats and other species that access water by skimming across the surface, fencing material should not extend across the water surface. If fencing across the water is necessary it should be made highly visible by avoiding the use of single wire fences and using fencing materials such as woven wire or by adding streamers or coverings on the fence.

For watering facilities that will be accessible to wildlife, give consideration to the effects the location of the facility will have on target and non-target species. Also consider the effect of introducing a new water source within the ecosystem in the vicinity of the facility. This should include things such as the concentration of grazing, predation, entrapment, drowning, disease transmission, hunting and expansion of the wildlife populations beyond the carrying capacity of available habitat.

Consider the following guidelines for materials commonly used for watering facilities.

Concrete	3000 psi compressive strength
Galvanized Steel	20 gauge thickness
Plastic	Ultraviolet resistance
Fiberglass	Ultraviolet resistance

Where water is supplied continuously or under pressure to the watering facility, consider the use of automatic water level controls to control the flow of water to the facility and to prevent unnecessary overflows.

Watering facilities often collect debris and algae and should be cleaned on a regular basis. Consider increasing the pipe sizes for inlets and outlets to reduce the chances of clogging. Maintenance of a watering facility can be made easier by providing a method to completely drain the watering facility.

Steep slopes leading to watering facilities can cause erosion problems from over use by animals as well as problems with piping and

valves from excess pressure. Choose the location of watering facilities to minimize these problems from steep topography.

Provide room for at least 1 animal in 20 to drink from a watering facility at a time. Plan on 20 inches of perimeter for circular watering facilities and 30 inches of length for the straight side of a watering facility for each animal drinking. (Circumference equals diameter X 3.1416. Diameter equals circumference divided by 3.1416).

Use portable watering facilities on rotational grazing systems, so the watering facilities can be relocated to disperse impacts from trampling vegetation.

To ensure uniform grazing and waste distribution in the field, locate the watering facilities so cattle do not travel more than 800 feet.

Locate watering facilities within 500 feet of where lactating dairy cattle are grazing. (See publication "Prescribed Grazing and Feeding Management for Lactating Dairy Cows", New York State Grazing lands Conservation Initiative and USDA NRCS, January 2000).

Install this practice in consideration of natural resource assessments that may be applicable, such as cultural resources, NEPA, wetland conservation provisions, existing wildlife habitat, and others.

Consider making watering facilities accessible to small animals. Consider installing escape ramps for small animals.

Where possible, a watering facility can provide water for 2 to 4 pastures. Gates or gaps may be placed adjacent to the watering facility to allow livestock access to the entire watering facility from any one paddock at a time. Avoid placing feeding areas or other concentrated animal activities above a water source.

Consider fencing ponds serving as a water source for a watering facility, to prevent cattle from damaging pond banks and creating water quality problems with the water source. The fenced boundary around the pond provides a vegetative filter strip for water entering the pond. Install fencing according to Conservation Practice Standard Code 382 - Fence.

Consider locating the watering facility to discourage cattle loafing around it. Placing the watering facility under trees encourages loafing and also creates maintenance problems from dropping leaves. If water temperature is a concern, partially bury the watering facility or shade it with a roof.

Consider an alternate permanent water source (such as a pond, lake, stream, etc.) to have water available for livestock if the normal water source becomes inoperable.

Consider the effects on any target wildlife species and the ecosystem by concentrated grazing, predation, hunting etc.

For wildlife facilities, consider the accessibility of the site for installation and maintenance.

Consider any effects upon natural springs and associated unique flora and fauna.

Consider the aesthetics of the installation.

Consider climate and water availability during winter months.

Consider life cycle requirements for indigenous amphibians and reptiles and supply supplemental structures to facilitate use of the facility (basking logs, woody debris, etc).

Consider the effects on downstream flows or groundwater that could affect other water users or associated aquatic sites.

Consider the effects on wetlands or other aquatic sites.

## PLANS AND SPECIFICATIONS

Plans and specifications for watering facilities shall provide the information necessary to install the facility. As a minimum this shall include the following:

- A map or aerial photograph showing the location of the facility
- Detail drawings showing the facility, necessary appurtenances (such as foundations, pipes and valves) and stabilization of any areas disturbed by the installation of the facility
- Construction specifications describing the installation of the facility

## OPERATION AND MAINTENANCE

Provide an O&M plan specific to the type of watering facility to the landowner. As a minimum include the following items in the plan:

- a monitoring schedule to ensure maintenance of adequate inflow and outflow;
- checking for leaks and repair as necessary;
- if present, the checking of the automatic water level device to insure proper operation;
- checking to ensure that adjacent areas are protected against erosion;
- if present, checking to ensure the outlet pipe is freely operating and not causing erosion problems;
- a schedule for periodic cleaning of the facility.

## REFERENCES

Brigham, William and Stevenson, Craig, 1997, Wildlife Water Catchment Construction in Nevada, Technical Note 397.

Tsukamoto, George and Stiver, San Juan, 1990, Wildlife water Development, Proceedings of the Wildlife Water Development Symposium, Las Vegas, NV, USDI Bureau of Land Management.

Yoakum, J. and W.P. Dasmann. 1971. Habitat manipulation practices. Ch. 14 in Wildlife Management Techniques, Third Edition. Ed. Robert H. Giles, Jr. Pub. The Wildlife Society. 633 pp.

National Engineering Handbook, Part 650 Engineering Field Handbook, Chapters 5, 11 & 12, USDA Natural Resources Conservation Service.

National Range and Pasture Handbook, Chapter 6, Page 6-12, Table 6-7 & 6-8, USDA-Natural Resources Conservation Service.

National Research Council, 1996 Nutrient Requirements of Domestic Animals, National Academy Press.

National Engineering Manual

Manual of Steel Construction, American Institute of Steel Construction

American Concrete Institute ACI 318, ACI 530

Building Code Requirement for Masonry Structures

General Manual, 190, Part 410, Compliance with NEPA.

FOTG Critical Area Treatment, Code 342, Heavy Use Area, Code 561

**Table 1 – Minimum Requirements of Individual Watering Facilities**

Kind of Livestock	Watering Facility Capacity	Depth (inches)	Minimum Daily Requirement <sup>1/</sup>	Maximum Height Above Normal Ground (inches)
Beef Cattle	100 (25) <sup>2/</sup>	12	6-18	30
Horse	100 (25) <sup>2/</sup>	12	8-12	30
Dairy Cattle (drinking only)				
Lactating	100 (25) <sup>2/</sup>	12	25-30	30
Non lactating	100 (25) <sup>2/</sup>	12	10-15	30
Sheep & Goats	15	6	1-4	18
Swine	15	6	2-4	18
<sup>1/</sup> These requirements vary with climatic conditions, kind of feed, size of animals, and other factors and may be increased as necessary. <sup>2/</sup> The minimum capacity of individual watering facilities may be reduced to 25 gallons provided all the following conditions are met: 1) The pasture is 14 acres or less. 2) Water supply into the watering facility is at least 5 gpm.				