MITIGATION PLAN AND AS-BUILT BASELINE REPORT
for the
BOWLIN-PEAK CREEK MITIGATION SITE

Ashe County, North Carolina

Final

EEP Project Number: 92606
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Prepared by the North Carolina Wildlife Resources Commission
in Partnership with the
North Carolina Ecosystem Enhancement Program
1652 Mail Service Center
Raleigh, NC 27699-1652

Table of Contents

1 Executive Summary

This mitigation plan and as-built report describes the project's background, outlines the mitigation plan's success criteria and monitoring guidelines, and summarizes stream channel enhancement work completed during September-October 2007 on 2,719 linear feet (lf) of Peak Creek, located in the New River drainage, Ashe County, North Carolina. Existing condition and pre-construction data comparisons are presented where possible.

The enhancement project's goal was to improve aquatic habitat, riparian area vegetation, and stream channel stability in order for the North Carolina Department of Transportation (NCDOT) to meet its off-site stream mitigation requirements for the U.S. 421 (Transportation Improvement Project number [TIP] R-0529) road improvement project in Watauga County. This was accomplished by installing root wads, rock cross vanes, and rock vanes to increase fish habitat diversity, stabilizing, resloping, and revegetating eroding streambanks to make the banks more resistant to erosion and flooding, eradicating invasive exotic plant species, and implementing a farm management plan to reduce stream impacts from livestock (Mickey and Scott 2002).

The United States Army Corps of Engineers (USACE) Section 404 permit and the North Carolina Division of Water Quality (NCDWQ) Section 401 permits allowing construction of the road were issued in 1998. Landowners agreed to the proposed easement boundary and the mitigation review team approved the site in 2000. Due to unforeseen complications in the acquisition process, the easement was not purchased until 2006. Both permits had expired by that time and new permits were re-issued in 2007. In 2006, responsibility for this site was transferred from NCDOT to the North Carolina Ecosystem Enhancement Program (EEP). The EEP requested the North Carolina Wildlife Resources Commission (NCWRC) complete this project.

Seven permanent stream channel cross-sections, four riffles and three pools, were established along the project (Appendix D) near the same locations as the pre-construction cross-sections. Direct comparisons with pre-construction survey were not possible. Peak Creek in the project reach now has a mean entrenchment ratio of 3.1, mean width/depth ratio of 18.5, mean bankfull width of 30.1 ft, and mean bankfull cross-sectional area of 47.9 ft^2. The enhancement work met most of the typical design specifications; entrenchment ratio >2.2, width/depth ratios >12.0, bankfull width of 34.0 ft, and bankfull cross-sectional area between 56 ft^2 and 60 ft^2 (Mickey and Scott 2002). The repair work converted Peak Creek from a degraded C4 stream channel type (Mickey and Scott 2002) to more stable C4, E4, and F4 stream channel types (Rosgen 1996).

The enhancement plan did not specify changes in the stream channel's pattern and only minor changes in the longitudinal profile (Mickey and Scott 2002). However, the section of stream between station 7+00 and station 8+00 had migrated approximately 20 ft to the left since the original channel survey was completed. This section of stream was moved back to its original location and did not result in any major changes in the stream's overall pattern. Additionally, the installation of log and rock structures with their associated pools did result in changes in the longitudinal profile.

The new cross-section locations did not allow for direct comparisons of cross-section pebble count data on Peak Creek with the pre-construction survey; general comparisons of reach pebble counts are possible. Reach pebble count comparisons indicated post-construction D16 particle size coarsened slightly, whereas the D50, D84, and D95 particle sizes were smaller than pre-construction particle sizes.

Disturbed areas were seeded with annual and perennial native seed mixtures and mulched with straw or net-free matting. A total of 769 containerized and bare root native trees and shrubs were planted in 1.0 acre of the riparian area (769 stems/acre). This exceeded the design specification of 320 woody stems/acre (Mickey and Scott 2002), which allowed for the greater mortality of bare root trees. A total of 2,000 live stakes were also planted along the stream bank. Actual plant densities were higher since much of the riparian area contained existing mature trees and shrubs.

Multiflora rose *Rosa multiflora* will be an ongoing problem at this site because of the existing seeds in the soil and it's prevalence in the adjacent pasture. Maintenance will be required to reduce impacts from multiflora rose. It will be treated in the spring of years 1, 2, 3, and 5 after construction with a glyphosate based herbicide.

An existing stream ford was improved, the easement was fenced to exclude livestock, and an alternative watering system for livestock was installed according to the farm management plan (Mickey and Scott 2002). The New River (Ashe County) Soil and Water Conservation District oversaw the installation of these agricultural best management practices.

The site will be monitored for five years following EEP and USACE monitoring guidelines (EEP 2008; Lee et al. 2006; USACE 2003). Monitoring will consist of measuring seven cross-sections, surveying the longitudinal profile of the entire site, collecting cross-section and reach-wide pebble count data, and enumerating woody plants in three vegetation plots.

It is important to note the easement widths for this project are smaller than currently required by the USACE and NCDWQ because this project originated using policies from 1999. Additionally, 1,003 lf of the project's 2,719 lf stream is protected with a conservation easement on only one side of the stream bank.

2 Project Goals, Background and Attributes

This mitigation plan and as-built report describes the project's background, outlines the mitigation plan's success criteria and monitoring guidelines, and summarizes stream channel enhancement work completed during 2007 (September-October) on 2,719 linear feet (lf) of Peak Creek and compares it with the pre-construction conditions to the extent possible.

2.1 Location and Setting

Peak Creek is a tributary to the South Fork New River in the New River drainage in Ashe County, North Carolina. Peak Creek (Appendix A, Figure A.1.) is located in the Blue Ridge Province of the Appalachian Mountains. The watershed upstream of the project site has an area

of approximately 4.4 square miles. The project is 4.1 miles southwest of Laurel Springs, 12.2 miles southeast of Jefferson, and 30.8 miles northwest of Wilkesboro.

Land uses within the watershed consist mostly of rural farms containing pastures and forested wood lots. The less steep valley floors are used to raise crops and graze livestock. While a significant portion of the watershed remains in second growth forest, some Christmas tree farms have been developed.

2.2 Project Goals and Objectives

The project's original goal was to improve aquatic habitat and riparian area vegetation and to reestablish channel stability in order for the NCDOT to meet its off-site stream mitigation requirements for the US 421 (TIP number R-0529) road improvement project in Watauga County. This will be discussed further in the Section 2.4. Project History, Contracts, and Attribute Data.

