NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

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 as defined in the WRP manual 514.11i, 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 landowner shall obtain all applicable and necessary local, state and federal permits before starting restoration activities.

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.

For additional information on Restoration refer to the Wetland Science Institute publication "Wetland Restoration, enhancement, and Management".

All wetland restoration plans will be reviewed by the NRCS State Biologist and NRCS State Engineer.

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. pocosin 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.

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," Chapter 6, "Structures", and Chapter 2, "Estimating Runoff" for additional design information.

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

Surface Drainage Removal

Where open channels were constructed to drain the wetland, the channel will be filled with earth or controlled with a grade stabilization structure to restore the wetland hydrologic conditions. A water control structure may be required to manage water levels for wetland operation and maintenance.

Provisions will be made to store, pass or divert the flow from the 10-year frequency, 24-hour storm so that it does not cause erosion and offsite flooding impacts.

Where the channel serves as an outlet for upstream lands, it is necessary to meet applicable state and local laws and regulations pertaining to flooding, surface and subsurface drainage or storage.

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The channel may be blocked with earth fill without a flow control device where flow duration and rate will not cause erosion and head cutting. The minimum length of a channel to be filled will be based on the hydraulic conductivity (permeability) of the soil at the site.

For channel blocks, the minimum length to be filled is 50 feet for soils with an average hydraulic conductivity of less than 0.6 inches per hour, 100 feet for 0.6 to 2.0 inches per hour, and 150 feet for greater than 2.0 inches per hour.

The side slopes on channel blocks will be 3:1 or flatter. All fill will be compacted to achieve the density of adjacent materials. The fill for channel block will be crowned a minimum of one foot above the top of the lowest existing channel bank to account for settlement and to prevent concentrated flow over the channel block.

Grade Stabilization Structure
When the 10-year frequency, 24-hour duration storm flow or groundwater inflow will prevent stabilizing the site due to long duration flows or high peak discharge, the channel will be filled and stabilized with a structure that meets the criteria for Grade Stabilization Structure (410).

Water Control Structure
When it is desirable to control or manipulate the water level for operation and maintenance (e.g. biological manipulation, nuisance vegetation) of the wetland at an elevation different than that caused by blocking the channel, a water control device meeting criteria of Water Control Structure (587) may be used.

Materials used for grade stabilization or water control structures will have minimum 25 year durability in the soil, water and climate conditions associated with the site unless site specific operation and maintenance plans and designs document rationale for shorter life materials.

Fire resistant materials will be used for exposed portions of structures where vegetation will be maintained by burning.

Subsurface Drainage Removal
In areas where subsurface drains were used to remove surface water or soil saturation, the existing system will be modified to restore the wetland hydrologic conditions.

Use old drainage records, interviews and site investigations as needed to determine the extent of the existing system. The effect of any modification to the existing subsurface drainage system on upstream landowners will be evaluated, and the landowner will be notified of potential offsite impacts. This evaluation will include both surface and subsurface impacts.

Where the subsurface drain serves as an outlet for upstream properties, it will be necessary to meet applicable state and local laws and regulations pertaining to subsurface drainage and flooding.

Upstream surface and subsurface drainage will not be impacted unless appropriate easements are obtained or mitigation measures are implemented.

The effects of the subsurface drainage system may be eliminated by the following:
a. removing a portion of the drain at the downstream edge of the site,
b. modifying the drain with a water control device, or
c. installing non-perforated pipe through the wetland site.

The minimum length of drain to be removed is 50 feet for soils with an average hydraulic conductivity of less than 0.6 inches per hour, 100 feet for 0.6 to 2.0 inches per hour and 150 feet for greater than 2.0 inches per hour.

All envelope filter material or other flow enhancing material will also be removed for the length. The trench will be filled and compacted to achieve a density equal to adjacent material.

A water control device placed on the inlet of an existing drain will limit inflow that will prevent damage to the drain downstream of the site. If the drain serves other areas, inflow will be limited to the capacity originally apportioned to the drain.

Storage Volume Replacement
Where the wetland site has been filled by sediment, land shaping or other activities, the storage may be replaced by excavating the fill material from the site or by construction of an earthen embankment.

Sediment deposition or other fill materials will only be removed to the top of the buried hydric soil. Sediment will be removed and placed on upland sites.

If the presence of hazardous waste materials in the sediment or fill is suspected, soil samples will be collected and analyzed for the presence of hazardous waste as identified by local, state or federal authorities.

Embankments
An earthen embankment may be constructed to create a pool storage volume equal to that which existed prior to conversion of the site. Embankments with an effective height of less than 6 feet will meet the criteria for Dike (356). Embankments with an effective height greater than 6 feet will meet the criteria for Pond (378).

Embankments meeting criteria for dikes will safely handle a 10-year frequency, 24-hour storm at the dike design high water level.

Embankment material should be soils which are stable for fill construction. Organic soils should not be used for embankment materials.

Dugout
Dugouts and potholes will meet criteria for Wetland Wildlife Habitat Management (644).

Wetland dugouts may be used to restore previously filled wetlands and to develop wetlands. A wetland dugout is a constructed shallow depression area. Side slopes shall be shaped to a stable grade. All excavated material shall be spread on non-wetland sites or hauled off-site. No spoil will be allowed in any drainage path.

Depressional wetlands may be developed or restored through blasting, excavation or by restoring the hydrology to existing depression areas. Blasting is to be done by experienced personnel in accordance with federal, state and local regulations.

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. Restoration of wetland plant communities will be based on reference wetlands of the type being restored or a suitable technical reference.

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.

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 three (3) species.

Seeding rates shall be based upon percentage of pure live seed that shall be tested within 6 months of planting.

Refer to the criteria and follow Conservation Practice Tree and Shrub Establishment (612) for establishing forest species.

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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.

Consider implementation of this practice to enhance rare and declining habitat for threatened, endangered and other plants and animals of concern.

Consider input from other agencies (GA Department of Natural Resources, US Fish and Wildlife Service) and organizations (Ducks Unlimited, Audubon) to assist in the development of the wetland restoration plan.

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.

The conservation plan shall include: location and amount of land to be restored, target wetland plant community, habitat and functions to be restored, monitoring of critical habitat elements and a long term management plan for maintaining restored functions.

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, including water level manipulation shall maintain vegetation, and control undesirable vegetation.

Compatible uses and timing (e.g. grazing, haying, recreation and hunting)

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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