Constructed Treatment Wetland

Stormwater Management Goals Achieved	Acceptable Sizing Methodologies
√ Pollution Reduction……..	PRES
√ Flow Control……..……	PRES
Destination……	NA

This facility is **not** classified as an Underground Injection Control structure (UIC).

SIM=Simplified Approach, PRES= Presumptive Approach, PERF= Performance Approach

Notes: 1) Wetlands can be used to manage stormwater from any type of impervious surface.

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Description: A wetland is an area inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Jurisdictional wetlands include swamps, marshes, bogs, and similar areas **but, not those constructed as pollution reduction or flow control facilities**. The Corps of Engineers and Division of State Lands make regulate and determine specific wetland designations. Constructed treatment wetlands are wetlands designed and constructed for the specific purpose of providing stormwater management. Constructed treatment wetlands are not regulated by the Corps of Engineers and the Division of State Lands.

Wetlands remove pollutants through several processes, including sedimentation, filtration, and biological uptake. When enough volume is provided, constructed treatment wetlands can also provide a significant level of flow control.

Design Criteria: To receive pollution reduction credit, the wet portion or permanent pool of the wetland shall be equal to that required for wet ponds, or the residence time of the stormwater volume (calculated as the pollution reduction design storm volume divided by the average facility outflow rate) shall be no less than 36 hours. A design team with experience in hydrology, wetland plants, and engineering will be needed to develop a successful wetland pollution reduction facility. A water budget analysis shall be performed with the design of the facility.

Sizing: Drainage area to be served shall be no less than 10 acres. To meet pollution reduction requirements, dead storage within the wetland must equal or exceed wet pond dead storage criteria. To meet flow control requirements, a detailed hydraulic analysis must be performed in compliance with flow control standards presented in **Section 1.6.2**.

Geometry: The configuration of a constructed wetland shall be tailored to each site, rather than limited to one design. Major elements of a wetland can include channels or trenches, shallow marshes, and deeper ponded areas. These elements shall be combined to take advantage of the site topography. Maximum slopes within the wetland area shall be 20%, and maximum slopes of surrounding land shall not exceed 10%. All wetland design shall address habitat, planting, and aesthetic issues.

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1) The volume of water to be treated shall be allocated over the treatment area of the facility as follows:

Component	Percent of Design Volume (approx.)	Percent of Facility Surface Area (approx.)
Forebay	10	5
Micropool	10	5
Deep water (> 18″)	50	40
Deep wetland (6″-18″)	20	25
Shallow wetland (<6″)	10	25

Definitions:

Forebay: A relatively deep zone placed where influent water discharges to a stormwater wetland. It traps coarse sediments, reduces incoming velocity, and helps distribute runoff evenly over the wetland.

Micropool: A deep (4 to 6 feet) pool placed at the outlet of a stormwater wetland forebay.

Deep-water: The area within a stormwater wetland that has a water depth greater than 18 inches.

Deep wetland: The area within a stormwater wetland that has a water depth between 6 and 18 inches.

Shallow wetland: The area within a stormwater wetland that has a water depth less than 6 inches.

2) The minimum length-to-width ratio shall be 3:1, unless otherwise approved by the City. If area constraints make this ratio unworkable, baffles, islands, or peninsulas may be installed, with City approval, to increase the flow path and prevent short-circuiting.

3) Where wetland vegetation is to be planted, side slopes shall be no steeper than 5:1. Wetland plant selection shall be consistent with anticipated hydrology.

4) Access routes to the wetland for maintenance purposes must be shown on the plans. Public wetlands will need to provide a minimum 10-foot wide access route, not to exceed 10 percent in slope. A minimum 30 foot turning radius shall be provided.

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Flow:

1) Flow velocity through the wetland shall average less than 0.01 feet per second for the water quality design storm event (1.4 inches in 24 hours). If natural slope does not allow for this velocity, berms shall be used to create ponded benches.

