

**CLARKS CREEK STREAM MITIGATION
2010 MONITORING REPORT
MONITORING YEAR ONE
Montgomery County, NC
Yadkin River Basin
Cataloging Unit: 03040104
EEP Project Number: 000622**



Prepared for:



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Ecosystem Enhancement Program
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ENHANCEMENT PROGRAM

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1. Executive Summary/Project Abstract

The Louis Berger Group, Inc. (LBG) preserved the Clarks Creek Stream Preservation Site (Site) in Montgomery County, North Carolina to provide the North Carolina Ecosystem Enhancement Program (NCEEP) with approximately 1,690 stream mitigation units needed to compensate for projects occurring within the Yadkin-Pee Dee River basin. This Mitigation Plan describes existing project site conditions and details the preservation process.

The Site provides high quality in-stream and riparian habitat for many aquatic and terrestrial species due to the mature canopy that shades the channel and the vegetated buffer that traps sediments. Piedmont/mountain bottomland forest (Schafale and Weakley, 1990) is the prevalent vegetative community currently found within the forested portions of the proposed easement boundaries, although inclusions of mesic mixed hardwood forest are common where the floodplains narrow and the hilly uplands are closer to the channel. Lands adjacent to the Site are primarily covered by contiguous forest communities; however, large fields utilized for pasture are present in several locations. A streamside riparian buffer zone of mature canopy trees has been retained through these agricultural areas and agricultural grasses border the upland side of this riparian zone.

Stream mitigation for the Site is to protect ecologically important streams in perpetuity, through the implementation of a conservation easement owned by the State of North Carolina. Stream mitigation will preserve the existing riparian corridor, aquatic habitat, and stream hydrology of the stable perennial stream channels by establishing a permanent conservation easement along 8,452 linear feet of stream. The easement protects a minimum 50-foot wide forested buffer along both sides of the creek and encompasses 24.5 acres of forested riparian habitat. Where necessary, the easement is protected by fencing to keep livestock out of the 50-foot buffer. The easement was recorded by Montgomery County and is held by NCEEP.

In addition to the preservation effort, several additional tasks were undertaken to improve the ecological functions on Site. Stands of invasive floral species were identified and removed from the Site. Native species were planted in order to re-establish native forest communities throughout the project area consistent with a Piedmont/mountain bottomland forest. Fencing was installed in the pasture areas to prevent cattle from entering the stream and to protect the existing forested areas and newly planted areas.

The goals of the project focus on the benefits obtained from preserving and restoring diverse areas of forested riparian ecosystems. These goals include:

- Increased wildlife habitat,
- Reducing overland sediment erosion and nutrient load, and
- Preservation of existing native species

To achieve the preservation goals, the Site has the combined objectives of:

- Establishment of a conservation easement around segments of geomorphically stable stream channel with intact forested buffer areas for purposes of preservation,
- The removal of livestock access through stream buffer fencing, and
- Improvement of existing vegetated streamside buffer areas through removal of invasive floral species and planting native species to re-establish native vegetative communities.

Successful completion of this project will benefit water quality within the Yadkin-Pee Dee River basin by reducing sediment input into the stream from erosion, moderating stream water temperatures by improving canopy coverage over the channel, and reducing non-point pollutant impacts by removing livestock access and restoring forested buffers. Wildlife habitat benefits will be achieved through the restoration and enhancement planting of the forest adjacent to the stream. The riparian area of the Site will provide habitat connectivity and a permanent forested corridor through agricultural areas between larger hardwood forests to the north and south of the Site.

