NATURAL RESOURCES CONSERVATION SERVICE
VIRGINIA CONSERVATION PRACTICE STANDARD

WETLAND ENHANCEMENT

(Ac.)

CODE 659

DEFINITION

The augmentation of wetland functions beyond the original natural conditions on a former, degraded, or naturally functioning wetland site; sometimes at the expense of other functions.

PURPOSE

To increase the capacity of specific wetland functions (such as habitat for targeted species, and recreational and educational opportunities) by enhancing:

- Hydric soil functions (changing soil hydrodynamic and/or bio-geochemical properties);
- Hydrology (dominant water source, hydroperiod, and hydrodynamics);
- Vegetation (including the removal of undesired species, and/or seeding or planting of desired species);
- Enhancing plant and animal habitats.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to any degraded or non-degraded wetland sites with hydric soils, where the objective is to enhance selected wetland functions to conditions different than those that originally existed on the site.

This practice does not apply to:

The treatment of point and non-point sources of water pollution.

The rehabilitation of a degraded wetland or the reestablishment of a former wetland so that soils, hydrology, vegetative community, and habitat are a close approximation of the original natural condition and boundary that existed prior to the modification; Virginia Conservation Practice Standard *Wetland Restoration (Code 657)*.

The creation of a wetland on a site location that was historically non-wetland; Virginia Conservation Practice Standard *Wetland Creation (Code 658)*.

The management of fish and wildlife habitat on wetlands enhanced under this standard.

CRITERIA

General Criteria Applicable to All Purposes

Permits are not required where there is no impact to existing wetlands and streams. Nationwide Permit 27 (Section 404 of the Clean Water Act) authorizes certain activities impacting wetlands where there is limited incidental loss and enhancement results in a net gain of wetlands. Contact the U.S. Army Corps of Engineers and/or the Virginia Department of Environmental Quality (DEQ) if there are any wetland questions or stream impacts.

The purpose, goals, and objectives of the enhancement shall be clearly defined in the enhancement plan, including soils, hydrology, vegetation, and fish and wildlife habitat criteria that are to be met and are appropriate for the site and the project objectives. The enhancement plan is part of the Job Sheet for this practice.

The planning process will evaluate the impact of this practice on existing non-degraded wetland functions and/or values. The relative increase or decrease in functions will be assessed with the use of a functional assessment procedure or state approved equivalent. The functions to be increased or decreased on wetlands found to be currently functioning at or near a “reference” condition will be documented.

The soils, hydrology, and vegetative conditions

existing on the site, the adjacent landscape, and the contributing watershed shall be documented in the planning process.

The nutrient and pesticide tolerance of the plant and animal species likely to occur shall be evaluated where known nutrient and pesticide contamination exists. Sites suspected of containing hazardous material shall be tested to identify appropriate remedial measures. If remedial measures are not possible or practicable, the practice shall not be planned.

The availability of sufficient water rights should be reviewed prior to enhancement.

Upon completion, the site shall meet the appropriate wetland criteria and provide wetland functions as defined in the project's objectives.

Invasive species, federal/state listed noxious plant species, and nuisance species (e.g., those whose presence or overpopulation jeopardize the practice) shall be controlled on the site as necessary to enhance wetland functions. The establishment and/or use of non-native plant species shall be discouraged.

Do not enhance wetlands on sites with T&E species unless it is demonstrated that the impact will benefit the species at risk. Consultation with the appropriate regulatory agency or agencies is required.

If the wetland is adjacent to a cold water stream, obtain input from Virginia Department of Game and Inland Fisheries Biologist to ensure that there is no effect on water temperature.

Criteria for Hydric Soil Enhancement

Enhancement sites will be located on soils that are hydric.

Changes to soil hydrodynamic and bio-geochemical properties such as permeability, porosity, pH, or soil organic carbon levels shall be made as needed to meet the planned objectives.

Criteria for Hydrology Enhancement

The hydroperiod, hydrodynamics, and dominant water source of the enhanced site shall meet the project objectives. The enhancement plan shall document the adequacy of available water sources based on groundwater investigation, stream gage data, water budgeting, or other appropriate means.

The work associated with the wetland shall not adversely affect adjacent properties or other water users unless agreed to by signed written letter, easement or permit.

Timing and level setting of water control structures required for the establishment and maintenance of vegetation, soil, and wildlife and fish habitat functions shall be determined.

Other structural practices, macrotopography and/or microtopography may be used to meet the planned objectives.

