

C. Creating a Tennessee Urban Riparian Buffer Plan

Introduction

The installation of a riparian buffer can most effectively and efficiently be done by initially devising a simple riparian buffer plan. This handout is intended to assist with its creation providing a set of steps to follow and factors to consider. It includes conducting a site assessment and developing a planting schematic that can be used to determine plant types and quantities to purchase. Its planting approach primarily incorporates the installation of bare root seedlings using one planting density, creating a plan that is low cost, easily installed, and maximizes stormwater and water quality benefits.

STEP 1: Consider how the buffer will be used

Waterside areas offer a range of opportunities for recreation and it is important to incorporate planned uses into the buffer plan.

Physical Access to the Waterway

Physical access points to a waterway may be desired for fishing, canoe launching, or picnicking. When planning, consider the following questions:

1. What is the intended use(s) of this access?
2. What ways could this access be used that are undesirable?
3. Do the benefits of having this access outweigh the potential drawbacks?

Once the uses are identified, the access point can be designed to meet these needs. Three design factors include access width, ground cover, and bank stability.

1. Access Width

Identify the narrowest possible width for the access point's intended use(s). For example, a three foot wide path may be sufficient for a homeowner who only plans to use the access for fishing. It may also limit unwanted uses by being narrow enough to go unnoticed or be used for unintended purposes.

Waterside Access Point Width Examples (feet)	
Homeowner fishing	3 ft
Picnic area with table	6-8 ft
Kayak/canoe launch	6-12 ft

2. Ground Cover

It is important to ensure that any exposed soils are minimal. Paths can be planted and maintained in grasses, or they may be covered in wood chips or gravel. Both options have their benefits and limitations. Grasses may be more appropriate for wider pathways that offer sufficient sun exposure, and wood chips may be washed away during periods of flooding. Consideration may be given to installing a mix of low-growing native grasses.

Initially, narrow paths may be planted in grasses but over time they may be shaded out by adjacent shrubs and trees and require another option such as wood chips or gravel. Many tree service companies will provide wood chips for free and may also deliver them when working in an area, while some municipalities may offer free or low cost mulch through their solid waste department.

3. Bank Stability

The bank fronting a waterway's access point should be planted minimally in low growing shrubs to offer protection from bank erosion. If a canoe or kayak launch is desired within the buffer, additional factors need to be considered including safety. The National Park Service's Rivers and Trails program provides a comprehensive design guide for a range of canoe and kayak launches entitled "Logical, Lasting Launches"

(<http://www.nps.gov/ncrc/programs/rtca/helpfultools/launchguide.pdf>).

Visual Access to the Waterway

"Windows" to a waterway may be created by strategically placing swaths of low-growing shrubs among the mix of taller growing trees and shrubs. In some urbanized situations, such as on school campuses, this may be necessary to create visual lines of site from one area of the campus to another. If this is being considered in the riparian plan, consider the following questions to help determine window width and placement.

1. Where will the viewer(s) most likely be located?
2. What is the narrowest width that can be used to meet site needs?
3. Is the access worth the long-term maintenance requirements?

The narrowest window option is always preferable since the streamside placement of only low-growing shrubs eliminates the buffer benefit of shading the adjacent waterway. There is also the consideration of long-term maintenance of these windows. With them being flanked by taller trees and shrubs, it is inevitable that taller shrubs and trees will migrate into the area requiring periodic removal.

