

## Appendix C

### Landscape Plan Requirements for Biofiltration Practices and Native Plant Lists

All native plant lists are in Section 9 of this Appendix in **Tables C.3-C.7**.

#### SECTION 1: GENERAL GIP PLANTING REQUIREMENTS

*\*These general requirements apply to all GIP biofiltration practices (any area containing amended soils in the filter bed). Additional specific requirements or exceptions for each practice are denoted in their specific subsequent section.*

##### 1.1 Planting Plans

A landscaping plan must be provided for each biofiltration (any area containing amended soils) area. Minimum plan elements shall include the proposed delineation of planting areas, the planting plan, including the size, the list of planting stock, sources of plant species, and the planting sequence, including post-nursery care and initial maintenance requirements. The planting area is defined as the area where amended soils are to be located, which does not include any pretreatment measures. The planting plan must address 100% of the planting area. The planting plan shall be prepared by a qualified landscape architect, to tailor the planting plan to the site-specific conditions.

Native plant species are required for biofiltration as they are typically best acclimated for our region's climate. Ornamental species may be used for landscaping effect if they are not aggressive or invasive but must be first approved by the City's Stormwater Coordinator. **Tables C.3 – C.7** list native plant species suitable for use in biofiltration practices. Milkweed shall be required in all biofiltration practices and shall equal 5% or greater of overall planting schedule.

Irrigation can be utilized around biofiltration areas to encourage growth of the plants through the first growing season and any subsequent droughts. If irrigation is to be utilized, an irrigation plan shall be submitted to the City's Stormwater Coordinator for review and then subsequently included in the Long Term Maintenance Plan for the site. A soil moisture probe shall be shown as installed within the footprint of the bioretention area to prevent overwatering or baseflow from occurring.

The planting template refers to the form and combination of native trees, shrubs, and perennial ground covers that maintain the appearance and function of the biofiltration practice areas.

##### 1.2 Plant Spacing

**Table C.1** is for use only when plants are spaced equidistant from each other as shown in **Figure C.1**, below.

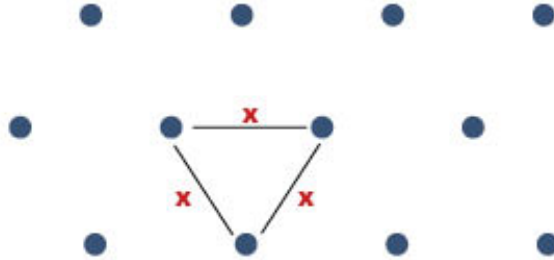


Figure C.1 Typical plant spacing where x equals distance on center (O.C.) of plant species.

Table C.1 Plant Spacing for Perennials, Grasses, Sedges and Shrubs	
Spacing (O.C.)	Plants per 100 sq.ft.
18" o.c.	51.2
24" o.c.	29
28" o.c.	22
30" o.c.	18.5
36" o.c.	12.8
42" o.c.	10
4' o.c.	7.23
5' o.c.	4.61
6' o.c.	3.2
8' o.c.	1.8

### 1.3 Soil Amendments for Tree Holes

Biofiltration practices that require trees in the planting schedule shall require tree holes in the filter bed that must be at least 4 feet deep (or as much as design allows) to provide enough soil volume for the root structure of mature trees. In addition, a more organic filter media is required within the planting holes for trees, with ratio of 50% sand, 30% topsoil and 20% acceptable leaf compost (or other as approved).

### 1.4 Groundcover

Groundcover for biofiltration practices shall either be a triple shredded hardwood mulch, river rock, or pine straw. In some situations, the City may consider alternative ground covers to mulch, river rock, and pine straw such as native groundcover, turf, and pea gravel. This alternative must be proposed, justified, and approved by the City’s Stormwater Coordinator during the plan review process and will be dependent on location, use and maintenance of the proposed areas. If seeding of the area is specified, then hydroseeding shall be the method detailed on the landscape sheets for seed application and establishment in these areas. This is due to the high failure rate of conventional seeding methods that is experienced due to frequent and high water flow these features experience.

The following design consideration should be evaluated when choosing groundcovers.

- **Mulch.** A 3-inch layer of mulch on the surface of the filter bed enhances plant survival, suppresses weed

growth, and pretreats runoff before it reaches the filter media. Triple shredded, aged hardwood, especially cypress, makes a very good surface cover, as it retains a significant amount of nitrogen and typically will not float away. Shredded hardwood mulch will typically require annual replacement as a part of regular maintenance.

- ***Pine Straw.*** A 3-inch layer of pine straw on the surface of the filter bed provides many of the same benefits as mulch. In some biofiltration designs pine straw will be resistant to floating and washing in frequent flow events. Pine straw still requires annual replacement and/or refreshing as part of a regular maintenance schedule.
- ***River Rock.*** River rock is often the preferred groundcover selected for biofiltration practices. This is due to its heavier weight which keeps it in place and provides a velocity dissipation effect which reduces filter bed erosion. River rock typically doesn't require annual replacement and provides for longer term stabilization solution. Higher upfront cost is typically offset when compared to annual replacement cost of mulch and pine straw as they compile annually. However, river rock does present its own challenges. During summer months river rock can absorb heat and create a heat island effect that can be detrimental to the vegetation planted within the biofiltration practice. Lastly river rock size can vary, and when larger (>4") river rock is used compaction of the filter bed can occur. Care should be taken during installation and placement as to prevent soil compaction when using larger river rock. Plant material selected should be chosen to withstand the heat the river rock can produce.

