LIGHT IMPRINT NEW URBANISM

A CASE STUDY COMPARISON

DUANY PLATER-ZYBERK & COMPANY

ARCHITECTS AND TOWN PLANNERS

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In recent years, the development industry has begun to shift from the conventional suburban model towards the New Urban model, which advocates the development of compact, mixed-use, pedestrian-friendly communities. Much of this shift has emerged from the need to better address environmental and community goals; it also addresses the need to reconcile the needs of the development industry with land conservation organizations. While sprawl leads to excessive land use and automobile dependency, New Urbanist development offers a far more sustainable alternative.

Mixed-use, pedestrian-friendly developments, which allow residents to greatly decrease use of their cars, clearly yield environmental benefits, but such developments also have a great number of other environmental strengths. The U. S. Green Building Council (USGBC), which developed the LEED (Leadership in Energy and Environmental Design) Green Building Rating System, has recently recognized this fact. In partnership with the Congress of New Urbanism (CNU) and the Natural Resources Defense Council, the USGBC used the principles of New Urbanism to develop a new rating system, LEED for Neighborhood Development. The new system integrates the principles of smart growth, urbanism, and green building into the first national standard for neighborhood design.

Georgio Tachiev, an environmental engineer at Florida International University, also confirms the high level of environmental benefits. According to Tachiev, New Urbanist developments perform well on the regional scale for two important reasons. First, compact communities reduce the stress on the watersheds caused by runoff from roads; second, they require reduced regional infrastructure. Conversely, the excessive land use encouraged by sprawl leads to fragmentation of watersheds by roads. Ultimately, sprawl leads to the impairment of the services and resources provided by the watershed.

Dr. Tachiev explains that the connected networks advocated in New Urbanist development create a symbiotic connection between built and natural environment. He says, “The methods we apply to design our built environment affect the balance of economy, energy, environment and society. From an engineering point of view, New Urbanism is a methodology that implements sustainability in all four aspects. When discussing sustainability, we need to place an emphasis on the watersheds since they are the natural containers hosting the human habitat. Maintaining the watershed in its natural condition is the key factor for ensuring continued quality services of the watersheds (expressed in biodiversity, water quality and quantity, and assimilative capacity).”

In spite of providing these qualities of environmental protection, New Urbanist development has been criticized for not being “green” enough; however, it is in fact very green when applied comprehensively. Further supporting this, there are newly developed techniques for “Light Imprint New Urbanism” (LINU) - a development technique which aims to “lie lightly on the land,” by coordinating engineering practices and New Urbanist design practices. Light Imprint New Urbanism developed out of the need to coordinate engineering concerns with design concerns. It enables developers to give added consideration to environmental and preservation factors without compromising design priorities such as connectivity and the public realm. Like all New Urban planning, LINU respects site terrain and topography while it prioritizes public civic space. Additionally, LINU offers a range of cutting-edge environmental strategies for differing landscapes and urban conditions.

LINU planning introduces a tool set that deals with stormwater run-off through natural drainage, conventional engineering infrastructure, and innovative infiltration practices. These tools are to be used collectively at the sector, neighborhood, and block scale. The combination of tools are adjusted according to the appropriateness of their use in each transect zone. This toolset not only offers a great range of environmental benefits, but can also significantly lower construction and engineering costs. By using different tools in each transect zone, LINU is not limited to a single approach for environmentally sensitive development. Rather, it offers a set of context-sensitive design solutions that ultimately work together on the community level.

Much of the criticism aimed at New Urbanist development and the Light Imprint model comes from advocates promoting their own specific environmental techniques within the framework of different development practices. Those techniques may be sound in their own individual agendas, but few offer a comprehensive approach to community development. Additionally, few take into account the general principles which make pleasant and livable communities, which are outlined in the Charter of the New Urbanism (http://www.cnu.org/cnu_reports/Charter.pdf). The Charter prioritizes diversity, walkability and connectivity, all of which contribute to the creation of sustainable neighborhoods. Leading planner Andres Duany, a principal of Duany Plater-Zyberk & Company, describes the layout of a typical New Urban community as an “open-mesh network” where a fine-grain system of connected streets mitigates traffic congestion and reinforces community connections. By prioritizing these design and planning issues, New Urbanist development offers multi-faceted environmental and community planning benefits, unlike more isolated environmental approaches.

Green Urbanism (GU) is one alternative environmental approach promoted by landscape architects. Green Urbanism, which is considered a more environmentally viable alternative than New Urbanism, emphasizes an increased percentage of open space within a development site, typically in the range of 60% or greater per project. Greenway fingers serve as the primary organizing spines for development, and storm water filtration mechanisms are placed outside of and around these green spaces. However, when compared with New Urbanist developments, Green Urbanism developments offer far less connectivity, because streets are often terminated to prevent encroachment on greenway fingers. Three problems often arise in these developments. First, important connections are so disrupted that functional issues such as traversing the site become difficult. A second problem encountered is that land development issues make reserving significant open space impracticable. And finally, the increased requirement for open space may so reduce the amount of developable land that the project may not be economically feasible.

Low Impact Development (LID) is another popular environmental development strategy. The origins of LID are found in conventional suburban development. Many municipalities have adopted this approach. LID attempts to manage stormwater quality by using both on-site design techniques and Best Management Practices (BMP – see below). LID techniques can be applied to both conventional suburban residential development and commercial development. However,

LID offers similar approaches to these different sorts of development. High-density residential development, such as a typical suburban apartment complex, is thrown into the same classification as commercial development, such as a strip shopping center. This lack of differentiation between developments of different characters is one downfall of LID.

