NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

WETLAND CREATION

(Ac.)

CODE 658

DEFINITION

The creation of a wetland on a site location that was historically non-wetland.

PURPOSE

To establish wetland hydrology, vegetation, and wildlife habitat functions on soils capable of supporting those functions.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies only to sites where hydric soils do not exist and the objective is to establish specific wetland functions.

This practice does **not** apply to:

- Indiana (IN) Natural Resources Conservation Service (NRCS) Field Office Technical Guide (FOTG) Standard (656) **Constructed Wetland** intended for treatment of wastewater and contaminated runoff from agricultural processing, livestock, and aquaculture facilities, or for improving the quality of storm water runoff.
- IN FOTG Standard (657) **Wetland Restoration** intended to restore wetland function, value, habitat, diversity, and capacity to a close approximation of the pre-disturbance conditions.
- IN FOTG Standard (659) **Wetland Enhancement** intended to increase the capacity of specific wetland functions by enhancing (a) hydric soil functions, (b) hydrology, (c) vegetation, and/or (d) plant and animal habitats.
- Existing **non-degraded wetlands** with intact native plant communities.
- Sites containing **Threatened or Endangered (T&E) Species**, unless it can be demonstrated that the proposed practices will not negatively impact the species at risk. Utilize the T&E Tool within Customer Service Toolkit, or contact the NRCS State Biologist.
- **Sites containing hazardous waste**. If the presence of hazardous waste materials is suspected, soil samples will be collected and analyzed as defined by local, state, or federal regulations. The nutrient and pesticide tolerance of the plant and animal species likely to occur will also be evaluated where known nutrient and pesticide contamination exists.
- The **management** of fish and wildlife habitat on wetlands created under this standard.

CRITERIA

General Criteria Applicable to All Purposes

Use of this standard will comply with all applicable federal, state, and local laws and regulations.

The purpose, goals, and objectives of the creation will be clearly defined in the creation 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 target wildlife species or the intended habitat type will be identified. The purpose will not include fish production unless recommended by the NRCS State Biologist.

The soils, hydrology and vegetative conditions existing on the site, the adjacent landscape,

and the contributing watershed will be documented in the planning process.

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

Excessive sediment, nutrient, pesticide, or other pollutant inflows will be controlled prior to site creation.

Any use of fertilizers, mechanical treatments, prescribed burning, pesticides or other chemicals will not compromise the intended purpose of the creation.

Refer to the Engineering Field Handbook, Chapter 13, "Wetland Restoration, Enhancement, and Creation," and Chapter 6, "Structures," for additional design information.

This practice will be established to species of permanent vegetation that accomplish the design objective, are adapted to the site, and do not function as hosts for field crop diseases or become a source of weeds in the crop field.

Seedbed preparation, species selection, seeding mixes, seeding rates, dates, depths, fertility requirements, site adaptation and planting methods will be consistent with the requirements in the IN NRCS Seeding Tool, IN Biology Technical Note Wetland Plantings for Wildlife and/or tables found in this Standard.

Refer to the IN NRCS Seeding Tool, or IN FOTG Standard (645) Upland Wildlife Habitat Management for species selection and seeding rates when planting the upland component of the wetland restoration.

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

Additional Criteria for Soils

Created wetlands will be located in landscape positions and soil types capable of supporting the planned wetland functions.

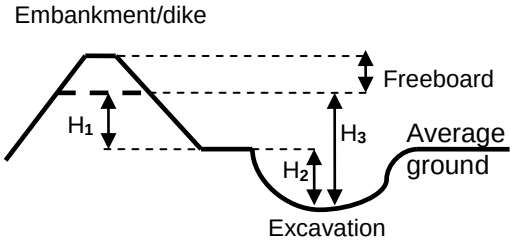
Changes to soil hydrodynamic and bio-geochemical properties such as permeability, porosity, pH, or soil organic carbon levels will be made as needed to meet the planned objectives.

Additional Criteria for Hydrology

The hydroperiod, hydrodynamics, and dominant water source will meet the project objectives. The creation plan will document the adequacy of available water sources based on groundwater investigation, stream gage data, water budgeting, or other appropriate means. If an artificial water supply is used, these sources will not be diverted from other wetland resources such as pothole wetlands or springs.

The total combined water depth (H3) resulting from embankment/dike construction (H1) and excavation (H2) will not exceed 60 inches (see Figure 1). No more than 25% of the total surface area of the created wetland will exceed 30 inches in water depth.

Figure 1



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

Wetland micro- and macro-topography will be created to achieve hydrologic diversity and to achieve the intended purpose.

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

The effect of any modification to the existing surface and/or subsurface drainage system on upstream, adjacent, and downstream landowners will be evaluated in the design. Upstream surface and subsurface drainage will not be impacted unless appropriate written permissions are obtained.

Soil borings will be conducted to determine the feasibility of excavation, dike or embankment construction intended to create hydrology.

Wetland hydrology will be created using one, or any combination of, the following four methods:

1. Subsurface Drain Removal or Destruction

Performing one or more of the following may eliminate the effects of a subsurface drainage system:

- Removing or rendering inoperable a portion of the drain,
- 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 or rendered inoperable is shown in Table 1.

