

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 and water storage facilities for livestock and/or wildlife.

CRITERIA

General Criteria Applicable To All Purposes

Watering systems and facilities for livestock shall be planned to include the needed storage, delivery rates, and spacing requirements for the anticipated herd size for the grazing unit, the projected carrying capacity (based on a grazing plan and forage inventory), and/or the highest anticipated demand. In general, livestock water twice a day and drink half of their daily requirement at each watering. Each animal will drink for approximately 5 minutes. It is recommended that a herd take no longer than 2 hours to complete a watering.

For wildlife purposes, design watering facilities with adequate capacity and supply to meet the daily water requirements of wildlife planned to use the facility. Include the storage volume necessary to provide water between periods of replenishment. Because each facility is unique to species, habitat, topography, and climate; watering facilities must be planned and installed

according to a wildlife management plan and adapted to the specific site.

Design the watering facility to provide adequate access to the animals planned to use the facility. Incorporate escape features into the watering facility design unless local knowledge and experience indicate that wildlife will not be at risk of drowning.

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

For purposes of this standard, watering facilities include water storage facilities, drinking facilities, and combination drinking and storage facilities. Dependable water supplies include pumping systems powered by electricity, systems served by rural water districts or other public water systems, and ponds and streams that are accessible to livestock that typically do not go dry (Ref. EFH Chapter 11, Table 11-3).

Watering Facility Definitions. "Water storage facilities" are tanks that hold water and serve other facilities via pipelines. These are usually taller structures and no animals drink from them.

"Combination drinking and storage facilities" are tanks with a wall height such that animals drink from it; however, it shall be large enough to store the drinking water required by the design.

"Drinking facilities" are small troughs or tanks that have no significant storage and provide drinking space for a limited number of animals. These facilities are dependent on quick recharge. Flow rates must be adequate to supply 2.0 GPM / Drinking Head for large livestock. Flow rates for small livestock such as sheep, pigs and goats are to be based on 0.5 GPM / Drinking Head. The number of drinking head is limited by the drinking space around the facility. The system shall be

designed to water all the livestock in the grazing unit within two hours. Freeze-proof tanks and energy-free fountains are also considered to be drinking facilities. When an energy free fountain is used, it shall be the primary source of water for the pasture in order to make the fountain function without freezing.

“Portable watering facilities” are watering facilities that have the ability to be moved to different locations. These facilities work best in situations for distributing grazing, intensive rotational systems and offsite water to minimize use of ponds and streams without the use of a fence to exclude access. These facilities generally are not designed, but shall be selected with adequate capacity to meet the livestock purpose.

“Wildlife watering facilities” typically include concrete lined watering basins, tanks or troughs, and guzzlers.

Materials. All materials shall have a life expectancy that meets or exceeds the planned useful life of the installation. Common construction materials are reinforced concrete, steel, fiberglass, brass, plastic and wood. Precast (freeze proof) concrete tanks and factory fabricated fiberglass tanks may be used. All designs shall meet the industry standards for the material being used. Tanks may also be constructed from heavy equipment tires. Used steel tanks (oil, gasoline, etc.) can be used provided the supplier certifies the tank’s use for livestock and/or wildlife.

Appurtenances. Shut-off valves shall be installed, where needed, to control and/or cut off flow to repair or protect the pipeline associated with the watering facility and to preserve the supply in case of pipeline failure. Backflow prevention devices shall be installed on facilities connected to wells, domestic or municipal water systems.

In watering facilities and water storage tanks, proper instrumentation and controls must be installed to regulate inflow and water level. With the exception of facilities serviced by windmills, solar pumps, or systems that operate on a timer, floats or other automatic shut off valves will be required in order to maintain the water level at 1 ½ inches below the top of the facility and conserve water. Floats and valves must be designed in a manner to prevent unnecessary restrictions of flows or changes to the system’s ability to deliver

the flow as designed. All valves and controls must be protected from livestock and/or wildlife and from freezing. Freeze protection may be accomplished by heat tape, earth sheltering, combination insulation and heat sink, an ice prevention valve, or other approved means.

Watering facilities and water storage tanks served by windmills or systems that operate on a timer shall use an overflow pipe to maintain the water level at 1 ½ inches below the top of the facility. The minimum diameter shall be 1 ½ inches. The overflow pipe shall extend a minimum of 12 feet from the outer rim of the facility and be marked or otherwise protected from damage.

Watering facilities shall be equipped with a suitable drainage outlet.

If a roof is placed over the facility to provide shade, the roof shall meet design requirements for appropriate snow and wind loads and shall be durable to withstand anticipated livestock and wildlife activities.

Site Selection. Establish water facilities in locations that will minimize adverse impacts on the land.

