

## Bioretention Plant Guidance for Coastal Georgia



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This Technical Assistance Guidance (TAG) document provides plant selection, design, purchasing, and plant establishment and care guidance for the most common bioretention features, such as bioretention swales, stormwater planters and rain gardens in coastal Georgia. Bioretention systems are low impact development (LID) features that use landscaped areas to slow, treat, retain and infiltrate stormwater runoff, mimicking the natural, pre-development hydrology of the site.

The intent of this guidance is to offer municipalities, developers, designers and homeowners with guidelines for selecting plants for bioretention areas, including tools that will provide a list of appropriate species for coastal Georgia. Bioretention systems look like regular landscaped areas, but are designed to manage stormwater runoff created by urbanization. Specifying the appropriate plants for a bioretention system is critical to its function.

This step-by-step guidance is specific to LID landscapes and will take you from plant selection and layout to installation and on-going maintenance. This guidance is intended to accompany standard landscape methods and point out areas where LID methods may differ.

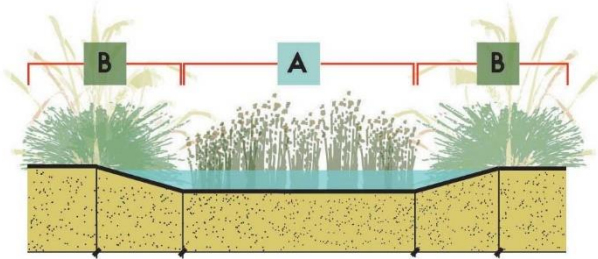
## Step 1. LID Type and Plant Selection

### Question 1: Is the soil surface of the structure sloped or uniform?

**A** can tolerate ponding    **B** conventional landscape

#### Sloped-Sided

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**Surface grade** and **ponding area** of a bioretention structure are the first factors to consider when choosing which plants to specify. Is the soil surface of the structure sloped or uniform? Stormwater planters and some rain gardens have uniform surface grades. In these designs, ponding will be equal across the structure and all plants will have the same conditions (Zone A).

In bioretention swales and some rain gardens, soil surface is sloped, resulting in differing planting conditions across the structure (Zones A and B). Plants located at the bottom where ponding occurs will have different requirements than those placed on the side slopes which receive runoff but no ponding. More specifically, **Zone A** plants can withstand periodic inundation and the area ponds following storm events (24-72 hours). **Zone B** plants are above the area of ponding with the side slopes receiving runoff but are never inundated. A third planting area may occur outside of Zones A and B on the upper edges of rain gardens and bioswales. This area is not a functional component of the bioretention area and therefore can be treated as a traditional area.

## Step 2: Plant Species Selection

### Question 2: What criteria should be used to select the appropriate plants?

Once the plant zones are identified (Zone A only or both Zone A and B) for a structure, the plants may be selected. The proper selection and installation of vegetation is key to a successful bioretention system. The best plants for these bioretention projects are those that are native to the area. They are highly recommended because of the wide range of benefits they offer (adapted to local climate, low/no water use once established, low maintenance needs once established, food and forage for native wildlife).

For the greatest ecological value, select the “true” or “pure” native species (scientific Latin genus and species name such as *Rudbeckia fulgida*), especially if planting for wildlife and pollinator benefit. Avoid the cultivated varieties (“cultivars” or “nativars”) available for some native plants. These are named using the scientific name plus the cultivar name, a third word in single quotation marks (such as *Rudbeckia fulgida* ‘Goldstrum’).

The plants selected for bioretention structures in coastal Georgia should be based on the following criteria:

- Native plants that occur in the lower coastal plain ecoregion of GA;
- Tolerant of varied moisture conditions (wet and dry);
- Tolerant of varied soil types and growing conditions (sun and salt exposure, etc.);
- Low maintenance requirements;
- Provide a diverse array of both deciduous and evergreen species, floral color, floral bloom time, texture, pollinator and wildlife use, and fall/winter characteristics;
- Are not invasive plants;
- Do not have aggressive/invasive root systems;
- Exhibit an attractive appearance;
- Plants are available in native nurseries in the coastal plain of FL, GA or SC.

