



APPENDIX C

PLANT SELECTION



The Plant Selection Table, in this appendix, is provided as a tool that can be used in the identification of plant species that may be appropriate for the location, size and environmental characteristics of the site. These plants represent a small sample of plants that are available, and have been chosen with an emphasis on native species appropriate for use in BMPs in Northern Kentucky. Native plants are recommended for storm water BMPs because they are more tolerant of local climates, soils and water conditions, and their deep rooting structure enhances water uptake and soil permeability.

To select plants, start by identifying the moisture conditions of the planting area; this information can then be used to identify the plants that meet this critical site requirement. Moisture requirements for each plant are listed in the Plant Selection Table, varying from Wet Mesic to Dry conditions; the moisture requirements correspond to the drainage capacity of the soils. The term Wet Mesic refers to soils that are usually very moist for most of the growing season and have poor infiltration. Mesic soils typically have good drainage and remain moist during the growing season. Dry soils vary from somewhat moist to very dry during the growing season. In addition to soils, the slope and exposure of a site can cause significant variations in the moisture that is available to plants within a small area. These variations must also be considered when identifying and locating plants. Next, consider the amount of sunlight that will be available for the proposed feature. Sunlight requirements for each plant are listed in the Plant Selection Table, ranging from full sun to partial sun and shade.

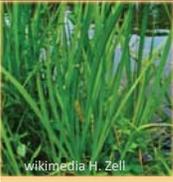
After identifying the basic site parameters, the next step is to consider the size of the plants that are desired for the planting area. Plant sizes should be considered based on the overall size and layout of the BMP feature, reserving the taller selections for larger applications. In general taller plants should be located in the center of the feature or they may be used as a backdrop. With these tasks completed, the aesthetic aspects of the feature become the primary focus in further refinement of the plant list. Especially large sites may require the addition of larger plant materials including native shrubs and trees.

Design elements such as plant color and texture as well as bloom color and bloom time are the next plant criteria to be considered. Color selection can focus on a theme such as primarily yellow flowers or a composite of a variety of colors selected from the plants that meet the basic site requirements. The texture of plants is an often overlooked characteristic that should be considered. A variety of textures can add visual depth and interest in the feature.

The final planning stage involves the layout or planting plan. A sketch or drawing of the planted area should be developed so areas can be identified for each plant type. Plants should be placed by grouping individual species in groups of three to fifteen plants, depending on the size of the feature. Space individual plants at 12" to 18" on center. Plant groupings will provide a statement of color and texture. When locating the plant groups, consider plant texture, size, color and bloom time relative the adjacent plants. Groups should be repeated to create cohesion of the plan. Provide a diverse mixture of sedges, rushes, and grasses with your flowering species to enhance the diversity and viability of the BMP. Sedges, rushes and grasses can be easily identified in the plant table by their green photo border and the light background in the corresponding row (i.e. Big Bluestem Grass).

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PLANT SELECTIONS

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| | Scientific Name | Common Name | Moisture | Sunlight | Height | Soil PH | Bloom Time/Bloom Color | | | | | | | |
| | | | Wet-Mesic, Mesic, Dry-Mesic, Dry | Full - Partial - Shade - | Max.Height (inches) | | April | May | June | July | Aug | Sept | Oct | |
|  <small>wikimedia H. Zell</small> | Acorus calamus | Sweet Flag | WM | Full | 24" | 5.2-7.2 | | M | J | J | | | | |
|  <small>NRCS Plant Materials Center</small> | Andropogon gerardii | Big Bluestem Grass | WM, M, DM, D | Full Partial | 84" | 6.0-7.5 | | | | | | | | |
|  <small>wikimedia Great Lakes</small> | Asclepias incarnata | Swamp Milkweed | WM, M | Full | 48" | 5.0-8.0 | | | J | J | A | | | |
|  <small>flicker.com gmayfield10</small> | Aster laevis | Smooth Blue Aster | WM, M, DM | Full Partial | 48" | 5.8-7.8 | | | | | | A | S | O |
|  <small>wikimedia Brian Arthur</small> | Symphyotrichum novae-angliae | New England Aster | WM, M, DM | Full Partial | 48" | 5.1-6.5 | | | | | | A | S | O |