Best Management Practices (BMP) is an approach that typically focuses on engineering rather than planning and design for addressing methods for stormwater treatment. The EPA proposes using smart growth techniques as a best management practice for stormwater. However, problems arise when Best Management Practices designed to solve suburban engineering issues are applied to more urban communities. For example, compact development suffers when BMPs dictate the need for storm water detention areas in front of, or beside buildings. This approach can harm a community's social connectivity. It may even interfere with retail merchandizing needs.

New Urbanist Conventional Engineering deviates from these conventional engineering practices to accommodate the broader range of development standards necessary for community-oriented design. Municipalities reviewing New Urban communities are often interested in embracing the New Urbanist approach; however, their governing bodies may be conservative regarding acceptance of different standards. Problems arise when designers attempt to overcompensate with standards and design. This overcompensation, or "gold plating," of infrastructure has adverse effects on the ability to successfully implement a New Urban community. Project delays and additional infrastructure cost can ultimately prevent the implementation of a good community development.

Light Imprint New Urbanism offers a more manageable alternative by coordinating innovative engineering practices with the New Urban design approaches in specific transect zones. This strategy will ease implementation - which is crucial, given that currently only a limited number of New Urbanist practitioners have significant implementation experience – and also offer great environmental benefits. According to Tachiev, LINU reduces infrastructure on the neighborhood scale in terms of roads, public works and facilities. On the block scale, the implementation of light imprint methods results in reduced ecological footprint of individual buildings and reduced stormwater runoff.

Griffin Park, a DPZ-designed traditional neighborhood development in Greenville, South Carolina, offers one example of Light Imprint New Urban development. While there have been numerous studies comparing Conventional Suburban Development (CSDs) with Traditional Neighborhood Development (TNDs), there have been few comparing standard TNDs to "Light Imprint" TNDs. The DPZ Charlotte office recently took on such a project, using Griffin Park as a case study.

Landscape architect Guy Pearlman and designer Patrick Kelly, both of the DPZ Charlotte office developed the LINU model for Griffin Park to create an environmentally sensitive community, preserve mature tree stands, and lower the construction costs for the first development phase. Pearlman explains, "The conventional TND engineering plan is engineered for both county review and bidding purposes; it reaches an extensive level of detail. The light-imprint engineering plan is based on many of the variables developed in the conventional plan. Added consideration, however, is given to environmental and preservation factors. Those factors enhance the overall value of the community and lower the total cost of construction."

Environmental strategies at Griffin Park included the introduction of rain gardens and a tree protection fence. The introduction of these elements allowed for the development's underground piping system as well as curbs and gutters to be downsized thereby lessening the environmental impact of the development and saving significant sums on construction.

In order to achieve the desired goals of the light-imprint TND plan, a tree protection fence is introduced in the erosion control phase to protect the existing mature trees. That strategy results in a 27% cost increase when compared with the conventional proposed method. Yet, a cost saving between the two methods was found in the storm water management phase. A 50% cost savings would be achieved by the following simple actions: 1) omission of curb and gutter in strategic areas; 2) reduction in the amount of pipe required as well as reduction in their lengths and size; 3) reduction in the need for inlets to underground pipes; and 4) the introduction of smaller rain gardens throughout the community to replace the one large retention pond.

The introduction of rain gardens also adds aesthetically pleasing natural areas and neighborhood recreation areas. Rain gardens would remove a greater amount of pollutants from runoff before the pollutants could reach the Reedy River. Also, there are two road pavement issues that reduce costs. First, building 24 feet wide roads instead of 26 feet wide roads results in a significant reduction of land coverage and paving costs. Second, substituting crushed stone in place of asphalt-paved alleys saves over 20% in development costs.

Pearlman summarizes, "Implementing the light-imprint engineering method results in over 30% cost savings in actual construction dollars for the first phase. That cost saving is in addition to the added value realized by the preserved mature trees and communal rain gardens."

Stephen L. Davis, P.E., of Davis & Floyd Engineers, is also active in the development of Griffin Park. He is an enthusiastic supporter of the Light Imprint approach to New Urbanism but tempers it with reality from a long-range standpoint. Davis uses the term "ground truthing" to determine how practical it is to get Light Imprint communities approved by municipalities and then actually built. Ultimately, their success must be measured over the life of the community.

Davis explains, "Standard engineering methods are quicker to complete and easier to submit for permits for processing. In order to have the Light Imprint approach embraced by advocates of New Urbanism within municipalities and the development and building industry, it is important to have the Light Imprint model presented as a comprehensive strategy." He also advises that this strategy should not substantially affect the New Urbanist design of street and lot layout along with other standard practices for common infrastructure elements including water and sanitary sewer. Additionally, when practicing Light Imprint New Urbanism, he states emphatically, "Engineering hydrology becomes critical." For example, soil analyses are needed to verify that soil is in compliance with rain garden absorption requirements and to confirm that smaller pipe size is sufficient for the system.

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Even though a comprehensive approach works best when applying the Light Imprint model, it is also important to make sure some of the technical issues work within the framework of good engineering practices. Davis points to the LINU strategy of allowing more storm water surface sheet-flow across pervious surfaces to encourage onsite absorption and to reduce the typical number of drain inlets and length of drainage pipe. This technique is good, but users should still apply the rule-of-thumb of a 400 linear feet maximum distance from a drain inlet using curb and gutter. Davis also finds additional ways to reduce infrastructure that may become over-designed for LINU. He suggests considering that the lots and streets along the neighborhood perimeter may not need swales since it may be possible to sheet flow the storm-water through the filtration landscaping directly into existing natural drainage systems.