The objectives of the Bowlin-Peak Creek enhancement project were as follows (Mickey and Scott 2002):

1. Increase fish habitat diversity by installing root wads, rock cross vanes, and rock vanes.
2. Stabilize, slope and vegetate eroding stream banks to make the banks more resistant to erosion and flooding.
3. Eradicate invasive exotic species such as multiflora rose *Rosa multiflora*.
4. Construct a stable stream crossing at the existing ford location.
5. Exclude livestock from the riparian zone by installing exclusionary fencing and providing an alternate drinking water source.
6. Plant native trees, shrubs, and ground cover on all disturbed banks and along the channel to provide long-term bank stability, stream shading, and cover and food for wildlife.
7. Provide long-term protection of the stream and riparian corridor by the purchase of a permanent conservation easement.

2.3 Project Structure, Restoration Type, and Approach

2.3.1 Project Structure

The project area consists of two separate reaches, reach 1 (station 1+34 to 18+50) is protected by a conservation easement on both sides of the creek, whereas reach 2 (stations 0+00 to 1+34 and 18+50 to 27+90) has a conservation easement on only one side of the creek. (Appendix A, Figure A.2. and Table A.1.). In reach 2 the conservation easement line is located along the center line of the stream and only protects of the left streambank. There were no differences in geomorphology, hydrology, or soils of the two reaches; therefore, the same type of approach (enhancement I) was used throughout the project. The two reaches are distinguished only for purposes of determining mitigation credits; reach 2 was not included as an expected asset. For the remainder of this document, the two reaches will be considered as one.

2.3.2 Restoration Type and Approach

Historic dredging of the stream channel, gravel mining, and poor riparian zone management on the Bowlin-Peak Creek site resulted in streambank instability at numerous locations, adverse water quality impacts through increased sedimentation, and degraded aquatic habitat (Mickey and Scott 2002). The narrow riparian zone, <15 feet on each bank, was fairly intact along sections of the stream and consisted primarily of tag alder *Alnus serrulata*, multiflora rose, silky dogwood *Cornus amomum*, red maple *Acer rubrum*, and black cherry *Prunus serotina*. Most of the vegetated streambanks were stable, except in areas where multiflora rose predominated.

The desire to protect existing vegetation and the narrow width of the conservation easement limited the stream improvement options to enhancement II (Appendix A, Table A.1.). The total average width of the conservation easement is approximately 66 ft, ranging from 50 ft to 85 ft. The enhancement plan included reshaping eroding stream banks while leaving as much of the existing native vegetation intact; installation of in-stream structures to improve bank stability and aquatic habitat; physical removal and herbicide treatment of multiflora rose; re-vegetating the banks with native plant species; and construction of fencing for livestock exclusion and installation of an alternative watering source. Peak Creek's degraded C4 stream type (Rosgen 1996) was enhanced to more stable C4, E4, and F4 stream types.

2.4 Project History, Contacts, and Attribute Data

The project's background and history are summarized in Appendix A, Tables A.2.-A.4:

- Appendix A, Table A.2. – reporting and milestone history for the project.
- Appendix A, Table A.3. − contact information for the project's consultants, contractors, and suppliers.
- Appendix A, Table A.4. – general geographical, morphological, and water quality characteristics of the project.

It should be noted that this site was identified and established under older mitigation permitting guidance and that the narrower conservation easement width and portions of the stream being protected on only one side of the stream bank were acceptable at the time.

The NCDOT had contracted with the NCWRC to provide off-site stream mitigation for impacts from the relocation of US 421 (TIP number R-0529) from the South Fork New River in Boone to the Blue Ridge Parkway in Deep Gap. For that project, a total of 14,814 linear feet of stream mitigation were required by the United States Army Corps of Engineers (USACE) Section 404 permit and 7,407 linear feet of mitigation were required by the North Carolina Division of Water Quality (NCDWQ) Section 401 water quality certification. Subsequent mitigation sites were originally permitted under the US 421 project and not via individual permits. The USACE Section 404 permit (Action ID No. 19970761) was issued on 4 May 1998 and the NCDWQ Section 401 permit (Project number 970616) was issued on 20 April 1998 (Appendix E).

The Peak Creek site on the Bowlin property was presented to the US 421 mitigation review team as a potential mitigation site in 2000; in 2002 the landowners agreed to the proposed conservation easement boundary. The pre-construction notification and the Peak Creek site mitigation plan were submitted to the USACE and NCDWQ in May 2003. The plan was approved by NCDWQ (Certification number 030599) on 29 May 2003 (Appendix E). No comments were received from the USACE; therefore it was assumed that the project was approved under the general permit conditions. Acquisition of the conservation easement was delayed due to problems obtaining valid appraisals. The NCDWQ permit was reissued on 15 August 2006 (Appendix E). In attempting to renew the USACE permit, it was determined that the original permit had expired, negating the NCDWQ August 2006 permit and requiring new permits to be obtained. A conservation easement on the property was purchased in the fall of 2006. In 2006, responsibility for this site was transferred from NCDOT to the EEP. Under a new memorandum of agreement and interagency contract, EEP tasked the NCWRC to complete this project. New Section 404 (Action ID No. 200702632; 11 Aug 2007) and Section 401 (Project number 030599; 20 Aug 2007) permits were obtained.

3 Success Criteria

The USACE (2003) outlines the general criteria used to evaluate the success or failure of mitigation sites and the required remedial actions necessary should monitoring activities indicate a failure of a monitoring component (Appendix A, Table A.5.). Success criteria are based on photographic documentation, channel stability, plant survival, including percent herbaceous cover from vegetation assessment plots, and biological monitoring.

3.1 Morphologic Parameters and Channel Stability

Streams are dynamic systems that change over time; however, restored or enhanced streams should maintain a dynamic equilibrium where the stream's overall dimension, pattern, and profile is maintained without significant aggradation or degradation. Some channel adjustment often occurs for several months to a year after restoration or enhancement work are completed. This is dependent on how well established the vegetation becomes and the number of bankfull or near bankfull events that occur. Some annual variation in these characteristics is also expected.

3.1.1 Dimension

Some adjustment of the channel dimensions will occur in the years immediately following construction. Stream banks are expected to build as herbaceous plants and shrubs trap sediment. The stream channel width may increase as the trees and shrub mature and shade out the herbaceous layer.

