

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

WATERING FACILITY

(No.)

CODE 614

DEFINITION

A watering facility is a means of providing drinking water to livestock or wildlife.

PURPOSE

To store or provide designated access to drinking water for livestock or wildlife to:

- supply daily water requirements
- improve animal distribution
- provide a water source that is an alternative to a sensitive resource

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all land uses where there is a need for a watering facility for livestock or wildlife, where there is a source of water that is adequate in quantity and quality for the purpose, and where soils and topography are suitable for a facility.

CRITERIA

Capacity. Identify the type of livestock or wildlife that will be the primary user(s) of the facility. If the watering facility will supply water to different species of animals, provide sufficient water to meet the sum of the seasonal high daily water requirements of all the animals.

Refer to the National Range and Pasture Handbook (Chapter 6), State guidance, or university publications for information on livestock water quantity and quality requirements. For wildlife, base water quantity and quality requirements on targeted species needs.

User Needs. Design the watering facility so that access is adequate to accommodate the number of animals that will be drinking at the same time. Include design elements to meet the specific needs of the primary user(s). Examples of specific design needs would include accommodation for antler size, species, and ingress and egress requirements.

Materials and Appurtenances. Construct the watering facility from durable materials that meet or exceed the lifespan of the practice. Follow NRCS design procedures for the selected materials. Use industry standards where NRCS standards do not exist.

Stabilization of Disturbed Areas. Vegetate or stabilize areas disturbed by construction in accordance with the planned use of the facility. Use the criteria in Alabama Conservation Practice Standard (CPS) *Critical Area Planting (Code 342)* to establish vegetation. If establishment of vegetation is precluded by site conditions, use the criteria in Alabama CPS *Mulching (Code 484)*, as appropriate.

Troughs and Tanks

Capacity/Size. A trough or tank shall have adequate capacity to meet the water requirements of the livestock (generally at least 50 percent of the needs for the day) and/or wildlife. This will include the storage volume necessary to carry over between periods of replenishment. Where water supplies are dependable and livestock are checked daily, troughs with less water storage capacity may be used (25 to 50 percent of the needs for the day). Provide a minimum trough capacity of 50 gallons. 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.

When livestock are in intensive rotational systems with less than 800 ft travel to water, and the trough or tank has adequate dependable flowrate to quickly replenish its capacity (at least 2 gpm/watering station), the tank can be sized for 5 – 10 percent of the needs for the day.

When water is supplied with non-conventional or alternative means (wind, solar, RAM, turbine, etc.), the system shall be designed with a water budget procedure to ensure the availability of water during periods of insufficient power. A storage tank or reservoir may be required.

Provide premanufactured, “on demand”, livestock waterers of the size and in sufficient numbers to meet the needs according to the manufacturer’s recommendations.

Install troughs and waterers at a height to meet the needs of the animal being watered. For horses, beef and dairy cattle, the height may vary from 22 to 36 inches.

Ensure that the capacity of the water supply system for the facility is adequate to meet the needs of the anticipated herd size served by the system and that it will deliver the water in a relatively short period of time each day (6 hours or less). For supplying livestock water, the system shall have a capacity to provide at least 12 gallons per head per day for beef cattle and horses, 25 gallons per head per day for dairy cattle, and 1.5 gallons per head per day for sheep and goats. These requirements may need to be increased based on climatic conditions, type of feed, and other factors.

Location. Locate the facility where there is natural surface and subsurface drainage. Locate the facility at least 150 feet from any well head, and if possible, down gradient from the well head. Locate the facility to provide easy access by livestock, promote even grazing distribution, and reduce grazing pressure on sensitive areas.

In areas subject to prolonged freezing conditions (generally North Alabama or as determined by the responsible engineer), the facility (trough or tank) shall be installed, or manufactured in a manner to prevent the water from freezing or to prevent damage from freezing water.

Provide at least 4 feet of elevation head (anticipated water surface elevation during late summer/early fall of pond or elevation of spring box to lip of trough or tank) for gravity flow systems.