Macrotopographic features, including ditch plugs installed in lieu of re-filling surface drainage ditches, shall meet the requirements of other practice standards to which they may apply due to purpose, size, water storage capacity, hazard class, or other parameters.

If no other practice standard applies, they shall meet the requirements for Virginia Conservation Practice Standard *Dike (Code 356)* unless there is no potential for damage to the feature or other areas on or off site due to erosion, breaching, or overtopping. Dikes used to impound water must use the Virginia Conservation Practice Standard *Dike (Code 356).* If there is 18 inches or less of water impounded against the dike, the minimum freeboard requirement is 6 inches.

Water control structures that may impede the movement of target aquatic species or species of concern shall meet the criteria in Virginia Conservation Practice Standard *Fish Passage (Code 396)*.

Criteria for Vegetative Enhancement

Hydrophytic vegetation restoration shall be of species typical for the wetland type(s) being established and the varying hydrologic regimes and soil types within the wetland. Preference shall be given to native wetland plants with localized genetic material (within 200 miles).

Where natural colonization of acceptable species can realistically be expected to occur within 5 years, sites may be left to re-vegetate naturally. If not, the appropriate species will be established by seeding or planting.

Adequate substrate material and site preparation necessary for proper establishment of the selected plant species shall be included in the plan.

Determine the appropriate number of vegetative species to establish using the following criteria:

- On sites that are predominantly herbaceous vegetation, establish a minimum of 4 species on projects restored to one ecological site (i.e., wet meadow, shallow marsh, or slough eco-sites, etc.). For projects where there are two or more ecological sites, establish at least three native species on each site.
- On sites that are predominantly forest or woodland community types, vegetation establishment will include a minimum of 6 species.

Use the Virginia Plant Establishment Guide to determine vegetative species, seeding rates and dates.

CONSIDERATIONS

Virginia Conservation Practice Standards *Dike (Code 356),* and *Structure for Water Control (Code 587)* may be used to enhance the performance of this practice.

Soil Considerations

Consider making changes to physical soil properties, including:

- Increasing or decreasing saturated hydraulic conductivity by mechanical compaction or tillage, as appropriate
- Incorporating soil amendments.
- The effect of construction equipment on soil density, infiltration, and structure.

Consider changes in soil bio-geochemical properties, including:

- Increasing soil organic carbon by incorporating compost.
- Increasing or decreasing soil pH with lime, gypsum, or other compounds.

Plan borrow areas for dikes or embankments as permanent pools or deepwater habitats. Use excess materials to create islands in water features or upland areas in flatlands.

Where possible, excavate fill for dikes and embankments away from the dike. This prevents permanent water against the structure and reduces likelihood of rodents burrowing in the dike.

Soil disturbance associated with the installation of this practice may increase the potential for invasion by unwanted species.

Hydrology Considerations

Consider the general hydrologic effects of the enhancement, including:

- Impacts on downstream stream hydrographs, volumes of surface runoff, and groundwater resources due to changes of water use and movement created by the enhancement.

Consider the impacts of water level management, including:

- Increased predation due to concentrating aquatic organisms, including herptivores, in small pool areas during draw downs.
- Increased predation of amphibians due to high water levels that can sustain predator fish.
- Decreased ability of aquatic organisms to move within the wetland and from the wetland area to adjacent habitats, including fish and amphibians, as water levels are decreased.
- Increases in water temperature on-site, and in off-site receiving waters.
- Changes in the quantity and direction of movement of subsurface flows due to increases or decreases in water depth.
- The effect changes in anaerobic conditions have on soil bio-geochemical properties; including oxidation/reduction, and maintenance of organic soils.
- The potential for water control structures, dikes, and macrotopographic features to negatively impact the movement of non-target aquatic organisms.
- The potential for using manipulation of water levels to control unwanted vegetation.

Vegetation Considerations

Consider:

- The relative effects of planting density on fish and wildlife habitat versus production rates in woody plantings.
- The potential for vegetative buffers to increase function by trapping sediment, cycling nutrients, and removing pesticides.
- The selection of vegetation for the protection of structural measures that is appropriate for wetland function.

- The potential for invasive or noxious plant species to establish on bare soils after construction and before the planned plant community is established.
- The use of prescribed burning to maintain wetland and adjacent upland plant communities.
- Micro-topography, hydrology and hydroperiod when determining which species of vegetation to plant.

