

Treatment Wetland

A stormwater treatment wetland is a shallow constructed pond that is designed to treat stormwater through the biological processes associated with emergent aquatic plants. These facilities use dense wetland vegetation and settling to filter sediment and oily materials out of stormwater.

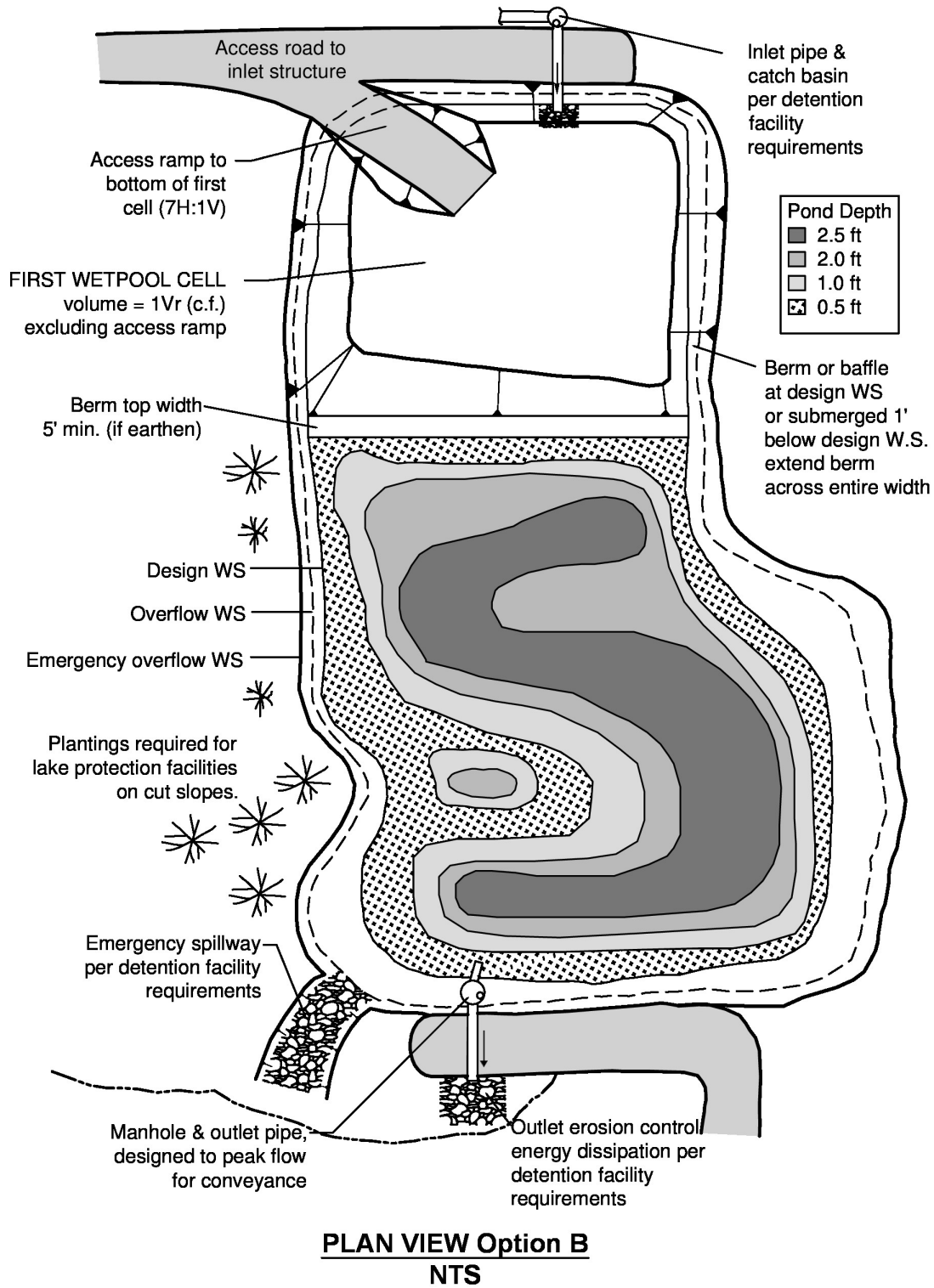
Stormwater treatment wetlands are used to capture pollutants in a managed environment so that they will not reach natural wetlands and other ecologically important habitats. Vegetation must occasionally be harvested and sediment dredged in stormwater treatment wetlands. In general, stormwater wetlands perform well to remove sediment, metals, and pollutants that bind to humic or organic acids.

Facility objects that are often associated with a treatment wetland include:

- inlet
- flow control structure
- detention pond
- access road or easement
- fence, gate, and water quality sign
- energy dissipaters (flow spreaders)
- conveyance stormwater pipe



Example Treatment Wetland



Key Operations and Maintenance Considerations

- Wetlands should be inspected at least twice per year during the first three years during both growing and non-growing seasons to observe plant species presence, abundance, and condition; bottom contours and water depths relative to plans; and sediment, outlet, and buffer conditions.
- Maintenance should be scheduled around sensitive wildlife and vegetation seasons.
- Plants may require watering, physical support, mulching, weed removal, or replanting during the first three years.
- Nuisance plant species should be removed and desirable species should be replanted.