2. Project Background

2.1. Project Objectives

The goals of the project focus on the benefits obtained from preserving and restoring diverse areas of forested riparian ecosystems. These goals include:

- Increased wildlife habitat,
- Reducing overland sediment erosion and nutrient load, and
- Preservation of existing native species

The goals of the project focus on the benefits of preserving and restoring diverse areas of forested riparian ecosystem. Lick Fork is a tributary to Clarks Creek, which flows to the Pee Dee River, entering the river channel below Norwood Dam at Lake Tillery. This section of the Pee Dee River is classified as impaired by the State of North Carolina under the 2006 final 303(d) list of impaired streams due to low dissolved oxygen levels (NCDWQ, 2006). The project will benefit water quality in the Yadkin Pee-Dee River Basin by removing livestock access and thus reducing non-point pollutant impacts from fecal coliform and sediment. Other benefits to water quality include moderating stream water temperatures by improving canopy coverage over the channel, reducing overland sediment erosion by restoring forested buffer, and reducing the influx of nutrients and exposure to fecal coliform.

To achieve the preservation goals, the Site has the combined objectives of:

- Establishment of a conservation easement around segments of geomorphically stable stream channel with intact forested buffer areas for purposes of preservation,
- The removal of livestock access through stream buffer fencing, and
- Improvement of existing vegetated streamside buffer areas through removal of invasive floral species and planting native species to re-establish native vegetative communities.

LBG had secured conservation easements for approximately 24.5 acres of riparian corridor contiguous to a UT to Lick Fork and the mainstem of Lick Fork. LBG has also removed invasive floral species and planted native species to re-establish native forest communities throughout the project area. Successful completion of this project will benefit water quality within the Yadkin-Pee Dee River basin by reducing sediment input into the stream from erosion, moderating stream water temperatures by improving canopy coverage over the channel, and reducing non-point pollutant impacts by removing livestock access and restoring forested buffer. Wildlife habitat benefits will be achieved through the enhancement planting of the forest adjacent to the stream. The riparian area of the Site will provide habitat connectivity and a permanent forested corridor through agricultural areas between larger hardwood forests to the north and south of the Site.

2.2. Project Structure, Restoration Type, and Approach

The Clarks Creek Stream Preservation Site is comprised of two segments of the mainstem of Lick Fork and a segment on a UT to Lick Fork. All segments are tributaries to Clarks Creek. Lick Fork is characterized by a geomorphologically stable stream channel that spans an average of 35 feet with a cobble substrate. The UT to Lick Fork is also a stable channel that

spans an average of 5 feet with a gravel substrate. Lick Fork and its UT currently provide high quality in-stream and riparian habitat for many aquatic and terrestrial species due to the mature canopy that shades the channel and the vegetated buffer that traps sediments. Lands adjacent to the Site are primarily covered by contiguous forest communities; however, large agriculture fields are present in several locations adjacent to the creek. Land use within the 24.5-acre Site consists of two primary land uses: 18 acres of mesic mixed hardwood forest/piedmont bottomland forest/loblolly pines and 6.5 acres of pasture.

Since preservation is proposed for the Site no morphological surveys, such as longitudinal profiles or cross sections, to determine pattern dimension or profile were done on the channel. Channel classification, valley classification, discharge evaluation, bankfull verification, and channel evolution, were not performed as well.

Stream mitigation for the Clarks Creek Stream Mitigation Site is to protect ecologically important streams in perpetuity, through the implementation of a conservation easement owned by the State of North Carolina. Stream mitigation will preserve the existing riparian corridor, aquatic habitat and stream hydrology of the stable perennial stream channels by establishing a permanent conservation easement along 8,452 linear feet of stream. The easement protects a minimum 50-foot wide forested buffer along both sides of the creek and encompasses 24.5 acres of forested riparian habitat. Where necessary the easement is protected by fencing to keep livestock out of the 50-foot buffer. The easement was recorded by Montgomery County and is held by NCEEP. The conservation easement is shown on all figures.

Stands of invasive floral species were identified in patchy distributions at various densities within the Site. These species include: multiflora rose (*Rosa multiflora*), Japanese honeysuckle (*Lonicera japonica*), Chinese privet (*Ligustrum sinense*), and bamboo (*Phyllostachys aurea*). Control efforts were undertaken to eradicate these species within the Site. Invasive species plant material was removed above and below ground, including stems, branches, roots and rhizomes, using hand tools. The materials were disposed of on Site in natural areas to let the nutrients degrade back into the soil. All invasive plant control was completed using chemical applications using cut/stump, basal bark, or foliar application.