Table 1. Minimum Length of Drain to be Plugged, Removed or Rendered Inoperable.

Soil Texture	Minimum Length* (ft.)
Sandy or Organic	150
Loamy	100
Clayey	50

* For a ditch plug, the length is measured parallel to the direction of the surface drain flow along the top of the settled fill.

If present, all sand and gravel bedding and filtering material or other flow enhancing material will also be removed. The trench will be filled or compacted to achieve a density approximating that of adjacent material.

Installation of non-perforated subsurface drain around or through the wetland may be necessary to allow upstream drainage systems to continue to function properly.

2. Surface Drain Filling

Where open channels and shallow surface drains provide surface and subsurface drainage, and a compacted embankment will not be used, the channel or surface drain will be:

- Totally filled with earth, or
- Filled with a single ditch plug or series of ditch plugs to the full depth of the ditch and according to Table 1, or
- Filled with a ditch plug to a height less than the full depth of the ditch and according to Table 1, and have an outlet designed according IN FOTG Standard (410) Grade Stabilization Structure or IN FOTG Standard (587) Structure for Water Control.

Ditch plugs will be installed where there is no potential for damage on or off site due to breaching or overtopping.

3. Excavation

Excavation within the created wetland will only be used to:

a. Provide a source of fill material for embankments, dikes or ditch plugs used in the creation

b. Create additional wetland features to meet the needs of the target wildlife species.

Excavation within the wetland creation:

- Will identify the target wildlife species for each excavated feature, and will be configured to meet the needs of the target species. See Table 2 in Indiana Biology Technical Note *Wetland Macrotopography* for design guidance.
- Will have side slopes of 8:1 or flatter.
- Will be obtained over a large area, to keep depths to a minimum, but will have a maximum excavated depth of 30 inches. (See H_2 in Figure 1).
- Will be at least 20 feet from the front toe of the embankment.
- Will incorporate the excavated fill into habitat mounds for the target wildlife species where appropriate. Minimum side slopes will be 6:1.
- Will be designed with a 30 foot distance between the nearest water surface and the base of any habitat mound, when geese are expected to be a nuisance.
- Includes microtopography with a maximum depth of less than six (6) inches.
- Includes macrotopography with a maximum excavated depth of six (6) to 30 inches.

See Indiana Biology Technical Note *Wetland Macrotopography* for additional guidance.

4. Embankments, Dikes or Structures

Where a grade stabilization structure will be used to create a wetland, design according to the IN FOTG Standard (410) Grade Stabilization Structure.

Where embankments will be constructed, all subsurface drains will be removed starting at one-half the minimum distance, shown on Table 1, downstream of the embankment centerline.

Pond-type embankments and spillways will be designed and installed according to the IN FOTG Standard (378) Pond, *Additional Criteria for Embankment Ponds,* with the exceptions listed below.

Dikes will be designed and constructed according to the IN FOTG Standard (356) Dike, with the exceptions listed below.

- *Site Preparation*. Vegetation, topsoil and debris will be removed from under the embankment.
- *Side Slopes*. Front slopes on embankments or dikes will be 6:1 or flatter and back slopes will be 3:1 or flatter.
- *Cutoff Trench*. Include a cutoff trench for all embankments with a fill height greater than four (4) feet and if necessary for seepage control on embankments less than or equal to four (4) feet in height.
- *Top Width*. The minimum top width will be six (6) feet, or the minimum top width listed under the appropriate standard, whichever is greater.
- *Fill Height.* Fill height will be less than 10 feet.
- *Organic soils*. Organic soils will not be used for fill exceeding five (5) feet in structural height. Top width will be increased to a minimum of 15 feet for organic soils.
- *Seeding*. Dikes and embankments will follow seeding guidelines in the Indiana Seeding Tool and the IN FOTG Standard (342) Critical Area Planting.

Additional Criteria for Vegetation

Hydrophytic vegetation planned to meet the selected wetland functions will be compatible with the planned soil and hydrologic conditions. Preference will be given to native wetland plants with localized genetic material.

When natural colonization of a diverse and native plant community is unlikely to occur within five (5) years, a planting plan will be developed. Situations where regeneration is unlikely include isolated sites that have been in crop production for many years, or where invasive or aggressive plant species will likely invade the wetland creation.

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

Plantings, seeding, or other types of vegetative establishment will be comprised of native species that occur on the wetland type being created, and will be compatible with the planned hydrologic condition. Refer to the IN NRCS Seeding Tool, or IN Biology Technical Note *Wetland Plantings for Wildlife,* for acceptable shrub, tree, grass, and forb species. See IN FOTG Standard (644) Wetland Wildlife Habitat Management for planting rates. When practical, only local genotypes of native species will be utilized. Seeding rates will be based upon the percentage of pure live seed and labeled with a current seed tag from a registered seed laboratory identifying the germination rate, purity analysis, and other seed statistics.

Native plant species will be used whenever possible. Known invasive species will not be used.