Plant Material

Table 6: Emergent Wetland Species for Treatment Wetlands

Inundation to 1 Foot		Table continues on next page.	
<u>Botanical Name</u>	<u>Common Name</u>	<u>Notes</u>	<u>Max. Depth</u>
<i>Agrostis exarata</i> ⁽¹⁾	Spike bent grass	Prairie to coast	to 2 feet
<i>Carex stipata</i>	Sawbeak sedge	Wet ground	
<i>Eleocharis palustris</i>	Spike rush	Margins of ponds, wet meadows	to 2 feet
<i>Glyceria occidentalis</i>	Western mannagrass	Marshes, pond margins	to 2 feet
<i>Juncus tenuis</i>	Slender rush	Wet soils, wetland margins	
<i>Oenanthe sarmentosa</i>	Water parsley	Shallow water along stream and pond margins; needs saturated soils all summer	
<i>Scirpus atrocinctus</i> (formerly <i>S. cyperinus</i>)	Woolgrass	Tolerates shallow water; tall clumps	
<i>Scirpus microcarpus</i>	Small-fruited bulrush	Wet ground to 18 inches depth	18 inches
<i>Sagittaria latifolia</i>	Arrowhead		
Inundation 1 to 2 feet			
<u>Botanical Name</u>	<u>Common Name</u>	<u>Notes</u>	<u>Max. Depth</u>
<i>Agrostis exarata</i> ⁽¹⁾	Spike bent grass	Prairie to coast	
<i>Eleocharis palustris</i>	Spike rush	Margins of ponds, wet meadows	
<i>Glyceria occidentalis</i>	Western mannagrass	Marshes, pond margins	
<i>Juncus effusus</i>	Soft rush	Wet meadows, pastures, wetland margins	
<i>Scirpus microcarpus</i>	Small-fruited bulrush	Wet ground to 18 inches depth	18 inches
<i>Sparganium emmersum</i>	Bur reed	Shallow standing water, saturated soils	

Inundation 1 to 3 feet			
<u>Botanical Name</u>	<u>Common Name</u>	<u>Notes</u>	<u>Max. Depth</u>
<i>Carex obnupta</i>	Slough sedge	Wet ground or standing water	1.5 to 3 feet
<i>Beckmania syzigachne</i> ⁽¹⁾	Western sloughgrass	Wet prairie to pond margins	
<i>Scirpus acutus</i> ⁽²⁾	Hardstem bulrush	Single tall stems, not clumping	to 3 feet
<i>Scirpus validus</i> ⁽²⁾	Softstem bulrush		
Inundation Greater Than 3 feet			
<u>Botanical Name</u>	<u>Common Name</u>	<u>Notes</u>	<u>Max. Depth</u>
<i>Nuphar polysepalum</i>	Spatterdock	Deep water	3 to 7.5 feet
Acceptable Seed Mix for Wet Ponds / Wet Pools			
<u>Species</u>	<u>Common Name</u>	<u>% by Weight</u>	
<i>Scirpus acutus</i>	Hardstem bulrush	9%	
<i>Juncus effusus</i>	Soft rush	9%	
<i>Carex stipata</i>	Awl sedge	29.5%	
<i>Glyceria occidentalis</i>	Western manna grass	25%	
<i>Eleocharis palustris</i>	Creeping spike rush	15%	
<i>Eleocharis ovata</i>	Ovoid spike rush	9%	
<i>Carex abnupta</i>	Slough sedge	3.5%	
Selected plants shall not include any plants from the State of Washington Noxious Weed List. Refer to clark.wa.gov/weed/ for a current list of noxious weeds.			
<p>⁽¹⁾ Non-native species. Native species are preferred.</p> <p>⁽²⁾ <i>Scirpus</i> tubers must be planted shallower for establishment, and protected from foraging waterfowl until established. Emerging aerial stems should project above water surface to allow oxygen transport to the roots.</p> <p>Primary sources: Municipality of Metropolitan Seattle, Water Pollution Control Aspects of Aquatic Plants, 1990. Hortus Northwest, Wetland Plants for Western Oregon, Issue 2, 1991. Hitchcock and Cronquist, Flora of the Pacific Northwest, 1973.</p>			

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Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
General	Water Depth	Water not retained to a depth of about 18 inches during the wet season.	Water is retained in the wet swale, outlet repaired as necessary.
	Wetland Vegetation	Vegetation becomes sparse and does not provide adequate filtration.	Vegetation coverage restored and healthy, and provides filtration per design function.
		Nuisance plant species becomes abundant.	Nuisance plant species have been removed and desirable species should be planted in their place.
	Trash and Debris Accumulation	Any trash and debris which exceed 1 cubic foot per 1,000 square feet. In general, there should be no visible evidence of dumping. If less than threshold all trash and debris will be removed as part of next scheduled maintenance.	Wetland area is free of trash and debris.
	Oil Sheen on Water	Prevalent and visible oil sheen.	Oil not present on pond surface. Oil has been removed from water using oil-absorbent pads or Vactor® truck. Source of oil located and corrected. If chronic low levels of oil persist, plant wetland plants such as <i>Juncus effusus</i> (soft rush) which can uptake small concentrations of oil.
	Erosion	Erosion of the pond's side slopes and/or scouring of the pond bottom, which exceeds 6-inches, or where continued erosion is prevalent.	Slopes stabilized using proper erosion control measures and repair methods.
	Settlement of Pond Dike/Berm	Any part of these components has settled 4-inches or lower than the design elevation, or inspector determines dike/berm is unsound.	Dike/berm is repaired to design specifications.
	Overflow Spillway	Rock is missing and soil is exposed at top of spillway or outside slope.	Rocks replaced to design specifications.