

Appendix C: Sample Subwatershed Management Strategy

This sample strategy is intended to serve as guidance for UNRBA in developing individual subwatershed strategies as part of the larger Lick Creek Watershed Plan. Information included here is based solely on field observations and limited mapping analysis and does not necessarily reflect more recent information garnered from project partners or other stakeholders. Therefore, this framework should be considered DRAFT at best.

Lick Creek Subwatershed 1 “Headwaters, Brightleaf”

a. Subwatershed Characteristics

Watershed Area: 1079 acres, 1.7 sq miles

Mapped Stream Length: 11.9 miles

Stream Length Walked: 5.4 miles

Current % IC: 10.7%

% Within Urban Growth Boundary: 100%

Active Construction: >200 acres

Monitoring stations: 1

The majority of this formerly rural, headwater subwatershed falls within the annexed portion of City of Durham. The subwatershed contains two of the three large construction sites in the Lick Creek watershed. Currently at 10.7% impervious cover, this subwatershed contains two of the three large construction sites in the Lick Creek watershed (>200 acres of active construction). When complete, the Brightleaf and Brightwood Trails subdivisions will contain over 1200 new residences. The Route 70 corridor cuts across the western tip of the subwatershed and contains existing commercial land uses, predominantly fast food and mobile home sales. A large power line ROW bisects the subwatershed further downstream. Some agricultural lands are located along Sherron Road, the western boundary of the subwatershed and of the watershed.

At the Brightleaf and Brightwood Trails subdivisions, extensive impacts to wetlands and streams were observed. While some of these impacts were approved during the permitting process, compliance with approved erosion and sediment control plans was particularly poor, resulting in visible sediment deposition in nearby wetlands, lakes, and streams. Many of these sediment laden discharges can be attributed to lack of maintenance on structural S&E practices. If these sites are representative of the type of development that will be occurring throughout the urban growth area of Lick Creek, then protecting drainages during all phases of the development cycle, particularly during the construction phase, will need to be a critical component to overall watershed management.

Examples of approved impacts include:

- Filling and piping zero and first order stream channels that were ruled to not be streams under the state classifications system
- Over four acres of approved encroachment or disturbance to the 50 foot and 30 foot stream buffer regulations stipulated by the Neuse rules; filling of portion of floodplain to accommodate homesites at Alyea Ct. (IB-110).
- Bisecting a wetland with a sewer embankment, causing approximately 0.4 acres of direct impacts and an undetermined amount of indirect impacts due to the altered hydrology (UT-111).
- Numerous crossings of the stream by sewer lines, some in close proximity that may have been reducible through an altered design. (sites – UT-301, etc)
- Use of fill material and culverts to cross stream channels that may be large enough and of significant enough habitat value to warrant bottomless culverts or bridges.

Example of erosion and sediment control violations at the construction sites include:

- Sediment deposition in Snappy's Lake and wetland complex in Brightleaf due to failing or inadequate sediment control practices
- Headcut below Snappy's Lake due to large stormwater volumes (ER-110 in RCH-113)
- Silt fences filled to the top with sediment (e.g. MI-309, OT-120, MI-307); breached or with gaps (e.g. MI-311, OT-120); and placed across stream channels (e.g. ER-111, SC-111).
- Poor inlet protection and excessive buildup of sediment on roads (e.g. near IB-110).
- Sediment ponds lacking storage volume because they are full of sediment (e.g. pond off of McCool Ct. at OT-110)
- No posting of copies of the approved S&E plans on site.

b. Subwatershed goals and objectives

Subwatershed 1 is in the process of transitioning from a predominantly forested condition to medium density residential. As a result, the streams and wetlands are being hammered with excessive sediment from construction site runoff, rerouted through culverts and sewer line crossings, and losing riparian buffer coverage. The main goals and objectives in this subwatershed should be geared towards maintaining the practices that are already in the ground and preventing additional impacts as the rest of the subwatershed gets developed.

- Pollutants of Concern: TSS; Nutrients
- Enforcement effort: Increase site inspections at active construction sites to ensure proper installation and maintenance of ESC and post-construction STPs to prevent turbid discharges to wetlands, ponds, and streams BEFORE they happen. Increase coordination between local site inspection staff

- **Monitoring:** Routinely monitor discharges from sediment ponds that discharge directly into wetlands and existing ponds (i.e. Lake Turbid, wetland along Prospect); also monitor turbidity at downstream monitoring sites; establish turbidity standard.
- **Retrofit effort:** look for opportunities to improve water quality treatment in existing commercial areas; look for opportunities to enhance channel protection and water quality from practices in newly developed residential areas
- **Stewardship:** Use active construction sites to raise awareness of development impacts by taking local officials and watershed practitioners to sites for hands on lesson in the challenges of balancing growth and water resource protection
- **Design and permitting:** Use existing construction site examples to train engineers, developers, and staff to recognize ESC practices that work and don't work; train inspectors to go start at the outfall and work their way up; train site designers
- **Protection:** Try to protect slopes and remaining forested buffers in areas not yet cleared for development. Retain minimum 35%-45% watershed forest cover at full build out
- **Reduce hydrologic impact of sewer line crossings on wetland and stream hydrology** either by retrofitting existing crossings or redesigning new/planned ones
- **Look for opportunities to restore riparian and wetland buffers along power line ROWs and in areas impacted through silviculture and new development**

c. Most promising management opportunities

Because this subwatershed is under construction, it may be wise to take a three-phase approach: (1) maintenance of active construction sites, (2) prevention of impacts from future construction sites, and (3) restoration in existing development. Given the lack of existing development and the extent of active/proposed construction, it will be difficult to move forward with significant stream restoration and stormwater retrofit projects at this time. Rather, the watershed should be viewed as a demonstration area to show not only how sensitive Triassic soils and waterways are to runoff from new development, but also to demonstrate which combination of structural and non-structural management practices are most effective in preventing those impacts.