Field supervision and on-going maintenance issues are also a major factor to consider. Additional supervision is needed to make sure the rain gardens are constructed properly. Proper design assures that water does not bypass the drainage area. Perforated drainpipes must be installed properly. Davis voices concern that there may be some binding with the rain gardens where they become dysfunctional over time. It helps if the rain garden plant material is indigenous and water tolerant; it should also be compatible with the desired community character and maintenance program. If pervious road surfaces are being considered for alleys, lanes, and streets without curb and gutter, then measures are needed to stabilize the road and alley shoulders to prevent soil erosion and tire rutting.

Finally, Davis advises that it will take time for LINU to become the norm rather than the exception. Designers and developers may not be able to implement all Light Imprint elements right away, but they could implement LINU in incremental stages as certain components are approved. Due to the pace of development and the need for projects to succeed, it is especially important to plan for incremental implementation.

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Joe W. Jelks, III, developer and founder of Griffin Park, sees the value in applying LINU. He explains, “For Griffin Park, the LINU case study for the first phase was compelling enough to lead our development team to apply LINU techniques even after the construction had started. The case study also convinced us to work with local stakeholders and approval agencies to holistically apply the LINU approach for the next phases.”

In forthcoming articles, the authors will elaborate on this approach including other case studies that have formulated different green engineering techniques based on transect zones and how the proposed methodology reduces the impact on watersheds on a larger regional scale.

Charts and Graphs:

The study, prepared by Duany Plater-Zyberk & Company, contains six plates of plan diagrams and one chart. The first two plates compare the master plan before and after the application of light imprint engineering. The second two plates show the engineering infrastructure for each of these plans. The fifth plate shows the Light Imprint TND catchment drainage area plan. The sixth plate shows the master plan with proposed reductions of pavement and curb and gutter. The chart is key, as it shows the substantial cost savings associated with applying the light imprint engineering techniques.

The referenced table shows the comparison between the two engineering methods for the first phase of the development of 42 acres and 174 lots. The table compares the costs of the two methods based on erosion control measures, storm water infrastructure, and pavement width and materials. Finally, it summarizes the cost of each.

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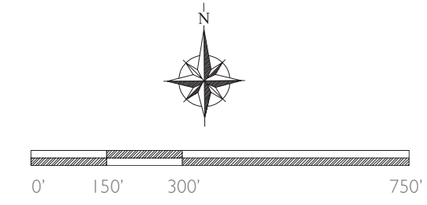
CONVENTIONAL TND MASTER PLAN

LIGHT IMPRINT TND MASTER PLAN



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CONVENTIONAL TND STORM WATER PLAN

LIGHT IMPRINT TND STORM WATER PLAN

STORM WATER INLET

MANHOLE

STORM WATER PIPE

STORM WATER DISCHARGE

UNDERGROUND STORM WATER STORAGE

RAIN GARDEN

N

0' 150' 300' 750'

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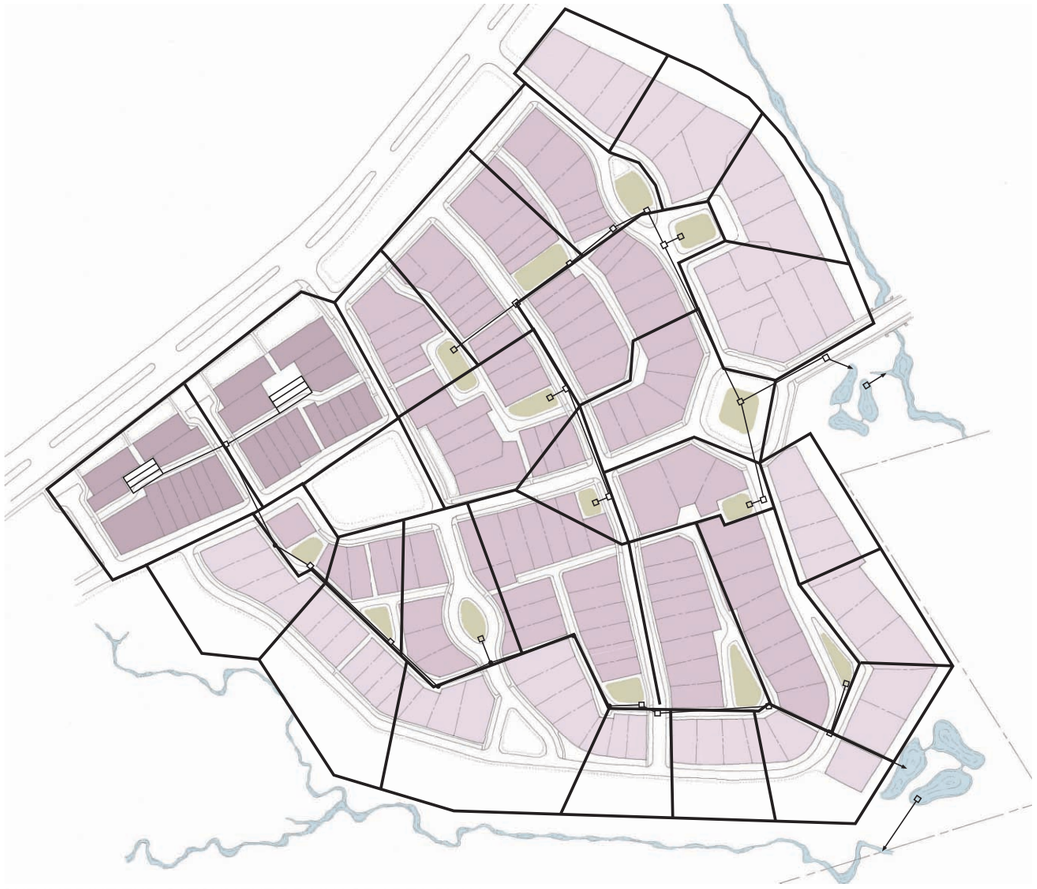