Foundation. Install the watering trough or water storage tank on a firm, level foundation that will not settle differentially. Examples of suitable foundation materials are bedrock, concrete, compacted gravel and stable, well-compacted soils. Select the foundation elevation so that the heavy use area around the facility can tie into the normal ground. Where necessary, prepare the foundation by removal and disposal of materials that are not adequate to support the design loads.

Tanks. Analyze the foundation conditions and provide a design that will ensure the stability of the storage tank. For a vertical storage tank with a tank height greater than the tank diameter, also analyze the potential for overturning and identify the anchoring requirements.

Use NRCS design procedures or manufacturer’s guidelines to ensure that buried tanks will withstand all earth and vehicle loads anticipated for the site.

Heavy Use Protection. Provide heavy use protection within the area of at least 10 ft. (6 ft. for small ruminants that are managed separately from larger animals) outside of the perimeter of the trough or tank. Design the protection according to Conservation Practice Standard Code 561, Heavy Use Area Protection. A portable facility used in intensive rotational systems where vegetative growth around the facility can be maintained is not required to have heavy use area protection. When concrete is used as a heavy use protection, the surface shall have a roughened finish and slope away from the facility to prevent ponding of water on the concrete surface.

Materials. 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.

Use the criteria in Alabama 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.

A reinforced concrete trough or tank shall be constructed of good quality concrete using sound, clean aggregates. The concrete mix shall be such that it will produce a compressive strength of 3,000 psi at 28 days. A concrete cast trough or tank shall have a minimum base thickness of 4 inches

and a minimum wall thickness of 3 inches. Minimum steel reinforcement shall be one of the following:

- 3/8 in. bars spaced on 8-inch centers in both directions.
- 8 gauge welded wire mesh.

A galvanized steel tank shall have a wall thickness of at least 20 gauge.

Prefabricated plastic and fiberglass facilities shall be made of materials resistant to sunlight or shall be coated with an ultraviolet resistant material.

When a heavy equipment tire is used as a trough or tank, it shall be of suitable quality to perform as intended for the useful life of the practice. Clean the tire to ensure that it is free of chemicals injurious to livestock. Utilize approved standard drawings to prepare site-specific designs for this type of facility.

Appurtenances. Troughs smaller than 500 gallon capacity (exclusive of concrete troughs or ball waterers) will be secured on at least four sides. (See drawings AL-ENG-561-01, AL-ENG-561-02 and AL-ENG-561-02a for details.)

Equip troughs and tanks with a suitable water supply pipe, drainage outlet, and overflow outlet, either as individual outlets or a combination of outlets.

Where water is supplied under pressure to the watering facility, use an automatic water level control or float valve to control the flow of water to the facility in order to reduce energy use and prevent overflows. The automatic water level control valve or float valve shall be rated according to the design pressure of the system.

As needed, install a float valve on a gravity-fed trough to avoid draining the water source.

Protect valves and controls from damage by livestock, wildlife, freezing, and ice.

A water level control valve or overflow pipe shall be used to maintain the water at least 1 1/2 inches below the top of a trough or tank. Use new galvanized steel or plastic pipe and fittings having a minimum diameter of 1 1/2 inches for the overflow pipe. Drainage outlets for systems with flow-through water must extend at least 10 feet from the trough or tank and outlet at a location to provide a safe and stable discharge. The outlet location must not be accessible to the livestock.

Plumbing shall be new galvanized steel, copper, bronze, or plastic pipe and fittings in conformance

with Conservation Practice Standard Code 516 - Pipeline. Water supply pipelines are to have a minimum inside diameter of 1 1/4 inches for gravity flow systems or 3/4 inch for pressurized systems. Connect supply lines in a manner to prevent leakage.

Provide a method of draining the facility for maintenance.

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

Escape Features. Install escape features where local knowledge and experience indicate that wildlife may be at risk of drowning.

An effective escape device must:

- Meet the inside wall of the tank or trough
- Reach to the bottom of the trough or tank
- Be firmly secured to the trough rim
- Be built of durable material with a rough surface animals can grip
- Have a slope no steeper than 45 degrees
- Be located to cause minimal interference with livestock

Provide one escape device for every 30 linear feet of rim.

Refer to *Water for Wildlife – A Handbook for Ranchers and Range Managers*, Bat Conservation International, for additional information on escape features.

