

# I. Plant Lists

## Native and Recommended Non-Invasive Plants

A list of trees, shrubs, and herbaceous plants suitable for planting in stormwater management facilities are included in **Table I-1** p. 4. The list is intended as a guide for general planting purposes and planning considerations. Knowledgeable landscape designers and nurseries can provide additional information for considering specific conditions for successful plant establishment.

**Table I-1** p. 4 lists native and recommended plants, trees, shrubs, and herbaceous plants and is organized by Type and Latin name. Additional information given for each species includes common name, National Wetland Indicator Status, hydrologic zone, inundation tolerance, drought tolerance, salt tolerance, mature canopy spread, mature height, light requirements, nativity, commercial availability, and notes to provide guidance for application and selection. For example, some trees are well-suited to landscaped areas that will receive stormwater runoff, while others may not tolerate the additional moisture.

## National Wetland Indicator Status

The National Wetland Indicator Status (from Region 1, Reed, 1988) has been included to show “the estimated probability of a species occurring in wetlands versus non-wetlands” (Reed, 1988). Reed defines the indicator categories as follows:

- Obligate wetland (OBL): Plants which nearly always (more than 99% of the time) occur in wetlands under natural conditions.
- Facultative Wetland (FACW): Plants which usually occur in wetlands (from 67 to 99% of the time), but occasionally are found in non-wetlands.
- Facultative (FAC): Plants which are equally likely to occur in wetlands and non-wetlands, and are found in wetlands from 34 to 66% of the time.
- Facultative Upland (FACU): Plants which usually occur in non-wetlands (from 67 to 99% of the time), but occasionally are found in wetlands.
- Upland (UPL): Plants which almost always (more than 99% of the time) occur in non-wetlands under natural conditions.
- A given indicator status shown with a “+” or a “-” means that the species is more (+) or less (-) often found in wetlands than other plants with the same indicator status without the “+” or “-” designation.

## Hydrologic Zones

For planting within a stormwater management practice (SMP), it is necessary to determine what hydrologic zones will be created within the SMP. Hydrologic zones describe the degree to which an area is inundated by water (the designer is referred to **Figure 4.1-3** [water.phila.gov/development/stormwater-plan-review/manual/chapter-4/4-1-bioinfiltration-bioretenion/#Figure\\_4.1-3](http://water.phila.gov/development/stormwater-plan-review/manual/chapter-4/4-1-bioinfiltration-bioretenion/#Figure_4.1-3) for an example of hydrologic zones in a

bioinfiltration/bioretention basin). Plants have differing tolerances to inundation, and, as an aid to landscape designers, these plant tolerance levels have been divided into six zones and corresponding appropriate plant species have been identified. In **Table I-1** p. 4, each plant species has a corresponding hydrologic zone provided to indicate the most suitable planting location for successful establishment. While the most common zones for planting are listed in parentheses, the listing of additional zones indicates that a plant may survive over a broad range of hydrologic conditions. Just as plants may, on occasion, be found outside of their hardiness zone, they may also be found outside of their hydrologic zone. Additionally, hydrologic conditions in an SMP may fluctuate in unpredictable ways; thus, the use of plants capable of tolerating wide varieties of hydrologic conditions greatly increases a successful planting. Conversely, plants suited for specific hydrologic conditions may perish when hydrologic conditions fluctuate, thus exposing the soil and increasing the chance for erosion.

### **Inundation Tolerance**

Since the Wetland Indicator Status alone does not provide an indication of the depth or duration of flooding that a plant will tolerate, the “Inundation Tolerance” column is designed to provide further guidance. If a plant is capable of withstanding permanent saturation, the depth of this saturation is listed (for example, “saturated” indicates the soil can be moist at all times, “sat, 0-6” indicates that the species can survive in constantly moist soil conditions with up to six inches of standing water). Conversely, a plant may only tolerate seasonal inundation – such as after a storm event – or may not tolerate inundation at all. This type of plant would be well-suited for an SMP that is expected to drain quickly or in the drier zones of the SMP.

### **Drought Tolerance (N=none; L=low; M=medium; H=high)**

The “Drought Tolerance” column is meant to provide a way for SMP designers to select appropriate native plants that can survive in hot summer conditions, with a minimum of irrigation. Drought tolerance is defined as the relative tolerance of the plant to drought conditions compared to other plants in the same region (USDA, 2005).

### **Salt Tolerance (N=none; L=low; M=medium; H=high; U=unknown)**

This column ranks the relative tolerance of a species to salt content in the soil. If U (unknown) is displayed, no research was found for that particular species.

### **Mature Canopy Spread**

This column gives the SMP designer a rough estimate of the diameter (or spread) of a tree species’ branching when it has matured. This information indicates what the light conditions will be like beneath the tree for understory plantings; how much space should be left open between the tree planting pit and any vertical structures, such as buildings; how far apart the trees should be planted; and it gives an idea, along with the mature height of the species, of the tree’s growth habit. The mature canopy spread also provides a rough idea for how much leaf surface area will be available to intercept stormwater before it reaches the ground. The designer should also consider critical lines for sight for vehicular or pedestrian traffic.

