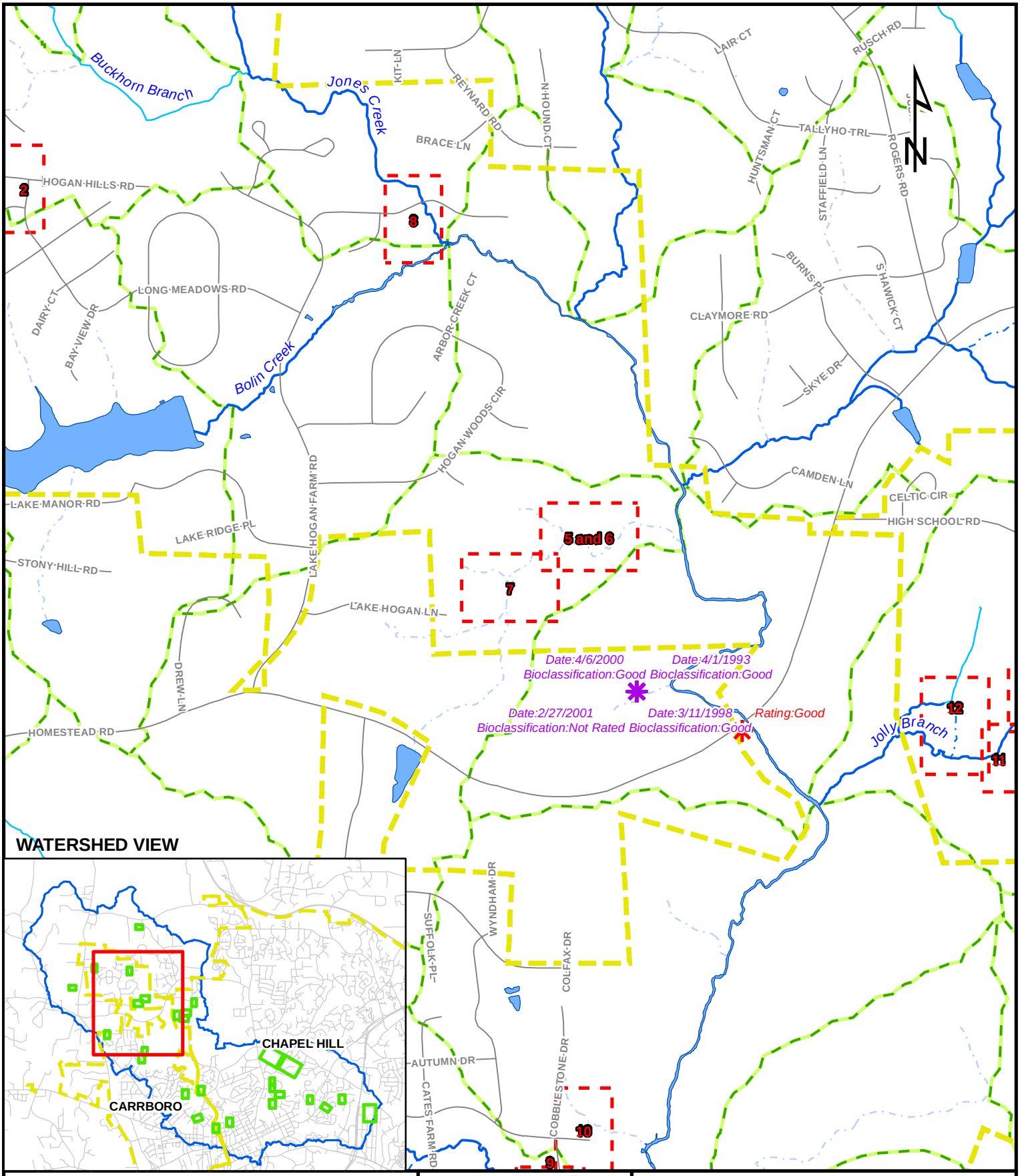
SITE 7

Index Sheet No.: 11
Raw Data Name: None

Estimated Construction Cost: $100,000



Legend

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

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SITE 7
VICINITY MAP

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

0 500 1,000 2,000 Feet

1 inch equals 1,000 feet

Project Description

	Drainage Area (acres)	Impervious Area (acres)	% Impervious
Site 7	2.4	0.7	29.6%

Location

Site 7 is located west of S. Cammelia Drive and private alley in the subdivision of Winmore, which is located off of Homestead Rd. At the time of this report, the subdivision was still under construction.