Fish and Wildlife Habitat Considerations

Consider:

- The addition of coarse woody debris to provide an initial carbon source and fish and wildlife cover.
- The potential to restore habitat capable of supporting fish and wildlife with the ability to control disease vectors such as mosquitoes.
- The potential to establish fish and wildlife corridors linking the site to adjacent landscapes, streams, and water bodies and to increase the sites colonization by native flora.
- The need to provide barriers to passage for unwanted or predatory fish and wildlife species.
- Installing complexes of vernal pools (5 acres is ideal) to provide habitat for amphibian species, that includes hardwood buffer areas.

PLANS AND SPECIFICATIONS

Plans and specifications for this practice shall be prepared for each site. Record the required information in Wetland Enhancement Job Sheet and in an engineer field book, on a plan sheet or design computation sheet, or other appropriate location. Plans and specifications shall be reviewed by staff with appropriate training in design and implementation of wetland enhancement.

DESIGN DATA

1. Completed Environmental Evaluation and subsequent requirements.
2. Wetland Enhancement Job Sheet. The Operation and Maintenance Plan is part of the Job Sheet.
3. Survey and plot data: profile, cross-sections, topography, as needed.
4. Design computations, including purpose of practice and references used.
5. Plan view of site with existing and planned features, including dimensions, distances, etc.
6. Standard Cover Sheet (VA-SO-100A).
7. Materials and quantities needed. Identify borrow material and/or spoil area, as needed.
8. Vegetation and/or ground cover requirements.
9. Identification of needed Erosion & Sediment Control measures.
10. Supplemental practices required.
11. Virginia Conservation Practice Specifications (700 Series).
12. Operation and Maintenance Plan

CHECK DATA

1. As-built survey.
2. As-built plans including dimensions, types and quantities of materials installed, and variations from design. Include justification for variations.
3. Locations of appurtenant practices.
4. Adequacy of vegetation and/or ground cover.
5. Completed as-built section of Cover Sheet.

Use the practice job sheet to plan and certify this practice.

OPERATION AND MAINTENANCE

The Wetland Enhancement Job Sheet includes the Operation and Maintenance Plan for the wetland enhancement. The O&M Plan contains a list of the management and monitoring activities needed to ensure the continued success of the wetland functions. A Maintenance and Monitoring schedule will be prepared as part of the O&M Plan. All appurtenant practices associated with the wetland enhancement will meet the requirements of the appropriate Conservation Practice Standard. The Operation and Maintenance Plan for each of these practices will be appended to the Job Sheet.

The O&M Plan will include the following:

- The timing and methods for the use of fertilizers, pesticides, prescribed burning, or mechanical treatments.

- Circumstances when the use of biological control of undesirable plant species and pests (e.g. using predator or parasitic species) is appropriate, and the approved methods.
- Actions which specifically address any expected problems from invasive or noxious species.
- The circumstances which require the removal of accumulated sediment.
- Conditions which indicate the need to use haying or grazing as a management tool, including timing and methods. Minimize disturbance to ground nesting species, especially during the primary nesting season.

Any use of fertilizers, mechanical treatments, prescribed burning, pesticides and other chemicals shall assure that the intended purpose of the wetland restoration shall not be compromised.

Management actions shall maintain vegetation, and control undesirable vegetation. Biological control of undesirable plant species and pests (e.g., using predator or parasitic species) shall be implemented where available and feasible. Management of water depth and duration may be utilized to control unwanted vegetation.

Inspect the embankments and structures on the site at least annually and after major storm events. Immediately repair any damage.

Timing and level setting of water control structures is required for the establishment of desired hydrologic conditions, for management of vegetation and for optimum wildlife and fish use.

REFERENCES

USDA-Natural Resources Conservation Service. Virginia Electronic Field Office Technical Guide (eFOTG), Section IV. [On-line]. Available at: http://www/nrcs.usda.gov/technical/eFOTG

USDA- Natural Resources Conservation Service. Virginia 700 Series Construction Specifications. [On-line]. Available at: http://www/nrcs.usda.gov/technical/eFOTG

USDA-Natural Resources Conservation Service. Virginia Biology Technical Note – Aquatic Systems #1 [Online]. Available at http://www.nrcs.usda.gov/technical/eFOTG

USDA, NRCS. National Engineering Handbook, Part 650, Engineering Field Handbook , Chapter 13, Wetland Restoration, Enhancement, or Creation, pp. 3, 24, 77, 78.

USDA, NRCS, 2003. Wetland Science Institute, Wetland Restoration, Enhancement and Management. Available at: ftp://ftp-fc.sc.egov.usda.gov/WLI/wre&m.pdf