Utility Line Access

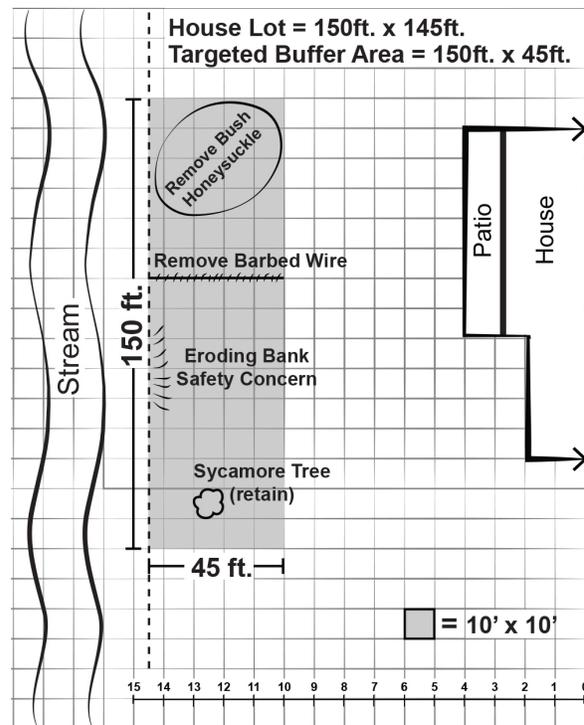
Utility companies have easements to run lines through properties and most have planting restrictions as a part of the easement agreements. For above ground power lines, there are typically limitations on installing plants of a certain height. If the buffer is potentially in an easement, contact the utility company to determine planting stipulations and whether the utility requires the submission of a planting plan. The risk of not contacting the company is that your installed plants may be mowed or sprayed with herbicide.

By state law, you are required to contact Tennessee811 to have underground utilities marked before any digging at the buffer site can occur.

STEP 2: Conduct a site inventory

Key information about the targeted buffer site needs to be collected in order to create a planting plan. The most effective way to collect this information is to visit the site to make and record observations. The **Targeted Buffer Site: Inventory** worksheet on page C-7 can be used to create a site inventory sketch. Consider incorporating the following factors:

- Native plants to be retained
- Invasive plants to be removed
- Saturated “soggy” ground (may be indicated by water-loving plants like sedges or rushes)
- Above-ground utilities and signs of underground utilities
- Potential safety hazards (e.g., holes in ground) to consider on the day of planting
- Adjacent buildings, taking note of vantage points to the buffer (e.g., from patio)

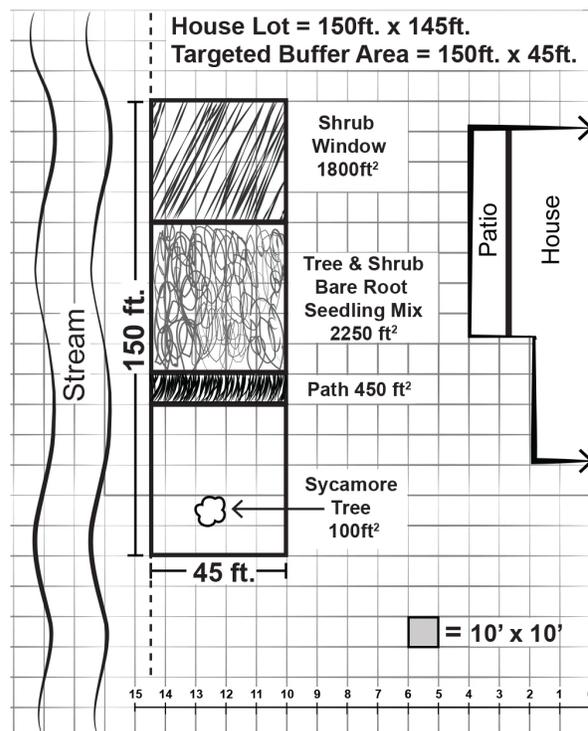


STEP 3: Create a plant layout

The planting layout defines the areas targeted for planting. It should include the site factors that will affect the size of the planting areas. The **Targeted Buffer Site: Planting Layout** worksheet on page C-8 can be used to create this schematic that could include:

- Walking paths(s)
- “Windows” for visual access to the waterway
- Kayak access
- Streamside picnic area
- Above and underground utilities

The scale of the grid can be adjusted according to the size of the site.

