NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

NEW JERSEY

WETLAND RESTORATION

(Ac.)

CODE 657

DEFINITION

The rehabilitation of a degraded wetland or the reestablishment of a wetland so that soils, hydrology, vegetative community, and habitat are a close approximation of the original natural condition that existed prior to modification to the extent practicable.

PURPOSE

To restore wetland function, value, habitat, diversity, and capacity to a close approximation of the pre-disturbance by:

- Restoring hydric soil
- Restoring hydrology (depth duration and season of inundation, and/or duration and season of soil saturation).
- Restoring native vegetation (including the removal of undesired species, and/or seeding or planting of desired species).

CONDITIONS WHERE PRACTICE APPLIES

This practice applies only to natural wetland sites with hydric soils, or problem soils that are hydric, which have been subject to hydrologic or vegetative degradation, or to sites where hydric soils are covered by fill, sediment, or other deposits.

This practice is applicable only where the natural hydrologic conditions, including the hydroperiods, can be approximated by modifying drainage and/or by artificial flooding of a duration and frequency similar to the original, natural conditions.

This practice does not apply:

- to treat point and non-point sources of water pollution (Constructed Wetland - 656);
- to modify an existing wetland where specific attributes are heightened by management objectives, and/or returning a degraded wetland back to a wetland but to a different type than what previously existed on the site (Wetland Enhancement - 659);
- to creating a wetland on a site location which historically was not a wetland (Wetland Creation - 658).

CRITERIA

General Criteria Applicable to All Purposes

The purpose, goals and objectives of the restoration shall be clearly outlined, including soils, hydrology and vegetation criteria that are to be met and are appropriate for the site and the project purposes.

The soil, hydrology and vegetative characteristics existing on the site and the contributing watershed shall be documented before restoration of the site begins.

The nutrient and pesticide tolerance of the species planned shall be considered where known nutrient and pesticide contamination exists.

Upon completion of the restoration, the site shall meet soil, hydrology, vegetation and habitat conditions of the wetland that previously existed on the site to the extent practicable.

Where offsite drainage or the presence of invasive species impact the site, the design shall compensate for these landscape changes (e.g., increased water depth, berms or microtopography).

Sites suspected of containing hazardous waste shall be tested to identify appropriate remedial measures. Sites containing hazardous material shall be cleaned prior to the installation of this practice.

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. This includes the manipulation of water levels to control unwanted vegetation. The establishment and/or use of non-native plant species shall be discouraged where possible.

Criteria for Hydric Soil Restoration

Restoration sites will be located on hydric soils, or on problem soil areas that are hydric.

If the hydric soil is covered by fill, sediment, spoil, or other depositional material, the material covering the hydric soil shall, to the extent technically feasible, be removed.

Criteria for Hydrology Restoration

The hydrology (including the timing of inflow and outflow, duration, and frequency) and hydroperiod of the restored site shall approximate the conditions that existed before alteration. This includes affects to hydrology restoration caused by roads, ditches, drains, terraces, etc. within the watershed.

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.

A natural water supply should be used to reestablish the site's hydrology that approximates the needs of the wetland type. If this is not possible, an artificial water supply can be used; however, these sources shall not be diverted from other wetland resources (e.g. prairie pothole wetland complexes or springs).

To the extent technically feasible reestablish topographic relief and/or microtopography. Use reference sites within the area to determine desired topographic relief.

Excavations from within the wetland shall remove sediment to approximate the original topography and/or microtopography or establish a water level that will compensate for the sediment that remains.

Existing drainage systems will be utilized, removed or modified as needed to achieve the intended purpose.

The standards and specifications for Dike (356) and Structure for Water Control (587) will be used as appropriate. Refer to the Engineering Field Handbook, Chapter 13, "Wetland Restoration, Enhancement, and Creation," and Chapter 6, "Structures," for additional design information. Existing drainage systems will be utilized, removed, or modified as needed to achieve the intended purpose. Pond freeboard and flood storage requirements (between the principal and emergency spillways) may be modified for low embankments with small drainage areas and no downstream hazards as outlined in A, B, and C below:

A. Low Embankments

1) Conditions – All must apply:

a. less than 3 feet of fill height from original ground line at centerline of embankment.

b. Less than 49 acres of drainage area.

c. Less than 50 acre-feet of storage (to top of embankment).

d. No downstream hazards.

2) Minimum design criteria

a. Principal spillway sized for 1 year, 24 hour, Type III storm, or where land slope is less than 1% use "D" drainage curve.

b. Top of embankment set 0.5 feet above principal spillway crest.

c. Use the entire crest of embankment as the emergency spillway with downstream slope of 6:1 or flatter. Embankment must be thoroughly compacted and vegetated.

d. If the downstream slope of the embankment is steeper than 6:1, the emergency spillway shall be sized as listed in Section B and C below.