Fencing in the pasture areas was installed to prevent cattle from entering the stream and to protect the existing forested areas and newly planted areas. Two types of fence were installed on Site. The downstream section of the UT to Lick Fork and the lower section of the east bank of Mainstem 2 will be fenced with 48" tall woven wire topped with a single strand of barbed wire per the request of the landowner. The rest of the Site will be fenced with 4 strands of barbed wire.

Native species were also planted in order to re-establish native forest communities throughout the project area. Even though the Site has a contiguous forest for most of the proposed reach, the conservation easement also incorporates areas of agricultural land where the riparian forest canopy is non-contiguous. In these areas, seedlings of native woody species were planted to ensure the success of the project. The planting scheme is consistent with a Piedmont/mountain bottomland forest.

2.3. Location and Setting

The Louis Berger Group, Inc. (LBG) preserved the Clarks Creek Stream Preservation Site (Site) in Montgomery County, North Carolina to provide the North Carolina Ecosystem Enhancement Program (NCEEP) with approximately 1,690 stream mitigation units needed to

compensate for projects occurring within the Yadkin-Pee Dee River basin. This number of units has increased since the original Technical Proposal, which stated that 1,569 stream mitigation units will be provided. The Restoration Plan describes existing project site conditions and details the preservation process. This report continues the regulatory review process through the NCEEP.

The Clarks Creek Stream Preservation Site consists of three reaches: two mainstem segments of Lick Fork and an unnamed tributary (UT) to Lick Fork (Figure 1). These waterways are tributaries to Clarks Creek, which then continue on to flow into the Pee Dee River. Reach 1 is the unnamed tributary to Lick Fork. This reach has approximately 3,773 linear feet of preservation. This tributary flows into the mainstem of Lick Fork (Reach 2), which will provide approximately 2,259 linear feet of preservation. Further downstream, Reach 3 will provide approximately 2,420 linear feet of preservation. Photographs of each reach can be found in Appendix 1. All reaches display perennial flow. North Carolina Division of Water Quality (NCDWQ) Stream Classification Forms can be found in Appendix 3. In total, the Site will provide 8,452 linear feet of preservation. At a 5:1 preservation ratio, the NCEEP will receive approximately 1,690 stream mitigation units from the Site. A total of 24.5 acres of riparian buffer is within a conservation easement.

Directions to the site from Raleigh: follow US-1 south. Take the US-501S / US-15S exit. Stay straight to go onto White Hill Road / US-15S / US-501S. Continue to follow US-15S/US-501S for approximately 10 miles. Stay straight to go onto NC-24W / NC-27S. Enter next roundabout and take second exit onto NC-24W / NC-27W. Follow NC-24W / NC-27W for approximately 33 miles. Turn left onto NC-109. After 3 miles, turn right onto NC-1134 (Wadeville Road). Memory Lane will be on your left follow it until it becomes a gravel road, pass the two residences and travel until it ends on the McRae Farm. From there, Lick Fork is downhill to the south. The downstream end of the site can be reached by continuing on 109 until it come to a split – take the right split, Pee Dee road. This road will cross over Lick Fork forming the downstream limit of the project site.

Access to the site is obtained from two additional locations within the middle of the Site as well, as shown on Figure 1.

Junction of Wadeville Rd & Memory Lane
Follow Memory Lane to the end.
Road becomes drive to McRae Farm.

Upon entering McRae farm,
follow the path between the buildings
to the left downhill to stream.

Traveling South on HWY 109,
the last driveway (Williams) on the right,
before the junction with Pee Dee Rd.

Crossing at the end of dirt road beyond
William's driveway.