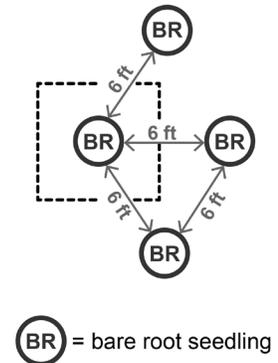


STEP 4: Determine plant stock and quantities

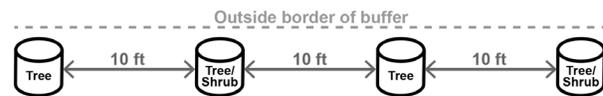
It is recommended for low-cost buffer plantings to primarily use **bare root seedlings**. **Container** and “**balled and burlapped**” (**B&B**) plants are much more expensive but may be strategically used for aesthetics. For example, they can be used as a buffer border, creating a neater edge and screening the remaining buffer as it goes through its early successional stages.

Plant Density Guidelines: The type of plant stock will determine how the plants are spaced or their planting density.

Bare root seedlings are to be placed about **six feet apart from one another**. Another way to visualize this spacing is that the seedling is located in the center of a 36 foot square. The reason for this “one size fits all” planting density is to ensure a high density planting that maximizes stormwater and water quality benefits and allows for some expected mortality of seedlings.



Container or B&B plant stock can be placed about 10 feet apart from one another. By alternating trees and shrubs more visual interest and diversity can be created.



Knowing the size of a planting area and the planting density, plant quantities can easily be determined. Following is an example of planting quantities for a half-acre residential lot where the landowner wants a “window” to view the stream and a pathway to access it for fishing.

Example of Plant Quantity Determination

Half-Acre Residential Lot: Buffer with “Window”, Path, and Visual Screen

Plan: A “window” with shrubs of low to moderate height will be located in front of the home’s front porch and a mulch walking path to the stream will be installed. A row of container/B&B trees/shrubs will be planted along the inside edge of the buffer to serve as a visual screen.

Total Buffer Area = 45 ft buffer width X 150 ft buffer length = 6750 ft²

Path = 45 ft X 10 ft = 450 ft²

“Shrub Window” Planting Area = 45 ft x 30 ft = 1350 ft²

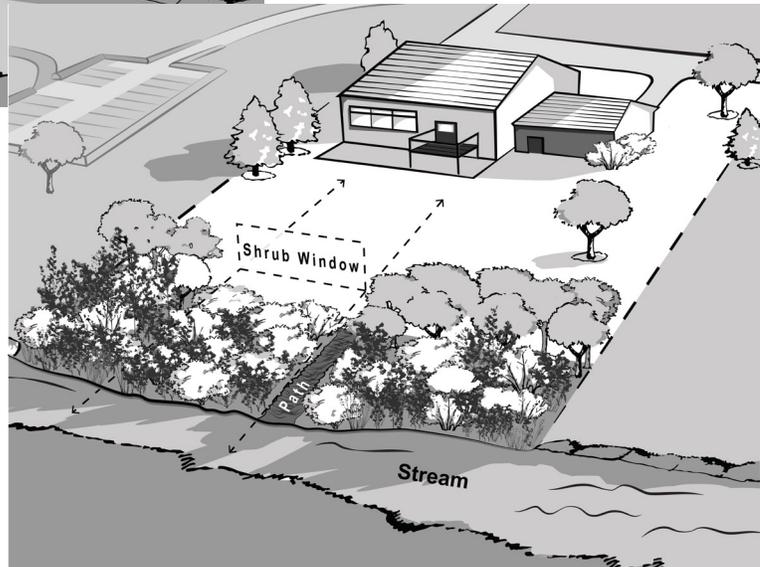
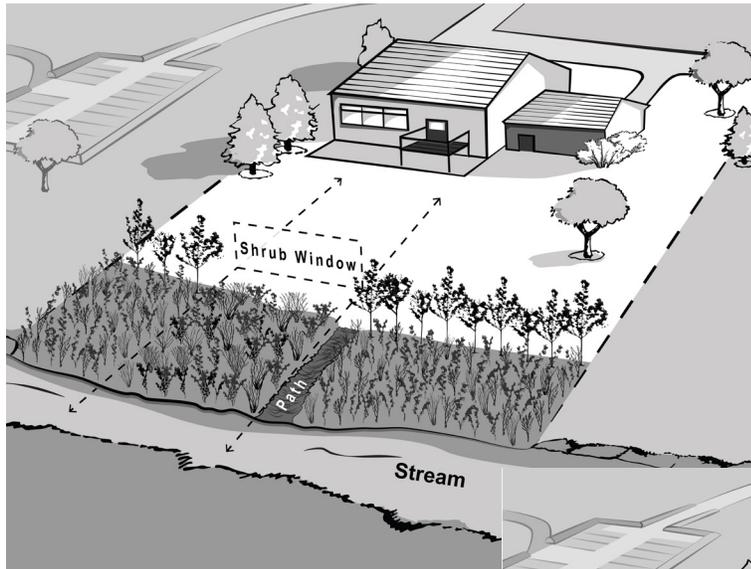
Tree/Shrub Planting Area = 6750 ft²- 450 ft²- 1350 ft²= 4,950 ft²