3.1.2 Pattern and Profile

The stream channel's pattern and profile should show little adjustment during the 5-year monitoring period following construction. The thalweg is expected to migrate within the new stream channel depending on water level at the time of survey and frequency and intensity of storm events.

3.1.3 Substrate

The D_{50} particle size classes for reach and cross-sections pebble counts at this site were expected to be very course gravel (32 mm to 64 mm). A significant declining trend in mean particle size could indicate stream bank instability within the project reach or that sediment inputs were coming from outside the project area.

3.1.4 Sediment Transport

The USACE (2003) does not require sediment transport calculations as part of the monitoring success criteria. These calculations are also not required for monitoring enhancement level projects by EEP. However, the net effect of any changes in channel morphology should result in the absence of any significant trend in the aggradation or degradation of the channel.

3.2 Hydrology

In order for monitoring to be considered complete, a minimum of two bankfull flow events must take place within the 5-year monitoring period (USACE 2003). The events must occur in two different monitoring years. Bankfull flow events can be documented by using on-site crest gages, data from USGS gages downstream or in close proximity of the project, and photographs showing wrack or debris lines on the streambank.

3.3 Vegetation

The North Carolina Division of Land Resources (NCDLR) requires all disturbed areas to be stabilized with mulch and temporary and permanent herbaceous plants that will result in a minimum of 75% ground cover (NCDLR 2007). This is to prevent erosion and minimize the amount of sediment entering the stream. Additionally, NCDLR requires a minimum 25 foot undisturbed buffer zone adjacent to stream with a DWQ trout waters classification. A trout buffer waiver allows disturbance activities in the trout buffer zone and requires that disturbed areas are replanted with native trees and shrubs (Sedimentation Pollution Control Act of 1973, as amended in 2007).

The USACE (2003) requires a minimum density of live planted bare root trees be achieved at the end of each monitoring year (Appendix A, Table A.5.). The success criteria do not incorporate existing trees and shrubs or natural recruitment. This site contains a significant number of mature trees and shrubs and therefore, existing vegetation and natural recruitment should be considered in assessing the overall success of the project.

3.4 Other Parameters

Biological monitoring is required for projects that are expected to make watershed level changes (USACE 2003).

4 Monitoring Plan Guidelines

The purpose of monitoring plan is to outline the type of monitoring necessary to determine the degree of success the project has achieved. Environmental components monitored at this site will be those that allow an evaluation of channel stability and development of a forested riparian area. The monitoring plan is based on the EEP and USACE monitoring guidelines (EEP 2008 and USACE 2003). All parameters listed below will be monitored annually for five years unless stated otherwise.

4.1 Stream Channel Stability and Geomorphology

4.1.1 Dimension

Seven permanent stream channel cross-sections transecting four riffles and three pools were established along the project (Appendix D). Many of these stream channel cross-sections were established near the same locations as those taken to develop construction plans. They will be used to monitor structures or features that may have an increased risk of failure and stable areas that were not disturbed. The stream channel cross-sections are located at stations 3+56, 6+39, 7+62, 10+43, 14+80, 16+80, and 20+90. Both ends of each cross-section were marked with iron rebar; an additional pin was installed at the approximate bankfull elevation on one streambank. The iron rebar's geographic location was collected using a Trimble Geo XT handheld mapping grade Global Positioning System receiver. This will establish the exact transect location and facilitate easy comparisons of year-to-year data. Photographs of each cross-section will be taken at the time of the survey.

4.1.2 Profile

The entire longitudinal profile will be surveyed annually during the monitoring period. The longitudinal profile begins at the culvert crossing on Peak Creek Church Road (SR 1616) and ends where a ditch enters the stream from the left at the lower end of the project (station 27+19). The geographic location information for the beginning and end of the longitudinal profile was collected using a Trimble Geo XT handheld mapping grade Global Positioning System receiver. A bench mark has been established on the left bank near station 0+55 and given the arbitrary elevation of 1,000 ft to help standardize elevations between monitoring years.

4.1.3 Pattern

Because only minor modifications were made to the stream pattern, it will be documented only for the as-built report. Additional data will be collected in monitoring year 5 only if profile and dimensional data indicate that significant geomorphological changes have occurred.

4.1.4 Substrate

Cross-section and reach-wide pebble count data will be collected annually. The measured data will be taken using standard stream survey techniques (Harrelson et al. 1994).

4.1.5 Visual Assessment

The visual assessment is used to analyze the success of each structural feature category (i.e. riffles, pools, thalweg, meanders, bank, rock/log vanes, and root wads). It will be conducted according to EEP's Content, Format and Data Requirements for EEP Monitoring Reports (2006).

4.1.6 Bank Stability Assessments

Bank erosion hazard index (BEHI) and near bank sheer stress (NBS) are used to estimate sediment export from streambank erosion (Rosgen 2006). They were not assessed for pre-construction conditions and, therefore, not required to determine the success of the project.

4.2 Hydrology

To monitor on-site occurrence of bankfull events a crest gage was installed at station 10+48. The bankfull water elevation is 2.8 ft above the channel bed; this elevation has been marked on the crest gage for easy identification. The crest gage will be checked every time the site is visited. Bankfull events will be recorded. Photographic documentation of wrack lines and deposition will serve to augment gage readings. Additionally, the United States Geological Survey's South Fork New River flow gage data (gage number 03161000 located near Jefferson, North Carolina) will be reviewed to corroborate the occurrence of bankfull events. Bankfull discharge at the South Fork New River flow gage was estimated by using the established gage height vs. discharge relationship calculated from historic gage data and relating the bankfull elevation in the field to the gage height. Bankfull discharge was estimated at 3,220 cubic feet per second at the South Fork New River gage station (Mickey and Scott 2002).

4.3 Vegetation

Vegetation data collection and sample size (number of plots required) determination follows the CVS-EEP Protocol for Recording Vegetation (Lee et al. 2006). The riparian area is approximately 2.0 acres. Three 100 m^2 vegetation of plots were established to monitor trees and shrubs within the riparian area. Plot corners were marked with 0.5 inch iron rebar, while the plot origins (0,0) were marked with additional 4 ft tall pvc pipe. The geographic locations of the origins were determined using a Trimble Geo XT handheld mapping grade Global Positioning System (GPS) receiver. Level 2 monitoring protocols (Lee et al. 2006) were implemented because of the large amount of existing vegetation and the high potential for natural recruitment.

