

## Wetland Restoration - 657 DESIGN AND INSTALLATION GUIDE

Wetland Restoration shall be planned and installed in accordance with the NRCS standard, as detailed in Section IV of the North Dakota Field Office Technical Guide (FOTG). This document provides additional parameters, recommendations, references, and requirements for developing site-specific plans for this practice.

### **REQUIREMENTS FOR CONSTRUCTION ACTIVITIES AND FEATURES**

The contractor and cooperater are responsible for notifying ND One Call to locate utilities at least 48 hours prior to any excavation, at 1-800-795-0555.

If a cultural resource is identified during construction, the contractor and cooperater shall notify NRCS immediately at 701-530-2089.

Construction operations shall be carried out in such a manner that air and water pollution and erosion are minimized.

Construction activities shall be carried out so that the wetland area is disturbed as little as possible. Existing natural vegetated spillways will be maintained as much as practicable.

Before constructing any features, the foundation area shall be cleared of trees, logs, stumps, roots, brush, boulders, sod, and rubbish. If stripping is required it shall be to a minimum depth of six inches, stockpiled, and spread on areas of compacted earth fill. Foundation surfaces shall be sloped no steeper than 1:1 unless otherwise shown on the drawings. The foundation area shall be thoroughly scarified before placing fill material.

Borrow material shall not be taken from the wetland, except as directed by an NRCS representative. Fill material must be approved by a NRCS representative. Fill shall be free of sod, roots, frozen soil, stones more than six inches in diameter, and other objectionable material.

The surface of work areas shall be smooth and present a quality, workmanlike appearance. The completed work shall conform to the lines, grades, and elevations shown on the drawings or staked in the field.

Pipes and appurtenances shall be suitably bedded and back-filled with materials meeting the requirements stated above. The side slopes of any trenches required for the installation shall be no steeper than 3 horizontal to 1 vertical. All backfill shall be placed in 6-inch layers and compacted to a density equivalent to or exceeding that of the surrounding fill by means of hand tamping or manually directed power tampers. Manual compaction shall continue to a height of 18 inches above the top of the pipe. Care shall be taken to assure that compaction does not lift or move the pipe, resulting in a void next to the pipe.

### **HYDROLOGY RESTORATION**

Surface and subsurface drains not directly connected to a wetland may impact it, i.e., cause a lateral effect. Such situations are most likely to occur in sandy areas with a high water table.

To determine lateral effects, use NRCS Engineering Handbook Chapter 19 - Hydrology Tools for Wetland Determination - Part 650.1905 Scope & Effect Equations.

### **Surface Hydrology Restoration**

Surface drain or diversion features that serve as an outlet for upstream lands must comply with applicable state and local laws and regulations pertaining to flooding and surface and subsurface drainage.

Where surface drains were constructed to drain the wetland, the channel will be filled with earth or controlled with a water control structure to restore the wetland hydrologic conditions.

When it is desirable to control or manipulate the water level for operation and maintenance of the wetland at an elevation different than that caused by blocking the surface drain, a water control device meeting the standard for "Structure for Water Control" (587) in FOTG Section IV will be used.

#### **A. Surface Drain Removal**

If the contributing drainage area is less than twenty acres and prolonged surface flows are not anticipated, the entire length of the surface drain may be returned to original topography using compacted earth fill with no overfill requirements for settlement. Fill material must be compacted to a density equal or greater than the adjacent material.

#### **B. Surface Drain Blocks/Ditch Plugs**

The surface drain may be blocked with earth fill without a flow control device when flow duration and rate will not cause erosion and head cutting of the block or plug.

The surface drain block or ditch plug will fill a minimum length of surface drain based on the hydraulic conductivity (permeability) of the most limiting layer in the exposed soil profile. The minimum length of surface drain 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.

Plan and install ditch plugs in accordance with the third tab or worksheet titled "Plug Spec" in the "ND Wetland Restoration Workbook" - FOTG Section I, or as follows;

The upstream and downstream side slopes of the surface drain block will be 3:1 or flatter. Fill will be compacted as needed to achieve the density of adjacent materials.

When the site has high flow rates or long duration flows from snowmelt or groundwater, the channel will be filled and stabilized with a structure that meets the criteria of "Grade Stabilization Structure" (410) conservation practice in FOTG Sec. IV.

All surface drain blocks or ditch plugs will be crowned to allow for settlement and to prevent concentrated flow over the constructed fill. Minimum overfill will be one-half foot or ten percent of the maximum fill height, whichever is larger.

C. Embankments

An earth embankment may be constructed to create a pool storage volume equal to that which existed prior to conversion of the site.

Plan and install embankments in accordance with the sixth worksheet, titled “Emb Spec” in the “ND Wetland Restoration Workbook”, or as follows;

Embankments with an effective height less than 6 feet will meet design criteria for Classification I dams in the North Dakota State Water Commission (SWC) North Dakota Dam Design Handbook. Conservation practice standard Pond (378) criteria in FOTG Section IV will be used for all earth fills with an effective height equal to or greater than 6 feet. The effective height of the embankment is the difference in elevation, in feet, between the emergency spillway crest and the lowest point in the cross section taken along the centerline of the embankment.

A minimum of 5 percent overfill will be added to the height of earth embankments to allow for settlement.

D. Restoration of surface inflow

To the extent practicable, features that divert natural surface inflow away from the wetland shall be removed or mitigated in a manner approved by an NRCS representative on a case-by-case basis.

**Subsurface Drain 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 landowners will be evaluated and the landowners 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: removing a portion of the drain at the downstream edge of the wetland boundary, modifying the drain with a water control device, or 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 the soil profile 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 surrounding 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.

The water control structure will 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 will be watertight at the head created at the maximum pool level.

#### **RESTORATION OF HYDRIC SOIL**

Sediment and fill shall be removed as directed by an NRCS representative. An NRCS representative shall observe the operation on-site.

#### **RESTORATION OF HYDROPHYTIC VEGETATION**

Natural regeneration of vegetative cover may be allowed on wetlands with an adequate seed bank of hydrophytic vegetation. If an adequate seed bank does not exist, develop a planting plan according to one of the following FOTG Section IV standards; Range Seeding (550), Riparian Herbaceous Buffer (390), or Riparian Forest Buffer (391). Prior to planting, obtain approval from the NRCS State Biologist for planting plans including vegetative material (such as sedge plugs) not addressed in the aforementioned practice standards. Species selection shall be limited to native species other than reed canarygrass, due to its aggressive monoculture tendency.

#### **LAWS**

Structures with a water storage capacity (spillway elevation) exceeding 12½ acre-feet require a FORM 108 Conditional Water Permit from the SWC prior to construction or modification activities.

All wetland restorations require completion of the form SFN51695 Application/Notification to Construct or Modify Dam, Dike, Ring Dike or Other Water Resource Facility from the SWC. Structures with maximum water retaining capacity (top of structure) exceeding 12½ acre-feet will require prior approval from the SWC before commencement of construction or modification.