The tools that can provide guidance to appropriately select native plants for bioretention structures in coastal Georgia are as follows:

(a) **UGA EcoScapes Native Plant Search Engine:**

<http://gacoast.uga.edu/outreach/resources-outreach/native-plant-search-engine/>

(website also provides both guidance document on how to use the search engine)

The rain garden native plant list will also apply to other bioretention structures.

- (b) **Rain Garden App** – this free mobile app developed for both Android and iPhones can be used to address the design, installation and maintenance of rain gardens. These plants and designated zones also will apply to other bioretention structures. The Georgia plant list was prepared by the UGA Marine Extension and GA Sea Grant EcoScapes program in partnership with the University of Connecticut Center for Land Use Education and Research (CLEAR) and National Nonpoint Education for Municipal Officials (NEMO) Programs.

When selecting plants from either of these tools, additional site-specific information, such as high and low temperatures, coastal conditions (salt tolerance) and wind resistance should be considered. In addition, project specific aspects of the design, for example, right-of-way vegetation height limits, appropriate street and parking lot tree species may further influence selection.

PLEASE NOTE: Do not plant noxious weeds and invasive plants. A list of non-native invasive plants in Georgia is provided by the Georgia Exotic Pest Plant Council at:

<https://www.gaepcc.org/list/>.

## Step 3: Plant Purchasing

### Question 3: Where do I purchase the native plants?

Once you have determined the preferred native plants that are suitable and desirable for the bioretention structure, the plant list should be provided to a regional reputable wholesale or retail nursery that specializes in propagating native plants. Detailed purchasing considerations and a list of wholesale and retail native nurseries appropriate for the coastal plain of Georgia is provided in the UGA EcoScapes document entitled "*Purchasing Native Plants: Considerations and Nursery Sources*".

Make sure that the nursery propagates what it sells or buys from wholesalers who propagate plants from nursery grown stock plants. The plants should be "nursery propagated" not just "nursery grown" (which can indicate they were dug from the wild and grown in the nursery).

Ideally, the plants you use should come from stock within a 250-mile radius in the same physiographic province (coastal plain). Differences exist from region to region even in the same plant species due to differences in climatic conditions between distant locations.

Provide the nursery with the following in order to determine plant availability:

- a list of the scientific name (genus and species) and common name of each individual species desired for the project;
- containerized plants or plugs are recommended (versus bare root or seed) which establish quickly and have well-established root systems
- # of plants desired per species;
- whether delivery is also being requested (where available) and location;
- appropriate contact information if the nursery has questions;
- tax-free form (if applicable).

Perennials and grasses should be purchased in a container size of at least 4" (larger if available). Small trees and shrubs should not be purchased in containers larger than 7 or 15 gallons in order to enhance establishment.

Seeding is not recommended due to the ease of seeds to float away before they germinate. In addition, most perennials take at least two growing seasons to become established from seed. During this growth period, weeds can move in and create more maintenance.

Once you and the nursery have finalized the native plant list, proceed to pay for the plants. If you are picking up plants from a nursery, utilize a vehicle where the plants can be safely placed inside in order to prevent wind damage, breakage, and dehydration.

## Step 4: Designing with Native Plants

### Question 4: What plant design components should I consider?

- Appropriate vegetation placement should be selected based on the zone of hydric tolerance
- Species layout should generally be random and natural
- Depending on size, a canopy should be established with an understory of shrubs and herbaceous materials
- Stressors (e.g., wind, sun, exposure, drought) should be considered when laying out the planting plan
- Placement and spacing of individual plants should be based on mature size (height and width)
- Include overall diversity with both deciduous and evergreen species, floral color, floral bloom time, texture, pollinator and wildlife use, and fall/winter characteristics;
- Aesthetics and visual characteristics should be a prime consideration
- Traffic (more fragile plants away from traffic) and safety issues (spiny vegetation) must be considered
- Existing and proposed utilities must be identified and considered (Call Before You Dig – dial 811).