LIGHT IMPRINT TND CATCHMENT DRAINAGE AREA PLAN

STREET AND ALLEY REDUCTION PLAN

STORM WATER INLET

MANHOLE

STORM WATER PIPE

STORM WATER DISCHARGE

UNDERGROUND STORM WATER STORAGE

RAIN GARDEN

1) REPLACE IMPERVIOUS PAVING WITH CRUSHED STONE

2) REMOVE CURB AND GUTTER FROM STREET

3) REDUCE ALL STREET WIDTHS BY 2 FEET

N

0' 150' 300' 750'

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ENGINEERING COMPARISON									
Project:	Light Imprint New Urbanism Study								
Date:	6-Dec-06								
Details:	Phase I, 42 Acres, 176 Lots				174 Lots				
Conventional TND Engineering					Light Imprint TND Engineering				
Material	Quantity	Unit	Cost	**Total**	Material	Quantity	Unit	Cost	**Total**
Erosion Control									
Silt Fence	8450	LF	$4.00	$33,800.00	Silt Fence	8450	LF	$4.00	$33,800.00
Rip Rap	200	Tons	$55.00	$11,000.00	Rip Rap	200	Tons	$55.00	$11,000.00
					TPF	4225	LF	$4.00	$16,900.00
Total				**$44,800.00**					**$61,700.00**
Storm Water									
Inlets	101	Ea	$2,500.00	$252,500.00	Inlets	24	Ea	$2,500.00	$60,000.00
Pipes	9434	LF	$30.93	$291,793.62	Pipes	4182	LF	$30.93	$129,349.26
Retention Pond	1	Lump	$48,400.00	$48,400.00	Rain Gardens	20	Ea	$5,120.00	$102,400.00
Total				**$592,693.62**					**$291,749.26**
Pavement									
Curb & Gutter	18910	LF	$7.60	$143,716.00	C & G	13091	LF	$8.00	$104,728.00
Sidewalk	8276	SY	$25.00	$206,900.00	Sidewalk	7000	SY	$25.00	$175,000.00
Paved Road	26705	SY	$18.64	$497,781.20	Paved Road	20515	SY	$18.64	$382,399.60
Paved Alley	6470	SY	$13.36	$86,439.20	Crushed Stone - Alley	5765	SY	$12.00	$69,180.00
Total				**$934,836.40**					**$731,307.60**
Grand Total				**$1,572,330.02**					**$1,084,756.86**
Cost per Lot	176			**$8,933.69**		174			**$6,234.23**

Notes:
TPF - Tree Protection Fence
LF - Linear Feet
SY - Square Yard
Ea - Each

Overall 31% Saving
Per Lot 30% Saving

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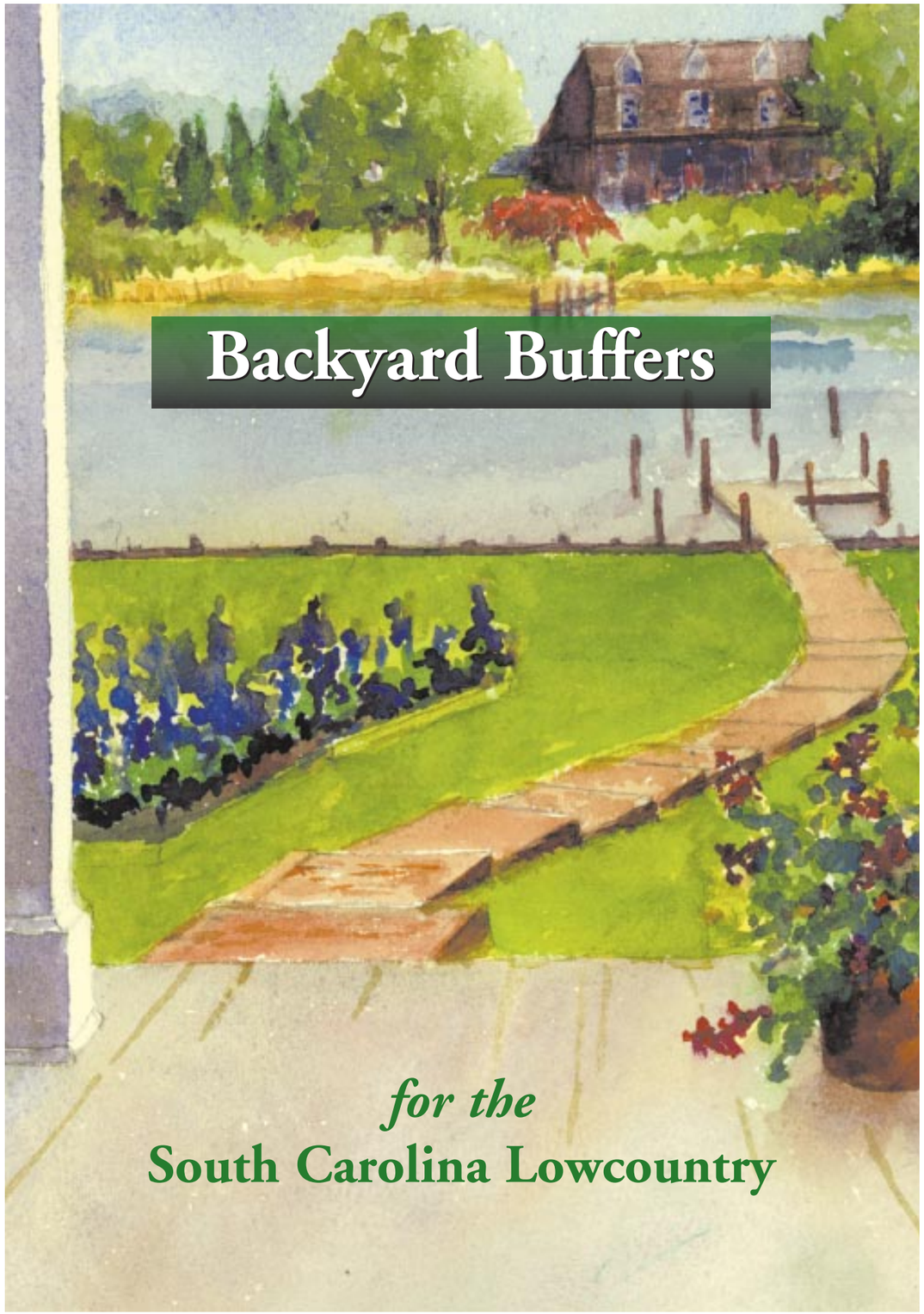


Backyard Buffers

for the

South Carolina Lowcountry

What's *wrong* with this picture?

