SITE 22

Stabilization of Bank Erosion on Bolin Creek

Index Sheet No.: 25
Raw Data Name: IJ 53

Estimated Construction Cost: $72,500
The image is a map showing the Vicinity Map for Orange County, North Carolina, with the title "Geomorphic Analysis and Identification of Potential Sites for Stormwater BMPs." The map includes various symbols and annotations, such as Ambient Monitoring, Benthic Monitoring, Fish Sampling, and Municipal Boundary. The map also highlights different waterways, including Cole Springs Branch, Battle Branch, and Mill Race Branch, with specific sites marked by numbers and symbols.

Legend:
- Orange County Roads
- Subwatersheds
- Perennial Stream
- Intermittent Stream
- Ephemeral Stream
- Stream, unknown flow

The map indicates a good rating with a date of 3/1/2001 and a site classification of Poor.
Project Description

<table>
<thead>
<tr>
<th>Site 22</th>
<th>Drainage Area (acres)</th>
<th>Impervious Area (acres)</th>
<th>% Impervious</th>
</tr>
</thead>
<tbody>
<tr>
<td>6050.0</td>
<td>780.5</td>
<td>12.9%</td>
<td></td>
</tr>
</tbody>
</table>

Location

Site 22 is located on Bolin Creek, just to the east of Bolinwood Drive. The site can be accessed by a greenway trail running parallel to Bolin Creek.

Problem Description

Site 22 consists of a massive, actively eroding bank along Bolin Creek. The bank is approximately 18 feet high at its highest point, and extends downstream for approximately 200 feet. The bank is the result of the stream flowing against the hillside at the edge of the streams valley, where it was probably moved during construction of the sewer line that runs parallel to Bolin Creek. Orange County tax parcel data shows that the properties which abut this bank have lost a significant amount their land to the erosion.

Using the BANCS model, it is estimated that approximately 1900 tons of sediment are being exported from the site each year. Concomitant nutrient export associated with the sediment has also been calculated and is listed in Table 22.1.

Table 22.1

<table>
<thead>
<tr>
<th></th>
<th>Pre-Treatment</th>
<th>Post-Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated Total Sediment Export</td>
<td>1889.3 tons/year</td>
<td>1.8 tons/year</td>
</tr>
<tr>
<td>Erosion per length of Channel</td>
<td>8.7 tons/yr/ft</td>
<td>0.008 tons/yr/ft</td>
</tr>
<tr>
<td>Pounds of Nitrogen</td>
<td>3778.7 lbs/year</td>
<td>3.7 lbs/year</td>
</tr>
<tr>
<td>Pounds of Phosphorus</td>
<td>1889.3 lbs/year</td>
<td>1.8 lbs/year</td>
</tr>
</tbody>
</table>

Proposed Solution

Site 22 needs stabilization of the hillside that has been eroded by the flow of Bolin Creek. If the erosion continues, tons of sediment will continue to be exported each year, and the adjacent landowners will continue to lose more of their property. Stabilization of the hillside will require a fill slope to be placed against the existing eroded bank at a slope of 2:1 or less. Doing this will also require relocation of the existing stream channel (see
Plan View). The existing stream channel should then be filled, which will provide a floodplain for the new channel. The entire site should then be planted with native vegetation. Structures such as root wads and cross vanes can be used to temporarily protect the newly constructed banks while the vegetation becomes established. These types of projects have a very high rate of success when the constructed project has the proper bankfull height, thus providing flood plain access. This project is a very high priority and also has a high chance for success.

**Constraints**

While an existing drainage easement may exist at the site, as evidenced by the sewer line running parallel to the stream, Orange County Tax Parcel data shows the land surrounding Bolin Creek is privately owned. Thus permission may need to be obtained to perform the recommended treatment at the site. It is assumed the landowners will be cooperative with efforts to keep them from continuing to lose their property.

The greenway and sewer lines run parallel to Bolin Creek at Site 22, therefore the relocation of the stream channel should be adjusted to maintain an adequate distance from these two features. Based on preliminary Proposed Solution, however, there is sufficient room to construct a fill slope and new channel without impacting the sewer line or greenway trail.

A floodway analysis and submission of a conditional letter of map revision (CLOMR) will likely be needed to determine if there will be any increase or decrease in flood elevations as a result of relocating Bolin Creek.

**Alternatives**

There are no alternatives proposed for this site.

**Cost-Estimate Breakdown**

**Table 22.2** shows a conceptual itemized cost estimate for Site 22. These costs represent construction costs only.

<table>
<thead>
<tr>
<th>Pay Item Description</th>
<th>Estimated Quantity</th>
<th>Unit</th>
<th>Unit Bid Price</th>
<th>Bid Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excavation</td>
<td>2500.00</td>
<td>CY</td>
<td>15.00</td>
<td>$37,500</td>
</tr>
<tr>
<td>Plantings</td>
<td>0.80</td>
<td>Ac</td>
<td>750.00</td>
<td>$6,000</td>
</tr>
<tr>
<td>Root Wads</td>
<td>8.00</td>
<td>Ea</td>
<td>395.00</td>
<td>$3,160</td>
</tr>
<tr>
<td>Cross Vane</td>
<td>2.00</td>
<td>Ea</td>
<td>5000.00</td>
<td>$10,000</td>
</tr>
<tr>
<td>Silt Fence</td>
<td>575.00</td>
<td>LF</td>
<td>3.75</td>
<td>$2,156</td>
</tr>
<tr>
<td>Construction Safety Fence</td>
<td>700.00</td>
<td>LF</td>
<td>2.50</td>
<td>$1,750</td>
</tr>
<tr>
<td>Construction Entrance</td>
<td>1.00</td>
<td>Ea</td>
<td>2500.00</td>
<td>$2,500</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$63,066</strong></td>
</tr>
<tr>
<td>Mobilization (5%)</td>
<td>1.00</td>
<td>LS</td>
<td></td>
<td>$3,153</td>
</tr>
<tr>
<td>Contingencies (10%)</td>
<td>1.00</td>
<td>LS</td>
<td></td>
<td>$6,307</td>
</tr>
<tr>
<td><strong>Total + Mobilization and Contingencies</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$72,526</strong></td>
</tr>
</tbody>
</table>
CONCEPTUAL CROSS SECTION

FILL AT 2:1 SLOPE

RELOCATE STREAM CHANNEL

EXISTING ERODING HILLSIDE

EXISTING GROUND

DESIGN GROUND BANKFULL

BANKFULL

FILL EXISTING STREAM CHANNEL TO CREATE NEW FLOODPLAIN

BLEND TO EXISTING FLOODPLAIN

GREENWAY

SEWER LINE

AERIAL PHOTO VIEW

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

SITE 22

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

AERIAL PHOTO VIEW

BOLINWOOD DR

MILL RACE DR

MILL RACE BRANCH

1 inch equals 50 feet

NOT TO SCALE