Invasive species, federal/state listed noxious plant species, and nuisance species (e.g., those whose presence or overpopulation jeopardize the practice) will be controlled prior to planting.

Refer to IN FOTG Standard (645) Upland Wildlife Habitat Management for species selection and seeding rates when planting the upland component of the wetland creation.

CONSIDERATIONS

Hydrology Considerations

Consider the general hydrologic effects of the creation, including:

- Impacts on downstream stream hydrographs, volumes of surface runoff, and groundwater resources due to changes

of water use and movement created by the restoration.

Consider the impacts of water level management, including:

- Increased predation of amphibians due to high water levels that can sustain predators.
- Decreased ability of aquatic organisms to move within the wetland and from the wetland area to adjacent habitats, including herptivores, 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 hydrologic regime have on soil bio-geochemical properties; including oxidation/reduction, maintenance of organic soils, and salinity increase or decrease on adjacent areas.
- The potential for water control structures, dikes, and macrotopography to negatively impact aquatic organism passage.

Some soil types will hold water longer in the spring if compacted by a sheepsfoot roller. The resulting longer hydroperiod will increase wetland use by extending the metamorphosis period for some amphibians.

On gently sloping sites (1% or less), consider using spoil placement to create linear mounds as an efficient means of providing shallow, “sheet” water habitat. Material from an excavated basin is used to form a low, meandering ridge on the down slope side of the basin. Typical heights for the ridge range from one (1) to two (2) feet. By using the spoil in a creative manner, the total shallow water on a project site can be substantially increased. The impounded sheet water provides seasonal or ephemeral water for shallow feeders such as shorebirds, while the excavated basins provide longer hydroperiod wetland habitats.

Vegetation Considerations

Consider:

- The relative effects of planting density on 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 potential for invasive or noxious plant species to establish on bare soils after construction and before the planned plant community is established.

When a planting plan is to be developed, consider consulting with a professional biologist or person knowledgeable in wetland ecosystems and plant establishment. Vegetation may also be predicted from historic records or existing vegetation on similar soils on nearby sites.

To increase plant diversity during re-vegetation, consider preserving native hydrophytic plant seed banks by stockpiling existing topsoil.

Consider giving preference to native wetland plants with localized genetic material. Plant materials collected or grown from material collected within a 200-mile radius from the site is considered local. These plants may:

- Provide better wildlife habitat.
- Be better adapted to local ecosystems.
- Be less likely to become invasive.

Consider establishing vegetative buffers on surrounding uplands to filter runoff and provide wildlife habitat. Refer to IN FOTG Standard (645) Upland Wildlife Habitat Management or (393) Filter Strip.

Soil Considerations

Consider changes of 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.

Wildlife Habitat Considerations

Consider:

- The potential to restore habitat capable of supporting 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 waterbodies and to increase the sites colonization by native flora.
- The need to provide barriers to passage for unwanted or predatory wildlife species.

Consider as a high priority, creation sites adjacent to existing wetlands as they increase wetland system complexity and diversity, decrease habitat fragmentation, and ensure colonization of the site by wetland flora and fauna.

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

To increase the value to wetland wildlife, especially **amphibians and reptiles**, consider the following options when excavating borrow areas or creating macrotopography:

- Create wetlands with side slopes of 20:1 or flatter.
- Create basins with increased winding perimeters.
- Create macrotopographic features with rough surfaces on all side slopes and top, an undulating bottom, and a ragged shoreline.

Where burrowing animals may be a problem, consider control methods and increasing top width of embankment a minimum of 10 feet or increasing front slope to 8:1 or flatter.

Consider adding a dead snag, tree stump or log, 10" or greater in DBH, to each created basin to provide structure and cover for wildlife and a carbon source for food chain support. Trees removed as a part of site access or preparation should be used for this purpose.

PLANS AND SPECIFICATIONS

Plans and specifications will be prepared for the practice site. Plans will include the following:

- Plan view
- Profile
- Cross section (typical or other)
- Location of excavation or borrow
- Species of plants to be established.
- Seeding rates.
- Seeding dates.
- Establishment procedure.
- Planned rates and timing of nutrient application.
- Other information pertinent to establishing and managing the species or species of plants to be established.

Plans and specifications for the establishment and management of the species or species of plants to be established may be recorded in narrative form, on job sheets, or on other forms.

OPERATION AND MAINTENANCE

A separate Operation and Maintenance Plan will be prepared for sites that have structural features. The plan will include specific actions for the normal and repetitive operation of installed structural items, especially water control structures, if included in the project. The plan will also include the maintenance actions necessary to assure that constructed items are maintained as constructed for the life of the project. It will include the inspection schedule, a list of items to inspect, a checklist of potential damages to look for, recommended repairs, and procedures for documentation.

Maintenance practices and activities will not disturb cover during the primary nesting period for grassland birds of April 1 through August 1.

Management and monitoring activities needed to ensure the continued success of the wetland functions may be included in the above plan, or in a separate Management and Monitoring Plan. In addition to the monitoring schedule, this plan may 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.

REFERENCES

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