Access via dirt road exactly opposite McRae Cemetery

- Legend**
- Williams Fencing selection
 - Crossings
 - Road Improvements
 - McRae Fencing
 - Easement Boundary



The Louis Berger Group
Raleigh, North Carolina
January 2009



Figure 1: Site Access
Clarks Creek
Stream Preservation Project

2.4. Project History and Background

The Clarks Creek Site was identified by LBG biologists as a potential restoration site. A Technical Proposal was submitted to NCEEP in April 2007. The existing conditions survey was performed and a Categorical Exclusion (CE) was submitted and approved by the NCEEP in January 2008. Invasive vegetation species were removed in the summer of 2008. The land was purchased from in February 2009. In June 2009, the Restoration Plan was submitted to NCEEP and approved. The Site was planted in March 2008. The plan was for the Site to be fenced in March of 2008 as well, but due to landowner delay it was not fenced until March 2009. The site was replanted in March 2009 after fencing was completed. Photo points were collected in August of 2008 (pre-fencing and planting) and again in April of 2009.

Table 1: Project Restoration Components Clarks Creek Stream Mitigation EEP Project Number: 000622				
Project Component or Reach ID	Total LF	Type	Restoration Level and Ratio	Comment
Lick Fork & UT to Lick Fork	8,452	Preservation	Restoration 5:1	
Mitigation Unit Summations – 1,690 Stream Mitigation Units				

Table 2: Project Activity and Reporting History Clarks Creek Stream Mitigation EEP Project Number: 000622		
Activity or Report	Data Collection Complete	Completion or Delivery
Technical Proposal	March 2007	April 2007
Categorical Exclusion	January 2008	January 2008
Restoration Plan	September 2009	November 2009
Existing Vegetation Removal	N/A	April 2008
Construction	N/A	N/A
Planting	N/A	Mar '09 & Mar '10
Mitigation Plan / As-built (Year 0 Monitoring – baseline)	April 2010	May 2010
Year 1 Monitoring	April 2010	May 2010
Year 2 Monitoring	N/A	N/A
Year 3 Monitoring	N/A	N/A
Year 4 Monitoring	N/A	N/A
Year 5 Monitoring	N/A	N/A

2.3.1. Project Contacts

Table 3: Project Contacts Table Clarks Creek Stream Mitigation EEP Project Number: 000622	
Designer Primary project design POC	The Louis Berger Group, Inc. 1001 Wade Avenue, Suite 400 Raleigh, North Carolina 27605 Michael O'Rourke (919-866-4421)

Construction Contractor	NA - Preservation
Construction contractor POC	
Planting Contractor	Superior Forestry Services, Inc. 36462 Highway 27 Tilley, AR 72679 John Foley (870-496-2442)
Planting contractor POC	
Nursery Stock Suppliers	Division of Forest Resources – Claridge Nursery (919) 731-7988 and Mellow Marsh Farms (919) 742-1200
Monitoring Performers	The Louis Berger Group, Inc. 1001 Wade Avenue, Suite 400 Raleigh, North Carolina 27605
Stream Monitoring POC (Photo Points)	Michael O'Rourke (919) 866-4421
Vegetation Monitoring POC	NA - Preservation
Wetland Monitoring POC	NA - Preservation

Table 4: Project Background Table Clarks Creek Stream Mitigation EEP Project Number: 000622	
Project County	Montgomery County
Drainage area	4654 acres
Drainage impervious cover estimate	<5%
Stream Order	UT to Lick Fork – 1 st order Lick Fork – 3 rd order
Physiographic Region	Piedmont
Ecoregion	Carolina Slate Belt
Rosgen Classification of As-built	N/A
Cowardin Classification	NA
Dominant soil type	Badin-Tarrus complex , Herndon silt loam, & Chenneby silt loam
Reference site ID	NA
USGS HUC for Project and Reference	Project: 03040104020020 Reference: NA
NCDWQ Sub-basin for Project and Reference	Project: 03-07-10 Reference: NA
NCDWQ classification for Project /Reference	Project: C Reference: NA
Any portion of project segment 303d listed?	No.
Any portion of any project segment upstream of a 303d listed segment	No, only downstream,
Reasons for 303d listing or stressor	NA
% of project easement fenced	Approximately 80% of the easement is fenced.

