

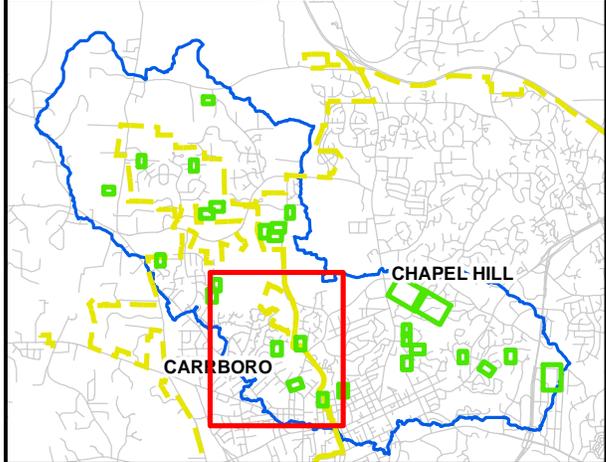
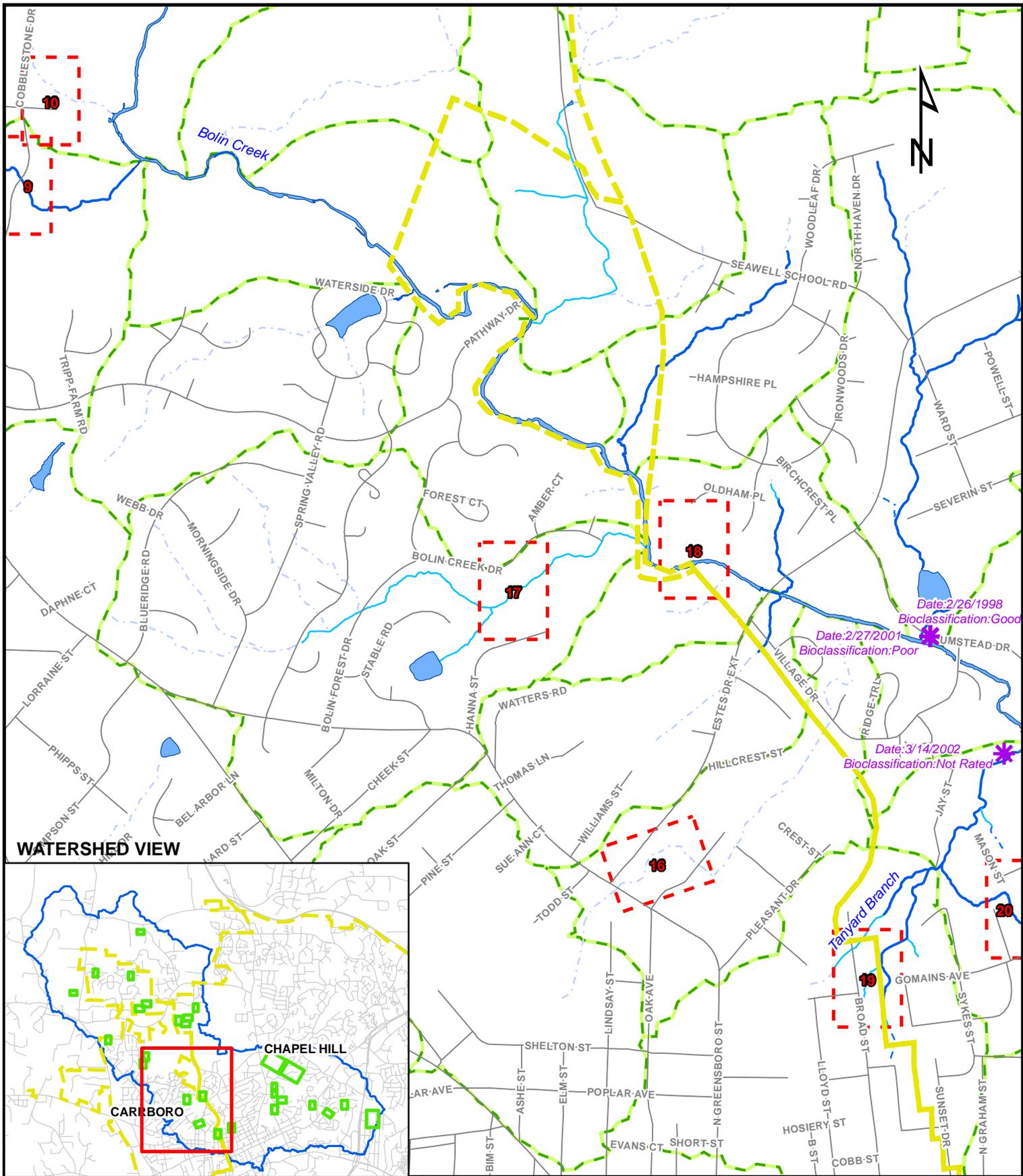
SITE 17

Offline Bioretention Area and Sediment Reduction Below New Development.

