

**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.
- Protect water quality of streams, ponds, and water supplies by providing alternative access to water.
- Create or expand suitable habitat for wildlife.

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.

DEFINITIONS

Watering facility – Any water storage facility, drinking facility, or combination drinking and storage facility planned to provide water to livestock and/or wildlife.

Drinking facility – Any trough or tank that contains less than two days' water storage for the class of livestock and/or wildlife the facility is planned to serve. A drinking facility will have a minimum of one day storage

Water storage facility – Any trough or tank that contains two or more days' water storage for the class of livestock and/or wildlife the facility is planned to serve.

Dependable water supply – Any pumping system powered by electricity, system served by a rural water district or other public water system, or a pond or stream that is accessible to livestock and typically does not go dry (Ref. EFH Chapter 11, Table 11-3).

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 visit the electronic [Field Office Technical Guide](#).

**NRCS, TEXAS
September, 2010**

Water storage volume – For the purposes of this standard the water storage volume of a water storage facility does not include any water volume required for stability.

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.

A water resource inventory will be made for each operating unit prior to sizing the watering facility. It will include existing capacity of wells, water supply pipelines, watering facilities, ponds and streams. Required storage of the operating unit will be based on existing water resources, potential forage production, planned grazing systems, the frequency that livestock is checked and the expected down time for repairs of pumps and wells. Daily water requirement tables are included in this standard for domestic livestock (Table 1) and wildlife species for which watering facilities are commonly constructed (Table 2).

The water storage facility or combination water storage and drinking facility will provide sufficient capacity for a minimum of:

- two days water demand when the source is a public water supply,
- four days water demand when the source is an electric pump, or
- seven days water demand when another source, such as solar or wind is used.

Water depth that is to be maintained for stability purposes will not be considered available for livestock use.

As a general rule the weaker the well, the greater the need for additional storage.

Table 1

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

Table 2

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

Locate facilities to promote even grazing distribution and reduce grazing pressure on sensitive areas. Tables 3 and 4 provide guidance for use in determining the location of watering facilities.

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.

Table 3

Type of Terrain	Travel Distance, min. (miles)
Rough (slopes > 15%)	1/4 - 1/2
Rolling (8 - 15%)	3/8 - 3/4
Level (<8%)	3/4 - 1

Table 4

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

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.

The area adjacent to the watering facility that will be trampled by livestock will be protected with a minimum of 6 inches of gravel, 4 inches of concrete, or otherwise treated to provide firm footing and reduce erosion. The protection will extend a minimum of 5 feet out from the drinking facility.

Install permanent watering facilities on a firm, level, foundation that will not settle differentially. Examples of suitable foundation materials are bedrock, compacted gravel and stable, well compacted soils.

STABILITY

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

Watering facilities that are utilized for drinking may be stabilized using the following methods:

1. An automatic inflow float valve on a pressurized inflow supply line such as public water supply, well with electric pump, elevated storage tank, and the water level is maintained at or near full capacity.
2. Installing a 4 inch thick and 5 foot wide concrete apron
3. Installing a 6 inch thick and 5 foot wide gravel or caliche apron
4. Mounding soil material to a depth of 1 foot sloped out a 10:1 slope.
5. Anchors attached to the drinking facility and embedded in the ground. Anchors will be a minimum of three in number equally spaced on the perimeter.
6. The facility's concrete floor
7. Manufacturer's recommendation.

Watering facilities that are not utilized for drinking may be stabilized using the following methods:

1. Manufacturer's recommendation
2. Anchors installed per manufacturer recommendations
3. By maintaining a minimum required water depth in the watering facility. The minimum required water depth (hw) in inches will be determined by the ratio (h/d) of the tank height (h) in feet to the tank diameter (d) in feet as shown in table 5:

Table 5
Minimum Water Depth, hw inches

h/d	hw inch	h/d	hw inch	h/d	hw inch
		1.1	13	2.1	30
0.2	2	1.2	14	2.2	33
0.3	3	1.3	15	2.3	36
0.4	5	1.4	16	2.4	39
0.5	6	1.5	17	2.5	42
0.6	7	1.6	19	2.6	46
0.7	8	1.7	20	2.7	49
0.8	9	1.8	22	2.8	53
0.9	10	1.9	24	2.9	57
1.0	11	2.0	27	3.0	61

Instructions for using Table 5 are as follows:

1. Calculate h/d to two decimal places.
2. Select the next highest value of h/d (and corresponding hw) with the following exception. In cases where hw values increase by more than one inch for consecutive h/d values, hw may be interpolated. For example, if h/d is calculated to be 1.84, the normal process would involve selecting 1.9 and reading the corresponding hw of 24 inches. However, since hw changes from 22 (h/d = 1.8) to 24 (h/d = 1.9), interpolate hw of 23 inches.

To assure that the minimum water depth for stability is not unknowingly withdrawn below the required depth, the water supply outlet pipe will be 1) fitted through the sidewall of the water storage facility at the distance "hw" above the floor of the water storage facility, or 2) made as a standpipe through the bottom of the water storage facility with the height of the standpipe within the water storage facility being the distance "hw" above the inside floor. A valve may be placed at the bottom of the water storage facility for cleanout and maintenance, but the supply outlet will not be connected to such cleanout facility.

4. The facility's concrete floor.
5. Alternative methods of anchorage may be accepted if they have been designed by a professional engineer licensed in Texas.

