

CHAPTER 130 CONSTRUCTED WETLANDS

131. INTRODUCTION

Constructed wetlands are a promising method for advanced treatment. Since there is not yet a consensus on specific design criteria only a few technical requirements are presented.

132. REFERENCES

Constructed wetland systems may be designed in accordance with:

- a. Natural Systems for Wastewater Treatment (1990) Water Environment Federation Manual of Practice FD-16;
- b. Constructed Wetlands for Wastewater Treatment (1989) Donald A. Hammer, Lewis Publisher, Chelsea, MI;
- c. Wastewater Treatment/Disposal for Small Communities (9/1992), EPA/625/R-92/005;
- d. Constructed Wetlands and Aquatic Plant Systems for Municipal Wastewater Treatment (1988) EPA/625/1-88/022, or;
- e. Other appropriate references.

133. DESIGN

133.1 General Design Criteria

- ___ The flow control structure or effluent structure shall be designed to allow variable depth of flow in the wetland cells.
- ___ The initial planting shall be dense enough to result in compliance with the permit by the end of the first full growing season, unless otherwise allowed by the permit.
- ___ Levee construction, cell bottom sealing, pretreatment lagoons, and other earthwork shall conform to Chapter 100.
- ___ Multiple cells should be provided.
- ___ Plants used should be proven suitable and planted on maximum three foot centers.
- ___ Consideration should be given to algae removal.

133.2 Free Water Surface

- ___ Currently, the loading rates (not accounting for ammonia removal) are about 15-40 ac/MGD. The actual rates used for design will be system-specific.

133.3 Subsurface Flow

- ___ A minimum of primary pretreatment is required.
- ___ The organic loading rate shall not exceed 0.1 lb BOD₅/ft² (0.5 kg BOD₅/m²) of end area/day (at the head of the wetland cells).
- ___ Consideration should be given to the cross-sectional area of the channel to prevent hydraulic overloading and plugging by algae. The hydraulic loading rate shall not exceed 350 gpd/ft² (14,260 lpd/m²) of end area (at the head of the wetland cells).
- ___ A minimum hydraulic detention time of 24 hours shall be provided for secondary treatment; longer times and other performance-enhancing features shall be used to meet more stringent limits.
- ___ A maximum long term porosity of greater than 35% shall not be assumed.
- ___ The bed bottom slope should be 1% - 2%.
- ___ Beds should consist of 18 to 24 inches (46-61 cm) of washed stone or artificial media with specified sizes of 3/4 to 3 inches (1.9-8 cm) and less than 5% fines.
- ___ P/S shall prohibit the operation of vehicles on in-place media.