Many people in South Carolina who live along the water would be surprised to discover that typical landscaping may actually harm the state's rivers and creeks.

Loss of Natural Shoreline

Landscaping with lawn all the way to the water increases stormwater runoff amounts. This runoff carries fertilizer, pesticides, sediments, and pet waste from lawns directly into waterways, polluting the aquatic environment. Landscaping to the water also increases riverbank erosion, increases the potential for flood damage, and decreases the available habitat for wildlife. Scenic natural views are lost as well.

Reduced Quality of Place

Failure to understand the effects of our actions on the environment has impaired natural biological functions and led to a loss of natural beauty throughout the South Carolina Lowcountry.

What's *right* with this picture?

By retaining or restoring native shoreline plantings we improve our immediate environment as well as the overall health of our waterways.

A More Natural Environment

A vegetated buffer between upland development and water protects more fish, shellfish, and terrestrial wildlife and produces less polluted stormwater runoff.

A Sheltered Look

Your views as well as those from the water are enhanced by native plantings. With buffers on both sides of the water, the view from each bank is primarily of trees and other vegetation and not of lawns and houses. Docks become the main visible manmade structures.

Good Economics

The efforts made at each home can lead directly to increased property values, lower yard maintenance costs, and less chance for property damage from Mother Nature.

Benefits of Vegetated Riparian Buffers

Shoreline or riparian buffers are corridors of native vegetation along rivers, streams, and tidal wetlands that protect waterways by providing a transition zone between upland development and adjoining surface waters. Vegetated buffers are beneficial environmentally, aesthetically, and economically.

Minimize Stormwater Pollution

Buffer vegetation captures sediments and pesticides in runoff and a large amount of nitrogen and phosphorus, which are primary pollutants to waterways. By slowing stormwater runoff, the vegetation absorbs some pollutants and allows sediments to settle out before reaching a waterway.

Reduce Erosion

The deep root systems of trees and shrubs absorb stormwater and stabilize shoreline soil to reduce erosion along the banks of waterways.

Reduce Heating of Waterways

Stormwater runoff heated by sunlight can raise the temperature of receiving waterbodies, which can impair the aquatic environment. The trees in a riparian buffer shade the ground to reduce surface heating.

Create a Sense of Place & Privacy

A homeowner can plan a landscape to frame desirable views, screen unwanted views, and enhance what others see from the water. Dense plantings reduce noise pollution.

Reduce Flooding and Flood Damage

Vegetated buffers reduce downstream flooding by slowing stormwater velocity and storing water in soils. Riparian buffers also reduce flood damage by keeping development back from the immediate banks of waterways.

Preserve Natural Habitat

Many wildlife species either live in riparian areas or use them as travel corridors. Wider buffers support more species and continuous buffers are very effective in protecting amphibians, colonial water birds, and coastal fish spawning and nursery areas.

Save Money

By keeping development away from floodwaters, storm surges, and extreme high tides, buffers lessen property damage. By reducing flooding, erosion, and sedimentation they reduce public investment in stormwater management and waterway protection. Vegetated buffers cost less to maintain than turf, and using native vegetation has the additional advantage of requiring little or no fertilizers and pesticides.

Enjoy Your Surroundings

Your outdoor activities may be more enjoyable and healthful in the shade beneath trees, with more opportunities for recreational activities such as bird watching.

Planning Your Backyard Buffer

If you haven't built your home yet, have your builder clear only around the footprint of your home and minimize clearing near the water. It will significantly reduce both the amount of sedimentation caused by construction and future stormwater runoff amounts. In addition, your yard maintenance costs will be lower with native vegetation. Limit the amount of lawn on your property to what you really need.

What Are Your Concerns?

- View: Consider the views you want to maintain and frame a “view corridor” from your home with plantings composed of small trees, shrubs, and/or native grasses (but not lawn) that won't obstruct your view. Keep the view corridor at one-third your lot's total width or less. Preserve and plant larger trees in the rest of your buffer.

- Attractive Foliage: Do you want to attract certain animals to your backyard buffer, such as hummingbirds or butterflies? Do you want to keep nuisance animals, such as deer, away? Certain plants will attract certain animals, while other plants are known to be deer-resistant (see pages 6-8).

- Plant Type: Do you want flowering plants? Evergreens? What time of year do you want to see blooms?

- Plant Location: Determine where you want different plant types. Where do you want shrubs and where you do want trees, flowering plants, or native grasses? Don't worry about particular species yet, but to aid you later in picking particular species, decide the maximum plant height and spread you want in certain areas. If you want to attract birds or butterflies, determine where in your yard you would like to see them.

Preparing Your Yard

- The first step is to remove any sod in the first area you are going to plant. Most herbicides should not be used for this purpose because they can pollute stormwater runoff and receiving waterbodies. Instead, cover the sod with a tarp to block sunlight and kill the grass. (You could cover the tarp with pine straw in the interim.) Till the soil after the grass is dead to break up the soil.

