Greensboro Stream Mitigation Plan for I-85 Bypass

TIP No. I-2402

Spring Valley
Starmount County Club
Sussman Park
Starmount Park
Lindley Park

North Carolina Department of Transportation

Stream Mitigation

Stream restoration is defined as "the process of converting an unstable, altered, or degraded stream corridor, including adjacent riparian zone and flood prone areas, to its natural or referenced, stable conditions considering recent and future watershed conditions. This process also includes restoring the geomorphic dimension, pattern, and profile as well as biological and chemical integrity, including transport of water and sediment produced by the stream's watershed in order to achieve dynamic equilibrium.

The goal of mitigation is to design adjustments to the stream reach that will increase long-term stability and create a more functional riparian ecological community. The design of the existing stream will adjust geomorphic dimensions, patterns, and profiles. The proposed changes will reflect stable conditions of reference reaches and their current geomorphic conditions. Additionally, vegetated buffers will be created that match proximal natural ecological communities found in similar physiographic and climatic regions. The reach will be redesigned to maximize its natural design in light of the needs of local agencies, public safety, and physical constraints within the park.

Stream Mitigation

Spring Valley

Over the course of forty years, the increased development, combined with the removal of natural vegetation, has deteriorated this stream segment. This is evident in the site photographs where there is visible stream bank slumping and erosion, as well as considerable direct sunlight on the stream due to a lack of a forest canopy.

Stream bank erosion is occurring throughout the stream reach. The problem is more isolated in the top section whereas severe erosion occurs throughout the lower section. At the double box culvert underneath Glenhaven Drive, the east barrel of the culvert is partially blocked due to sediment and vegetation that has eroded and slumped into the stream.

Underneath the northernmost pedestrian bridge, large rock and a fallen tree are trapping debris in this area of the stream. With the exception of a small forested area along the western stream bank in the lower segment, there is no riparian forested or shrub vegetation along the stream banks.

The primary problem with this stream appears to be the lack of stabilization of the banks, the increased flow velocities due to increased development within the watershed, and the lack of riparian habitat along the stream.

Based upon an evaluation and assessment, the following mitigation goals have been identified and will be carried out upon approval.

- Stabilize eroded stream banks to provide structural integrity to the stream and reduce sedimentation into the channel.
- Establish a riparian corridor along the stream to provide wildlife habitat.
- Provide vegetative cover/shading for aquatic habitat.
- Establish a stable channel to accommodate high velocity flash floods.

Stream Mitigation

Lindley Park

The primary problems with the upper stream segment, appear to be the lack of stabilization of the banks, the increased flow velocities due to increased development within the watershed, and the lack of riparian forest habitat. North Buffalo Creek appears to have been relocated and channalized during the construction of Wendover Avenue.

The primary problems with the lower tributary and stream segment appear to be stream bank erosion. There is no riparian forested or shrub vegetation along the stream bank. The downstream side of the culvert under Masonic Drive is blown out and a 2-inch deep plunge pool has been created. There is severe scour farther downstream from this where a storm drainpipe discharges into the stream on the west bank adjacent to the recreation center.

Based upon an evaluation and assessment of the stream, the following mitigation goals have been determined and will be carried out upon approval.

- Stabilize eroded stream banks.
- Establish a forested riparian corridor along the stream to provide wildlife habitat.
- Provide vegetative cover/shading for aquatic habitat.
- Establish a stable channel to accommodate high velocity storm events.
- Modify pipe outlets to provide energy dissipation.

Stream Mitigation

Starmount Park

Bank erosion in the upstream section is prevalent along sections of the right bank with bank heights averaging 4-6 feet. This erosion may be attributed to a sanitary sewer which runs parallel to the stream along this section restricting access to the floodplain on this side of the stream and the absence of well rooted vegetation.

The downstream section, below West Market Street, is characterized by isolated reaches of bank erosion, with the most significant section occurring along the right bank of the park pedestrian trail system. Increased flows and erosive capacity of the stream due to the upstream widening are likely contributing factors to this erosion. A lack of bank vegetation, channel encroachment, and a flashy flow regime tax the banks in these sections as well.

Based upon an evaluation and assessment of the stream, the following mitigation goals have been determined and will be carried out upon approval.

- Establish stable channel geometry for low and high flows.
- Enhance warm water fisheries habitat.
- Enhance water quality and reduce localized erosion.
- Stabilize eroded banks.
- Protect adjacent structures/utilities from damage.
- Maintain and promote efficient sediment transport.
- Promote environmental awareness.
- Establish improved recreation access.

Stream Mitigation

Sussman's Park

The riparian area of the stream, i.e. those areas in the 2-year floodplain, is primarily mowed turf. Bank erosion is present at several locations of the reach. Through not extensive in nature the eroding areas contribute a significant sediment load to the downstream areas. These problems have developed from a combination of increased flows in the stream and fill material that modifies the floodplain. These factors shifted flood flows prompting the erosion at pressure points.

In the central portion of the park, a wide, low floodplain is present on the south side of the channel. This floodplain region, though fully vegetated, appears to be an active fluvial surface. Channel substrate is variable, with frequent exposed sections of bedrock and regolith, as well as areas of sand and gravel. The combination of large residual cobbles and finer sediments produce a typical bi-modal distribution of sediment throughout the system.

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Stream Mitigation

Starmount Country Club

The investigation of the five stream segments flowing through Starmount Country Club identified significant deficiencies in the systems which warrant corrective measures. There is a need for improved water quality in a system that flows through a golf course and has numerous stormwater inputs. The presence of severe bank erosion and sloughing has been caused by insufficient bank vegetation, flashy urban drainage, channel alterations, and inappropriate maintenance practices. There is also aggradation of the channel bed due to overwidening, and corresponding loss of aquatic habitat. There are inconsistencies in the pattern, dimension, and profile when compared to similar stable reaches and the absence of a diversified riparian buffer.

Based upon an evaluation and assessment of the stream, the following mitigation goals have been determined and will be carried out upon approval.

- Establish a two-tier channel to promote efficient sediment transport during low flow conditions, while accommodating the flashy flood flows that are prominent in this urban hydrologic regime.
- Enhance warm water fisheries by establishing riffle/pool complexes.
- Improve water quality and habitat value by stabilizing eroded banks and establishing a riparian buffer.
- Establish a stable channel pattern, dimension, and profile to maximize channel efficiency by adjusting platform and cross-section.