If you want a traditional-looking landscape (versus naturalized landscape), consider implementing the following:

- Select clump-forming plants (rather than spreaders). For example, clump-forming bunch grasses have a neat mounded form
- Plant groups in odd numbers (3, 5 or 7 plants)
- In smaller bioretention gardens, limit the number of species and repeat a few specific plant groupings or color schemes at intervals throughout the garden.

## Step 5: Planting Considerations

### Question 5: How do I plant the plants in the bioretention garden?

Like traditional landscapes, LID planting areas require care for optimal health. Here are some important considerations regarding native plantings for bioretention projects in coastal Georgia:

#### Planting Time and Watering

- In general, planting of shrubs and small trees do best when planted in late fall/winter/early spring so that they are provided ample time to become established

before summer heat and possible drought conditions. However, shrubs and small trees can be planted in late spring with other plant habits IF their roots are watered continuously throughout the first and possibly second growing season. Planting of shrubs and trees is NOT recommended in the summer.

- In general, planting of grasses and perennials do well when planted in early to mid spring so that they are provided ample time to become established before summer heat and possible drought conditions. These plants must be watered for several weeks for appropriate establishment.
- Container-grown flowers and most woody plants can be planted in spring, fall or winter IF you are diligent about watering when needed.

### Plant Spacing, Preparation and Planting Strategy

- Due to the functional nature of LID landscapes and their connectivity to natural receiving water bodies, plants must be placed in their proper saturation zones within the garden.
- Plant spacing depends on each individual species mature height and width. Generally, a 12" spacing is appropriate for most herbaceous perennial plants. Shrubs, small trees, grasses and palm/cycads require much greater spacing depending on the species mature width and height.
- Place the container plants in the organic mulched garden before putting them in the ground to verify the overall planting scheme and placement. If you determine that you did not buy quite enough plants to cover an area, you may want to space the plants farther apart. If you determine that you ordered too many, plant the extra plants in another garden.
- Make sure that the plants are well watered in their containers right up until the time they are planted in the ground. Potted plants need to be carefully removed from their containers. If grown in loose soil-less mix, shake off the excess and plant them like bare-root plants. If roots are circling, disentangle them to encourage outward growth. If the root ball is dense, use a sharp knife to cut through some of the roots. (Cutting may seem extreme and harsh but the roots must be free to move into the surrounding soil or they will perish).
- Avoid stepping in the garden as much as possible when planting. Start in the middle and work outward. Pull away the organic mulch and prepare a planting hole just deep enough so that the plant will go into the ground at the same level as it was growing in the nursery container. However, dig the hole 2x the width of the plant. Gently add soil as needed to keep the plant's crown at the right level, making sure to fill in the hole completely with soil to avoid air pockets where the roots may dry out. Then gently pull the mulch back up around the plant, **keeping it a few inches away from the stem itself**.
- Provide your plant with an adequate soaking right after installation regardless of soil moisture levels. If you have plant tags, you may choose to stick the tag next to the plant

to help you remember what you planted and differentiate from weeds that may appear later (especially in the first growing season).

### Care Directly After Planting

- The new transplants will require watering their first growing season if rainfall is not adequate. Keep soil adequately moist until the new plants have a full year of growth. This is especially critical for small trees and shrubs. A recommended goal is one to two inches of water every 3 days for the first month with additional water as needed throughout the first growing season. After the first year, most plants won't require additional water except in dry spells.
- Because bioretention soils are formulated to infiltrate, irrigation application rates must be properly designed to avoid overwatering. For example, do not overwater plants situated on the bank and upper slope of the garden that are best suited for drier conditions.
- Trees and shrubs need to be watered regularly for AT LEAST the first full year of planting. In hot water they may need supplemental water once or twice a week. If autumn is dry, continue watering until cooler weather and precipitation occurs. Once fully established (3-4 years after planting) most native woody plants should be self-sufficient and no longer require watering.
- DO NOT FERTILIZE THE PLANTS. Native plants can be killed with granular or other synthesized fertilizer. In addition, fertilizer use will only encourage weeds. A compost top dressing application or compost tea can be used to introduce nutrients and beneficial soil microorganisms.

