

**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

All planned work shall comply with Federal, state, and local laws, rules and regulations. Plans for terraces may need to be permitted by the appropriate Water Management District (WMD) and comply with the appropriate WMD rules contained in Chapter 40-4 Florida Administrative Code (F.A.C.), Environmental Resource Permits: Surface Water Management Systems; Chapter 40-40 F.A.C., Standard General Environmental Resource Permits: Regulation of Stormwater Management Systems; Chapter 40-41 F.A.C., Environmental Resource Permits: Surface Water Management Basin Criteria; Chapter 40-42

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

F.A.C., Environmental Resource Permits: Regulation of Stormwater Management Systems; Chapter 40-44 F.A.C., Environmental Resource Permits: Regulation of Agricultural Surface Water Management Systems.

Evaluate the impact to cultural resources, wetlands and Federal and state protected and avoid or minimize to the extent practicable during planning, design and implementation of this conservation practice in accordance with established National and Florida policy, General Manual (GM) Title 420-Part 401; Title 450-Part 401, Title 190-Parts 410.22 and 410.26, National Planning Procedures Handbook (NPPH) Florida Supplements to Parts 600.1 and 600.6, National Cultural Resources Procedures Handbook (NCRPH), National Food Security Act Manual (NFSAM), and the National Environmental Compliance Handbook (NECH).

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.

Stabilization of Disturbed Areas. Vegetate or stabilize areas disturbed by construction in accordance with the planned use of the facility. Use the criteria in Florida NRCS 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 Florida NRCS CPS Mulching, Code 484, as appropriate.

Troughs and Tanks

System Capacity. Design the trough or tank and water delivery system to have adequate capacity to meet the water requirements of the livestock and/or wildlife using the watering facility. The minimum watering system storage capacity will be three (3) days. This minimum watering system storage capacity may be reduced to one (1) day supply of water if the following conditions exist:

1. a dependable alternative water source (such as a pond, lake, stream, etc.) is available in the planned grazing unit or a dependable backup power source is available at the trough and
2. livestock are checked daily.

A dependable backup power source is a well maintained generator that is connected to the pump and has the capacity to energize the pump and all other critical components. A portable generator is not considered a dependable backup power source.

Watering Facility Size. Base the size of watering facilities on capacity and perimeter access space. The capacity (or storage) of a watering facility is dependent upon the animal type, dependability of the water source and the flow rate to the watering facility. Use Table 1, as a minimum, for determining daily requirements, capacity, and depth of individual watering facilities. For wildlife, base water quantity requirements on targeted species needs.

Access space to the watering facility is dependent upon the number of animals drinking at any one time and the configuration of the watering facility. As a minimum, design the watering facility to accommodate 5% of the herd at one time. For large animals such as cattle, horses, donkeys, etc., allow 20 inches of perimeter per animal for circular tanks and 30 inches per animal for straight side tanks. For small animals such as goats, sheep, swine, etc., allow 12 inches of perimeter per animal for circular tanks and 18 inches per animal for straight side tanks.

Location. Locate the watering facility to meet the needs of the managed livestock or wildlife species. Select a site that will promote even grazing distribution and reduce grazing pressure on sensitive areas. Where multiple watering facilities are planned, place the watering facilities at distances that are appropriate for the species that will be managed.

When possible, locate the watering facility away from streams, ponds, or riparian areas to minimize chance of contamination from fecal contamination or surface pollution.

When a watering facility is installed adjacent to a well, provide positive drainage away from the well head.

Table 1 – Minimum Requirements of Individual Watering Facilities

Type of Livestock	Daily Water Requirement ^{1/} gal/head/day	Minimum Trough Size		Maximum Trough Height inches
		Capacity gal	Depth inches	
Beef cattle	12	70	12	30
Horse	12	70	12	30
Dairy Cattle				
Lactating	25	70	12	30
Non-lactating	15	70	12	30
Sheep and Goats	2	15	6	18
Swine	4	15	6	18

^{1/} Daily water requirements vary with climatic conditions, types of feed, size of animals, and other factors and may be increased as necessary.

Replenishment rate. The flow rate will be the greater of the following:

- 1) The inflow of water within a 2-hour period plus the individual watering facility (trough/tank) capacity equals or exceeds one-half the daily requirements for the livestock using the facility.
- 2) The one day water requirements for the watering facility supplied in:
 - a. 10 hours or less for electric and solar with battery backup;
 - b. 5 hours or less for solar without battery backup;
 - c. 5 hours or less for windmills.
- 3) 2 gpm.

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

Anchor or brace the watering facility to prevent overturning by wind and animals, if needed.

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.

Stabilization. For a fixed trough on poorly drained and wetter soils, or other areas where needed, protect the area around the watering facility where animal concentrations or overflow from the watering facility will cause resource concerns. Use Florida NRCS CPS Heavy Use Area Protection, Code 561, to design the protection.

For a portable facility, move the trough frequently to prevent damage from animal concentrations.

Appurtenances. Use the criteria in Florida NRCS CPS Livestock Pipeline, Code 516, to select the components needed to attach the water supply to the trough. Include backflow prevention devices on facilities connected to wells or to domestic or municipal water systems.