## SECTION 2: BIORETENTION

### 2.1 Landscape and Planting Plan

Bioretention areas shall be planted in accordance with a planting template. The choice of which planting template to use depends on the scale of bioretention, the context of the site in the urban environment, the filter depth, the desired landscape amenities, and the future owner's capability to maintain the landscape. In general, the vegetative goal is to achieve a surface area coverage of at least 75% in the first two years. For a bioretention area to qualify for Level 2 Design, a minimum of one tree must be planted for every 400 square feet. All bioretention areas shall include at least 5% of native milkweed vegetation within the planting plan.

The planting template refers to the form and combination of native trees, shrubs, and perennial ground covers that maintain the appearance and function of the bioretention area. Planting templates may be of the following types:

- ***Ornamental planting.*** This option includes perennials, sedges, grasses, shrubs and/or trees in a mass bed planting. This template is recommended for commercial sites where visibility is important. This template requires maintenance much like traditional landscape beds.
- ***Meadow.*** This is a lower maintenance approach that focuses on the herbaceous layer and may resemble a wildflower meadow or prairie. The goal is to establish a more natural look that may be appropriate if the facility is in a lower maintenance area (e.g., further from buildings and parking lots). Shrubs and trees may be incorporated.
- ***Reforestation.*** This option plants a variety of tree seedlings and saplings in which the species distribution is modeled on characteristics of existing local forest ecosystems. Trees are planted in groups with the goal of establishing a mature forest canopy. This template is appropriate for large bioretention areas located at wooded edges or where a wooded buffer is desired.

## SECTION 3: GIP-02 URBAN BIORETENTION

### 3.1 Landscape and Planting Plan

The degree of landscape maintenance that can be provided will determine some of the planting choices for urban bioretention areas. The planting cells can be formal gardens or naturalized landscapes. Landscaping in the ROW should be designed to limit visual obstructions for pedestrian and vehicular traffic. **Tables C.8 - C.12** detail plants suitable for tree planters.

In areas where less maintenance will be provided and trash accumulation in shrubbery or herbaceous plants is a concern, consider a “turf and trees” landscaping model. Spaces for herbaceous flowering plants can be included. This may be attractive at a community entrance location.

Native trees or shrubs shall be used for urban bioretention areas. As with regular bioretention, selected perennials, shrubs, and trees must be tolerant of drought, and inundation. The landscape designer should also take into account that de-icing materials may accumulate in the bioretention areas in winter and could kill vegetation. Additionally, tree species selected shall meet the City of Franklin street tree requirements within the Zoning Ordinance.

## SECTION 4: GIP-04 INFILTRATION TRENCH

### 4.1 Landscape and Planting Plan

The trench may be covered with permeable topsoil and planted with grass in a landscaped area. If sod is to be used it shall be a sand based or washed sod product.

## SECTION 5: GIP-05 WATER QUALITY SWALE

### 5.1 Landscape and Planting Plan

Designers should choose grasses, herbaceous plants or trees that can withstand both wet and dry periods and relatively high velocity flows for planting within the channel. Salt tolerant grass species should be chosen for water quality swales receiving drainage from areas treated for ice in winter. Taller and denser grasses are preferable, although the species is less important than good stabilization and dense vegetative cover. Grass species should have the following characteristics: a deep root system to resist scouring; a high stem density with well-branched top growth; water-tolerance; resistance to being flattened by runoff; and an ability to recover growth following inundation. A qualified landscape designer should be consulted for selection of appropriate plantings. A nonfloatable mulch, such as river rock, should be used to prevent clogging of the check dams.

## SECTION 6: GIP-07 SHEET FLOW

### 6.1 Landscape and Planting Plan

**6.1.1 Conserved Open Space.** No grading or clearing of native vegetation is allowed within the Conserved Open Space.

**6.1.2 Reforested Conserved Open Space.** At some sites, the Conserved Open Space may be in turf or meadow cover or overrun with invasive plants and vines. In these situations, a landscape architect shall prepare a reforestation plan for the Conserved Open Space utilizing the reforestation specifications as described under **GIP-08, Reforestation**, with any credits and associated plans receiving approval by the City Engineer.

