

567—69.15(455B) Constructed wetlands.**69.15(1) General site design.**

a. Application. Constructed wetlands shall only be used where soil percolation rates at the site exceed 120 minutes per inch. Because of the higher maintenance requirements of constructed wetland systems, preference should be given to packed bed media filters, where conditions allow.

b. Effluent treatment. The effluent from a constructed wetland shall receive additional treatment through the use of intermittent sand filters of a magnitude prescribed in subrule 69.9(2) for pretreated effluent.

c. Effluent sampling. All constructed wetland systems having an open discharge shall be sampled in accordance with the requirements of NPDES General Permit No. 4 if applicable.

d. Additional specifications. Specifications given in this rule for constructed wetlands are minimal and may not be sufficient for all applications. Technical specifications are changing with experience and research. Other design information beyond the scope of this rule may be necessary to properly design a constructed wetland system.

69.15(2) Wetland design.

a. Depth. The wetland shall be of a subsurface flow construction with a rock depth of 18 inches and a liquid depth of 12 inches.

b. Materials. Substrate shall be washed river gravel with a diameter of $\frac{3}{4}$ inch to $2\frac{1}{2}$ inches. If crushed quarried stone is used, it must meet the criteria listed in paragraph 69.9(4) "a."

c. Sizing and configuration. Detention time shall be a minimum of seven days.

(1) *Dimensions.* Detention time may be accomplished with trenches 16 to 18 inches deep (12 inches of liquid), 3 feet wide, with 100 feet of length per bedroom. Detention time may also be done with beds 16 to 18 inches deep, with at least 300 square feet of surface area per bedroom. The bottom of each trench or bed must be level within $\pm\frac{1}{2}$ inch.

(2) *Configuration.* Multiple trenches or beds in series should be used. Beds or trenches in series may be stepped down in elevation to fit a hillside application. If the system is on one elevation, it should still be divided into units by earthen berms at about 50 and 75 percent of the total length.

(3) *Unit connections.* Each subunit shall be connected to the next subunit with an overflow pipe (rigid sewer pipe) that maintains the water level in the first section. Protection from freezing may be necessary.

d. Liner. Wetlands shall be lined with a synthetic PVC or PE plastic liner 20 to 30 mils thick.

e. Inlet pipe. Effluent shall enter the wetland by a 4-inch pipe sealed into the liner. With beds, a header pipe shall be installed along the inlet side to distribute the waste.

f. Protective berms. Wetland system sites shall be bermed to prevent surface water from entering the trenches or beds.

69.15(3) Vegetation.

a. Setting plants. Vegetation shall be established on the wetlands at the time of construction. Twelve inches of rock shall be placed in each unit, the plants set, and then the final 4 to 6 inches of rock placed.

b. Plant species. Only indigenous plant species, preferably collected within a 100-mile radius of the site, shall be set. Multiple species in each system are recommended. Preferred species include, but are not limited to:

- (1) *Typha latifolia* – common cattail.
- (2) *Typha angustifolia* – narrow leaf cattail.
- (3) *Scirpus* spp. – bullrush.
- (4) *Phragmites communis* – reed.

c. Plant establishment. Transplantation is the recommended method of vegetation establishment. For transplanting, the propagule should be transplanted, at a minimum, on a 2-foot grid. The transplants should be fertilized, preferably with a controlled-release fertilizer such as Osmocote 18-5-11 for fall and winter planting, 18-6-12 for spring planting, and 19-6-12 for summer planting. Trenches or beds should be filled with fresh water immediately.

d. Plant management. In the late fall, the vegetation shall be mowed and the detritus left on the wetland surface as a temperature mulch. In the early spring, the mulch shall be removed and disposed of to allow for adequate bed aeration.

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