

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

DRAINAGE WATER MANAGEMENT

**Code 554
(Ac.)**



DEFINITION

The process of managing water discharges from surface and/or subsurface agricultural drainage systems.

PURPOSES

This practice is applied to achieve one or more of the following purposes:

- reduce nutrient, pathogen, and/or pesticide loading from drainage systems into downstream receiving waters;
- improve productivity, health, and vigor of plants;
- reduce oxidation of organic matter in soils;
- reduce wind erosion or particulate matter (dust) emissions; and/or
- provide seasonal wildlife habitat.

CONDITIONS WHERE PRACTICE APPLIES

This practice is applicable to agricultural lands with surface or subsurface agricultural drainage systems that are adapted to allow management of drainage discharges.

The practice may not apply where saline or sodic soil conditions require special considerations.

This practice does not apply to the management of irrigation water supplied through a subsurface drainage system. For that purpose, use NRCS conservation practice standard (CPS), Irrigation Water Management (449).

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

General Criteria Applicable To All Purposes

Evaluate and avoid or minimize impacts to cultural resources, wetlands and Federal and state protected species 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).

Plan all work to comply with all Federal, state, and local laws and regulations. Plans for water control structures 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 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.

Manage gravity drained outlets by adjusting the outlet elevation of the drainage outlet. Refer to Florida NRCS CPS, Structure for Water Control, Code 587 for design criteria.

Manage pumped drainage outlets by raising the on-off elevations for pump cycling.

Locate structures and pumps where they are convenient to operate and maintain. Design critical components in accordance with pertinent Florida NRCS CPS.

Raising the outlet elevation of the flowing drain shall result in an elevated free water surface within the soil profile.

When operated in free drainage mode, use the minimum drainage coefficients contained in the Florida NRCS Drainage Guide to ensure water control structures do not restrict the flow of the drainage system.

Manage drainage discharges and water levels in a manner that does not cause adverse impacts to other properties or drainage systems.

Design the flow velocity in the drainage system to ensure it does not exceed acceptable velocities prescribed by NRCS Florida CPS, Surface Drain, Main or Lateral, Code 608.

Design the flow velocity in the drainage system to ensure it does not exceed acceptable velocities prescribed by NRCS Florida CPS, Subsurface Drain, Code 606.

Additional Criteria to Reduce Nutrient, Pathogen, and/or Pesticide Loading

During non-cropped periods, the system shall be in managed drainage mode within 30 days after the season's final field operation, until at least 30 days before commencement of the next season's field operations, except during system maintenance periods or to provide trafficability when field operations are necessary.

The drain outlet shall be raised prior to and during liquid manure applications to prevent direct leakage of manure into drainage pipes through soil macro pores (cracks, worm holes, root channels).

Manure applications shall be in accordance with Florida NRCS CPS, Nutrient Management, Code 590 and Waste Utilization, Code 633.

Additional Criteria to Improve Productivity, Health, and Vigor of Plants

When managing drainage outflow to maintain water in the soil profile for use by crops or other vegetation, the elevation at which the outlet is set shall be based on root depth and soil type.

If using this practice to control rodents, apply in conjunction with Florida NRCS CPS, Pest Management, Code 595.

Additional Criteria to Reduce Oxidation of Organic Matter in Soils

Minimize drainage beyond that necessary to provide an adequate root zone for the crop.

To reduce oxidation of organic matter, set the planned control elevation to enable the water table to rise to the ground surface, or to a designated maximum elevation, for sufficient time to create anaerobic soil conditions. The implementation of this practice must result in a reduced average annual thickness of the aerated layer of the soil.

Additional Criteria to Reduce Wind Erosion or Particulate Matter (Dust) Emissions

When the water table is at the planned control elevation, the system must provide sufficient moisture to the soil surface, either by ponding or capillary action from the elevated water table.

Additional Criteria to Provide Seasonal Wildlife Habitat

During the non-cropped season, the elevation of the drainage outlet shall be managed in a manner consistent with a habitat evaluation procedure that addresses targeted species.

CONSIDERATIONS

In-field water table elevation monitoring devices can be used to improve water table management.

Reducing mineralization of organic soils may decrease the release of soluble phosphorus, but water table management may increase the release of soluble phosphorus from mineral soils.

Elevated water tables may increase the runoff portion of outflow from fields. Consider conservation measures that control sediment loss and associated nutrient discharge to waterways.

Elevate the drainage outlet for subsurface drains during and after manure applications to decrease potential for nutrient and pathogen loading to receiving waters.

Consider manure application setbacks from streams, flowing drain lines, and sinkholes, to reduce risk of contamination.

To maintain proper root zone development and aeration, downward adjustments of the drainage outlet control elevation may be necessary, especially following significant rainfall events.

Monitoring of root zone development may be necessary if the free water surface in the soil profile is raised during the growing season.

The effect of drainage systems on wetlands should be evaluated.

To further reduce subsidence of organic soils, the water management infrastructure should be designed for temporary flooding of fallow fields.

PLANS AND SPECIFICATIONS

Plans and specifications for regulating water in drainage systems shall be in keeping with this standard and shall describe the requirements for properly installing and operating the practice to achieve its intended purpose. As a minimum, the plans and specifications shall include, but not limited to, the following items:

- Location and extent of area to be managed.
- Location of pumps and structures.
- Typical cross-sections of dikes, channels and structures.
- Pumping plant size and location.
- Location of all systems.
- Details of water control structures, component practices, etc.

OPERATION AND MAINTENANCE

Develop and provide an Operation and Maintenance (O&M) plan that identifies the intended purpose of the practice, requirements to maintain practice life, timing of water table elevations at various crop stages or fallow periods to meet the intended purpose. If in-field water table observation points are not used, include the relationship of the control elevation settings relative to critical field water table depths in the O&M plan.

Include instructions in the O&M plan of critical components of the drainage management system, including instructions to maintain flow velocities within allowable limits when lowering water tables.

To prevent leakage of liquid manure applications into drain pipes, the O&M plan shall specify the elevation of the raised drainage outlet and the number of days prior to and after the application that a raised outlet elevation is to be maintained.

Replace warped flashboards that cause structure leakage.

The O&M plan shall also include specific requirements to operate and maintain associated practices and components of the infrastructure used to manage the drainage water.

REFERENCES

Florida NRCS Drainage Guide

Florida NRCS CPS:

- Nutrient Management, Code 590
- Pest Management, Code 595
- Structure for Water Control, Code 587
- Subsurface Drain, Code 606
- Surface Drain, Main or Lateral, Code 608
- Waste Utilization, Code 633

General Manual

- Title 420-Part 401
- Title 450-Part 401
- Title 190-Parts 410.22 and 410.26

National Cultural Resources Handbook

National Environmental Compliance Handbook

National Food Security Act Manual

National Planning Procedures Handbook

- Florida Supplements to Parts 600.1 and 600.6
- WMD Rules Chapter 40-4, 40-40, 40-41, 40-42, 40-44 F.A.C.