Watering Ramps

Ramps may only be located in streams or in ponds to serve as a water source when no other practical source of livestock water is available or can be reasonably developed. Ramps are especially not preferred in streams and used only as a last-alternative watering source.

Where livestock or wildlife will drink directly from a pond or stream, use a watering ramp to provide a stabilized access to the water. Evaluate the existing and proposed fences, grazing patterns, shoreline slope, and water depth when choosing the optimum location for the ramp.

Width. Make the ramp wide enough to accommodate the expected usage. Ramps in streams will not exceed 20 feet in width.

Length. Extend the ramp into the stream or pond far enough to achieve the desired depth. Extend ramps to the center of the stream or no more than 5 feet into the stream, whichever is less.

Surface drainage. Divert surface runoff from the approach to the ramp.

Slope. Make the slope of the watering ramp consistent with planned animal usage but not steeper than 5:1.

Side slopes. Make all side slope cuts and fills stable for the soil materials on the site. Make the side slopes of cuts or fills in soil materials no steeper than 2.5 horizontal to 1 vertical (2.5:1). Make rock cuts or fills no steeper than 1.5 horizontal to 1 vertical (1.5:1).

Foundation. Where necessary, prepare the foundation by removal and disposal of material that are not adequate to support the design loads.

Surface material. Use the criteria in Alabama CPS *Heavy Use Area Protection (Code 561)* to design the ramp surface. The selected material must be of adequate quality to withstand underwater conditions.

Access. Use fencing or other barriers to delineate the boundaries of the ramp. Use Alabama CPS *Fence (Code 382)* for the design and construction of a fence. Barriers must be of sufficient size, strength, and quality to meet the intended use of the facility.

Ramps in Streams. Use the criteria in Alabama CPS *Stream Crossing (Code 578)* for the design and construction of a ford crossing.

Install ramps in streams perpendicular to the direction of the stream flow and in areas where the streambed is stable. Avoid wetlands. Provide watering ramps located in streams with a toe trench constructed on the upstream and downstream edges of the ramp.

Locate the watering ramp so that it does not impede the movement of aquatic organisms in the stream.

Ramps in Ponds. Extend ramps installed in farm ponds far enough into the pond to insure access to water during drought conditions.

A minimum water depth of 3 feet, measured from the designed permanent water level, is recommended. Where the pond depth is greater than 3 feet at the ramp location, it may be necessary to excavate the ramp into the pond bank to provide a stable base at the lower end. Extend the ramp a minimum of 0.5 feet above the designed permanent water level.

CONSIDERATIONS

Not all species need or benefit from supplemental water. Consider impacts to both target and non-target wildlife species before installation of a watering facility. Observed or documented use of a facility by wildlife does not necessarily indicate net benefits. Introducing a new water source within an ecosystem can have effects such as the concentration of grazing, predation, entrapment, drowning, disease transmission, and expansion of the wildlife populations beyond the carrying capacity of the available habitat. Providing a water source for wildlife could enhance the habitat for species that compete with or prey on at-risk species.

Design fences associated with the watering facility to allow safe ingress and egress for area wildlife species. To protect species that access water by skimming across the surface, make fencing materials highly visible with appropriate openings. Add permanent streamers or coverings to wire fences that extend across a watering facility to make them more visible to skimmers.

Consider designing the facility to benefit wildlife. Such designs would include providing ground-level access to water for species that cannot use raised structures such as troughs. Ground-level access can be provided through creation of an overflow collection area or a secondary ground-level water source. Depending on the target species, planners may want to consider protecting these areas through the use of suitable fencing (marked as needed) that excludes livestock and larger wildlife species while allowing access of the site to small ground-dwelling species.

Consideration should also be given to prevention of disease transmission at watering facilities. Suitable controls/treatments for water-transmissible diseases and parasites should be considered if they are a problem locally.

When windmill, solar, or other potentially unreliable power source is used, supply additional daily water storage volume (3-5 days), provide a battery back-up system or provide an alternate water source. Use of a float valve on a system with one of these types of power supply may not be practical.

Consider the effects of water development on the balance or budget of water resources in the area of the new project. In some settings, this could be important and may result in effects to adjacent or associated habitats and species.