## **Mature Height**

This column provides the approximate mature height of plant species in optimal growing conditions. This height may be reduced dramatically in the urban environment where light, space, and other factors may not be as readily available as in a forest or field setting. However, by providing as much space as possible for a plant to grow and by choosing appropriate species for a planting area, improved – if not optimal – growing conditions can be achieved. For example, a tree planted in a sidewalk pit measuring four feet by four feet may only reach half its mature height, while a tree planted in a four-foot-wide “trough” style planting bed will grow taller and live longer, because it will have greater access to air and water.

## **Light Requirement**

The light requirements for each species are listed as ranges between full shade and full sun. At the bottom of the range – full shade – plants thrive in conditions where they receive filtered, or dappled, light for the entire day (such as under an oak tree). In the middle of the range are plants that grow best in partial shade, where they are in full shade for two to three hours during midday. Plants that require full sun should be sited so that they receive five or more hours of direct sun during the growing season. Some plants requiring full sun may still do well in a partial shade environment, depending on the quality and duration of the light the plants receive when they are not in the shade.

## **Nativity**

A native plant is an indigenous species that occurred in the region prior to settlement by the Europeans. In this column, each species is located within a range of nativity to Philadelphia. Plants known to have existed in Philadelphia County are native to Philadelphia, while a wider geographic range lists plants native to the state, but not necessarily to the county. The widest geographic range lists a few species native to the United States, but not necessarily to Pennsylvania. The plants listed that are not specifically native to Philadelphia are included because of their demonstrated success within SMPs.

## **Commercial Availability (C=Container; P=Plug; S=Seed)**

Herbaceous plants often come in a form known as a plug. These are often grown and sold in trays of 50 of the same species. They are essentially very small container plants, with a root/soil mass about an inch wide and two to four inches long. Most species available in plug form are also sold as seed. Often, a combination of plugs and seed will be used to establish a SMP quickly and provide immediate visual interest and stabilization.

Container-grown plants include trees, shrubs, and herbaceous plants. This is an excellent alternative to the far more expensive balled-and-burlapped (B&B) form of trees and shrubs, although the size of the tree is almost always smaller. Nurseries often provide a few container sizes for each species. This information is provided as guidance, and determining what is currently commercially available will require the designer to contact nurseries and plant providers directly.

## Notes

PWD has included recommendations for street trees in the “Notes” column of Table I-1 to assist designers in selection of vegetation most appropriate for the harsh conditions that are often associated in close proximity to streets. It is likely that most of these areas will be hot in summer months until the trees become established.

### Table I-1: Native and Recommended Non-Invasive Plants

Table I-1 is too large to display in the browser. **Download a PDF copy** [water.phila.gov/pool/files/table-i-1-non-invasive-plants.pdf](https://water.phila.gov/pool/files/table-i-1-non-invasive-plants.pdf).

## Prohibited Invasive Plants and Noxious Weeds

Invasive plants reproduce rapidly, degrade, and take over natural ecosystems. Under no circumstance should they be planted in a SMP. Nonetheless, because of appealing characteristics, some of these invasive plants are available for sale; care should be taken not to purchase them. Cultivating an ability to identify and remove invasives before they establish themselves is advantageous; due to their gregarious reproductive strategies, they can be especially difficult to eradicate once they take hold. For a list of invasive species to avoid planting, the designer is referred to the **Invasive Plant Fact Sheets webpage** <https://www.dcnr.pa.gov/Conservation/WildPlants/InvasivePlants/InvasivePlantFactSheets/Pages/default.aspx> from the Pennsylvania Department of Conservation and Natural Resources (DCNR).

Noxious weeds, as defined by the **Pennsylvania Department of Agriculture** [https://www.agriculture.pa.gov/Plants\\_Land\\_Water/PlantIndustry/NIPPP/Pages/Controlled-Plant-Noxious-Weed.aspx](https://www.agriculture.pa.gov/Plants_Land_Water/PlantIndustry/NIPPP/Pages/Controlled-Plant-Noxious-Weed.aspx), “are identified as a plant that is determined to be injurious to public health, crops, livestock, agricultural land or other property and cannot be sold, transported, planted, or otherwise propagated in Pennsylvania.” Under no circumstance should they be planted within an SMP. Table I-2, below, highlights a list of prohibited noxious weeds.

### Table I-2: Prohibited Noxious Weeds

#### Prohibited Noxious Weeds, As Identified in Pennsylvania Code Section 110.1: Noxious Weed Control List

- Marijuana (*Cannabis sativa*)
- Purple Loosestrife (*Lythrum salicaria*)
- Canada Thistle (*Cirsium arvense*)
- Multiflora Rose (*Rosa multiflora*)
- Johnson Grass (*Sorghum halepense*)
- Musk Thistle, or Nodding Thistle (*Carduus nutans*)
- Bull Thistle, or Spear Thistle (*Cirsium vulgare*)
- Jimson Weed (*Datura stramonium*)
- Mile-a-minute (*Polygonum perfoliatum*)
- Kudzu (*Pueraria lobata*)
- Shattercane (*Sorghum bicolor*)
- Giant Hogweed (*Heracleum mantegazzianum*)
- Goatsrue (*Galega officinalis*)