Locate water in underutilized portions of the grazing unit to reduce grazing pressure on sensitive areas.

The site shall be well drained; if not, drainage measures shall be provided. Areas adjacent to the watering facility or apron, if applicable, that will be trampled by livestock shall be stable. Where needed, added protection shall be installed in accordance with the Oklahoma NRCS Conservation Practice Standard, Heavy Use Area Protection (561).

Watering facilities may be located to facilitate and control stock movement and generally should be located near the middle of a pasture.

Heavy Use Area Protection Aprons.

Watering facilities shall withstand heavy use. The protected area around watering facilities where livestock congregate to drink shall be a minimum of 12 feet wide from the outer edge of the facility. Where the type of facility requires a concrete floor extension as part of the design of the facility, the width of such an extension can be included in the total protected area. The minimum width shall apply to all areas around the watering facility

where livestock have access. Surfacing material, thickness, and other design criteria for aprons shall be in accordance with the Oklahoma NRCS Conservation Practice Standard and Specification, Heavy Use Area Protection (561).

Flow Rate. Pipelines serving a watering facility shall be adequate to meet the requirements of the watering facility. The type of facility served by the pipeline will influence the pipeline requirements.

The flow rate to a water storage facility is governed by the water source and recharge rate. The recharge rate for all systems except wind and solar powered systems shall be 2.0 times the daily use in a 24 hour period. The recharge rate for wind and solar powered systems shall be such that it delivers 1.5 times the daily livestock need in a 24 hour period. See the Oklahoma NRCS Conservation Practice Standard, Pipeline (516) for further pipeline criteria.

Drinking Space. For “combination drinking and storage facilities”, size requirements are governed by the water demand for the herd and not by drinking space.

For “drinking facilities” the perimeter of the facility shall be a minimum of 1 inch per head in the herd. This requirement is waived for freeze-proof tanks and energy-free fountains. Table 1 is to be used as a guide to animal space requirements (Divide the facility perimeter by the Drinking Space/Head).

Table 1. Drinking Space Requirements

Animal	Drinking Space per Head (inches)
Beef	20
Dairy	24
Goats	12
Horses	20
Sheep	12
Swine	12
Poultry	3
Elk	20
Deer	12
Antelope	12
Bison	24

Storage Capacity. A complete watering system includes both the storage part and the drinking part of the facility. Storage and drinking facilities can be provided in combination or they can be provided separately by connecting the components with pipelines to meet the livestock and/or wildlife demand.

Water Quality. Water should be of adequate quality for wildlife and/or livestock consumption. Refer to the Oklahoma NRCS Conservation Practice Standard, Well Water Testing (355) or the National Range and Pasture Handbook, 600.0603(e) (5) and Table 6 - 8, Water Quality Standards for Livestock.

Criteria Applicable to Livestock Watering Facilities

Facility Height. The facility outside height, measured from the top of the apron to the top of the facility, may vary from 18 to 24 inches for beef and dairy cattle, 22 to 36 inches for horses, and 8 to 22 inches for sheep and goats.

Storage Capacity. Livestock watering needs shall be based on the guidelines in Table 2. For both “combination drinking and storage facilities” and “drinking facilities”, the water in a facility shall be accessible to livestock. Any storage volume in the these facility types that is more than 6 inches below the top of the apron elevation shall be considered inaccessible to livestock and deducted from the available storage capacity in the facility.

Table 2. Livestock Watering Requirements

Animal	Gallons / 1000 lbs. Live Animal Weight
Beef Cattle	15
Dairy Cattle	20
Goats	25
Horses	15
Sheep	25
Swine	20
Poultry	120
Bison	15

The water system shall provide a total system capacity for a 5-day storage if the supply is dependent upon a windmill or solar system.

A minimum of a 2-day storage shall be provided for systems powered by electricity, by rural water districts or other public water systems.

In order to attain additional distribution of grazing within a single grazing unit and within the confines of the spacing established in Table 3 of this standard, the 2-day storage requirement may be met by more than one facility. However, "combination drinking and storage facilities" used with multiple facilities shall be designed for no less than a 1-day storage.

"Drinking facilities" installed where a system malfunction or interruption in service is immediately evident and are checked for proper functionality a minimum of once a day (i.e. house wells or pipelines tied to livestock feeding operations for poultry, swine, dairy, etc.) are not required to meet the 2 days of storage, however a minimum tank capacity of 100 gallons shall be provided. This 100 gallon storage requirement is waived for freeze-proof tanks and energy-free fountains.

Spacing. Slope, barrier, and pasture design and travel distance are to be included in the design and layout to address grazing distribution.

Spacing requirements in a grazing unit shall be based on the following guidelines:

- Other dependable drinking facilities within the grazing unit,
- The need for water in a given location, and
- Terrain, as described in Table 3.

