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 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 hydro-periods, 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 nonpoint sources of water pollution (Conservation Practice Standard (CPS) 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 (CPS Wetland Enhancement (659));
- to creating a wetland on a site location which historically was not a wetland (CPS 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. This documentation may exist as part of a wetland determination for the site, or it shall be developed using the South Dakota (SD) forms for documenting soils, hydrology, and vegetation for completing a certified wetland determination.

The nutrient and pesticide tolerance of the species planned shall be considered where known nutrient and pesticide contamination exists. The wetland restoration shall not be comprised by any use of fertilizers, mechanical

treatments, prescribed burning, pesticides, and other chemicals.

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. If hazardous wastes are identified on the site, planning for the practice will proceed only after the site has been cleaned, the clean up approved by the responsible regulatory agency, and the state conservationist has agreed to provide technical assistance for planning.

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 nonnative 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 hydro-period 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. Detailed surveys shall be conducted at the wetland site to determine the extent of planned water levels near property lines.

A signed written letter, easement, or permit by the adjacent landowner must be obtained if temporary water storage will occur on adjacent properties due to the wetland restoration.

A natural water supply should be used to reestablish the site's hydrology that approximates the needs of the wetland type. If this natural water supply does not restore the wetland hydrology, an artificial water supply can be used; however, well water pumped from an aquifer or flowing from an artesian well may not be used as a water supply. Additionally, tile drainage from cropland may not outlet into the wetland to be restored.

All wells within the wetland restoration area shall be decommissioned according to the CPS Well Decommissioning (351) for restorations greater than 15 years. For short-term restorations, where the restoration is likely to not be maintained for more than 15 years, the well shall not be used to add water to the area and shall be raised above the maximum designed water level. Water from flowing wells shall bypass the restoration area.

An artificial water supply may be used provided it does not divert water 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.

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 and/or a water control structure to restore the wetland hydrologic conditions.

The channel may be blocked with earth fill without a water control structure where the block will be permanently maintained and flow rate and duration will not cause erosion and head cutting. The surface drain block must be located near the edge of the wetland where it will fully restore water storage in the wetland. The area under the surface drain block must be stripped of vegetation, silt, and debris before installation of the earth fill.

The required surface block length (measured parallel to the channel) will depend on site conditions, including land use, soils, and size of the watershed. The surface drain block top length must be at least 20 feet for wetland areas in permanent vegetation and 50 feet for areas in cropland. A longer plug may be needed to adequately restore wetland functions. Surface drain block end slopes must be 3:1 or flatter upstream and 8:1 or flatter downstream. Drain block fills must be carefully compacted and overfilled 10 percent of the fill height to allow for settlement.

Grade Stabilization Structure. When the 10-year frequency, 24-hour duration storm flow or base flow from snow melt or groundwater inflow results in long duration flows or high peak discharge, the channel will be filled and stabilized with a structure that meets the criteria for the CPS Grade Stabilization Structure (410).

Water Control Structure. A water control device meeting the criteria of the CPS Structure for Water Control (587) will be used when the water level required to be maintained for the restoration is different than that caused by blocking the channel.

The water control device may not increase the inflow into a downstream drain beyond what was originally apportioned or designed for the drain.

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. Review of drainage records, interviews, and site investigations will be needed to determine the extent of the existing system. The effect of any modification to the existing subsurface drainage system on upstream and downstream 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 possibly be eliminated by the following:

- removing a portion of the drain at the upstream and downstream edges of the site; or
- modifying the drain with a water control device; or
- installing nonperforated pipe in and an appropriate lateral effect distance upstream and downstream from the wetland boundary.

The minimum length (measured from the outside edge of the wetland) of drain to be removed is 50 feet for soils with a 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 this length. The trench will be filled and compacted to achieve a density equal to adjacent material.

Any water control structure will be attached to a nonperforated 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 nonperforated pipe will be watertight at the head created at the maximum pool level.

Storage Volume Replacement. Where sediment, land shaping, or other activities have filled the wetland site, the storage shall be

replaced by excavating the fill material from the site.

Embankments. Where surface drainage removal with drain blocks are not sufficient to restore hydrology, 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 the CPS Dike (356). Embankments with an effective height of greater than 6 feet will meet the criteria for the CPS Pond (378).

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

Criteria for Vegetative Restoration

Hydrophytic vegetation restoration shall be of species typical for the wetland type(s) being established. The appropriate plant community to be restored will be determined using one of the following:

a. The plant community found on an established reference wetland site for the hydric soil on the restored site. In the absence of an established reference site, refer to the Historic Climax Plant Community in the Ecological Site Description to determine the appropriate plant community.

b. The plant community for the water regime and salinity of the restored site as described by Stewart and Kantrud (1971 and 1972).

c. The plant community for the water regime of the restored site from South Dakota Biology Technical Note No. 10 (1987).

Preference shall be given to native wetland plants with localized genetic material.

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

If the wetland has extensive cropping history, it is unlikely that the temporary zone will have an adequate seed bank and this zone will be vulnerable to noxious weed infestations. The wetland margin, including the low prairie and wet meadow or temporary zone of these wetlands, will be seeded using at least two native species appropriate for the restored soils and water regime.

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 five years; or, a suitable precursor to the original community will be established within five 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, or a suitable precursor to the original plant community. Seeding rates shall be based upon percentage of pure live seed that shall be tested within six months of planting.

CONSIDERATIONS

Complete ditch closure within the wetland and appropriate lateral effect distances from the wetland edge should be considered for use instead of ditch blocks for increased stability, landscape integrity, and hydrologic restoration.

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.

The use of water control structures and grade stabilization structures should be limited. The use of these structures is generally more appropriate for the CPS Wetland Enhancement (659) and the CPS Wetland Creation (658).

A water control device placed on the inlet of an existing drain may be designed to intentionally limit inflow into downstream drains. This may prevent damage to the downstream drains.

Long duration flows and high peak discharges will severely impact surface drain blocks. In these cases, a water control structure designed in accordance with the CPS Grade Stabilization Structure (410) or the CPS Pond (378) should be used.

On sites where woody vegetation will dominate, consider adding one to two 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 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 hydro-period when determining which species to plant.

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.

REFERENCES

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