Greenville County Technical Specification

WQ-11 PERMANENT WATER QUALITY STREAM BUFFER

1.0 Permanent Water Quality Stream Buffer

1.1 Description

A Permanent Water Quality Stream Buffer is the area along a shoreline, wetland or stream meant to protect the waterbody. Development is restricted or prohibited in the stream buffer to prevent impacts to the waterbody. In addition, the stream buffer provides the following:

- Protection to the overall stream quality by providing shade for the stream,
- Natural habit for wildlife, and
- A setback from the stream to prevent damage to structures or improved property due to flooding or changes in the stream channel.

When a buffer must be disturbed, promptly stabilize it with a dense cover of strong rooted grasses, native plants, and native trees. When certain conditions are met, the buffer may be used for water quality treatment.

1.2 When and Where to Use

The most effective Stream Buffers for protecting water quality are those that consist of undisturbed natural vegetation including maintaining the original tree line along the stream or channel banks. The buffer remains undisturbed to the maximum extent practical. Immediately stabilize any stream buffer area that is temporarily disturbed with a dense cover of strong rooted natural grasses, native plants, and native trees. Buffers may also be created or enhanced by planting new vegetation of native varieties and stabilizing the area.

1.3 Classification

Major streams, drainage ways and water bodies have Stream Buffer requirements based on Tree Ordinance and the following classifications:

Class 1: Streams with drainage area less than 50 acres
Class 2: Streams with drainage area 50 acres or greater

According to the Tree Ordinance, for Class 1 streams, the buffer must be at least 50 feet wide (measured from the streambank). For Class 2 streams, the buffer must be at least 100 feet wide (measured from the streambank). However, this Specification is written in reference to the water quality function of stream buffers, which is not a necessary requirement of the Tree Ordinance. While the ordinance establishes minimum lengths of buffers, this Specification establishes the requirements if a designer wishes to use the buffer area for water quality treatment. If any area designated as buffer by the Tree Ordinance is to be used for water quality, it must first meet all requirements of the Tree Ordinance.

1.4 Allowable Disturbances

The vegetative target for a stream buffer is mature forest. This area is used to protect water quality and the ecosystem of the stream. In addition, the area is expected to hold flood waters during large storm events. Clearing, grading, or cutting of vegetation is prohibited in this zone, and natural vegetation is preferred. In the event stabilization measures are needed, use native vegetation.

While the Tree Ordinance may allow some disturbances within the stream buffer, some of those allowable disturbances will prohibit the designer from considering that portion of the buffer for water quality treatment. In order for any portion of the buffer to be used for water quality treatment purposes, native vegetation (or newly-planted native species) must be present and the requirements of Section 1.5 must be met. Any

disturbances, structures, or other factors that do not meet the requirements of Section 1.5 will prohibit that section of buffer from being used for water quality treatment, but will not present other sections of the buffer that meet the requirements from being used.

1.5 Design Requirements

Determine the required Stream Buffer width based on the watershed drainage areas. If the following design requirements are not met for a portion of the buffer, that portion cannot be used for meeting water quality requirements. If the following requirements are met, the stream buffer may be evaluated for its post development runoff water quality benefit using the IDEAL software. The requirements are as follows:

- Slope is not to exceed 8%.
- All runoff entering the undisturbed buffer must be sheet flow. This should be ensured by providing a level spreader followed by at least 10 feet of grassed filter strip meeting the specifications of WQ-12 (Vegetated Filter Strip).
- The level spreader must be constructed according to Specification WQ-13 and be designed such that flow with erosive velocity will bypass the grassed filter strip and undisturbed buffer and be discharged through a stabilized conveyance channel. Erosive velocity is defined as greater than 2.0 feet per second (fps) for mixed hardwood/pine forest or 1.5 fps for hardwood forests, and should be calculated using the slope from the steepest portion of the stream buffer. The Manning's n-value should be 0.05 for hardwood forests and 0.075 for mixed hardwood/pine.
- The length (in the direction of flow) of the forested section of the stream buffer may be less than the length of the entire buffer. This will allow the designer to evaluate the water quality benefit of the buffer even if there are disturbances, as long as portion used for water quality treatment is upstream of the disturbance.
- If there is significant change in slope in the portion of the stream buffer that is to be used for water quality treatment, sections with different slopes should be considered as separate sections for modeling purposes. It is recommended that sections with slopes differing by more than 1% be considered separately.

1.6 Maintenance

Clearly mark the buffer extents before construction begins to prevent unnecessary disturbance. Stabilize all sediment as soon as possible. After construction, maintain the level spreader and vegetated filter areas as needed. Removal of invasive species or diseased plants and planting of new native species is permitted, so long as disturbance from these activities is minimized, and the soil is stabilized immediately after completion.

1.7 Marking Permanent Water Quality Stream Buffer and Final Plat Requirements

Clearly mark the stream buffer during construction to protect it and prevent unnecessary disturbance. Prior to the initiating of land disturbing activities, ensure construction layout surveys include staking and labeling of the Stream Buffer. Use a combination of staking, flagging, construction fencing and/or other methods to ensure adequate visibility of the Stream Buffer during construction activities.

Ensure the final plat shows the exact boundary of all Permanent Water Quality Stream Buffers prepared by a registered surveyor.

Provide visible permanent Stream Buffer boundary markers approved by Greenville County prior to recording the final plat for the property. Ensure the boundary markers are installed in a visible area located on the landward edge of the Stream Buffer. Place boundary markers a minimum of one every 100 linear feet of Stream Buffer. Where possible, attach the permanent boundary markers to trees larger than 6-inches in diameter. Where it is not possible to attach the marker to a tree, use treated wood, steel, or plastic signposts.

Ensure the final plat contains the following statement:

"This property contains a Permanent Water Quality Stream Buffer that must be maintained in perpetuity in accordance with the recorded Operations and Maintenance Agreement by the responsible property owner. No clearing, grading, construction or disturbance is permitted in the Permanent Water Quality Stream Buffer except as permitted by the Permanent Water Quality Stream Buffer Technical Specification WQ-11 (2018 Revision) and permitted by Greenville County."

1.8 IDEAL Modeling

The stream buffer may be modeled as a BMP in IDEAL if the design requirements above are met. The buffer should be modeled as two parts: the grassed section and the forested section. The grassed section is a VFS preceded by a Diffuse Connector modeled according to the instructions in WQ-12 (Vegetated Filter Strip). The grassed VFS should discharge to another VFS object, using another Diffuse Connector. The forested VFS should have one of the two "forested" options selected.

Table 1: IDEAL Modeling Guide

Forested Buffer Modeling in IDEAL		
What to Model as in IDEAL	Vegetative Filter Strip; if a gravel trench is to be used before the VFS, it should be modeled in IDEAL as a separate infiltration trench. Diversions do not need to be modeled because IDEAL will automatically bypass flows greater than 2.5 fps.	
Similar BMPs	Vegetated Filter Strips (grassed)	
Specifications Needed for IDEAL	Dimensions, slope, and % peak flow for routing of the filter strip	
	Direct loading of bacteria that will be entering the filter strip	
	Type of forested condition (mixed forest indicates a higher density of trees than hardwood forest)	
	Direct loading of bacteria that will be entering the filter strip	
Parameters that Drive Performance	Feature	How Value Affects Sediment Trapping Efficiency (TE)
	Width (perpendicular to flow)	Increasing width slows velocity and increases TE
	Slope	Flatter slope slows velocity and increases TE
	Underlying Soil Texture	Soils with higher infiltration capabilities increase TE