**6.1.3 Vegetated Filter Strips.** Vegetated Filter Strips shall be planted at such a density to achieve a 90% grass/herbaceous cover after the second growing season. Performance has been shown to fall rapidly as vegetative cover falls below 80%. Filter strips shall be seeded, not sodded, whenever possible. Seeding establishes deeper roots, and sod may have muck soil that is not conducive to infiltration. The filter strip vegetation may consist of turf grasses, meadow grasses, other herbaceous plants, shrubs, and trees, as long as the primary goal of at least 90% coverage with grasses and/or other herbaceous plants is achieved. Designers should choose vegetation that stabilizes the soil and is salt tolerant. Vegetation at the toe of the filter, where temporary ponding may occur behind the permeable berm, shall be able to withstand both wet, with approximately 6 inches of ponding, and dry periods. The planting areas can be divided into zones to account for differences in inundation and slope.

## SECTION 7: GIP-08 REFORESTATION

### 7.1 Landscape and Planting Plan

The credit given for the reforestation GIP is based on conditions representative of a natural forested area. The intent of these areas is to create a mature native successional undisturbed forest. There shall be no mowing, clearing, grading, construction, storage, or disturbance of vegetation in reforestation areas except as permitted by the City's Stormwater Coordinator. Reforestation areas are eligible under the following qualifying conditions:

- The minimum contiguous area of reforestation must be greater than 5,000 square feet, with no more than 20% of the area in any single tree species. The basic density of plantings is 300 large canopy trees per acre, approximately 12 feet on center. When shrubs are substituted for trees, there must be 10 shrubs per one large canopy tree. Two small canopy trees or understory trees, such as Dogwoods or Red Buds, may be substituted for one large canopy tree. Adjustments can be made to these densities for areas of urban reforestation with the approval of the City's Stormwater Coordinator. Reforestation should consider the composition of area forests, and two thirds of selected trees must be large canopy. Reforestation methods should achieve 75% forest canopy within ten years.
- The minimum size requirement for reforestation is saplings 6-8 feet in height. The minimum size requirement for shrubs is 18-24 inches, or 3 gallon size, or with a native seed mix in order to help retain moisture and provide a beneficial environment for the reforestation.
- A reforestation management plan shall be included in the Long Term Maintenance Plan and Agreement outlining long term management and maintenance objectives that will perpetuate a

mature native successional forested ecosystem. The plan shall address but be not limited to; irrigation needs, tree removal and replacement methods, ground cover goals for stabilization, yearly health surveys, and any other requirements set forth in this section or GIP 08. The plan shall have a scale drawing showing the area to be planted, along with a plant list which includes species, size, number, and packaging. In addition, the reforestation area shall be clearly identified on all construction drawings and EPSC plans during construction. Reference the GIP-08 section for further Long Term Maintenance Requirements.

- The reforestation area must be protected by a green infrastructure easement which stipulates that no future development or disturbance may occur within the area.
- The planting plan shall be approved by the City, including any special site preparation needs.
- The construction contract should contain a care and replacement warranty extending at least two growing seasons, to ensure adequate growth and survival of the plant community.
- The final size of the trees should be considered when designing the planting plan. Tennessee One-Call (811) must be contacted prior to the submission of the planting plan to ensure that no utilities will be impacted by the tree planting. The planting plan must also avoid placing trees under overhead utilities.
- If using the reforestation area as a vegetated filter strip to receive additional credit under **GIP-07**, follow all GIP design criteria and ensure that additional routed runoff does not cause erosion or degrade the quality of ground cover.

The overall runoff reduction credits for reforestation through lower runoff coefficients are summarized in **Table C.2**.

Table C.2. Design Specifications for Reforestation	
Item	Specifications for Level 1 and Level 2
Area	Minimum contiguous area of 5,000 sq. ft.
Tree Type	No more than 20% of any single tree species. Consider composition of local forests in planting design. 2/3 of trees must be large canopy. See the USGS landfire map for delineation of forest type and the 2006 Descriptions of Ecological Systems for Modeling of LANDFIRE Biophysical Settings Ecological Systems of location US State TN .PFD for description of species within each forest type. Links: <a href="http://landfire.cr.usgs.gov/viewer/">http://landfire.cr.usgs.gov/viewer/</a> <a href="http://www.tn.gov/environment/na/pdf/tn_eco_systems.pdf">http://www.tn.gov/environment/na/pdf/tn_eco_systems.pdf</a> <a href="http://www.se-eppc.org/pubs/middle.pdf">http://www.se-eppc.org/pubs/middle.pdf</a>
Density	<ul style="list-style-type: none"> <li>• 300 large canopy trees – species that normally achieve an overall height at maturity of thirty feet or more per acre</li> <li>• 10 shrubs substitute for 1 large canopy tree</li> <li>• 2 small canopy trees substitute for 1 large canopy tree</li> </ul> Note: Adjustments to densities may be possible with CITY approval.
Canopy Rate	Achieve 75% forest canopy within first 10 years
Size	Tree - Minimum tree size 6-8 ft in height Shrub – 18-24 inches or 3 gallon size
Ground Cover	Entire area should be covered with 2-4 inches of organic mulch or a native seed mix

## SECTION 8: GIP-09 GREEN ROOF

### 8.1 Landscape and Planting Plan

A planting plan must be prepared for a vegetated roof by a landscape architect and it must be reviewed and approved by the City.