Index Sheet No.: 20
Raw Data Name: BD 11



Estimated Construction Cost: \$66,700



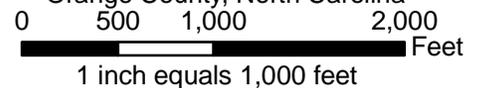
Legend

- Ambient Monitoring
- Benthic Monitoring
- Fish Sampling
- Municipal Boundary
- Orange County Roads
- Subwatersheds
- Perennial Stream
- Intermittent Stream
- Ephemeral Stream
- Stream, unknown flow



**SITE 17
VICINITY MAP**

Geomorphic Analysis and Identification of Potential Sites for Stormwater BMPs
Orange County, North Carolina



Project Description

	Drainage Area (acres)	Impervious Area (acres)	% Impervious
Site 17	156.0	36.4	23.3%

Location

Site 17 is located downhill and to the south of Bolin Creek Drive, and downhill and to the north of Hannah Street. A sewer easement runs along the stream where treatment is proposed.

Problem Description

Site 17 consists of an incised channel and actively eroding bank, as well as a relatively flat area in the floodplain of the stream in which an offline bioretention area could be constructed. Water quality treatment is lacking in most of this watershed, thus a flat area such as that present at Site 17 affords an opportunity for diversion of flow and pollutant treatment.

An actively eroding bank at Site 17 is causing export of sediment and loss of bank. Using the BANCS model, it is estimated that approximately 60.8 tons of sediment are being exported from the site each year. Concomitant nutrient export has also been calculated and is listed in **Table 17.1**.

Table 17.1

Pre-Treatment	
Estimated Total Sediment Export	60.8 tons/year
Erosion per length of Channel	1 tons/yr/ft
Pounds of Nitrogen	121.6 lbs/year
Pounds of Phosphorus	60.8 lbs/year
Post-Treatment	
Estimated Total Sediment Export	0.2 tons/year
Erosion per length of Channel	0 tons/yr/ft
Pounds of Nitrogen	0.3 lbs/year
Pounds of Phosphorus	0.2 lbs/year

Proposed Solution

As with other bank stabilization/restoration projects, this site could benefit primarily from a change in the stream cross-section that provides the following:

- a bankfull bench that gives the stream a floodplain to access, thus significantly reducing near bank stress during above-bankfull events

*Bolin Creek Watershed
Geomorphic Analysis and Potential Site Identification for Stormwater BMPs and Retrofits*

- reduced slopes on the bank, at a maximum of 2:1, thus reducing potential for bank erosion
- vegetated banks with woody plants that will provide stabilization through rooting depth

By modifying the cross-section of the stream in this way for the length of the extreme eroding banks, the sediment export rates of this site could potentially be reduced to 0.2 tons per year, with a corresponding reduction in nutrient export rates. Calculated sediment and nutrient reductions are shown in **Table 17.1**.

An offline bioretention area could also be built in the existing floodplain of the stream. A topographically flat area there could provide the needed surface area for providing pollutant removal for a percentage of the flow, with the added benefit of attenuation of peak flows and reduction of near bank stress against the outside meander that is currently eroding. Additionally, the storage of runoff volume in the bioretention area may supplement for some of the loss of baseflow that was observed in this channel. Side channel storage can generally be assumed to reduce channel stresses of the downstream system.

Constraints

Constraints consist of space needed for the construction of the bioretention area, and avoiding impacts to the existing sewer line.

Alternatives

No alternatives are proposed for this site.

Cost-Estimate Breakdown

Table 17.2 shows a conceptual itemized cost estimate for Site 17. These costs represent construction and maintenance costs only. The cost for the bioretention area is derived from a cost per cubic foot treated for bioretention areas as reported by Schueler, et. al. (2007). The contingency fee for this site has been increased due to the difficulty of access and proximity to a sewer easement.

Table 17.2

SITE 17 Construction Cost

Pay Item Description	Estimated Quantity	Unit	Unit Bid Price	Bid Amount
Bio-Retention Area	4401.00	CY	12.62	\$55,541
Total				\$55,541
Mobilization (5%)	1.00	LS		\$2,777
Contingencies (15%)	1.00	LS		\$8,331
Total + Mobilization and Contingencies				\$66,649
Maintenance Costs				
Maintenance (5% of base construction cost of BMP)	1.0	Year		\$2,777

SITE 17

BOLIN CREEK DR



REALIGNED STREAM

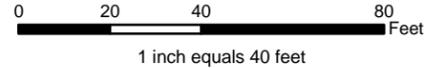
BIORETENTION AREA

Legend

- Stormwater Lines
- Impervious Surfaces
- Perennial Stream
- Intermittent Stream
- - - Ephemeral Stream
- - - Stream, unknown flow
- Contours



CONCEPTUAL PLAN VIEW
BOLIN CREEK WATERSHED
 Geomorphic Analysis and Potential Site
 Identification For
 Stormwater Structures and Retrofits





BOLIN CREEK DR

SITE 17

REALIGNED STREAM

BIORETENTION AREA

Legend

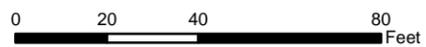
- Stormwater Lines
- Perennial Stream
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AERIAL PHOTO VIEW

BOLIN CREEK WATERSHED
Geomorphic Analysis and Potential Site
Identification For
Stormwater Structures and Retrofits



1 inch equals 40 feet