B. Small Drainage Areas (less than 20 acres)

1) Conditions – All must apply

a. Less than 5 feet of water to the emergency spillway crest measured from the downstream toe of the embankment.

b. Less than 20 acres of drainage area.

c. Less than 50 acre-feet of storage

d. No downstream hazard.

e. Fetch length less than 1000 feet.

2) Minimum design criteria

a. Principal spillway sized according to A.2)a. above.

b. Emergency spillway crest set 0.5 feet above principal spillway crest.

c. Emergency spillway sized to carry the 10 year, 24 hour peak discharge using EFH Chapter 11, Exhibit 11-2.1, Retardance C-D.

d. Top of embankment set at 0.5 feet above flow level in emergency spillway.

e. In lieu of a pipe principal spillway, an emergency spillway lined with erosion resistant material (rock, precast interlocking block) may be used.

C. Moderate Sized Drainage Areas (21 to 49 acres)

1) Conditions – All must apply

a. Less than 5 feet of water to emergency spillway crest measured at original ground at centerline of embankment.

b. Drainage area between 21 and 49 acres.

c. Less than 50 acre-feet of storage to emergency spillway crest.

d. No downstream hazard

e. Fetch length less than 1000 feet.

2) Minimum design criteria

a. Principal spillway sized according to A.2)a. above.

b. Emergency spillway crest set 0.5 feet above principal spillway crest.

c. Emergency spillway sized to carry the 25 year, 24 hour peak discharge using EFH Chapter 11, Exhibit 11-2.1, retardance C-D.

d. Tope of embankment set 0.5 feet above flow level in the emergency spillway (1.0 feet minimum above emergency spillway crest).

For sites with good storage conditions, the 25 year peak discharge may be flood routed using TR-55 to reduce the size of the emergency spillway.

Surface Drain Plugs – In areas where open ditches were constructed to provide drainage, wetland hydrology may be restored by constructing surface drain plugs, using a pipe riser or other structures within the ditch to control the water level, or by filling a surface drain to the original ground line.

Provisions shall be made to store, pass through or divert excess runoff. Structure capacity shall be determined using Engineering Field Handbook, Chapter 14.

The minimum length of surface drain plug shall be 50 feet. All fill shall be relatively

impermeable and be compacted to achieve the density of adjacent materials. The fill for the surface drain plug shall be crowned a minimum of one foot above the top of the lower existing channel bank to account for settling.

Subsurface Drain Plugs – In areas where subsurface drains were used to lower the water table, wetland hydrology may be restored by removing or plugging the drain or replacing the perforated drain with a non-perforated drain.

The minimum length of drain to be removed or plugged shall be based on average hydraulic conductivity of the soil. For <.6 inches/hour – 50 feet; .6 to 2.0 inches/hour – 100 feet; and >2.0 inches/hour – 150 feet.

All envelope filter material or other flow enhancing material shall also be removed for this length. The trench used to alter the drain shall be filled and compacted to achieve a density equal to adjacent natural soil material.

When subsurface drains also function as outlets for other drained areas where drainage is still desired, appropriate measures must be incorporated to keep the upstream drainage systems functional. A non-perforated pipe shall replace the perforated pipe through the wetland area to be restored, and shall extend beyond the wetland in all directions at least the minimum length previously specified for length of drain to be removed or plugged. Drains may also be re-routed around the wetland at the same minimum distances from the wetland, or where topography permits, setting a water control structure at a level that does not affect upstream drainage.

A water control structure may be placed on the inlet of an existing drain. The water control structure shall be attached to a non-perforated conduit that extends at least the minimum length previously specified for length of drain to be removed. The connections of the water control structure and the non-perforated pipe shall be watertight.

Removal of Fill Material – Where a wetland has been filled by sediment, land shaping, or other activities, the hydrology may be restored by removing the fill material to the top of the buried hydric soil, placed on an upland site, and stabilized so that no erosion of the material occurs.

Shallow Excavation – A wetland may be restored by excavating below the existing ground surface to create a shallow basin which will hold surface water and/or intercept groundwater. The basin shall permit storage of water at a depth, frequency, and duration as closely as possible to the original hydrologic conditions on the site.

Criteria for Vegetative Restoration

Hydrophytic vegetation restoration shall be of species typical for the wetland type(s) being established. Preference shall be given to native wetland plants with localized genetic material.

Where natural colonization of pre-identified, selected species will realistically dominate within 5 years, sites may be left to revegetate naturally. If a site has not become dominated by the targeted species within 5 years, active forms of revegetation may be required.