4.4 Digital Photographs

Twenty-one permanent photograph points (15 stream channel points and 6 vegetation plot locations) were established to document changes in the stream channel (cross-sections and longitudinal profile) and vegetation. Photographs of the stream channel should be taken when vegetation is minimal and within the same 2-month window between monitoring years. The photograph points will be close enough to get an overall view of the entire reach. Representative vegetation plot photographs will be taken on the same day the vegetation inventories are conducted. Photograph captions will include the plot number and date taken. The photograph

points' geographic location information was collected using a Trimble Geo XT handheld mapping grade Global Positioning System receiver.

4.5 Other Parameters

Biological monitoring is not required for this project since it is not a full restoration project and not expected to make watershed level changes (USACE 2003). Agricultural best management practices implemented in the farm management plan will be monitored to ensure their proper function. Problem areas will be described in the annual monitoring reports.

4.6 The Watershed

Manmade and natural activities within the watershed can influence stream channel and riparian conditions within the project area. An informal survey of the watershed will be conducted each monitoring year to document any new land use activities or impacts from recent hydrologic events. All changes and impacts to the project area will be described in the annual monitoring reports.

5 Maintenance and Contingency Plans

Maintenance will be required to reduce the incidence of multiflora rose. Current plans are to treat it in the spring of monitoring years 1, 2, 3, and 5. A glyphosate based herbicide will be used.

An important part of this stream mitigation plan is the exclusion of livestock from the riparian zones and maintenance of the alternative watering system. Major fence repairs and maintenance of the stream crossing and watering system will be the responsibility of EEP. Landowners are expected to do minor fence and stream crossing maintenance to maintain their function. This includes fence tightening due to cattle pushing the wire, damage to the fence or gates caused by farm equipment activities, and removing debris that may block crossings. The landowner is responsible for structures that are not within the conservation easement.

Annual monitoring reports will include recommendations for any maintenance deemed necessary on the project. These recommendations will be based, in part, on previously established thresholds and criteria for remedial actions (Appendix A, Table A.5.) Staff at EEP, USACE, and DWQ will determine what, if any, action is required.

6 Methods

Four representative riffle and three representative pool cross-sections were measured, the longitudinal profile surveyed, and cross-section and reach-wide pebble count data were collected 7-9 January 2008. The measured and surveyed data were taken using standard stream survey techniques (Harrelson et al. 1994). A Nikon DTM 821 total station was used to survey the stream's pattern, profile, and cross-sectional dimensions. Mountain and piedmont regional hydraulic geometry curve data were used to evaluate bankfull elevation conditions in the field (Harman et al. 1999). Cross-section data were used to classify the stream based on existing

morphological features of the stream channel and valley type (Rosgen 1994, 1996). Site conditions were analyzed using RIVERMorph stream assessment and restoration software, Version 4.1.1 (RSARS 2006) and AutoCAD (2004) Version 2004.0.0. Vegetation surveys were completed on 20 March 2008 and followed the EEP and the Carolina Vegetation Survey level 2 protocol (Lee et al. 2006). Monitoring followed standard regulatory guidance, procedures, and success criteria (USACE 2003). Detailed methods and deviations in standard methods are detailed in individual sections below.

Geographic location information was collected using a Trimble Geo XT handheld mapping grade GPS receiver. Coordinates were collected at the beginning, end, and bankfull pin locations for all cross-sections, the beginning and end of the longitudinal profile, the origin of each vegetation-monitoring plot, and at photographic points. Sufficient GPS fixes were obtained to allow the geographic positions to be determined with sub-meter precision.

7 Project Condition and As-built Results

7.1 As-built Plan View

The as-built plan view is located in Appendix D.

7.2 Morphological State of the Channel

Morphological data is summarized in the following:

- Appendix B, Table B.1.1. summarizes the pre-construction, reference reach, design, and as-built quantitative morphological data collected from the cross-section surveys, longitudinal profile surveys, and pebble counts for Peak Creek.
- Appendix B, Table B.1.2. summarizes the as-built quantitative morphological data collected for each cross-section.
- As-built cross-section plots are located in Appendix B, section B.2.
- As-built longitudinal profile plots are located in Appendix B, section B.3.
- As-built pebble count cumulative frequency distribution plots are located in Appendix B, section B.4.

These data will be compared with future monitoring data and will be used to illustrate the degree of departure of the stream channel and substrate characteristics, if any, from the desired condition.

7.2.1 Dimension

Cross-section 1 at station 3+56: This cross-section transects a riffle just upstream of a small log vane. The stream channel was moved slightly to the left and the right stream bank, resloped, and vegetated. The left stream bank was not resloped to the degree called for in the design plans (Mickey and Scott 2002). Since the 2001 pre-construction survey, an inner berm feature developed along the left bank along with an established shrub community. However, the elevation of the inner berm was lowered during construction at the location of the cross-section to allow for access to the stream. The remainder of the lower berm upstream of the cross-section

was not disturbed. The height of the inner berm feature should increase over time and result in the stream channel evolving into an E4 stream type (Rosgen 1996). Because of the wide inner berm feature, this cross-section is classified as an F4 stream type (Rosgen 1996), having an entrenchment ratio of 1.4 and width/depth ratio of 34.6.

Cross-section 2 at station 6+39: This cross-section transects a pool and the downstream portion of a log cross-vane. The right stream bank was resloped and vegetated. The left arm of the log cross-vane ties into the roots of a large red maple *Acer rubrum* and helps stabilize the resloped left stream bank upstream of the maple tree. The pool's depth may decrease slightly over time. The bankfull pin may have been placed slightly low on the stream bank resulting in a cross-sectional area of 32.4 ft^2 and bankfull width of 18.7 ft. This is well below the pool design typical's cross-sectional area of 107.2 ft^2 and bankfull width of 38.3 ft (Mickey and Scott 2002).

Cross-section 3 at station 7+62: This cross-section transects a pool at the downstream end of a double drop log/rock cross vane. The left stream bank is protected by a root wad. The pre-construction survey data indicated the channel had migrated approximately 20 feet to the right. The channel was moved back to its original location and has a cross-sectional area of 48.5 ft^2 and a bankfull width of 19.9 ft. Although this cross-sectional area and bankfull width are smaller than the pool design dimensions (Mickey and Scott 2002), the double drop cross-vane and extensive floodplain should help keep this portion of stream channel stable.