Problem Description

The stormwater system coming from several acres of the Winmore subdivision is discharged at a location that is very near an un-named perennial stream. The pipe system outlet had a small pre-formed scour type sediment basin and the plans call for a rip-rap apron at the completion of construction. During the site visit, Earth Tech observed the effects of concentrated flow on the perennial stream and the flood plain. Rill erosion has begun and a head cut up from the stream to the outlet will likely be the end result of the erosive forces of the concentrated flows. Also, from a water quality point of view, the approximately 10' of distance between the BMP and the stream channel is not a sufficient filter strip. This BMP will very likely cause significant degradation to the water quality of the receiving waters due to the anticipated sediment inputs from future channel instability and direct inputs of nutrients.

Proposed Solution

The terrain of this site limits the options for retrofitting the existing BMP. A linear bio-retention area is proposed a solution to dissipative energy, reduce velocities by distributing flow over a significantly larger area, and utilizing a much larger area of biological treatment of nutrients by using the bioretention are itself and increased area of filter strip that results. This project would be a hybrid of a bioretention area with storage and a level spreader.

A secondary, although very significant benefit of this BMP retrofit would be the possibility of augmenting base flow via the stored stormwater volume. It may be desirable to add a series of "weeps" to the design which would be made of several collector pipes or seepage layer fill material with a vegetated geo-grid to prevent erosion due to the seep. An example of the later method would be the use of a pervious drain layer on a typical dam embankment design. The idea is to insure that you regain available storage volume in the BMP by allowing a delayed release of the volume over an extended period, up to 2 weeks, while intentionally adding base flow to the channel between rainfall events.

Table 7.1

SITE 7	Pollutant Load (lbs)		
	TN	TP	TSS
EXISTING CONDITION	9.92	1.57	292.55
STORM WATER WETLAND TREATMENT	20.00%	17.50%	42.50%
NET REDUCTION	1.98	0.27	124.33
FUTURE CONDITION	7.94	1.29	168.21

Constraints

The primary constraint of this site is the boundary of the roadway on one side and the stream on the other. Access to the site is excellent and the terrain is suitable for equipment. Due to the confinement of the site, there will be modifications to the floodplain of the small stream and this will create some environmental concerns that must be considered and managed. In addition, a utilities easement is adjacent to the site, and thus a MOU or MOA may be required to be executed with the utilities entity to implement the project.

Alternatives

No alternatives are proposed for this site.

Cost-Estimate Breakdown

Table 7.2 shows a conceptual itemized cost estimate. 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).

Table 7.2
Site 7 Construction Cost

Pay Item Description	Estimated Quantity	Unit	Unit Bid Price	Bid Amount
Bioretention Area	6933.0	CF	12.62	$87,494
			Total	$87,494
Mobilization (5%)	1.00	LS		$4,375
Contingencies (10%)	1.00	LS		$8,749
	Total + Mobilization and Contingencies			**$100,619**
Maintenance Costs				
Maintenance (5% of base construction cost)	1.0	Year		**$5,031**

SITE 7

CONSTRUCT BERM
TIE TO EXISTING GRADE

CONSTRUCT BIORETENTION AREA
WITH UNDERGROUND STORAGE
IN FLOODPLAIN

EXISTING PIPE (TEMPORARY)

PRIVATE ALLEY

W. WINMORE AVE.

N. CAMMELIA ST.

E. WINMORE AVE.

S. CAMMELIA ST.

Legend

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

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CONCEPTUAL PLAN VIEW

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

0 25 50 100 Feet

1 inch equals 50 feet

Legend

- Stormwater Lines
- Perennial Stream
- Intermittent Stream
- Ephemeral Stream
- Stream, unknown flow

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AERIAL PHOTO VIEW

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

0 25 50 100 Feet

1 inch equals 50 feet