Plant selection for vegetated rooftops is an integral design consideration, which is governed by local climate and design objectives. The primary ground cover for most vegetated roof installations is a hardy, low-growing succulent, such as *Sedum*, *Delosperma*, *Talinum*, *Semperivum* or *Hieracium* that is matched to the local climate conditions and can tolerate the difficult growing conditions found on building rooftops (Snodgrass and Snodgrass, 2006). Franklin lies in the transition zone between USDA Plant Hardiness Zones 6 and 7.

Other vegetation considerations:

- Plant choices can be much more diverse for deeper intensive vegetated roof systems. Herbs, forbs, grasses, shrubs and even trees can be used, but designers should understand they have higher watering, weeding and landscape maintenance requirements.
- The species and layout of the planting plan should reflect the location of building, in terms of its height, exposure to wind, snow loading, heat stress, orientation to the sun, and shading by surrounding buildings. In addition, plants should be selected that are fire resistant and able to withstand heat, cold and high winds.
- Designers should also match species to the expected rooting depth of the growing media, which can also provide enough lateral growth to stabilize the growing media surface. The planting plan should usually include several accent plants to provide diversity and seasonal color. For a comprehensive resource on vegetated roof plant selection, consult Snodgrass and Snodgrass (2006).
- It is also important to note that most vegetated roof plant species will not be native to the Southeast (which is in contrast to native plant recommendations for other stormwater biofiltration practices).
- Given the limited number of vegetated roof plant nurseries in the region, designers should order plants 6 to 12 months prior to the expected planting date. It is also advisable to have plant materials contract-grown.
- When appropriate species are selected, most vegetated roofs will not require supplemental irrigation, except during the first year that the vegetated roof is being established or during periods of drought. Irrigation should thus be provided as needed for full establishment and during drought periods. The planting window extends from the spring to early fall, although it is important to allow plants to root thoroughly before the first killing frost.
- Plants can be established using cuttings, plugs, mats, and, more rarely, seeding or containers. Several vendors also sell mats, rolls, or proprietary vegetated roof planting modules. For the pros and cons of each method, see Snodgrass and Snodgrass (2006).
- The goal for vegetated roof systems designed for stormwater management is to establish a full and vigorous cover of low-maintenance vegetation that is self-sustaining and requires minimal mowing, trimming or weeding.
- The vegetated roof design should include non-vegetated walkways (e.g., permeable paver blocks) to allow for easy access to the roof for weeding and making spot repairs.

## SECTION 9: NATIVE PLANT LISTS

Table C.3. Popular Native Perennials for Bioretention – Full Sun						
Latin Name	Common Name	Size	Spacing	Moisture	Color	Height
<i>Asclepias incarnate</i>	Marsh milkweed	Plugs – 1 gal.	1 plant/24" o.c.	Wet	Pink	3-4'
<i>Asclepias</i>	Purple milkweed	Plugs – 1 gal.	1 plant/18" o.c.	Moist	Purple	3'
<i>Asclepias syriaca</i>	Common milkweed	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Orange	2-5'
<i>Asclepias tuberosa</i>	Butterfly milkweed	Plugs – 1 gal.	1 plant/18" o.c.	Dry-moist	Orange	2'
<i>Asclepias verdis</i>	Green milkweed	Plugs – 1 gal.	1 plant/18" o.c.	Moist	Green	2'
<i>Asclepias verticillata</i>	Whorled milkweed	Plugs – 1 gal.	1 plant/18" o.c.	Moist	White	2.5'
<i>Aster laevis</i>	Smooth aster	Plugs – 1 gal.	1 plant/18" o.c.	Moist	Blue	2-4'
<i>Aster novae-angliae</i>	New England aster	Plugs – 1 gal.	1 plant/24" o.c.	Wet-moist	Blue	2-5'
<i>Aster sericeus</i>	Silky aster	Plugs – 1 gal.	1 plant/18" o.c.	Dry	Purple	1-2'
<i>Chamaecrista</i>	Partridge pea	Plugs – 1 gal.	1 plant/18" o.c.	Dry	Yellow	1-2'
<i>Conoclinium</i>	Mist flower	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Blue	1-2'
<i>Coreopsis lanceolata</i>	Lance-leaf coreopsis	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Yellow	6-8'
<i>Echinacea pallida</i>	Pale purple coneflower	Plugs – 1 gal.	1 plant/18" o.c.	Dry	Purple	2-3'
<i>Echinacea purpurea</i>	Purple coneflower	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Purple	3-4'
<i>Eupatorium</i>	Boneset	Plugs – 1 gal.	1 plant/24" o.c.	Wet	White	3-5'
<i>Eupatorium</i>	Sweet Joe-Pye Weed	Plugs – 1 gal.	1 plant/24" o.c.	Wet-moist	Purple	3-6'
<i>Iris virginica</i>	Flag Iris	Plugs – 1 gal.	1 plant/18" o.c.	Moist-Wet	Blue	2'
<i>Liatris aspera</i>	Rough blazingstar	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Purple	2-5'
<i>Liatris microcephala</i>	Small-headed	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Purple	3'
<i>Liatris spicata</i>	Dense blazingstar	Plugs – 1 gal.	1 plant/24" o.c.	Wet-moist	Purple	1.5'
<i>Liatris squarulosa</i>	Southern blazingstar	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Purple	2-6'
<i>Lobelia cardinalis</i>	Cardinal flower	Plugs – 1 gal.	1 plant/18" o.c.	Wet-moist	Red	2-4'
<i>Monarda didyma</i>	Bee balm	Plugs – 1 gal.	1 plant/24" o.c.	Wet-moist	Red	3'
<i>Monarda fistulosa</i>	Wild bergamot	Plugs – 1 gal.	1 plant/18" o.c.	Moist	Purple	1-3'
<i>Oenothera fruticosa</i>	Sundrops	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Yellow	
<i>Penstemon digitalis</i>	Smooth white	Plugs – 1 gal.	1 plant/24" o.c.	Wet	White	2-3'
<i>Penstemon hirsutus</i>	Hairy beardtongue	Plugs – 1 gal.	1 plant/18" o.c.	Dry	White	1-3'
<i>Penstemon smallii</i>	Beardtongue	Plugs – 1 gal.	1 plant/18" o.c.	Moist	Purple	1-2'
<i>Pycnanthemum</i>	Slender mountain mint	Plugs – 1 gal.	1 plant/18" o.c.	Moist	White	1.5-2.5'
<i>Ratibida pinnata</i>	Gray-headed	Plugs – 1 gal.	1 plant/18" o.c.	Moist	Yellow	2-5'
<i>Rudbeckia hirta</i>	Black-eyed Susan	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Yellow	3'
<i>Salvia lyrata</i>	Lyre-leaf sage	Plugs – 1 gal.	1 plant/18" o.c.	Moist	Purple	1-2'
<i>Solidago nemoralis</i>	Gray goldenrod	Plugs – 1 gal.	1 plant/18" o.c.	Dry	Yellow	2'
<i>Solidago rugosa</i>	Rough-leaved	Plugs – 1 gal.	1 plant/18" o.c.	Wet	Yellow	1-6'
<i>Veronacastrum</i>	Culver's root	Plugs – 1 gal.	1 plant/24" o.c.	Dry	White	3-6'
<i>Veronia veboracensis</i>	Tall ironweed	Plugs – 1 gal.	1 plant/24" o.c.	Wet-moist	Purple	3-4'