Cross-section 4 at station 10+43: This cross-section transects a stable riffle. The left stream bank was reshaped after removing multiflora rose. This enhancement work was not in the original design plan (Mickey and Scot 2002). The stream channel at this cross-section is classified as a C4 stream type (Rosgen 1996) based on the location of both the bankfull pin and the existing bankfull bench feature. The bankfull pin appears to have been placed slightly low on the left stream bank when compared with an existing bankfull feature on the right stream bank. The bankfull width and cross-sectional area measured at the bankfull pin and bankfull feature were similar - bankfull widths were 25.8 ft and 28.2 ft and cross-sectional areas were 48.5 ft^2 and 55.0 ft^2. Although the stream channel dimensions are slightly smaller than the design plans, this section of stream has remained stable since the pre-construction survey. Both the bankfull pin and bankfull feature will continue to be monitored.

Cross-section 5 at station 14+80: This cross-section transects a pool at the downstream end of a rock J-hook. The extent of enhancement work at his location was limited by the narrow buffer and the desire not to remove mature vegetation. The as-built cross-sectional area of 48.3 ft^2 and bankfull width of 20.4 ft is below the pool design typical dimensions. This should not be a concern because the left bank, which has the greatest sheer stress acting upon it, is protected by the rock J-hook and reshaped bank. The J-hook also acts as a grade control structure that should prevent a head cut from occurring.

Cross-section 6 at station 16+80: The cross-section transects a riffle. The right bank was reshaped throughout this section of stream and stabilized with vegetation. The stream channel at this cross-section is classified as a C4 stream type (Rosgen 1996) based on the location of the bankfull pin and the existing bankfull bench feature. After reviewing the cross-section data, the bankfull pin appears to have been placed on an inner berm below the actual bankfull bench.

Dimensional measurements from the bankfull bench (cross-sectional area of 60.4 ft^2 and bankfull width of 36.8 ft) closely fit with the riffle design plan typical ranges (cross-sectional area of 56.0 ft^2 to 60.4 ft^2 and bankfull width of 28.4 ft to 35.8 ft). Stream channel dimensions calculated from the bankfull pin and bankfull bench feature will be compared in future reports.

Cross-section 7 at station 20+90: The cross-section transects a stable riffle. No enhancement activities were performed at this cross-section because existing mature vegetation made the bank stable and only one side of the stream is within the conservation easement. The stream channel at this cross-section is classified as an E4 stream type (Rosgen 1996) based on an entrenchment ratio of 3.4 and a width/depth ratio of 10.4. The survey did not extend far into the right stream bank floodplain because it was not within the easement; therefore, the floodplain was arbitrarily given a width of 70 ft because this is a low lying area.

7.2.2 Profile

The enhancement work changed the profile of the stream channel through the addition of log and rock structures with their associated pools and the relocation of approximately 100 lf of stream channel. Direct comparison between the pre-construction and as-built longitudinal profiles is difficult because approximately 6 years elapsed between the two surveys. In addition, the as-built conditions were surveyed in greater detail than were the pre-construction conditions (Appendix B.3). Despite this issue, it does appear that the stream's longitudinal profile did change in the time between the original survey and construction. A beaver dam recorded in the pre-construction survey at station 16+69 was not present at the time of construction and the stream's bottom elevation had lowered into a more stable riffle feature. Several segments of the stream channel had migrated, most notably portions from station 3+00 to station 4+00, from station 7+00 to station 8+00, and from station 16+25 to station 17+00. Additionally, the pool extending from station 4+77 to station 6+00 accumulated almost one foot of sediment.

The percentage of riffles decreased from 65% pre-construction to 34.6% post-construction. In addition, the mean riffle length and mean pool length also decreased from 100.0 ft to 30.8 ft and from 50.0 ft to 35.1 ft (Appendix B, Table B.1.1.). The enhancement work resulted in more pool habitat. As a consequence, pool-to-pool spacing decreased from 100.0 ft pre-construction to 91.6 ft post-construction. Comparisons for runs and glides could not be made as they were not delineated in the pre-construction survey.

7.2.3 Pattern

Enhancement work was mainly oriented towards reshaping banks to establish a bankfull bench and did not change pattern although the pattern measurements suggest otherwise. Pre- and post-construction mean channel belt widths were 66.0 ft and 51.2 ft, whereas the mean radiuses of curvature were 12.7 ft and 30.8 ft (Appendix B. Table B.1.1.). These differences in the stream's pattern are attributed to the use of different measurement techniques (in situ measurements vs. on-screen GIS analysis), taking measurements at different locations, and the number of measurements taken.

7.2.4 Substrate Data

Riffles were not constructed on this project; therefore, an as-built bar substrate sample was not collected. Direct comparisons of pre- and post-construction cross-section pebble counts were limited, since post-construction cross-sections were taken at different locations (Appendix B.4). Reach pebble count comparison indicated post-construction D16 particle size coarsened slightly from 4.0 mm gravel to 6.3 mm gravel. The D50, D84, and D95 particle sizes were smaller than pre-construction particle sizes; D50 went from 47.7 mm to 31.7, D84 went from 155.7 mm to 88.3 mm, and D95 went from 223.4 mm to 163.8 mm. The apparent increase in the D100 particle size from 362.0 mm to 1,024.0 mm was probably caused by the presence of a boulder in a rock structure that was included in the pebble count. All particle size indexes stayed within their perspective size classes (i.e. gravel, cobble, and boulder).

7.3 Stream Gage Placement and Condition

The stream crest gage location and the associated bankfull elevation are described under monitoring in section 4.1. The crest gage was installed just prior to the as-built survey. No bankfull events occurred between the installation of the crest gage and completion of the as-built survey.

7.4 Verification of Plantings

The enhancement project disturbed approximately 1 acre of riparian land within the conservation easement. Disturbed areas were seeded at 40 lb/acre with an annual rye grain *Lolium multiflorum* to establish a temporary ground cover; a native herbaceous seed mix consisting of 19 species was planted at 10 lb/acre to establish a permanent ground cover (Appendix C, Table C.1.1.). A total of 769 containerized and bare root native trees and shrubs comprised of 17 species were planted in the riparian area (769/acre; Appendix C, Table C.1.2.). This exceeded the design specification of 320 woody stems/acre, which allowed for greater mortality of bare root trees. Actual total plant densities were higher since much of the riparian area contained existing trees and shrubs. No inventory of the existing plants was made. A total of 2,000 live stakes (10,890 stakes/acre) representing five shrub species were also planted on approximately 2-foot centers along the disturbed stream banks (Appendix C, Table C.1.2.). Live stakes were planted at higher densities near structures and in areas of greater bank stress.