- Remove all other non-native vegetation from the buffer area.

- Determine your soil type and test the soil for its pH level. Many plants will tolerate a wide pH range, but will do best when planted in the right soil. Be aware that different areas on the same property may have vastly different soils because of imported fill. You can take a soil sample to your local Clemson Extension Service to determine the pH of your soil for a nominal fee.

Planning Your Layout

- The buffer can be phased in over time. You don't need to do everything at once.
- Pick the native plants you want in your buffer (refer to page 6-8 for plant information). For those who have not yet built their homes, saving existing native plants reduces costs, leaves habitat undisturbed, and limits the substantial amount of erosion caused by clearing for construction.
- Slower growing plants may take longer to fill in empty spaces, but they will require less maintenance and most will last longer because they are more resistant to damage from storms.

A To get from your back lawn to your dock and to the water, construct a boardwalk through the buffer to prevent the channelization of stormwater runoff that occurs with dirt footpaths. Dirt footpaths are permissible in a buffer if they run parallel to the water.

B Mass your plants together. You want to be sure your plantings are dense and that there are no large patches of unplanted ground because you will increase the amount of sediment washed into the receiving waterbody. Dense plantings provide better stormwater filtration. You will need enough space between plants, however, to allow each to reach its full spread at maturity.

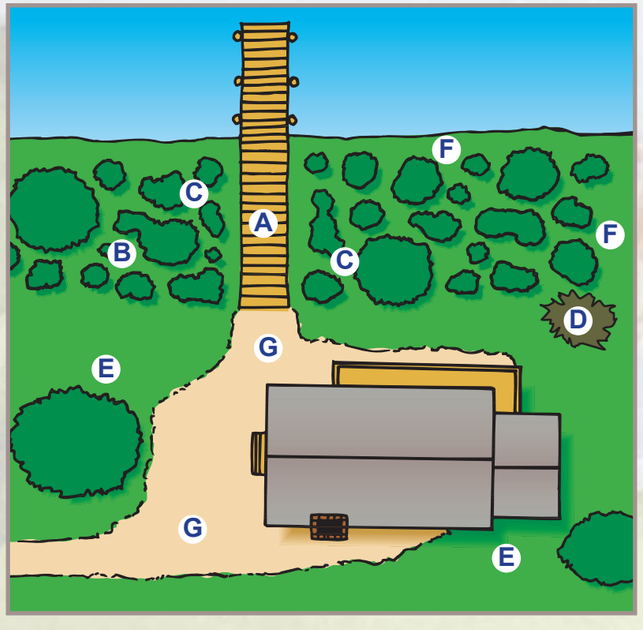
C Strive for diversity - a mix of trees, shrubs, ground covers, and native grasses. Large expanses of the same species of plant are prone to disease and infestation from insects. Select plants that flower and bear fruit at different times of the year.

D Snags and dead trees are beneficial for birds as perches, for nests and roost sites, and as sources of insects for food. If they do not threaten structures or driveways, consider leaving dead trees and snags in place.

E Locate tall trees on the east and west sides of the house to shade roof and walls.

F After planting, mulch your buffer area two to four inches deep with organic matter such as pine straw, leaves, or bark.

G Select ground cover instead of hard surfaces to absorb rainfall and reduce heat buildup. Porous surfaces, such as brick driveways and mulch paths, are better for handling stormwater runoff than paved surfaces because they allow water to soak into the ground.



South Carolina Lowcountry Native Plant List

EVERGREEN or DECIDUOUS: Is it an evergreen or a deciduous plant?
ATTRACT WILDLIFE: What wildlife does it attract?
DEER RESISTANCE: Is the plant resistant to being fed upon by deer? (Lack of other available natural forage may affect deer resistance.)
BLOOM: When does it bloom, if at all?
COLOR BLOOM: What is the color of the blooms?
FRUIT: What fruit does it produce, if any?
SOIL TYPE: What type of soil does it prefer?
SALTWATER/BRACKISH: If you are planting at the water's edge, is the plant tolerant to salt water or brackish conditions?
HEIGHT at MATURITY: What is the plant's height at maturity?
SPREAD at MATURITY: What is the plant's spread at maturity?
SUN PREFERENCE: Does it have a sunlight preference?