Plant material size and grade to conform to "American Standards for Nursery Stock" American Association of Nurserymen, Inc. latest approved revision, ANSI Z-60-1



Table C.4. Popular Native Perennials for Bioretention – Shade						
Latin Name	Common Name	Size	Spacing	Moisture	Color	Height
<i>Aquilegia canadensis</i>	Wild columbine	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Pink	1-2.5'
<i>Athyrium filix-femina</i>	Lady Fern	1 gal.	1 plant/18" o.c.	Moist	Green	3'
<i>Arisaema triphyllum</i>	Jack-in-the-pulpit	Plugs – 1 gal.	1 plant/18" o.c.	Moist	Green	1.5-2.5'
<i>Arisaema dricontium</i>	Green dragon	Plugs – 1 gal.	1 plant/18" o.c.	Wet-moist	Green	3'
<i>Asarum canadense</i>	Wild ginger	Plugs – 1 gal.	1 plant/18" o.c.	Wet-moist	Red-brown	0.5-1'
<i>Aster cardifolius</i>	Blue wood aster	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Blue	1-3'
<i>Aster novae-angliae</i>	New England aster	Plugs – 1 gal.	1 plant/24" o.c.	Moist-dry	Blue/purple	3-4'
<i>Aster oblongifolius</i>	Aromatic Aster	Plugs – 1 gal.	1 plant/24" o.c.	Moist-dry	Blue/purple	1.5-3'
<i>Coreopsis major</i>	Tickseed coreopsis	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Yellow	3'
<i>Dryopteris marginalis</i>	Shield Fern	1 gal.	1 plant/18" o.c.	Moist	Green	2-3'
<i>Geranium maculatum</i>	Wild geranium	Plugs – 1 gal.	1 plant/18" o.c.	Moist	Pink	2'
<i>Heuchera americana</i>	Alumroot	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Purple	1'
<i>Iris cristata</i>	Dwarf crested iris	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Purple	4"
<i>Lobelia siphilicata</i>	Great blue lobelia	Plugs – 1 gal.	1 plant/18" o.c.	Wet-moist	Blue	1.5-3'
<i>Lobelia cardinalis</i>	Cardinal flower	Plugs – 1 gal.	1 plant/18" o.c.	Wet-moist	Red	2-4'
<i>Mertensia virginica</i>	Virginia bluebells	Plugs – 1 gal.	1 plant/18" o.c.	Moist	Blue	1.5'
<i>Osmunda cinnamomea</i>	Cinnamon Fern	1 gal.	1 plant/24" o.c.	Wet-moist	Green	3-4'
<i>Phlox divericata</i>	Blue phlox	Plugs – 1 gal.	1 plant/18" o.c.	moist	Blue	0.5-2'
<i>Polemonium reptans</i>	Jacob's ladder	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Blue	15"
<i>Polystichum acrostichoides</i>	Christmas fern	Plugs – 1 gal.	1 plant/24" o.c.	Moist-dry	Evergreen	2'
<i>Stylophoru diphyllum</i>	Wood poppy	Plugs – 1 gal.	1 plant/18" o.c.	Wet -moist	Yellow	1.5'

Plant material size and grade to conform to "American Standards for Nursery Stock" American Association of Nurserymen, Inc. latest approved revision, ANSI Z-60-1.