Vegetation was surveyed in three 100-m^2 representative plots (Appendix D). The plots cover 4% of the 2 acre riparian habitat. Vegetation data, including plot attributes and vegetation metadata, stem counts, plant vigor, and plant damage are presented in Appendix C, Tables C.1.3.-C.1.9. Stem counts for plot 1 revealed 14 planted live stems (567 stems/acre) with a total of 66 planted and existing live stems (2,307 stems/acre). Stem counts for plot 2 revealed only 18 planted live stems (728 stems/acre) and no existing plants. Stem counts for plot 3 revealed 13 planted live stems (526 stems/acre) with a total of 42 planted and existing live stems (1,700 stems/acre). A total of 22 species were identified in the three vegetation monitoring plots with an average of 11 species per plot.

Multiflora rose was sprayed with a glyphosate based herbicide in April 2007 to help reduce the density of the infestation. It was physically removed from the easement and burned on site during the enhancement work. Multiflora rose will be an on going problem at this site because of the existing seed bed and the presence of additional plants in the adjacent pasture. Additional herbicide treatments should reduce impacts of this invasive exotic species on maturing vegetation within the conservation easement.

7.5 Photograph Documentation

Fixed stream photograph points document pre- and post-construction conditions and are located in Appendix B, Section B.5. Fixed vegetation plot photographs document post-construction vegetation coverage and are located in Appendix C, Section C.2.

7.6 Farm Management Plan

The livestock management program developed for this project (Mickey and Scott 2002) included the improvement of the existing stream-crossing, installation of four watering tanks, drilling of a well and pump installation, and fencing to exclude livestock from the riparian zone. The New River (Ashe County) Soil and Water Conservation District oversaw the installation of these agricultural best management practices. At the time of the as-built survey, all best management practices were functioning properly.

8 Acknowledgements and References

8.1 Acknowledgements

M. Fowlkes and J. Wasseen, II of the NCWRC oversaw project construction; M. Fowlkes, J. Wasseen, II, and J. Ferguson collected and analyzed the field data; M. Fowlkes and J. Wasseen, II prepared this report. J. Borawa improved the report with this thorough review and thoughtful suggestions.

8.2 References

AutoCAD. 2004. Version 2004.0.0. Copyright 2004, AutoDesk, Inc., San Rafael, California.

EEP (North Carolina Ecosystem Enhancement Program). 2006. Content, format and data requirements for EEP monitoring reports version, 1.2. Raleigh.

EEP (North Carolina Ecosystem Enhancement Program). 2008. Mitigation plan document format, data requirements and content guidance, version 2. Raleigh.

Harman, W. A., G. D. Jennings, J. M. Patterson, D. R. Clinton, L. O. Slate, A G. Jessup, J. R. Everhart, and R. E. Smith. 1999. Bankfull hydraulic geometry relationships for North Carolina streams. Pages 401-408 *in* D. S. Olsen and J. P. Potyondy, editors. American Water Resources Association, Wildland Hydrology Symposium Proceedings. American Water Resources Association, Middleburg, Virginia.

Harrelson, C. C., J. P. Potyondy, and C. L. Rawlins. 1994. Stream channel reference sites: an illustrated guide to field technique. General Technical Report RM-245, U.S. Department of Agriculture, Forest Service, Fort Collins, Colorado.

Lee, M. T., R. K. Peet, R. D. Steven, and T. R. Wentworth. 2006. CVS_EEP Protocol for Recording Vegetation Version 4.0. Available: www.nceep.net/business/monitoring/veg/datasheets.htm (October 2006).

Mickey, J. H. and S. Scott. 2002. Streambank stabilization and habitat enhancement plan, Bowlin site, Peak Creek, Ashe County. North Carolina Wildlife Resources Commission, Raleigh.

NCDLR (North Carolina Division of Land Quality). 2007. Erosion and sediment control field manual. Raleigh

Rosgen, D. L. 1994. A classification of natural rivers. Catena 22:169-199.

Rosgen, D. L. 1996. Applied river morphology. Printed Media Companies, Minneapolis, Minnesota.

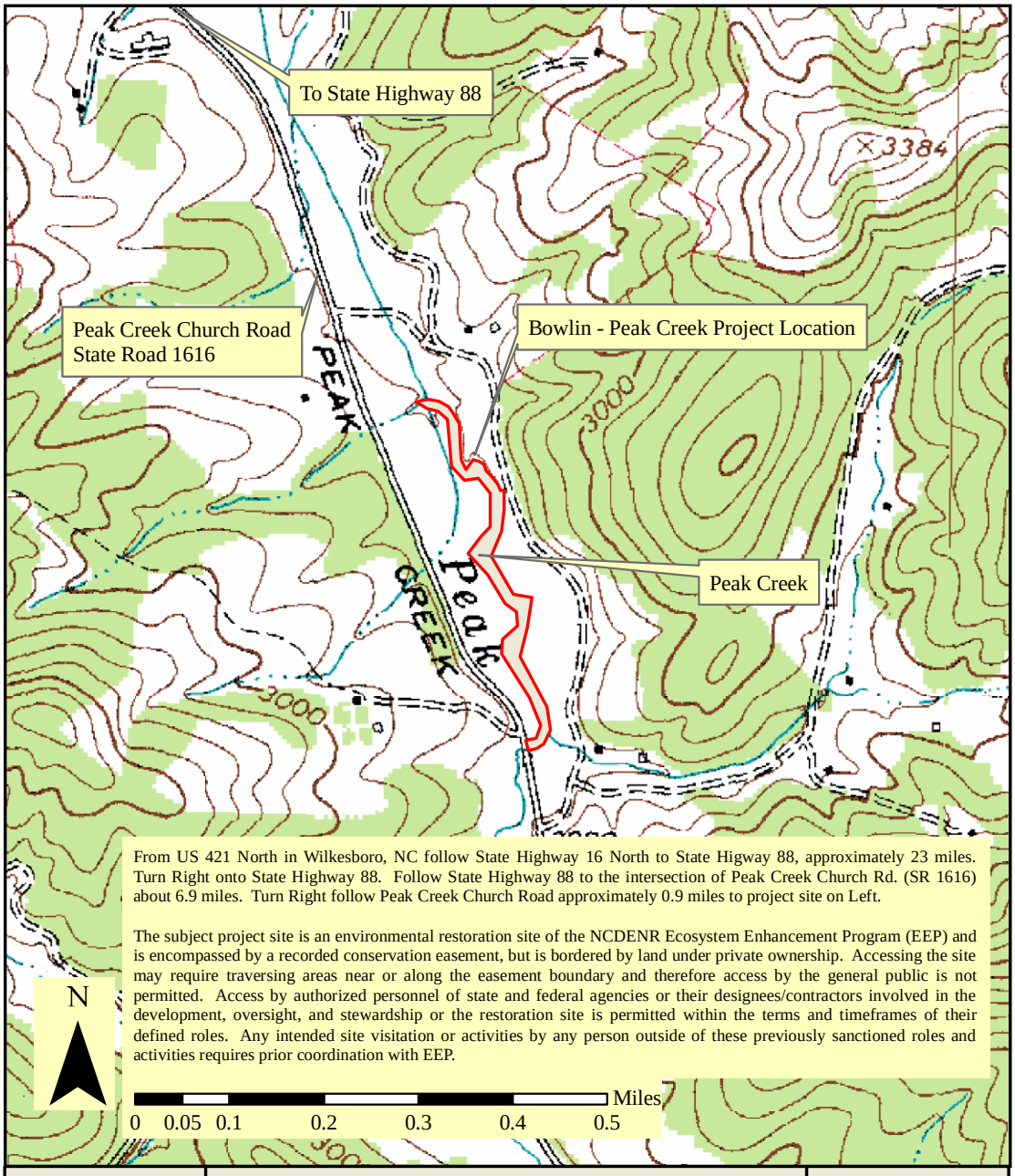
Rosgen, D. L. 2006. Watershed assessment of river stability and sediment supply. Wildland Hydrology, Fort Collins, Colorado.