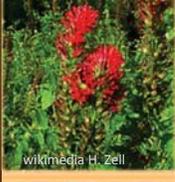
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| | | | Wet-Mesic, Mesic, Dry-Mesic, Dry | Full - Partial - Shade - | Max.Height (inches) | | April | May | June | July | Aug | Sept | Oct |
|  <small>commons.wikimedia.org</small> | Baptisia australis | Blue Wild Indigo | WM, M | Full Partial | 48" | 6.1-7.5 | | M | J | J | | | |
|  <small>flicker.com Matt Lavin</small> | Calamagrostis canadensis | Blue Joint Grass | WM, M | Full Partial | 48" | 4.5-8.0 | | | | | | | |
|  <small>wikimedia Jeffdelong</small> | Caltha palustris | Marsh Marigold | WM | Full Partial Shade | 24" | 4.9-6.8 | A | M | J | | | | |
|  <small>flicker.com Jason Sturmer 72</small> | Carex hystericina | Porcupine Sedge | WM | Full | 36" | 6.5-7.5 | | | | | | | |
|  <small>flicker.com Jason Sturmer 72</small> | Carex vulpinoidea | Fox Sedge | WM, M, DM | Full Partial | 42" | 6.8-8.9 | | | | | | | |

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| | | | Wet-Mesic, Mesic, Dry-Mesic, Dry | Full - Partial - Shade - | Max.Height (inches) | | April | May | June | July | Aug | Sept | Oct | |
|  <small>wikimedia Michael Wolf</small> | Chelone glabra | White Turtlehead | WM | Full | 60" | 5.1-6.5 | | | | | J | A | S | |
|  <small>wikimedia Maeter</small> | Echinacea Purpurea | Purple Coneflower | WM, M, DM | Full Partial | 48" | 6.5-7.2 | | | | | J | A | S | |
|  <small>wikimedia Kurt Stueber</small> | Eryngium yuccifolium | Rattlesnake Master | WM, M, DM | Full | 48" | 6.6-7.5 | | | | | J | A | S | |
|  <small>wikimedia Mare Ryckaert</small> | Eupatorium maculatum | Joe Pye Weed | WM | Full Partial | 60" | 6.1-7.8 | | | | J | J | A | | |
|  <small>wikimedia SB_Johnny</small> | Eupatorium perfoliatum | Boneset | WM | Full Partial | 48" | 6.1-7.8 | | | | | J | A | S | |

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| | | | Wet-Mesic, Mesic, Dry-Mesic, Dry | Full - Partial - Shade - | Max.Height (inches) | | April | May | June | July | Aug | Sept | Oct | |
|  <small>wikimedia Daderot</small> | Liatris pycnostachya | Prairie Blazing Star | WM, M | Full Partial | 48" | 6.0-8.5 | | | | | J | A | S | |
|  <small>wikimedia H. Zell</small> | Liatris spicata | Marsh Blazing Star | WM, M | Full Partial | 60" | 5.6-7.5 | | | | | J | A | S | |
|  <small>wikimedia H. Zell</small> | Lobelia cardinalis | Cardinal Flower | WM | Full Partial | 48" | 5.8-7.8 | | | | | J | A | S | |
|  <small>wikimedia Nova</small> | Lobelia siphilitica | Great Blue Lobelia | WM, M | Full Partial | 36" | 6.1-7.8 | | | | | J | A | S | O |
|  <small>flicker.com Pellea</small> | Lycopus americanus | Water Horehound | WM | Full | 24" | 5.2-7.8 | | | | | J | A | S | |

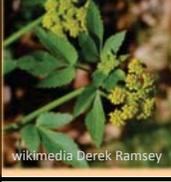
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| | | | Wet-Mesic, Mesic, Dry-Mesic, Dry | Full - Partial - Shade - | Max.Height (inches) | | April | May | June | July | Aug | Sept | Oct |
|  <small>wikimedia Jason Hollinger</small> | Mimulus ringens | Monkey Flower | WM | Full Partial | 24" | 5.6-7.5 | | | J | J | A | S | |
|  <small>wikimedia Great Lakes</small> | Monarda fistulosa | Wild Bergamot | WM, M, WM, D | Full Partial | 48" | 6.0-8.0 | | | | J | A | S | |
|  <small>wikimedia US Gov</small> | Panicum virgatum | Switch Grass | WM, M, DM, D | Full Partial | 48" | 4.5-8.0 | | | | | | | |
|  <small>wikimedia Kurt Steeber</small> | Penstemon digitalis | Foxglove Beardtongue | M, DM | Full Partial Shade | 48" | 5.5-7.0 | | | J | J | | | |
|  <small>wikimedia Malte</small> | Physostegia virginiana | Obedient Plant | WM, M | Full Partial | 48" | 5.6-7.5 | | | | | A | S | |