Table C.5. Popular Native Grasses and Sedges for Bioretention						
Latin Name	Common Name	Size	Spacing	Moisture	Color	Height
<i>Carex grayi</i>	Gray's Sedge	1 gal.	1 plant/24" o.c.	Moist	Green	3'
<i>Carex muskingumensis</i>	Palm Sedge	1 gal.	1 plant/24" o.c.	Moist	Green	3'
<i>Carex stricta</i>	Tussock Sedge	1 gal.	1 plant/24" o.c.	Moist	Green	3-4'
<i>Chasmanthium latifolium</i>	Upland Sea Oats	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Green	4'
<i>Equisetum hyemale</i>	Horsetail	Plugs – 1 gal.	1 plant/18" o.c.	Wet	Green	3'
<i>Juncus effesus</i>	Soft Rush	Plugs – 1 gal.	1 plant/24" o.c.	Wet-dry	Green	4-6'
<i>Muhlenbergia capallaris</i>	Muhly Grass	1 gal.	1 plant/24" o.c.	Moist	Pink	3'
<i>Panicum virgatum</i>	Switchgrass	1-3 gal.	1 plant/48" o.c.	Moist-dry	Yellow	5-7'
<i>Schizachyrium scoparium</i>	Little Blue Stem	1 gal.	1 plant/24" o.c.	Moist-dry	Yellow	3'
<i>Sporobolus heterolepis</i>	Prairie Dropseed	1 gal.	1 plant/24" o.c.	Moist-dry	Green	2-3'

Plant material size and grade to conform to "American Standards for Nursery Stock" American Association of Nurserymen, Inc. latest approved revision, ANSI Z-60-1.

Table C.6. Popular Native Trees for Bioretention							
Latin Name	Common Name	DT-FT	Light	Moisture	Notes	Flower Color	Height
<i>Acer rubrum</i>	Red Maple	DT-FT	Sun-shade	Dry-wet	Fall color		50-70'
<i>Acer saccharum</i>	Sugar Maple		Sun-pt shade	Moist	Fall color		50-75'
<i>Ameleanchier Canadensis</i>	Serviceberry		Sun-pt shade	Moist-wet	Eatable berries	White	15-25'
<i>Asimina triloba</i>	Paw Paw		Sun-pt shade	Moist	Eatable fruits	Maroon	15-30'
<i>Betula nigra</i>	River Birch	FT	Sun-pt shade	Moist-wet	Exfoliating bark		40-70'
<i>Carpinus caroliniana</i>	Ironwood		Sun-pt shade	Moist		White	40-60'
<i>Carya aquatica</i>	Water Hickory	FT-DT	Sun	Moist	Fall color		35-50'
<i>Cercus Canadensis</i>	Redbud	DT	Sun-shade	Moist	Pea-like flowers, seed	Purple	20-30'
<i>Chionanthus virginicus</i>	Fringetree		Sun-pt shade	Moist	Paniced, fragrant	White	12-20'
<i>Cladratis lutea</i>	Yellowwood	DT	Sun	Dry-moist	Fall color	White	30-45'
<i>Cornus florida</i>	Flowering Dogwood		Part shade	Moist	Red fruit, wildlife	White	15-30'
<i>Ilex opaca</i>	American Holly	DT	Sun-pt shade	Moist	Evergreen	White	30-50'
<i>Liquidambar styraciflua</i>	Sweetgum	DT-FT	Sun-pt shade	Dry-moist	Spiny fruit		60-100'
<i>Magnolia virginiana</i>	Sweetbay Magnolia		Sun-pt shade	Moist-wet	Evergreen	White	10-60'
<i>Nyssa sylvatica</i>	Black Gum		Sun-Shade	Moist	Fall color		35-50'
<i>Oxydendrum arboretum</i>	Sourwood		Sun-pt shade	Dry-moist	Wildlife	White	20-40'
<i>Platanus occidentalis</i>	Sycamore	FT	Sun-pt shade	Moist	White mottled bark		70-100'
<i>Quercus bicolor</i>	Swamp White Oak	DT	Sun-pt shade	Moist-wet	Acorns		50-60'
<i>Quercus nuttalli</i>	Nuttall Oak	DT	Sun	Dry-moist	Acorns		40-60'
<i>Quercus lyrata</i>	Overcup Oak	FT	Sun	Moist	Acorns		40-60'
<i>Quercus shumardii</i>	Shumard Oak	DT	Sun	Moist	Acorns		40-60'
<i>Rhamnus caroliniana</i>	Carolina Buckthorn		Sun	Moist	Black fruit		15-30'
<i>Salix nigra</i>	Black Willow	FT	Sun-pt shade	Moist-wet	White catkins	Yellow	40-60'
<i>Ulmus americana</i>	American Elm	DT-FT	Sun-pt shade	Moist			
<i>Salix nigra</i>	Black Willow	FT	Pt shade	Moist-	White catkins	Yellow	40-60'