3. Project Condition and Monitoring Results

3.1. Vegetative Assessment

Vegetation monitoring was not required as part of this project as it is a preservation project. Invasive species were removed and native plants were installed over a large portion of the project and these efforts are documented in the Mitigation Plan as part of the AS-Built Plans.

3.2. Stream Assessment

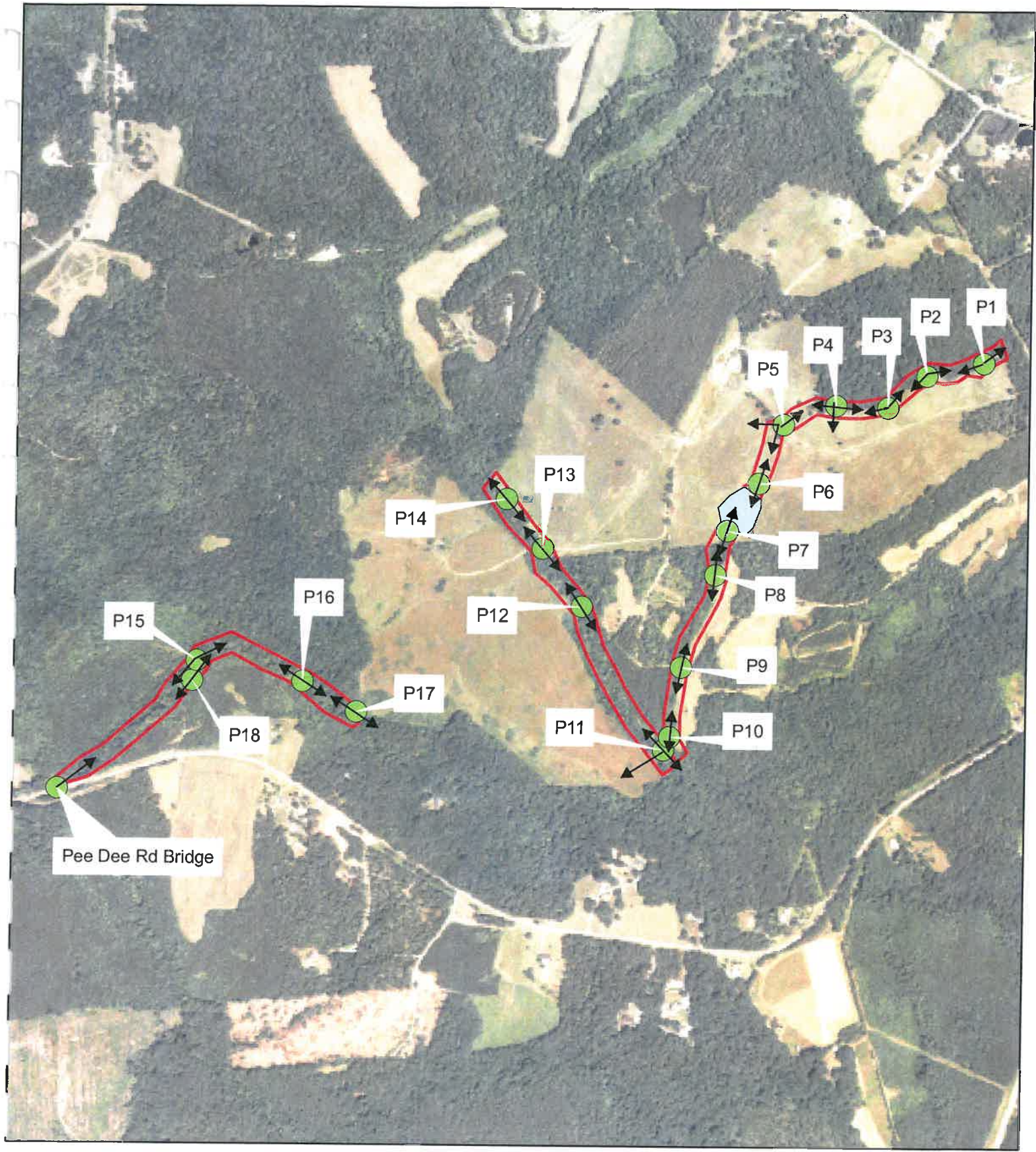
The entire stream project is preservation therefore a stream assessment is not required.

