

NATURAL RESOURCES CONSERVATION SERVICE - ILLINOIS

CONSERVATION PRACTICE GUIDANCE

656 – CONSTRUCTED WETLAND**Cropland Drainage Water Treatment****I. SCOPE**

A constructed wetland may be used to treat water from a variety of different sources, including wastewater and contaminated runoff from livestock facilities, stormwater runoff and other water flows. The guidance in this document refers specifically to the treatment of drainage water from cropland.

In Illinois, the primary goal for installing constructed wetlands to treat drainage water from cropland is to reduce nitrate loading in receiving surface waters.

II. CRITERIA

All applicable criteria in Conservation Practice Standard 656 – Constructed Wetland must be met. In addition, the following criteria are important in the design of constructed wetlands for treating cropland drainage water.

The constructed wetland must be located out of the 100-year floodplain, and must also not be located in a wetland under the jurisdiction of the Clean Water Act (Section 404) or identified as a wetland under the conservation compliance provisions of the Farm Bill.

A map of existing drainage tile on the site and in the watershed contributing to the proposed constructed wetland must be made available prior to planning the constructed wetland. The constructed wetland must receive discharge from at least one subsurface drain.

The constructed wetland must be located such that the flow line of the subsurface tile(s) supplying drainage flow to the wetland is at or above the proposed permanent pool of the wetland.

The treatment pool area of the constructed wetland should be at least 1% of the size of the contributing watershed. Treatment pool area is defined as the portion of the site that is 24" below to 12" above the design permanent wetland pool elevation. Areas that will be deeper than 24" are not counted when computing the wetland to watershed drainage

area ratio. Design the treatment pool so that at least 50% of the area flooded at design pool elevation has a depth of 12 inches or less.

The volume of the constructed wetland must accommodate an accretion rate of at least 1 inch per year for the design life of the practice, plus any expected sedimentation, to account for an expected buildup of organic matter.

The outlet structure for the constructed wetland should be located hydraulically distant from inflow locations, to maximize hydraulic retention time. If necessary, interior berms may be added to the design (Reference NRCS National Engineering Handbook 637.0306f). Maximum flow rate from inflow to outlet should not exceed 1.5 ft/sec during the 10 year frequency, 24 hour duration storm event, to allow settling of sediments.

If there are any tile intakes within the wetland area, they should be removed and capped, or replaced by an in-line water control structure, to prevent them from draining the wetland. Any tile serving as an outlet for upstream properties which cannot be routed into the constructed wetland should be replaced with non-perforated tile at all locations within 100 feet of the wetland.

The soil on site should be capable of holding water without installation of a liner. The soil should also be capable of serving as a planting medium: medium textured or loamy soils are best suited for the constructed wetland.

The embankment of the constructed wetland will be stabilized with vegetation according to Conservation Practice Standard 342 – Critical Area Planting. A buffer area meeting the criteria of Conservation Practice Standard 393 – Filter Strip will be planted upstream of and adjacent to the constructed wetland to protect against excessive sedimentation.

The wetland area will be planted with emergent herbaceous macrophytes for nitrogen uptake and nutrient adsorption, and the soil will need to be kept moist but without total inundation for the establishment period (the first year after installation).

III. WETLAND VEGETATION ESTABLISHMENT

Wetland vegetation is essential for constructed wetlands to increase the amount of microbial activity both in the water and in the substrate. Microbes play a major role in the transformation of nutrients and contaminants that enter the constructed wetland. Constructed wetlands have average water depths that allow emergent wetland vegetation to grow after an establishment period.

Species of emergent wetland vegetation that are hardy in Illinois, easy to establish and reproduce well at water depths typical for constructed wetlands are listed in the following table. Not all species need to be used in the same wetland cell. Typically only one or two species are used in each wetland cell. If the wetland cell varies in depth, a greater diversity of species can be established.

Plant Species for Constructed Wetlands

Common Name	Scientific Name	Max Water Depth (inches of permanent pool)
Softstem bulrush	<i>Scirpus validus</i>	12
Broad-leaved cattail	<i>Typha latifolia</i>	12
Arrowhead	<i>Sagittaria latifolia</i>	8
Prairie cordgrass	<i>Spartina pectinata</i>	8
Soft rush	<i>Juncus effusus</i>	6

Establishment of the wetland plant species by transplanting rhizomes, stolons and plants is the fastest and most reliable method. Transplants should be healthy pieces of rhizomes, stolons or plants that have live shoots or buds. The source should be from commercial nurseries, grown for a specific project or collected from a maintenance operation such as a ditch cleanout. Natural wetlands are not to be used as a donor site of plant material. If wild sources of plant material are used, the donor site must be inspected to ensure that unwanted exotic species do not exist at the site.

Time of Planting

Transplant from early spring to mid-June. Wetland plants need a growing season to

establish themselves before winter. If the wetland is constructed after the wetland vegetation planting season, keep the water control structure open until after the wetland plants have been planted.

Site Preparation

Once the wetland is graded, and top soil replaced if required by the design, disk, harrow or otherwise prepare the site for planting. Flood the site with a few inches of water to settle the soil. After the site is dry enough planting may begin.

Wetland Planting

Depending on the type and size of stock, modified tree planters can be used or hand planted with a dibble bar. Plant stock at a minimum of 3 foot by 3 foot spacing. Rhizomes and stolons should be placed in the ground with 1 inch of cover. Plants should be set with the entire root in the ground, with part of the shoot in the ground and part of the shoot out of the ground.

IV. MANAGEMENT AND FOLLOWUP

As soon as the wetland is planted, flood the new planting with a few inches of water. The wetland should remain saturated to ponded 1 inch in depth for the first growing season. The following spring, as the plants grow in height, raise the water level, always leaving a minimum of 4 to 6 inches of plant tops out of the water. After the permanent pool water depth has been reached, the constructed wetland is ready for normal operation.

After the first growing season, if there is an area of the wetland without satisfactory vegetation larger than 20% of the wetland, then that part of the wetland should be replanted.

REFERENCES

USDA – Natural Resources Conservation Service, Illinois. September, 2010. Conservation Practice Standard 656 – Constructed Wetland.

USDA – Natural Resources Conservation Service Jimmy Carter Plant Materials Center. 1996. Guidelines For Establishing Aquatic Plants in Constructed Wetlands. Fort Valley State University Cooperative Extension Program.

United States Environmental Protection Agency, A Handbook of Constructed Wetlands. May, 1995. Vol. 1 General Considerations.