Size: min. 2" caliper if not reforestation. DT: Drought Tolerant FT: Flood Tolerant  
 Plant material size and grade to conform to "American Standards for Nursery Stock" American Association of Nurserymen, Inc. latest approved revision, ANSI Z-60-1.

Table C.7. Popular Native Shrubs for Bioretention

Latin Name	Common Name	DT FT	Light	Moisture	Spacing (0 C)	Notes	Flower Color	Height
<i>Aronia arbutifolia</i>	Red Chokeberry	FT	Sun-pt shade	Dry-wet	4'	Red berries, wildlife	White	6-12'
<i>Buddleia davidii</i>	Butterfly Bush	DT	Sun-pt shade	Dry-moist	4'	Non-native	Blue	5'
<i>Callicarpa Americana</i>	American Beautyberry	DT	Sun-pt shade	Dry-wet	5'	Showy purple fruit	Lilac	4-6'
<i>Cephalanthus occidentalis</i>	Button Bush	FT	Sun-shade	Moist-wet	5'	Attracts wildlife	White	6-12'
<i>Clethra alnifolia</i>	Sweet Pepper Bush		Sun-pt shade	Dry-moist	3'	Hummingbird	White	5-8'
<i>Cornus amomum</i>	Silky Dogwood		Sun-shade	Moist-wet	6'	Blue berries, wildlife	White	6-12'
<i>Corylus americana</i>	American Hazelnut		Sun-pt shade	Dry-moist	8'	Eatable nuts, wildlife	Yellow	8-15'
<i>Hamamelis virginiana</i>	Witch-hazel		Sun-pt shade	Dry-moist	8'	Winter bloom	Yellow	10'
<i>Hibiscus moscheutos</i>	Swamp Mallow	FT	Sun	Moist-wet	30"	Cold-hardy	White – red	4-7'
<i>Hydrangea quercifolia</i>	Oakleaf Hydrangea	DT	Pt shade – shade	Moist	4'	Winter texture	White	3-6'
<i>Hypericum frondosum</i>	Golden St. John's Wort	DT	Sun-pt shade	Dry-moist	30"	Semi-evergreen	Yellow	2-3'
<i>Hypericum prolificum</i>	Shrubby St. John's Wort	DT	Sun-pt shade	Dry-moist	3'	Semi-evergreen	Yellow	3'
<i>Ilex decidua (dwarf var.)</i>	Poosumhaw Viburnum	DT	Sun-pt shade	Moist	4-6'	Red berries		6-14'
<i>Ilex glabra</i>	Inkberry	DT	Sun-pt shade	Moist-wet	3'	Evergreen		4-8'
<i>Ilex verticillata</i>	Winterberry Holly	FT	Sun-pt shade	Moist-wet	3'	Red berries		10'
<i>Itea virginica</i>	Virginia Sweetspire	DT FT	Sun-shade	Moist-wet	4'	Fall color	White	4-8'
<i>Lindera benzoin</i>	Spicebush	DT	Pt shade – shade	Moist-wet	8'	Butterflies, wildlife	Yellow	6-12'
<i>Viburnum dentatum</i>	Arrowwood Viburnum		Sun-shade	Dry-wet	6'	Wildlife	White	6-8'

Size: minimum 3 gal. container or equivalent.

DT: Drought Tolerant

FT: Flood

Tolerant

This list provides plant species; there are multiple varieties within each species.

Plant material size and grade to conform to "American Standards for Nursery Stock" American Association of Nurserymen, Inc. latest approved revision, ANSI Z-60-1.

Table C.8. Popular Native Perennials Suitable for Tree Planters – Full Sun						
Latin Name	Common Name	Size	Spacing	Moisture	Color	Height
<i>Asclepias tuberosa</i>	Butterfly milkweed	Plugs – 1 gal.	1 plant/18" o.c.	Dry-moist	Orange	2'
<i>Aster novae-angliae</i>	New England aster	Plugs – 1 gal.	1 plant/24" o.c.	Wet-moist	Blue	2-5'
<i>Coreopsis lanceolata</i>	Lance-leaf coreopsis	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Yellow	6-8'
<i>Eupatorium purpureum</i>	Sweet Joe-Pye Weed (Dwarf)	Plugs – 1 gal.	1 plant/24" o.c.	Wet-moist	Purple	3-6'
<i>Iris virginica</i>	Flag Iris	Plugs – 1 gal.	1 plant/18" o.c.	Moist-Wet	Blue	2'
<i>Liatris spicata</i>	Dense blazingstar	Plugs – 1 gal.	1 plant/24" o.c.	Wet-moist	Purple	1.5'
<i>Penstemon digitalis</i>	Smooth white beardtongue	Plugs – 1 gal.	1 plant/24" o.c.	Wet	White	2-3'
<i>Salvia lyrata</i>	Lyre-leaf sage	Plugs – 1 gal.	1 plant/18" o.c.	Moist	Purple	1-2'