3.3. Wetlands Assessment




This Project has no wetland component so this section is not applicable.

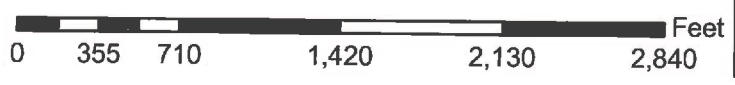
3.4. Photo Stations



Nineteen (19) fixed photo stations were established throughout the Site. These locations are presented in Figure 2. Photographs were taken during the monitoring efforts in April 2010. Photographs can be found in Appendix C.



Legend

-  Photo Stations with Directional Arrows
-  Pond
-  Easement Boundary



	North Carolina Ecosystem Enhancement Program	
	Clarks Creek Stream Preservation (Lick Fork - Tributary to Clarks Creek) EEP Project # 000622	
	Project Site Photo Station Map	
	THE LOUIS BERGER GROUP 1001 Wade Avenue, Suite 400 Raleigh, NC 27605	
	Figure 2 May 2010	

4. Methodology Section

4.1. Vegetation

The entire stream project is preservation; therefore, this section is not applicable.

4.2. Hydrology

The entire stream project is preservation; therefore, this section is not applicable.

5. References

US Army Corps of Engineers, 2003. Stream Mitigation Guidelines. Prepared by: USACE, NCDWQ, USEPA, NCWRC.

Environmental Laboratory, 1987. Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1, US Army Engineer Waterways Experiment Station, Vicksburg, MS.

Griffith, G.E., Omernik, J.M., Comstock, J.A., Schafale, M.P., McNab, W.H., Lenat, D.R., MacPherson, T.F. 2002. Ecoregions of North Carolina (map scale 1:1,500,000). U.S. EPA. Corvallis, OR.

Natural Resources Conservation Service. Climate Information – Wetlands Retrieval for North Carolina. Brunswick County. Available URL:

<http://www.wcc.nrcs.usda.gov/cgi-bin/getwetco.pl?state=nc>.

Accessed: January 15, 2009.

Lee, Michael T., R. K. Peet, S. D. Roberts, and T. R. Wentworth. 2006. CVS-EEP Protocol for Recording Vegetation, Version 4.0 Available URL: <http://cvs.bio.unc.edu/methods.htm>.

Appendix A: Vegetation Data Tables and Photographs

Appendix A is not applicable as this project is solely preservation and contains no planting requirements.

Appendix B: Hydrological Data

Appendix B is not applicable as this project is solely stream preservation and contains no hydrologic requirements.

Appendix C: Photo Stations



Photo Point 1: Looking Upstream



Photo Point 1: Looking Downstream



Photo Point 2: Looking Upstream



Photo Point 2: Looking Downstream



Photo Point 3: Looking Upstream



Photo Point 3: Looking Downstream



Photo Point 4: Looking Upstream



Photo Point 4: Looking Downstream



Photo Point 4: Looking at Left Bank



Photo Point 5: Looking to the Left (Downstream)



Photo Point 5: Looking Upstream (from McRae's upstream gravel Crossing)



Photo Point 5: Looking Downstream (from McRae's upstream gravel Crossing)