RSARS (RIVERMorph Stream Assessment and Restoration Software). 2006. Version 4.0.1 Professional edition. Copyright 2002-2006, RIVERMorph LLC, Louisville, Kentucky. Available: www.rivermorph.com. (July 2007)

USACE (U.S. Army Corps of Engineers, Wilmington District, U. S. Environmental Protection Agency, North Carolina Wildlife Resources Commission, and the North Carolina Division of Water Quality). 2003. Stream Mitigation guidelines. Wilmington, North Carolina.

Appendix A General Tables and Figures

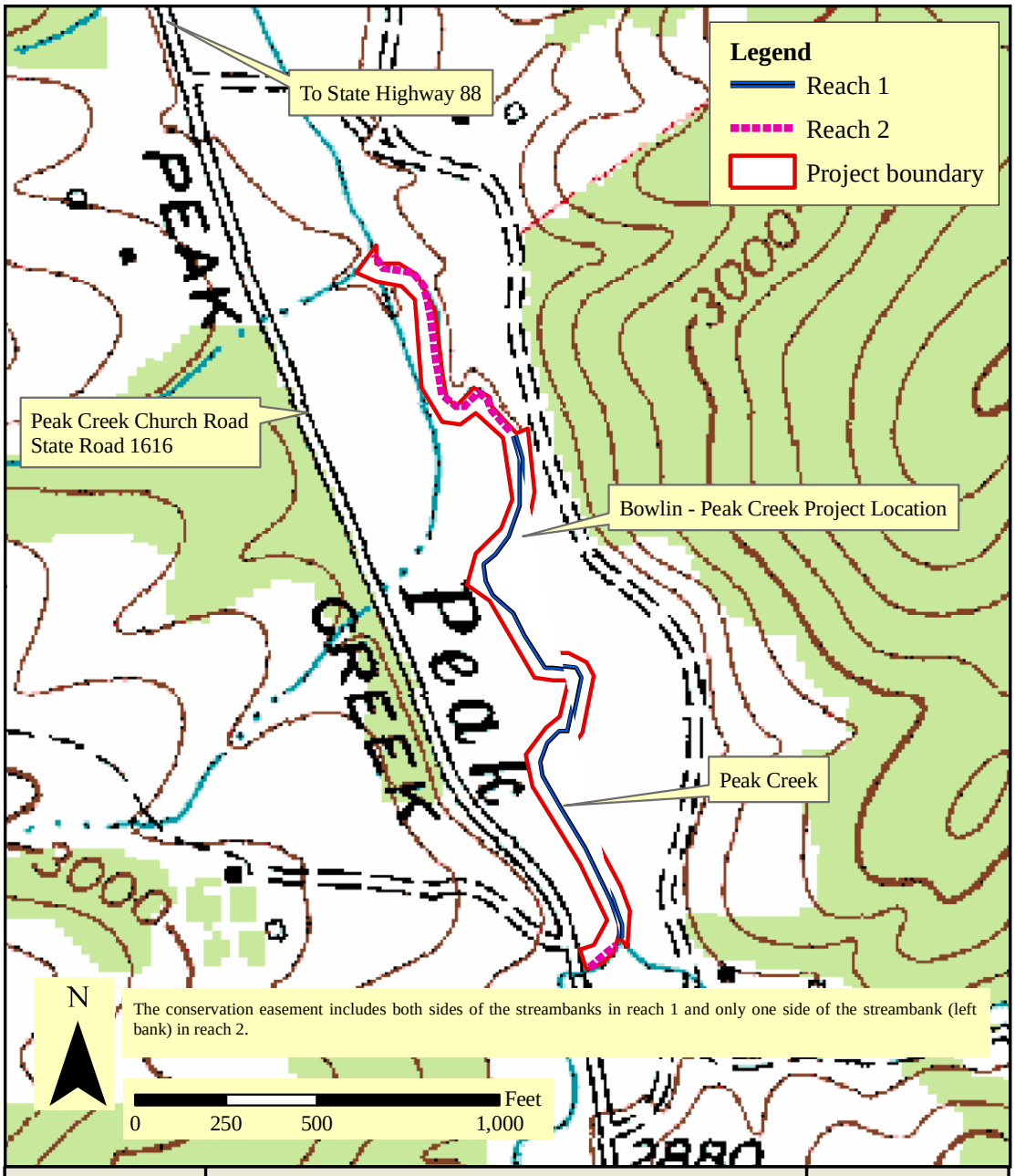
Figure A.1—Vicinity Map.



Project Vicinity Map.
Bowlin - Peak Creek Mitigation Site
EEP Project Number: 92606, As-built (2007)
Ashe County, North Carolina
May 2008

Source:
United States Department of the Interior, Geological Survey
Laurel Springs Quadrangle, 7.5 Minute Series (Topographic).