of Bare Root Seedlings

- Tree/Shrub Mix = 4950 ft² / 36 ft² = 138
- Shrub Window = 1350 ft² / 36 ft² = 38

Container/B&B Plants

- 150 ft buffer length - 30 ft shrub window - 10 ft path = 110 linear feet
- 110 linear ft / 10 ft spacing = 11



Plant Selection Considerations: A number of factors can be considered when selecting plant species for the buffer site. These include whether they are native to a particular region of Tennessee, their plant form, their preferred growing conditions, their wildlife value and appearance (see “D. Tennessee Native Riparian Plant List”).

Mix of Plant Species: In determining the number and mix of plant species, no one species should dominate and there should be enough species that if one or two species do not make it, a healthy buffer stand will remain. Consider the following guidelines to help achieve these objectives:

- No one species should comprise more than 20% of the mix of species.
- Include a mix of canopy, subcanopy and shrub species, with about 60% or more of the total plant count consisting of canopy trees.

Another factor that needs to be considered when purchasing bare root seedlings is that most nurseries provide them in multiples of 25 or 100. If extra plants are purchased as a result, consider overplanting the buffer site or using them as give-a-ways.

Example of Plant Type and Mix
Half-Acre Residential Lot: Buffer with “Window”, Path and Visual Screen

About 180 bare root seedlings are required in this scenario, with about 40 being relatively low growing shrubs for the “window.” Following is a mix of plants for this site. The numbers take into account that the seedlings will be purchased in bundles of 25. In addition, a mix of 11 available container and/or B&B trees and shrubs of the same species (e.g. red maple, tulip poplar, wild hydrangea) could be purchased for the buffer’s edge that would create a visual screen.

Canopy	#	Subcanopy	#	Shrubs	#	Total
Willow oak	25	Red mulberry	25	Wild hydrangea	25	75
Shumard oak	25			Hearts-a-bustin	25	50
Tulip poplar	25					25
Red maple	25					25
Sweetgum	25					25
Total	125		25		50	200

The Tennessee Urban Riparian Buffer Handbook Series

This handout is one of a series of supporting appendices to the **Tennessee Urban Riparian Buffer Handbook**. To download go to: <http://tn.gov/agriculture/topic/ag-forests-urban>

- A. The Tennessee Urban Riparian Buffer
- B. Tennessee Riparian Buffer Site Assessment
- C. Creating a Tennessee Urban Riparian Buffer
- D. Tennessee Native Riparian Plants List
- E. The Threat of Invasive Plants to Tennessee Urban Riparian Buffers
- F. Organizing and Conducting a Riparian Buffer Community Planting
- G. Properly Installing Plants: How to Plant Trees and Shrubs

Targeted Buffer Site: Inventory

Location: _____ Date: _____

Lot Dimensions: _____ Buffer Area Dimensions: _____

A large grid of graph paper for data entry, consisting of 20 columns and 30 rows of small squares.

Targeted Buffer Site: Planting Layout

Location: _____ Date: _____

Lot Dimensions: _____ Buffer Area Dimensions: _____