FLOWERING PERRENIALS

Scientific Name	Common Name		Attract Wildlife	Deer Resistant	Bloom	Color Bloom	Fruit	Soil Type		Salt/Brackish	Height at Maturity	Spread at Maturity	Sun Preference
Asclepias tuberosa	Butterfly Weed		Butterflies	No	May-Aug	Orange		Dry or moist			12-30"	12-18"	Full sun/ part shade
Coreopis augustifolia	Tickseed Coreopsis		Butterflies, songbirds		Aug-Oct	Yellow		Dry or moist			3-5'	2-3'	Full sun/ part shade
Coreopis lanceolata	Coreopsis		Butterflies, songbirds	No	Apr-Jun	Yellow		Dry			12-18"	12-18"	Full sun/ part shade
Eyrthrina herbacea	Coral Bean		Butterflies, hummingbirds	Yes	May-Jul	Red	Scarlet seeds	Dry or moist, sandy		Salt	2-5'	2-5'	Full sun/ part shade
Helianthus angustifolius	Swamp sunflower		Butterflies, songbirds		Jul-frost	Yellow		Moist or wet, sandy			3-6'	2-3'	Full sun
Hibiscus moscheutos	Swamp Rose mallow		Butterflies		Jun-Sep	White, Pink		Moist or wet		Brac	3-4'	3-4'	Full sun/ part shade
Iris virginica	Blue Flag Iris		Hummingbirds		Apr-May	Blue		Moist or wet, acidic			1-2'	6-12"	shade to part shade
Kosteletzkya virginica	Seashore Mallow		Butterflies, hummingbirds		Jul-Oct	Pink, Lavender, White		Moist or wet		Brac	5'	2-3'	Full sun
Liatris spicata	Blazing Star		Butterflies		Sep-Oct	Lavender		Moist or dry, acidic		Salt	1-6'	6-12"	Full sun
Oenothera drummondii	Beach Evening Primrose		Butterflies	Yes	Mar-Nov	Yellow		Dry		Salt	6-12"	1-2'	Full sun
Oenthera speciosa	Evening Primrose		Butterflies		Apr-Oct	Pink		Dry		Salt	1-2'	Ground cover	Full sun
Phlox carolina	Carolina Phlox		Butterflies, hummingbirds	No	May-Jul	Pink, Lavender, White		Moist, acidic			1-3'	6-18"	Full sun/ part shade
Rudbeckia fulgida	Black-eyed Susan		Birds		Aug-Oct	Yellow or Orange		Moist or dry, acidic		Salt	2-3'	18-24"	Full sun/ part shade
Rudbeckia hirta	Black-eyed Susan		Birds	No	May-Jul	Yellow, Orange, Red		Moist or dry, acidic			3-4'	2-3'	Full sun/ part shade
Saliva coccinea	Scarlet Sage		Butterflies, hummingbirds		Feb-Nov	Red		Dry, sandy			24"	3-6"	Full sun/ part shade
Salvia lyrata	Lyre-leaved Sage		Butterflies, hummingbirds		Apr-May	Blue		Dry to wet, acidic			12-32"	3-5"	Sun or shade
Solidago sempervirens	Seaside Goldenrod		Butterflies, birds		Aug-Nov	Yellow		Moist or dry, acidic		Salt	1-6'	1-2'	Full sun/ part shade
Verbena canadensis	Pink Verbena		Butterflies		Mar-May	Pink,		Dry			6-12"	Ground cover	Full sun

TREES

Scientific Name	Common Name	Evergreen/Decidious	Attract Wildlife	Deer Resistant	Bloom	Color Bloom	Fruit	Soil Type	Salt/Brackish	Height at Maturity	Spread at Maturity	Sun Preference
Acer rubrum	Red maple	Dec	Song birds	No	Feb-Mar	Red	Red winged seed	Wet or dry		50-60'	35'	Full sun to part shade
Magnolia grandiflora	Southern Magnolia	Evg	Birds	No	May-June	Creamy white	Cone, Red seed	No pref	Salt	60-80'	30-50'	Full sun to part shade
Pinus elliottii	Slash Pine	Evg	Song birds		No		Cones	Moist	Salt	Up to 100'	40-60'	Full sun
Pinus taeda	Loblolly Pine	Evg	Song birds		No		Cones	Acidic	Salt	50-90'	20-30'	Full sun
Quercus falcata	Southern Red Oak	Dec	Birds, mammals		No		Acorn	Dry, acidic	Salt	70-80'	40-50'	Full sun to part shade
Quercus laurifolia	Laurel Oak	Evg	Birds, mammals		No		Acorn	Dry or moist, sandy		40 to 60'	30-40'	Full sun to part shade
Quercus phellos	Willow Oak	Dec	Birds, mammals		No		Acorn	Wet or moist, acidic		60-75'	40-60'	Full sun
Quercus virginica	Live Oak	Evg	Birds, mammals, Butterflies		No		Acorn	Moist	Salt	40-80'	60-100'	Full sun
Sabel palmetto	Cabbage Palmetto	Evg	Birds, mammals, Butterflies	Yes	Yes	Cream	Black berries	Moist	Salt	30-50'	8'	Full sun
Taxodium distichum	Bald Cypress	Dec	Birds		No		Cones	Wet		100-120'	30-40'	Full sun

SMALL TREES

Scientific Name	Common Name	Evergreen/Decidious	Attract Wildlife	Deer Resistant	Bloom	Color Bloom	Fruit	Soil Type	Salt/Brackish	Height at Maturity	Spread at Maturity	Sun Preference
Aesculus pavia	Red Buckeye	Dec	Humming-birds, squirrels		Apr-May	Red		No Pref	Brac	20-25'		Part shade
Cercis canadensis	Eastern Redbud	Dec	Birds		Mar-May	Lavender		Moist or dry, acid		Up to 30'	15-35'	Full sun to part shade
Chinanthus virginicus	Fringe Tree	Dec	Birds, mammals		Jul-Sep	Off white				Up to 30'		
Cornus florida	Dogwood	Dec	Birds		Mar-Apr	White, pink,red	Red berry	Moist or dry		Up to 40'	Up to 50'	Sun or shade
Gordonia lasianthus	Loblolly Bay	Evg		No	Jul-Sep	White		Wet or moist, acidic		Up to 75'	20-30'	Full sun
Juniperus virginiana	Red Cedar	Evg	Songbirds, butterflies, mammals	No	No		Blue berry	No pref	Salt	40-60'	20-30'	Full sun
Magnolia virginiana	Sweetbay Magnolia	Semi Evg	Birds, butterflies	No	Apr-Jul	White	Cone, red seed	Moist or wet, acidic		40-50'	15-25'	Full sun to part shade
Persea borbonia	Red Bay	Evg	Birds, butterflies	No	No		Blue berry	Moist or dry	Salt	30-40'	20-30	Full sun to part shade
Prunus caroliniana	Cherry Laurel	Evg	Birds		Mar-Apr	White	Black berry	Moist	Salt	Up to 40'	6-10'	Full sun to part shade
Sassafras albidum	Sassafras	Dec	Birds		Mar-Apr	Yellow		Moist	Brac	Up to 50'	25-40'	Full sun to part shade