Photo Point 6: Looking Upstream



Photo Point 6: Looking Downstream (at breached farm pond)



Photo Point 7: Looking Upstream (at breached farm pond)



Photo Point 7: Looking Downstream (from center fencepost)



Photo Point 8: Looking Upstream



Photo Point 8: Looking Downstream



Photo Point 9: Looking Upstream (from William's Crossing)



Photo Point 9: Looking Downstream (from William's Crossing)



Photo Point 10: Looking Upstream



Photo Point 10: Looking Downstream



Photo Point 11: Looking Upstream



Photo Point 11: Looking Downstream



Photo Point 12: Looking Upstream



Photo Point 12: Looking Downstream



Photo Point 13: Looking Upstream (from McRae's concrete Crossing)



Photo Point 13: Looking Downstream (from McRae's upstream concrete Crossing)



Photo Point 14: Looking Upstream



Photo Point 14: Looking Downstream



Photo Point 15: Looking Upstream (from McRae's downstream gravel Crossing)



Photo Point 15: Looking Downstream (from McRae's downstream gravel Crossing)



Photo Point 16: Looking Upstream



Photo Point 16: Looking Downstream



Photo Point 17: Looking Upstream



Photo Point 17: Looking Downstream

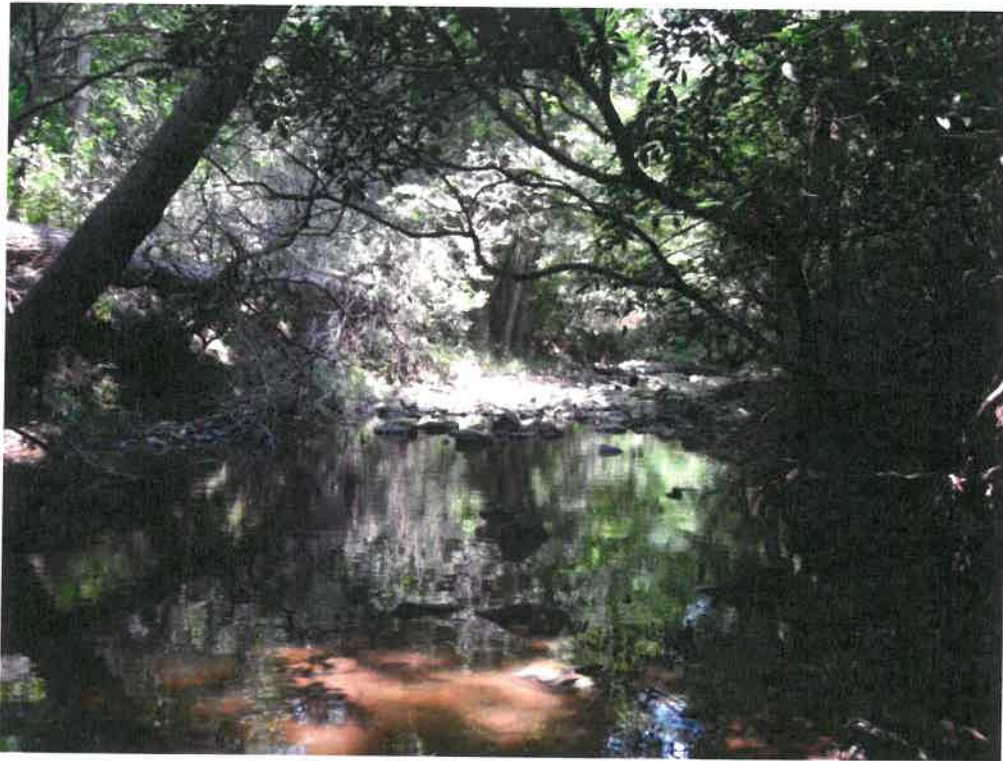


Photo Point 18: Looking Upstream



Photo Point 18: Looking Downstream



Photo Point 19: Looking Upstream from Pee Dee Road