If there is the potential for small livestock, such as lambs or kids, to fall into the trough, provide a ledge or similar structure in the trough to provide an escape route or provide a second trough that has a shorter height.

Debris and algae can collect in watering facilities resulting in the need for frequent cleaning. Covers that shade the facility and reduce debris from falling into the facility, while still allowing animal access, will keep the water cooler, cleaner, and more palatable to animals.

When a roof is placed over the trough to provide shade, design the roof for appropriate snow and wind loads and ensure that it will be durable to withstand anticipated livestock and wildlife activities. Use the criteria in *Alabama CPS Roofs and Covers (Code 367)* to design the roof.

Where debris or algae is a problem, reduce the chances of clogging by increasing pipe sizes for inlets and outlets or by installing a feature such as an inverted elbow at the inlet to the overflow pipe.

Protect the outlet of a drain from erosion.

Consider installation of a permanent means of ingress and egress for maintenance of a storage tank, if needed.

A watering facility located on a steep slope can have erosion problems from the animal traffic. The steep slopes may also cause problems with piping and valves from excess pressure. Choose the location of the watering facility to minimize problems caused by steep topography.

To ensure uniform grazing and waste distribution in the field, cattle should not have to travel more than 800 feet to the facility. The facility should be located so that loafing of the cattle around it is not encouraged. The facility placed under trees encourages loafing and also creates maintenance problems with leaves dropping into it. If water

temperature is a concern, a trough or tank can be partially buried.

Watering ramps. Where livestock exclusion from a stream is part of the planned installation, consider installing a watering ramp that can be used if emergency access to water is needed. Use a gate to restrict access to the ramp.

The slope of the ramp can influence animal behavior. Steeper slopes tend to discourage loafing in the ramp area.

Select a surface material for the ramp that will discourage loafing but still provide a stable footing. The larger stone will make the hoof contact slightly uncomfortable.

Avoid locating watering ramps in shady places where possible.

It is difficult to put a fence in the middle of a stream. Where possible, extend the fence completely across the stream. Swinging gates can be used to restrict animal movement.

PLANS AND SPECIFICATIONS

Provide plans and specifications that describe the requirements for applying this practice to achieve its intended purpose. As a minimum, include:

- A map or aerial photograph showing the location of the facility and any associated pipelines
- Type and number of animals expected to use the facility.
- Special conditions for access, as needed
- Foundation stability requirements.
- Site-specific detail drawings showing the facility and necessary appurtenances (foundations, pipes and valves, escape features, anchoring, etc.)
- Requirements for stabilization of any areas disturbed by the installation of the facility
- Fencing, as needed
- Materials and quantities
- Construction specifications describing the installation of the facility

OPERATION AND MAINTENANCE

Prepare an operation and maintenance plan and review it with the operator. The plan will describe the actions that must be taken to ensure that the facility functions properly for its design life. As a minimum, include the following items:

- Regularly check for damage to the facility. Check for leaks, site erosion, and damage to fences, heavy use areas, and appurtenances associated with the watering facility. Repair or replace damaged components, as needed.
- Check the performance of the automatic water level device, if present.
- Ensure that the outlet pipe is freely operating and is not causing erosion.
- Regularly clean the facility.
- Maintain the facility to ensure that there is adequate inflow and outflow.
- Prepare the facility for winter as dictated by the climate. This may include draining supply pipes, emptying tanks, or ensuring that float valves will not be damaged by ice.
- For a portable facility, include the plan for moving the facility and for monitoring/repair of the areas around the facility.

Algae and iron sludge accumulation should be addressed in areas with water quality that is known to cause problems. Chemicals such as copper sulfate and chlorine can be recommended as needed, as long as local rules and regulations are followed.

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.

Prescribed Grazing and Feeding Management for Lactating Dairy Cows", New York State Grazing lands and USDA NRCS, January 2000).

Taylor, Daniel A. R. and Merlin D. Tuttle. Water for Wildlife, A Handbook for Ranchers and Range Managers. Bat Conservation International. 2012.

Concrete, ACI 318, American Concrete Institute

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

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](#) for your state.