Table 3. Livestock Watering Facility Spacing

Type of Terrain	Water spacing (miles)
Rough (slopes > 15%)	1/4 - 1/2
Rolling (8 - 15%)	3/8 - 3/4
Level (<8%)	3/4 - 1

Criteria Applicable to Wildlife Watering Facilities

Storage Capacity. The effective water storage capacity for any wildlife watering facilities will be no less than 82.5 gallons, the minimum designed

storage specified by Oklahoma Standard Engineering Drawing 518b. With the exception of meeting the minimum storage requirements described above, the design shall be sized to accommodate the expected and/or anticipated consumptive rates of target and non-target species as described in Table 2a.

Table 2a. Wildlife Watering Requirements

Species	Number of Animals	Gallons of Water per Day
Antelope	Each	1-2
Deer	Each	1-2
Elk	Each	5-8
Quail	Covey	1-2
Turkey	Flock	2-3
Pheasant	Local Population	2-5
Dove	Local Population	2-5
Songbirds	Local Population	1-2

Spacing. The distribution and spacing of facilities serving wildlife shall be based on the required travel distance to water, proximity to other required habitat components, and the home range, territory size, and distribution of the target species as indicated in Table 3a.

Table 3a. Wildlife Watering Facility Spacing

Species	Distribution of Facilities
Antelope	1 per 1-2 square miles
Deer	1 per square mile
Elk	1 per 2-4 square miles
Quail	1 within 0.25 mile of food and cover areas
Turkey	1 within 1 mile of roost areas
Pheasant	1 within 0.5 miles of feeding areas
Dove	1 within 2 miles of feeding areas
Songbirds	1 within 0.25 miles of feeding areas

Other. The storage reservoir(s) associated with wildlife watering facilities that are dependent on normal precipitation as the primary water source shall be filled with water immediately after installation.

Wildlife watering facilities that are dependent on normal precipitation as the primary water source shall require a precipitation collecting structure that empties into the facility reservoir and has a minimum area of 144 square feet. This criterion applies to prefabricated facilities, as well.

Concrete lined watering basins require permanent water supplied by a spring, pipeline, or well. The outside dimensions of concrete lined watering basins will be no less than 6 feet by 6 feet and no greater than 12 feet by 12 feet. Designed water depths will be between 1 foot and 2 feet. Slopes will be 3 horizontal to 1 vertical or flatter. Concrete will be 4 inches in thickness and textured to provide solid footing for hooved wildlife species. Concrete and other materials and installation requirements will be the same as those described in the Oklahoma NRCS Conservation Practice Standard, Lined Waterway or Outlet (468).

CONSIDERATIONS

This practice may adversely affect cultural resources and must comply with GM 420, Part 401.

Topography should be evaluated to minimize trail erosion and flooding erosion from tank overflow.

Watering facilities should be accessible to small animals. Escape ramps for birds and small animals should be installed.

A removable overflow pipe may be installed on watering facilities using floats or other automatic shut off valves as a primary level control device to function in case the float fails and to provide a method of draining the facility by its removal when maintenance needs to be performed.

During freezing weather, adequate protection for livestock and alternative water supplies should be considered. Systems should be checked regularly to ensure proper operation.

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.

Wildlife watering facilities should be installed so that a wide range of wildlife species may benefit from its installation.

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

Water collected within the storage reservoir of a wildlife watering facility should be protected from evaporation.

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.

Where applicable, plan for the use of overflow water for wildlife or other beneficial use.

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

If the facility is a component of a system that includes additional conservation practices, the information necessary to construct these additional practices will be a part of the conservation plan.

Development of plans will be guided by Engineering Field Handbook, Chapter 5, and shall be in accordance with National Engineering Manual, Parts 541 and 542.

OPERATION AND MAINTENANCE

A written O&M plan specific to the type of installed watering facility shall be provided to the landowner. Maintenance items should be performed within 5 days from the time they are noticed. The plan shall include, but not be limited to, the following provisions:

- check for debris, algae, sludge or other materials in the facility which may restrict the inflow or outflow system;
- check for leaks and repair if any leaks are found;
- check the automatic water level device to ensure proper operation;
- check to ensure that adjacent areas are well protected against erosion;
- check to ensure the outlet pipe is freely operating and not causing erosion problems;
- prepare guidance for winter weather, such as adding material in the storage area to allow for ice expansion without damage;
- and a schedule for periodic cleaning of the facility.

REFERENCES

Manual of Steel Construction, American Institute of Steel Construction

Timber, National Design Specification for Wood, American Forest and Paper Association

Concrete, ACI 318, American Concrete Institute

Masonry, Building Code Requirement for Masonry Structures, ACI 530, American Concrete Institute

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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.

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