Adequate substrate material and site preparation necessary for proper establishment of the selected plant species shall be included in the design. This shall include deep tillage practices to reduce any soil compaction that may have developed during construction or farming activities. Topsoil that was removed from borrow areas and stockpiles shall be spread to a depth of 4 to 6 inches where needed to provide a suitable medium for plant growth. If insufficient quantity of topsoil is available, organic matter such as straw, composted manure, or wood chips shall be added. If the soil surface horizon has a Munsell value and chroma of <3, it will normally contain at least 1% organic matter, and does not need to be augmented. However, if the surface layer has a Munsell value or chroma of >3, then use one of the following options to add organic matter to the wetland area:

Straw – Spread straw over the soil surface to a minimum thickness of 3 inches (1.5 to 2 tons per acre)

Composted Manure – Spread composted cow or horse manure to a minimum thickness of 4 inches (500 cubic yards per acre)

Wood Chips – Spread hardwood chips (not bark) to a minimum thickness of 4 inches

It is not necessary to incorporate the organic matter into the soil if the inundated areas are intended to remain as shallow open water, or if they will be allowed to revegetate naturally. If the inundated areas will be revegetated by planting, the organic matter shall be mixed into the top 4 to 6 inches of soil.

Where planting and/or seeding is necessary, the minimum number of native species to be established shall be based upon the type of vegetative communities present and the vegetation type planned:

- Where the dominant vegetation will be herbaceous community types, a subset of the original vegetative community shall be established within 5 years; or, a suitable precursor to the original community will be established within 5 years that creates conditions suitable for the establishment of the native community. Species richness shall be addressed in the planning of herbaceous communities.

Where the dominant vegetation will be forest or woodland community types, vegetation establishment will include a minimum of six species. Seeding rates shall be based upon percentage of pure live seed that shall be tested within 6 months of planting.

CONSIDERATIONS

It is expected that for wildlife purposes, planting density and stocking rates will generally be lower than for production purposes, and that the selection of species will generally be different than those used for production purposes.

On sites where woody vegetation will dominate, consider adding 1 to 2 dead snags, tree stumps or logs per acre to provide structure and cover for wildlife and a carbon source for food chain support.

Consider impact that water surface draw-downs will have on concentrating aquatic species such as turtles into diminished pool area resulting in increased mortality.

Consider existing wetland functions and/or values that may be adversely impacted.

Consider the effect restoration will have on disease vectors such as mosquitoes.

Consider effect of volumes and rates of runoff, infiltration, evaporation and transpiration on the water budget.

Consider effects on downstream flows or aquifers that would affect other water uses or users.

Consider the effect of water control structures on the ability of fish or other aquatic species to move in and out of the wetland.

Consider establishing herbaceous vegetation by a variety of methods over the entire site, or a portion of the site, and at densities and depths appropriate.

Consider effects on wetlands and water-related resources, including fish and wildlife habitats, which would be associated with the practice.

Consider linking wetlands by corridors wherever appropriate to enhance the wetland's use and colonization by the native flora and fauna.

Consider establishing vegetative buffers on surrounding uplands to reduce sediment and soluble and sediment-attached substance carried by runoff and/or wind.

Consider effects on temperature of water resources to prevent undesired effects on aquatic and wildlife communities.

Consider the effects of soil disturbance and probability of invasion by unwanted species.

For discharge wetlands, consider underground upslope water and/or groundwater source availability.

Consider microtopography and hydroperiod when determining which species to plant.

Consider controlling water levels to prevent oxidation of organic soils and inundated organic matter and materials.

PLANS AND SPECIFICATIONS

Specifications for this practice shall be prepared for each site. Specifications shall be recorded using approved specifications sheets, job sheets, narrative statements in the conservation plan, or other documentation. Requirements for the operation and maintenance of the practice shall be incorporated into site specifications. Plans and specifications should be reviewed by staff with appropriate training in design and implementation of wetland restoration.

OPERATION AND MAINTENANCE

The following actions shall be carried out to insure that this practice functions as intended throughout its expected life. These actions include normal repetitive activities in the application and use of the practice (operation), and repair and upkeep of the practice (maintenance):

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;

Biological control of undesirable plant species and pests (e.g., using predator or parasitic species) shall be implemented where available and feasible;

Establish an inspection schedule for embankments and structures for damage assessment;

The depth of accumulated sediment should be measured and the accumulations removed when the planned project objectives are jeopardized.

Management actions shall maintain vegetation, and control undesirable vegetation.

For wildlife habitat purposes, haying and grazing, if justified as a necessary wildlife/wetland management tool, can be used for management of vegetation. Disturbance to ground nesting species shall be minimized.

The control of water depth and duration may be utilized to control unwanted vegetation.

REFERENCES:

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