Provide a stable outlet for the overflow pipe when an overflow pipe is included in the design. Protect the outlet from damage. Direct overflow from the trough to another beneficial use or to the original watercourse, where possible.

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. All valves and water control devices shall allow the design inflow rate.

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.

For watering facilities with a capacity greater than 100 gallons, provide a method of draining to facilitate maintenance.

All exposed pipes, fittings, and appurtenances shall be galvanized, painted, or ultraviolet protected as appropriate.

Materials. Select materials that have a life expectancy of at least 10 years and are compatible with the livestock using the watering facility. Common construction materials are reinforced concrete, steel, fiberglass, plastic and rubber. All designs shall meet the industry standards for the material being used. Generally applicable design requirements and procedures can be found in the documents referenced at the end of this standard.

Concrete structures shall be constructed with a concrete mix producing a minimum compressive strength of 3,000 psi at 28 days.

Galvanized steel tanks shall have a minimum thickness of 20 gauge.

Plastic and fiberglass structures shall be made of ultraviolet resistant materials or shall have a durable coating to protect the structure from deterioration due to sunlight. On round plastic troughs greater than 6 feet in diameter, sufficiently brace the perimeter of the trough to prevent sagging and deformation.

Heavy equipment tires shall be clean and free of any chemical contaminants.

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

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, but not less than 12 feet.

Length. Extend the ramp into the stream or pond far enough to achieve the desired depth.

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 4 horizontal to 1 vertical (4:1).

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 horizontal to 1 vertical (2:1). 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 Florida NRCS 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 Florida NRCS 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 Florida NRCS CPS Stream Crossing, Code 578, for the design and construction of a ford crossing except as noted above.

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

Ramps in Ponds. 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

General. 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, consider increasing the water system storage capacity to 7 days. Use of a float valve on a system with one of these types of power supply may not be practical.

Consider locating troughs at least 150 feet from wellheads.

Consider locating troughs at least 300 feet from streams, creeks, and other bodies of water to protect sensitive riparian areas.

Consider heavy use area protection around troughs and tanks for all large animals.

Consider sizing water supply pipelines with a velocity of less than 5 feet per second to reduce energy use.

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.

Consider the size of animals (domestic and wildlife) using the facility. Design watering facilities so small animals (e.g. calves, goats, deer, etc.) can access the water. 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 Florida NRCS 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.

Maintenance of a watering facility can be made easier by providing a method to completely drain the watering facility. 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.

Grazing. This practice facilitates Florida NRCS CPS Prescribed Grazing, Code 528, which assists in supporting a more efficient grazing program. An efficient grazing program will reduce energy costs associated with planting, harvesting and storing feed by applying direct feeding through field grazing.

Consider providing livestock with access to a permanent water source (such as a pond, lake, stream, etc.) in the event of power loss.

Where practicable, use portable water troughs that can be relocated between grazing events to disperse impacts from trampling vegetation.

Plan watering facilities at locations to optimize livestock distribution to fully utilize grazing lands. Grazing intensity declines significantly with distances from water of more than 800 feet. (See 1997 Missouri Grazing Manual, University of Missouri, 1997).

Locate watering facilities within 300 feet of where lactating dairy cattle are grazing. (See publication "Prescribed Grazing and Feeding Management for Lactating Dairy Cows", New York State Grazing lands and USDA NRCS, January 2000).

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 loitering in the ramp area.

Select a surface material for the ramp that will discourage loitering 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

Plans and specifications for terraces shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

As a minimum, the plans and specifications shall include:

Troughs and Tanks

- 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.

Watering Ramps

- Location of ramp.
- Ramp width, length, and slope.
- Foundation preparation requirements.
- Thickness, gradation, quantities, and type of rock or stone, if used
- Thickness, compressive strength, reinforcement and other special requirements for concrete, if used.
- Vegetative requirements.
- Location, type, and extent of fencing required.

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:

Troughs and Tanks

- 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.

Watering Ramps

- Inspect watering ramps, appurtenances, and associated fences after each storm event and make repairs as needed.
- Remove any accumulation of organic material, woody material, or excess sediment.
- Replace surfacing stone as needed.

REFERENCES

Florida NRCS CPS,

Critical Area Planting, Code 342

Fence, Code 382

Heavy Use Area Protection, Code 561

Livestock Pipeline, Code 516

Mulching, Code 484

Prescribed Grazing, Code 528

Roofs and Covers, Code 367

Stream Crossing, Code 578

General Manual

Title 420-Part 401

Title 450-Part 401

Title 190-Parts 410.22 and 410.26

National Cultural Resources Handbook

National Engineering Field Handbook, Part 650, Chapter 5

National Engineering Manual, Parts 541 and 542

National Environmental Compliance Handbook

National Food Security Act Manual

National Planning Procedures Handbook

Florida Supplements to Parts 600.1 and 600.6

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

Water for Wildlife, A Handbook for Ranchers and Range Managers, Bat Conservation International, 2007

1997 Missouri Grazing Manual, University of Missouri, 1997