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| | | | Wet-Mesic, Mesic, Dry-Mesic, Dry | Full - Partial - Shade - | Max.Height (inches) | | April | May | June | July | Aug | Sept | Oct |
|  <small>wikimedia Teun Spaans</small> | Rudbeckia laciniata | Wild Golden Glow | WM, M | Full Partial Shade | 84" | 4.5-7.0 | | | | J | A | S | O |
|  <small>flicker.com Matt Lavin</small> | Scirpus validus | Great Bulrush | WM | Full | 72" | 5.4-7.5 | | | | | | | |
|  <small>wikimedia Paul Henjum</small> | Silphium perfoliatum | Cup Plant | WM, M | Full Partial | 96" | 4.5-7.5 | | | | J | A | S | |
|  <small>wikimedia Teun Spaans</small> | Solidago ohioensis | Ohio Goldenrod | WM, M | Full | 36" | 5.6-7.5 | | | | J | A | S | |
|  <small>KIT Prairie Peter Chen</small> | Spartina pectinata | Prairie Cord Grass | WM, M | Full Partial | 96" | 6.0-8.5 | | | | | | | |

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| | | | Wet-Mesic, Mesic, Dry-Mesic, Dry | Full - Partial - Shade - | Max.Height (inches) | | April | May | June | July | Aug | Sept | Oct |
|  <small>wikimedia H. Zell</small> | Verbena hastata | Blue Vervain | WM, M | Full Partial | 60" | 5.6-7.5 | | | | J | A | S | |
|  <small>flickr.com Pchorman</small> | Verbena stricta | Hoary Vervain | DM, D | Full Partial | 24" | 5.6-7.5 | | | J | J | A | S | |
|  <small>wikipedia Wouter Habens</small> | Veronicastrum virginicum | Culver's Root | WM, M, DM | Full Partial | 60" | 6.6-7.8 | | | J | J | A | | |
|  <small>wikimedia Derek Ramsey</small> | Zizia aurea | Golden Alexanders | SM, M, DM | Full Partial | 36" | 6.1-7.8 | A | M | J | | | | |

Plant Selection Tips

- ◆ Start by considering moisture conditions and the variation of moisture regimes within the area to be planted.
- ◆ Consider size and scale of the area to be planted avoiding taller plants in small rain gardens. Arrange taller plants near the middle of the rain garden.
- ◆ Select smaller more ornamental species for small urban rain gardens. Arrange plants in groups if a more refined look is desired.
- ◆ Consider plant sunlight requirements, soil and site conditions of the proposed rain garden.
- ◆ Select at least two plants from the categories of (Grass, Sedge or Rush). Additional plants may need to be considered including native shrubs and trees.
- ◆ Consider plant bloom time,color and texture.



APPENDIX D

SITE SOIL TYPE AND INFILTRATION TESTING

PURPOSE OF SOIL AND INFILTRATION TESTING

The purpose of site soil and infiltration testing is to evaluate the condition of the soils and determine the in situ infiltration rate at the location where structural treatment BMPs are proposed to be located. A preliminary site soil assessment is recommended to identify candidate BMP sites that are most amenable to infiltration. This section summarizes the methods for conducting (1) subsurface soil investigations and (2) infiltration testing at candidate infiltration testing locations identified in preliminary site assessments.

A qualified soil scientist or geotechnical professional should conduct the subsurface soil investigation and infiltration tests. The professional should be experienced with the testing procedures as well as the hydraulic functioning of the potential BMPs to ensure that necessary additional information related to BMP siting is acquired during the subsurface soil investigation and infiltration tests.

This appendix is not intended to be applied as a protocol for conducting soil and infiltration testing. Instead, this section is provided to assist in specifying and standardizing soil and infiltration testing techniques across sites within Northern Kentucky where development is occurring.

SUBSURFACE SOIL INVESTIGATIONS

A subsurface soil investigation is an important part of assessing site soil conditions. Soil maps and hydrologic soil groups are based on regional data and provide only a general understanding of what to expect; however, there are undoubtedly unknowns that will be discovered during these initial field observations. A subsurface soil investigation involves drilling test borings and/or excavating test pits. Both test borings and test pits allow for locally assessing the soil conditions as they change with depth. Series of test borings and test pits enable an evaluation of how the soil conditions change horizontally. In an individual test pit, the variation in localized soil conditions can be observed vertically and horizontally in addition to the soil horizons. To maximize the knowledge gained during the subsurface soil investigation, field tests and observations should be conducted during this process. Additionally, samples of the soils encountered should be recovered for laboratory testing if needed (e.g., gradation analyses, Atterberg limits testing, natural density and moisture content determinations, etc.).

Test borings or test pits are recommended to extend to a depth of at least 3 feet deeper than the proposed bottom of the BMP. If the BMP is intended to infiltrate the entire design storm, the test borings or test pits are recommended to be excavated to a depth of at least 10 feet deeper than the proposed bottom of the BMP. In general, test borings would be considered advantageous over test pits when the depth exceeds 5 feet from existing grades; otherwise, the test pit excavation would become significantly large to accommodate appropriate OSHA regulations for safety. A project that imports fill should characterize the proposed soil profile at the specified depths. For example, if the proposed