Maintaining Management Measures at Active Construction Sites

- Follow up on all high priority pond, outfall, and culvert maintenance issues identified in Brightleaf and Brightwood Trail subdivisions. Specifically follow-up with discharges to Snappy's Lake and to wetland along Prospect Dr. Check in with Rebecca to see how many violations were actually issued and the progress on addressing those violations. Violations mostly involved temporary stabilization; silt fence failure; removal of sediment from sediment ponds, catch basins, and culverts; embankment repair, and prevention of stockpile erosion. At a minimum, these problem areas should be inspected weekly. Failure to maintain practices reduces the storage capacity of sediment ponds, increases erosion potential, and poses safety threats (embankment failure).
- Consider assigning one inspector to each development site, or requiring a third party inspector. These sites are extensive and consist of multiple phases, and frequent

inspections are difficult for local staff to complete. Inspectors should start at the outfalls and work their way up. There appears to be a gap in inspection responsibility between ESC and post-construction stormwater staff. Perhaps there is a way to be more efficient. In addition, we need to enforce requirement that all ESC/stormwater plans are available on site, and that any changes to plans are updated, illustrated and signed on the available site plan.

- Efforts to repair failing ESC practices were observed at many locations throughout construction sites (i.e. new ESC matting, replaced silt fences, etc); however more effort in anticipating and preventing failure is necessary. Site inspectors as well as general site contractors should be responsible for noting potential problem locations.
- While tree protection fencing was visible throughout sites, contractors should make an effort to ensure fencing is installed outside the drip line of large trees and removed upon completion of construction.
- Follow up with water quality samples taken in Snappy's Lake. Did they exceed turbidity standards? This existing pond is not supposed to serve as a stormwater practice.
- Add new stormwater infrastructure (outfalls and practices) to County/City GIS layers
- Investigate silt fence/groundwater at pumping station?
- Investigate wetland buffer impacts at IB 110 in Brightleaf to make sure impacts were permitted and mitigation actions required.

Prevention of Impacts from Future Construction Sites

- There are three forested wetland areas in pretty decent shape that should be protected from future development (see RCH 304, 310, and 309).
- Also, investigate diabase sills located at MI 302, 304, and 110
- Link more stringent development standards to Falls Lake water quality concerns and overall Neuse River Basin requirements, particularly for buffer requirements (do not allow for frequent violations; in fact consider increasing to 100ft)
- Develop guidelines that require or provide incentives for innovative on-site stormwater treatment.
- Discourage the use of dry pond designs, since they are ineffective at water quality treatment, and encourage pretreatment and pond designs that maximize water quality treatment and channel protection
- Establish turbidity standards at monitoring sites and at outfalls. Try to establish baseline conditions prior to upstream development. Are there additional tributaries that should be monitored?
- Don't construct misaligned, erosion causing culverts or flow altering sewer line crossings like the ones at SC-301 and UT301-303. Evaluate the hydrologic impacts on wetlands of sewer line crossings like the one at Alyea Ct in Brightleaf (UT-111)

Restoration of Existing Development Areas

Retrofit strategy

- Retrofit dry ponds

- Existing pond retrofit at Brightleaf, Golden Belt and Creighton Hall (R-303). Pond has a short (<5') flow path and lacks vegetation. Add baffle and vegetation.
- Evaluate high priority stormwater wetland retrofit R-300 between Burger King and Pizza Hut
- Consider outfall retrofit on Route 70 near Budget Truck rental (R301)

Reforestation strategy

- IB110 buffer restoration for forested wetland along Prospect Ave between Alyea Ct and Wooddale in Brightleaf subdivision. Because of sewer ROW, replanting with large trees and providing for maintenance access may be difficult. If this is case, at least establish 50 ft native shrub/grass buffer. Be sure to include "no mow" signage.
- Consider similar planting approach for buffers along RCH 503 and 205 which are currently impacted along power line ROW.
- Evaluate feasibility of tree planting along Hwy 70 median (*was there a median?*) and along power lines

Stream repair strategy

- Restoration of Snappy's Lake (remove sediment)
- Hard to recommend new stream repair in light of active and future development
- Address large headcut forming in RCH 113 below new Snappy's Lake discharge ER-110. Based on the trees that have collapsed in the headcut, it is clear that this headcut was recently formed and will continue to expand.

Pollution prevention strategy

- McElhoney Homes on HWY 70 could use assistance with outdoor material storage of hazardous chemicals
- Work with McDonalds and Burger King on dumpster management, wash water disposal and other pollution prevention measures
- Most of businesses along HWY 70 are auto related (sales, repair, car washes); target

d. Stakeholder issues

The key stakeholders to meet with individually early in the game include municipal agencies responsible for review and oversight of construction sites and post-construction stormwater practices. In addition, contractors, builders, and promoters of Brightleaf and Brightwood Trails need to be involved. Businesses where retrofits are encouraged should be involved.