SHRUBS

Scientific Name	Common Name	Evergreen/Decidious	Attract Wildlife	Deer Resistant	Bloom	Color Bloom	Fruit	Soil Type	Salt/Brackish	Height at Maturity	Spread at Maturity	Sun Preference
Baccharis halmifolia	Salt Myrtle	Dec			Sep-Oct	White	Downy plumes	No pref	Brac	3-9'		Full sun/ part shade
Callicarpa americana	Beauty Berry	Dec	Birds, mammals	Yes	June-July	Pink	Purple berries	Dry or moist, acidic	Salt	Up to 8'	4-6'	Sun or shade
Cephalanthus occidentalis	Button Bush	Dec	Ducks & waterbirds		June-Aug	White		Wet		3-4'		Sun or shade
Clethra alnifolia	Sweet Pepper bush	Dec	Butterflies, birds, mammals	Yes	May-July	White		Wet, acidic, sandy or clay		3-10'	3-4'	Sun or shade
Ilex glabra	Inkberry	Evg	Birds	Yes	Mar-Apr	White	Black berries	Moist, acidic, sandy	Brac	7-9'	7-8'	Sun or shade
Ilex vomitoria	Yaupon Holly	Evg	Songbirds		Mar-Apr	White	Red berries	Moist or dry	Salt	20-25'	10-15'	Full sun/ part shade
Itea virginica	Virginia Sweetspire	Dec	Butterflies, birds	No	May-June	White		Moist or wet, acidic		3-6'	3-4'	Part shade to shade
Leucothoe axillaris	Leucothoe	Evg			Mar-May	White		Moist or wet, acidic		Up to 5'	2-3'	Part shade to shade
Myrica cerifera	Wax Myrtle	Evg	Song birds		No		Blue berries	No pref	Salt	15-20'	15-20'	Full sun/ part shade
Osmanthus Americana	Wild Olive	Evg	Birds, mammals		Apr-May	Cream	Blue drupe	Dry or moist, acidic	Salt	15-30'	20-30'	Full sun/ part shade
Rhododendron canescens	Wild Azalea	Dec	Butteflies, Hummingbirds		Mar-May	Pink		Moist, acidic		6-10'	6-10'	Full sun/ part shade
Rhododendron atlanticum	Dwarf Azalea	Dec	Butteflies, Hummingbirds		Apr-May	Pink		Moist or dry		3-5'	2-3'	Full sun/ part shade
Sabal minor	Shrub Palmetto	Evg	Birds	Yes	May-June	White	Black berries	Moist or wet	Brac	4-5'	4-5'	Part shade to shade
Sabal repens	Saw Palmetto	Dec	Birds	Yes	May-July	White	Blue-black drupe	Moist or dry	Salt	4-5'	4-5'	Full sun/ part shade
Vaccinium aboreum	Sparkle-berry	Evg	Birds, butterflies	No	Apr-Jun	White	Black berries	Dry or moist	Salt	Up to 30'	15-20'	Sun or shade
Yucca aloifolia	Spanish Bayonet	Evg	Moths	Yes	June-July	White	Purple	Dry	Salt	5-10'	2-3'	Full sun/ part shade
Yucca filamentosa	Bear Grass	Evg	Moths	Yes	Apr-June	White	Purple	Dry	Salt	2-4'	1-2'	Full sun/ part shade

GRASSES

Scientific Name	Common Name	Evergreen/Decidious	Attract Wildlife	Deer Resistant	Bloom	Color Bloom	Fruit	Soil Type	Salt/Brackish	Height at Maturity	Spread at Maturity	Sun Preference
Andropogon glomeratus	Bushy Broomsedge		Birds, mammals		Aug-Oct	Silvery white	Silver	Moist	Brac	2-5'	1-2'	Full sun
Andropogon virginicus	Broomsedge		Birds		Sep-Oct		White	Dry or moist	Salt	2-5'	1-2'	Full sun
Dichromena latifolia	Whitetop Sedge				May-Sep	white		Wet or Moist	Brac	Up to 4'	6-12"	Full sun/ part shade
Muhlenbergia filipes	Sweetgrass Perenn			Yes	Oct-Nov	Pink	Purple	Dry or moist	Salt	2-4'	1-2'	Full sun
Panicum amarum	Seaside Panicum		Birds	Yes	Oct		Purple	Dry	Salt	15-40"	2-3'	Full sun
Panicum virgatum	Switch Grass		Birds	Yes	Jun-Oct	Pink, Purple		Moist or wet	Brac	3-4'	1-2'	Full sun/ part shade
Uniola paniculata	Sea Oats		Birds	Yes	Jun-Nov		Oats	Dry	Salt	3-6'	1-2'	Full sun

Buffer Management

- Plant all cleared areas and remove any non-native plants. Inspect your buffer at least annually for invasive, non-native plants and remove them promptly. Such nuisance plants can overrun a buffer in a short period, impairing the buffer's ability to provide habitat and protect the aquatic environment.*
- Use fertilizer and pesticides sparingly, if at all. Native plants grew here before man arrived, so they are adapted to tolerate the area's extreme conditions and have their own natural defenses against pests.
- Pruning and Cutting: You may prune branches over time to maintain your view corridor, but be sure not to damage your trees or shrubs by cutting too many limbs.

* Contact OCRM or The Department of Natural Resources (DNR) for a list of the worst invasive, non-native plants in South Carolina.

Whom to Call for More Information:

South Carolina Department of Health and Environmental Control Office of Ocean and Coastal Resource Management (DHEC-OCRM): (843) 744-5838
United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) (in the phone book)
Your local Clemson Extension Service (in the phone book)
Charleston Soil and Water Conservation District (843) 727-4160, ext 3
Your local chapter of the South Carolina Native Plant Society (in the phone book)

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