## **6. Plant Care and Ongoing Maintenance**

### **Question 6: How do I maintain the bioretention garden?**

Like traditional landscapes, LID planting areas require ongoing maintenance for optimal health. Due to the functional nature of LID landscapes and their connectivity to natural receiving water bodies, there are some differences between conventional landscape maintenance and LID maintenance.

#### Irrigation

- Irrigation is an important aspect of any landscape establishment. After establishment, native plants will need little to no supplemental irrigation to survive. Plants may enter a dry season dormancy, which affects their appearance. Where this "dry look" is not desired, summer irrigation may be utilized.

### Compost Mulch

- 1-2" of compost mulch should be applied to bioretention areas to retain moisture, prevent erosion and suppress weed growth. Reapply annually as the mulch breaks down. Use a specified compost mulch and avoid bark mulches that can float during storm events.

### Fertilizer

- Fertilizer should NOT be used in bioretention areas. Instead, a compost top dressing or application of compost tea can be used to introduce nutrients and beneficial microorganisms to the soil. Apply compost mulch once per year in spring or fall or apply compost tea once per year during March and if needed May/June.

### Synthetic Herbicides and Pesticides

- Synthetic herbicides and pesticides SHOULD NOT BE USED IN BIORETENTION AREAS because of their potential toxicity risk to aquatic organisms and the garden plants and animals that depend upon them. A variety of natural methods and products are available that can be used to control weeds and pests.

### Weeds

- Weeds compete with plants for nutrients, water and sunlight. They should be regularly removed with their roots by hand pulling or with manual pincer-type weeding tools. Care should be given to avoid unnecessary compaction of soils while weeding.

### Provide Extra Support to Trees

- Where necessary, provide extra support to trees planted in bioretention areas (e.g., high wind areas). They should be securely staked during establishment and inspected once or twice a year and following storm events. Stakes should be removed as soon as they are no longer needed to stabilize the tree (between 1-2 years).

### Replace plants that die

- Replace plants that die due to unsuitable plant conditions, disease, underwatering or other unforeseen issues. Dead and dying plants must be removed and replaced to avoid spreading disease, establishment of weeds in bare areas and reduced LID function. Before replacing with the same species, determine if another species may be better suited to the conditions.

### Prune dead or dying branches

- Many native shrubs and trees do not require pruning and shaping and actually look best when left to grow naturally. However, some annual removal of dead, diseased, or damaged and older branches during their dormant period will keep your shrubs or small



trees looking better and improve flowering. Depending on spring versus summer-flowering shrubs and trees, prune dead or dying branches at the appropriate time of year. Spring blooming shrubs and small trees flower on buds formed during the previous summer or fall (dogwoods, wild plums, redbuds, fringetree, magnolias, viburnums, etc.). They should be pruned as soon as possible after flowering. If you prune them in winter or spring, you will be cutting off their flower buds. This will not kill them but you will not have flowers for the season.

#### Cut back dead vegetation from previous growing season

- In early spring, cut back the dead winter vegetation from the perennials and, if desired, grasses. Do not cut all the way to the ground or you will damage the plant crowns. Be very careful when trimming around shrubs and trees. It is recommended to leave the perennial dead vegetation throughout the fall and winter due to their usefulness as sources of food and shelter for wildlife and beneficial insect wintering sites. If it is necessary, you may want to cut back some of the taller perennial plants in the fall for aesthetic reasons.

#### Controlling tall plants

- Integrating tall perennials and grasses together may naturally reduce the need for staking. However, some taller plants may need staking (especially in open windy areas). If this is deemed necessary, provide stakes in the ground in late spring prior to the plants getting too tall.
- Cutting back taller summer and fall-flowering species in spring also reduces plant height and encourages more compact growth, making the plants more suitable for landscape use. Cutting back by one-half or one-third must be done early enough in the growing season (May/June) so as not to delay flowering too long. Cutting back can also be used to stagger bloom times by extending the period of bloom for certain species.

For more information, contact Keren Giovengo, UGA EcoScapes Sustainable Land Use Program Manager, at [giovengo@uga.edu](mailto:giovengo@uga.edu).



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