2) Flow through the wetland shall be distributed as uniformly as possible across the marsh and ponded section.

Forebay:

1) The forebay area shall be established along the wetland inflow points to capture sediment. The forebay shall have a water depth of about 3 feet and have at least 10 percent and up to 25 percent of the total treatment wetland volume.
2) Two staff gauges shall be installed at opposite ends of the bottom of the wetland, to enable maintenance staff to measure the depth of accumulated silts.

An overflow mechanism to an approved conveyance/destination method per **Section 1.4** will be required.

Soil Suitability: Constructed treatment wetlands are appropriate for NRCS type C and D soils. Topsoil shall be used within the top 12 inches of the facility, or the soil shall be amended per **Appendix G** to support plant growth.

Setbacks: Required setback from the top of the bank to property lines is 5 feet, and 10 feet from building foundations. Easements for non-buildable areas may be required if facilities are located next to property lines. Infiltration basins shall meet the following setback requirements from downstream slopes: minimum of 100 feet from slopes of 10%; add 5 feet of setback for each additional percent of slope up to 30%; 200-foot setback for slopes of 30%; infiltration trenches shall not be used where slopes exceed 30%.

Landscaping: Shrubs and wetland plantings shall be designed to minimize solar exposure of open water areas. Trees or other appropriate vegetation shall be located around the east, south, and west sides of a facility to maximize shading. Reducing solar exposure has two benefits: it helps reduce heat gain in water before discharging to receiving waters, and it helps maintain a healthy and aesthetic pond condition, reducing algae blooms and the potential for anaerobic conditions to develop.

Facility area is equivalent to the area of the wetland, including bottom and side slopes, plus a 10-foot buffer around the wetland. Minimum plant material quantities per **250** square feet of the facility area are as follows:

4 - Large shrubs/small trees 3-gallon containers or equivalent.
6 - Shrubs/large grass-like plants 1-gallon containers or equivalent

Ground cover plants: 1 per 18 inches on center, triangular spacing, for the ground cover planting area only, unless seed or sod is specified. Minimum container: 4-inch pot. At least 50 percent of the groundcover plantings shall be grasses or grass-like plants.

Wetland plants:	1 per 2 square feet of a pond emergent plant zone. The emergent plant zone shall be at least 25 percent of the total pond water surface area.

Wildflowers, native grasses, and ground covers used for city-maintained facilities shall be designed not to require mowing. Where mowing cannot be avoided, facilities shall be designed to require mowing no more than once or twice annually. Turf and lawn areas are not allowed for city-maintained facilities; any exceptions will require City approval.

A soil scientist or trained person working under the supervision of an Oregon licensed professional geotechnical engineer shall inspect the soil after the system is excavated to confirm that soils remain in suitable condition for planting.

Trees: The following evergreen or deciduous trees shall be retained or planted around the perimeter of the swale (approximately 30 feet on center):

Evergreen trees:	Minimum height: 6 feet
Deciduous trees:	Minimum caliper: 1 ½ inches at 6 inches above base.

Stormwater Report Requirements For Presumptive Approach: See **Exhibit 2-2**.

Checklist of minimal information to be shown on the permit drawings:

1) Facility dimensions and setbacks from property lines and structures
2) Profile view of facility, including typical cross-sections with dimensions
3) Growing medium specification
4) Filter fabric specification (if applicable)
5) All stormwater piping associated with the facility, including pipe materials, sizes, slopes, and invert elevations at every bend or connection
6) Landscaping plan

Inspection requirements and schedule: The following table shall be used to determine which stormwater facility components require City inspection, and when the inspection shall be requested. Please note that, while not all facility components may require an inspection call, inspectors will inspect for all required components in the field.

Facility Component	Inspection Requirement
Wetland grading	
Piping	Call for inspection
Filter fabric (if applicable)	
Growing medium	
Plantings	Call for inspection

Operations and Maintenance requirements: See **Chapter 3.0**.

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