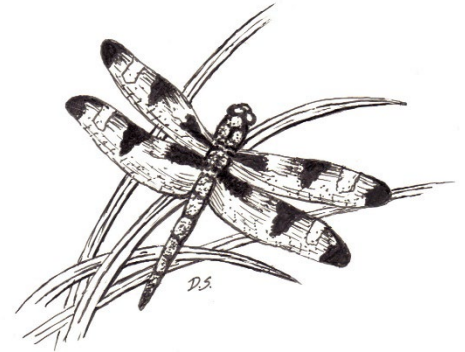


Stormwater Ponds

Document Purpose – This fact sheet is a companion to BWSR’s Native Vegetation Establishment and Enhancement Guidelines and provides detailed considerations for project planning and design with an emphasis on vegetation selection, installation and management.

Introduction – Stormwater ponds play an important role in landscapes for managing the volume or rate of stormwater runoff and allowing for water treatment. Both dry ponds (retention) and wet ponds (detention) are used in urban settings. Dry ponds may help decrease the rate of water flow and capture pollutants. Wet ponds may provide similar benefits but also accomplish denitrification and improved treatment of other pollutants. Vegetation plays an important role in stabilizing soils and increasing biological activity that can increase the treatment of nutrients and contaminants.



Site Selection – Stormwater ponds may be required in combination with other water quality management practices for new developments and redevelopment to accommodate rate and/or volume control. They may be appropriate in retrofit situations. Locations and sizing can be determined by subwatershed assessments and water quality modeling. Models commonly in use include [P8 Urban Catchment](#), [WinSLAMM](#), WAM: Watershed Assessment Tool, and AGWA: Automated Geospatial Watershed Assessment. The size of ponds generally depends on the drainage area, soils, the amount of impervious surfaces, and the extent and condition of additional stormwater management practices in the watershed and as part of the project treatment train.

General Planning Considerations – Stormwater ponds are often in areas of high disturbance due to fluctuating water levels, pollutants and sedimentation that are associated with stormwater runoff management and treatment. Plants are often needed that can handle these conditions such as floodplain forest species. More water tolerant species are commonly planted in the base of retention ponds, while dry prairie, mesic prairie or woodland species are typically planted on side slopes. Ponds that are typically dry (detention) need to be able to handle periods of wetness as well as periods of dryness, floodplain species as well as some wet meadow and mesic prairie species are well suited to these conditions. Vegetated areas are prone to invasion of weed species, so routine weed control is often needed.



Urban stormwater pond

Structural Design Considerations – Engineers design stormwater ponds based on the hydrology and water management needs of the drainage area. In many cases it is beneficial to incorporate pre-treatment practices to manage excess sediment, trash, and floatables before it moves into the larger basin. Periodic removal of pollutants in pre-treatment practices can decrease maintenance over time. Stormwater ponds are also designed with primary and secondary outlets and maintenance access and may be designed with valves/bypasses to control flows. Also consider 1) infiltration restrictions in sensitive areas such as near drinking water wells, vulnerable DWSMAs, emergency response areas, contaminated soils, 2) separation from bedrock and seasonal water table, and 3) vegetation height in rights-of-way.

Plant and Seed Selection – A key to achieving high function in stormwater ponds involves creating suitable conditions for species as they establish; and planting species that can thrive in the site conditions - as plants that are healthy will aid water infiltration, filtering, toxin remediation, and evapotranspiration. The design of pre-treatment practices to help capture pollutants entering a pond will help sustain plantings. The establishment of shallow water benches in detention ponds, created for safety and maintenance purposes will also promote emergent plant growth that can increase water treatment effectiveness. The base of retention ponds typically is not planted as they will be too deep to sustain most commercially available species.

Medium diversity levels are often used for stormwater basin side slopes and the base of retention basins (20-30 species). A combination of native grasses and forbs on side slopes will help provide competition from weed species. The sides of stormwater basins can provide important habitat for pollinators so it is beneficial to plant species that will provide nectar and pollen sources through the entire growing season.

Stormwater ponds are often planned in zones to aid species selection, establishment and maintenance. Species should be selected that are native to the area and well adapted to site conditions.

Commonly Used Plant Species in Stormwater Ponds

Upper Slope Grasses:	Big bluestem, Indian grass, Switchgrass, Slender wheat grass, Little bluestem, Canada wild rye, Kalm’s brome, Fringed brome
Upper Slope Forbs:	Yellow coneflower, Black-eyed Susan, Golden alexanders, New England aster, Maximilian sunflower, Sawtooth sunflower, Prairie clovers, Spiderwort, Showy goldenrod, Canada milk vetch, Stiff goldenrod
Edge of Open Water	River bulrush, Wild iris, Sweet flag, Soft-stem bulrush, Three-square bulrush, Lake sedge
Dry Pond Base	(Grasses) Switchgrass, Rice-cut grass, Prairie brome, Fowl bluegrass, Virginia wild rye, (forbs), Golden alexanders, New England aster, Bergamot, Mountain mint, Grass-leaved goldenrod, Sneezeweed, Green-headed coneflower, Canada anemone

Plant Source Considerations – Stormwater basins are typically connected to downstream wetlands and other waterbodies, so species should not be used that may negatively influence downstream resources. The seed and plant source sequence in the Native Vegetation Establishment and Enhancement Guidelines is recommended for stormwater ponds.

Vegetation Establishment – separate zones (upper slopes, edge of open water, etc.) are often planted differently as part of vegetation establishment for detention ponds. Upper slopes are typically drill seeded unless they are too steep, where they may be broadcast seeded and rolled or hydroseeded and rolled or harrowed. The side slopes of stormwater ponds and bases of retention ponds are often highly compacted and require loosening of soil prior to seeding. It is also important that seed has good contact with the soil which can be accomplished with seed drills or using harrows, rollers or erosion fabrics after broadcast seeding. If hydroseeding is used for seeding side slopes and the base of retention ponds it is important that seed is applied with water as a first step followed by the application of a tackifier if one will be used. The edge of open water is commonly planted with a combination of seed and containerized plants, or pre-vegetated mats; many emergent species will spread into deeper water. It is important that water levels do not rise above the height of establishing plants, so it can be beneficial to keep ponds offline from stormwater flows when possible to allow vegetation time to establish.

Operations and Maintenance – Key steps to maintenance involve mowing annual and biennial weeds to 4-6 inches during the first couple years as needed to provide sunlight and to decrease competition for seedlings; hand weeding or spot herbicide treatment of perennial weeds and prescribed burning as applicable to maintain diversity and to control woody species after establishment. Biocontrol of invasive species such as spotted knapweed, leafy spurge and purple loosestrife may also be long-term maintenance strategies.

Information Sources

Plants for Stormwater Design www.pca.state.mn.us/publications/manuals/stormwaterplants.html

Minnesota Stormwater Manual <http://www.pca.state.mn.us/index.php/water/water-types-and-programs/stormwater/stormwater-management/minnesotas-stormwater-manual.html>