C.9. Popular Native Perennials Suitable for Tree Planters – Shade						
Latin Name	Common Name	Size	Spacing	Moisture	Color	Height
<i>Aquilegia canadensis</i>	Wild columbine	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Pink	1-2.5'
<i>Aster novae-angliae</i>	New England aster	Plugs – 1 gal.	1 plant/24" o.c.	Moist-dry	Blue/ purple	3-4'
<i>Aster oblongifolius</i>	Aromatic Aster	Plugs – 1 gal.	1 plant/24" o.c.	Moist-dry	Blue/ purple	1.5-3'
<i>Coreopsis lanceolata</i>	Tickseed coreopsis	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Yellow	3'
<i>Heuchera americana</i>	Alumroot	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Purple	1'

DT: Drought Tolerant

FT: Flood Tolerant

Table C.10. Popular Native Grasses and Sedges Suitable for Tree Planters

Latin Name	Common Name	Size	Spacing	Moisture	Color	Height
<i>Carex muskingumensis</i>	Palm Sedge	1 gal.	1 plant/24" o.c.	Moist	Green	3'
<i>Chasmanthium latifolium</i>	Upland Sea Oats	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Green	4'
<i>Equisetum hyemale</i>	Horsetail	Plugs – 1 gal.	1 plant/18" o.c.	Wet	Green	3'
<i>Juncus effesus</i>	Soft Rush	Plugs – 1 gal.	1 plant/24" o.c.	Wet-dry	Green	4-6'
<i>Muhlenbergia capallaris</i>	Muhly Grass	1 gal.	1 plant/24" o.c.	Moist	Pink	3'
<i>Panicum virgatum</i>	Switchgrass	1-3 gal.	1 plant/48" o.c.	Moist - dry	Yellow	5-7'
<i>Schizachyrium scoparium</i>	Little Blue Stem	1 gal.	1 plant/24" o.c.	Moist-dry	Yellow	3'
<i>Sporobolus heterolepis</i>	Prairie Dropseed	1 gal.	1 plant/24" o.c.	Moist-dry	Green	2-3'

Table C.11. Popular Native Trees Suitable for Tree Planters

Latin Name	Common Name	DT-FT	Light	Moisture	Notes	Flower Color	Height
<i>Acer rubrum</i>	Red Maple	DT-FT	Sun-shade	Dry-wet	Fall color		50-70'
<i>Betula nigra</i>	River Birch	FT	Sun-pt shade	Moist-wet	Exfoliating bark		40-70'
<i>Carpinus caroliniana</i>	Ironwood		Sun-pt shade	Moist		White	40-60'
<i>Carya aquatica</i>	Water Hickory	FT-DT	Sun	Moist	Fall color		35-50'
<i>Cercus Canadensis</i>	Redbud	DT	Sun-shade	Moist	Pea-like flowers, seed pods	Purple	20-30'
<i>Liquidambar styraciflua</i>	Sweetgum (fruitless)	DT-FT	Sun-pt shade	Dry-moist			60-100'
<i>Nyssa sylvatica</i>	Black Gum		Sun-Shade	Moist	Fall color		35-50'
<i>Platanus occidentalis</i>	Sycamore	FT	Sun-pt shade	Moist	White mottled bark		70-100'
<i>Quercus nuttalli</i>	Nuttall Oak	DT	Sun	Dry-moist	Acorns		40-60'
<i>Quercus lyrata</i>	Overcup Oak	FT	Sun	Moist	Acorns		40-60'
<i>Quercus shumardii</i>	Shumard Oak	DT	Sun	Moist	Acorns		40-60'
<i>Ulmus americana</i>	American Elm	DT-FT	Sun-pt shade	Moist			

DT: Drought Tolerant

FT: Flood Tolerant

Table C.12. Popular Native Shrubs Suitable for Tree Planters							
Latin Name	Common Name	DT- FT	Light	Moisture	Notes	Flower Color	Height
<i>Clethra alnifolia</i>	Sweet Pepper Bush (Dwarf)		Sun-pt shade	Dry-moist	Hummingbirds	White	5-8'
<i>Hydrangea quercifolia</i>	Oakleaf Hydrangea	DT	Pt shade – shade	Moist		White	3-6'
<i>Hypericum frondosum</i>	Golden St. John's Wort	DT	Sun-pt shade	Dry-moist	Semi-evergreen	Yellow	2-3'
<i>Ilex glabra</i>	Inkberry (Dwarf)	DT	Sun-pt shade	Moist-wet	Evergreen		4-8'

DT: Drought Tolerant

FT: Flood Tolerant