WATERING FACILITY MATERIALS

Design watering facilities and all valves and controls to withstand or be protected from damage by livestock, wildlife, freezing and ice damage.

Construct watering facilities from durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation. Follow appropriate NRCS design procedures

for the material being used or industry standards where NRCS standards do not exist. All plastic and fiberglass materials will be UV resistant.

All pre-fabricated watering facilities will have adequate fittings meeting industry standards for all required inlets, outlets and overflows. Manufactured appurtenances are to be equal in quality to the watering facility material.

All fiberglass watering facilities will be manufactured in accordance with ASTM D4097 or ASTM D3299.

Concrete watering facilities will be designed and constructed in accordance with approved standard drawings or applicable industry standards. The concrete shall have a minimum compressive strength of 3,000 psi at 28 days.

Precast concrete watering facilities manufactured under plant control conditions in accordance with industry standards must have minimum 3" wall thickness except that this wall thickness will be increased to 4" where corrosive conditions are expected.

For watering facilities constructed with a concrete base and steel plate wall, 4 feet or less in height, the steel plate shall be a minimum of 1/8" thick, greater than 4 feet in height; the steel plate shall be a minimum of 3/16" thick. For watering facilities constructed with a concrete base and corrugated steel wall, the minimum thickness of the corrugated steel shall be 16 gauges.

Polyethylene is the only plastic material currently approved for use in Texas for watering facilities and its use is limited to upright water storage facilities. Polyethylene upright water storage facilities must be designed in accordance with ASTM D1998 and have a minimum depth of 3.5 feet.

Unlined galvanized metal watering facilities will have a minimum wall and bottom thickness of 20 gauges. Galvanizing will meet or exceed the requirements of ASTM A653, G90.

Galvanized watering facilities will not be used where corrosive water or soil conditions are encountered. Galvanized watering facilities will not be used when the "Suitabilities and Limitations Ratings for Use" for corrosion of steel is rated medium or high in the Web Soil Survey or Soil Data Mart unless an approved foundation is installed to limit soil contact.

Galvanized metal water storage facilities with a reinforced plastic liner will have a minimum galvanized metal thickness of 23 gauges and a minimum depth of 5 feet. The reinforced plastic liner will have a minimum thickness of 20 mils and meeting the following specifications:

Property	Test Method	Value
Penetration Resistance	ASTM D751	50 lbs. (Min.)
Breaking Force	ASTM D751 (Grab Test) Length – Width –	375 lbs. (Min.) 275 lbs.(Min.)

PLUMBING

Use the criteria in NRCS Conservation Practice Standard 516, Pipeline to design piping associated with the watering facility. Include backflow prevention devices on facilities connected to wells, domestic or municipal water systems.

Plumbing shall be new galvanized steel, copper, bronze, PVC plastic schedule 40 unthreaded, or schedule 80 threaded pipe or PE pipe. All fittings shall comply with the ASTM standard for the type of fitting and material used.

Double check valves or other measures prescribed in local plumbing codes are required at watering facility inlets when watering facilities are connected to waterlines that have domestic users.

Shut-off valves will be installed on inlets and outlets to cut off flow as necessary for repairs and maintenance.

Watering facilities shall be equipped with a water inlet pipe, drainage outlet and overflow outlet, as either individual outlets or combination of outlets. Overflow outlets will be piped to a stable point of release.

All valves and pipes shall be protected by shields or covers, or designed to prevent damage by livestock and be protected from freezing and ice damage. PVC pipe shall be made of ultraviolet resistant materials or shall have a durable coating of ultraviolet resistant paint to protect from deterioration due to sunlight.

Closed top water storage facilities will be vented in accordance with the manufacture's recommendations.

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.

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.

Consider painting fiberglass or plastic watering facility to prevent deterioration due to sunlight and reduce algae growth.

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.

ROOFS AND COVERS

Consideration will be given to placing a roof, cover, or shade over the watering facility to reduce evaporation and control algae. Roofs and insulated floating covers also help to keep water cooler in the summer and warmer in the winter. If wildlife species that access water during flight are a concern then a roof or cover may not be desirable.

When a cover (roof, shade, or floating cover) is placed over the watering facility, the cover will be designed for the appropriate snow and wind loads and able to withstand anticipated livestock and wildlife activities.

Floating covers on watering facilities will be designed to provide adequate space around the perimeter for animals to water.

Floating covers consisting of chemically inert materials may be used to limit evaporation. Such covers will protect at least 80% of the facility's surface area from evaporation and will be stable for the expected range of weather conditions for that site. Manufacturer's recommendations for installation will be followed.

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

Standard drawings and certifications for watering facilities are available on Texas eFOTG website.

Texas Biology Technical Note 19 contains information for the conceptual planning of watering facilities for wildlife applications.

Plans and specifications shall be approved by the NRCS before construction of the watering facility.

CERTIFICATION

A written certification is required from the facility manufacturer certifying that the facility supplied meets the material and manufacturing requirements of this standard.

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.
- check for debris, algae, sludge or other materials in the watering facility which may restrict the inflow or outflow system;
- prepare guidance for winter weather
- ensure that wildlife species access and escape is adequate and operating properly.

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Reference Use Only
November 2015

**APPROVAL AND CERTIFICATION
WATERING FACILITY**

(No.)

CODE 614

PRACTICE STANDARD APPROVED:

John W. Mueller

State Conservation Engineer

9/10/10

Date

Archived
Reference Use Only
November 2015