Figure A.2─Project Components.



Project Component Map.
Bowlin - Peak Creek Mitigation Site
EEP Project Number: 92606, As-built (2007)
Ashe County, North Carolina
May 2008

Source:
United States Department of the Interior, Geological Survey
Laurel Springs Quadrangle, 7.5 Minute Series (Topographic).

Table A.1─Project Components.
Bowlin-Peak Creek/Project Number: 92606

Project Segment or Reach ID[a]	Existing feet/Acres	Restoration Level[b]	Approach[c]	Restored Feet/Acres	Stationing	Buffer Acres[c]	Comment
Peak Creek Reach 1	1,707 lf	EI	P3	1,716 lf	1+34-19+07	1.5	Installed rock vanes, rock j-hooks, root wads, digger logs, and log vanes, sloped banks and created bankfull benches on both sides of the stream.
Peak Creek Reach 2[d]	1,003 lf	EI	P3	1,003 lf	0+0-1+34 18+50-27+19	0.5	Installed rock vanes, rock j-hooks, root wads, digger logs, and log vanes, sloped banks and created bankfull benches on one side of the stream channel.

Component Summations

Restoration Level	Stream (lf)	Riparian Wetland (Acre)		Non-Riparian	Upland (Acre)	Buffer (Acre)	BMP
		Riverine	Non-Riverine				
Restoration							
Enhancement							
Enhancement I[d]	1,773					1.5	
Enhancement II							
Creation							
Preservation							
HQ Preservation							
Totals	**1,773**	**0**		**0**	**0**	**1.5**	**BMP Count**

= Non-Applicable

R = Restoration EII = Enhancement II P3 = Priority 3 lf = Linear Feet
EI = Enhancment I S = Stabilization SS = Stream Bank Stabilization

[a]The two reaches are identical geomorphologically and distinguished for mitigation purposes only. The distinctions are only found in this table.

[b]Source: USACE (2003).

[c]Source: Rosgen (2006).

[c]Defined as the area of the conservation easement measured post construction from the bankfull elevation nearest to the active stream channel to the easement boundary.

[d]Reach 2 was excluded from the Component Summation Totals because the conservation easement protects only one side of the stream channel.

Table A.2─Project Activity and Reporting History.
Bowlin-Peak Creek/Project Number: 92606

Activity or Report	Data Collection Complete	Actual Completion or Delivery
Restoration Plan	Apr 2002	Dec 2002
Final Design	Apr 2002	Dec 2002
NCDWQ 401 Water Quality Certification	NA	May 2003, Aug 2007
USACE 404 Permit	NA	Apr 1998, Aug 2007
Acquired conservation easement	NA	Sep 2006
Erosion and Sediment Control Design Plan Approved	NA	May 2007
Trout Buffer waiver	NA	Jun 2007
Construction	NA	Nov 2007
Temporary seed mix applied to entire project area	NA	Nov 2007
Permanent seed mix applied to entire project area	NA	Nov 2007
Bare root and live stakes plantings for the entire project area	NA	Feb 2008
Mitigation/As-built (Year 0 Monitoring - baseline)	Dec 2007, Feb 2008	May 2009
Year 1 Monitoring		
Year 2 Monitoring		
Year 3 Monitoring		
Year 4 Monitoring		
Year 5 Monitoring		

Table A.3─Project Contact Table.
Bowlin-Peak Creek/Project Number: 92606

Designer North Carolina Wildlife Resources Commission Watershed Enhancement Group Field Office	Mr. Joseph H. Mickey, Mr. Mark Fowlkes 1701 Mail Service Center Raleigh, NC 27699-1701 (336) 527-1547
Construction Contractor North Carolina Wildlife Resources Commission Watershed Enhancement Group Field Office	Mr. Mark Fowlkes P.O. Box 387 Elkin, NC 28621 (336) 527-1547
Sub-Construction Contractor Yadkin Valley Construction, Inc. Grading and Fencing	Mr. Terry Benton 2961 Old 60 Hwy Ronda, NC 28670 (336) 984-2219
Planting Contractor North Carolina Wildlife Resources Commission Watershed Enhancement Group Field Office	Mr. Mark Fowlkes P.O. Box 387 Elkin, NC 28621 (336) 527-1547
Seeding Contractor North Carolina Wildlife Resources Commission Watershed Enhancement Group Field Office	Mr. Mark Fowlkes P.O. Box 387 Elkin, NC 28621 (336) 527-1547
Seed Mix Sources	New England Wetland Plants, Inc. (413) 548-8000
Nursery Stock Suppliers	North Carolina Forest Service (888) NC-Trees
	River Bend Farms (336) 366-2982
	Foggy Mountain Nursery (336) 977-2958
Monitoring Performers North Carolina Wildlife Resources Commission Watershed Enhancement Group Field Office	Mr. Mark Fowlkes P.O. Box 387 Elkin, NC 28621 (336) 527-1547

Table A.4─Project Attribute Table.
Bowlin-Peak Creek/Project Number: 92606

Project County	Ashe
Physiographic Region Reference: http://www.geology.enr.state.nc.us/proj_earth/proj_earth.html	Blue Ridge Province
Ecoregion (Reference: USACE 2003)	New River Plateau
Project River Basin	New River
USGS HUC for Project (14 digit)	05050001020050
NCDWQ Sub-basin for Project	05-07-01
Within extent of EEP Watershed Plan?	Yes
NCWRC Class (Warm, Cool, Cold)	Cold
Percent of project easement fenced or demarcated	100
Beaver activity observed during design phase?	Yes
Restoration Component Attribute Table	
	Peak Creek
Drainage Area (square miles)	4.44
Stream Order (Reference: USGS 1:24,000 Topographic maps)	Third
Restored length (ft)	2,719
Perennial or Intermittent	Perennial
Watershed type (Rural, Urban, Developing, etc.)	Rural
Watershed LULC Distribution (e.g.) (percent)	
Residential	<1%
Ag-Row Crop	<1%
Ag-Livestock	24%
Forested	74%
Watershed impervious cover (percent)	<10%
NCDWQ AU/Index number	10-1-35 (2)a
NCDWQ Classification	B Tr+
303d listed?	No; Peak Creek 303d listed 3.3 miles downstream of project
Upstream 303d listed segment?	No
Reasons for 303d listing or stressor	Toxic impacts and habitat degradation
NCDWQ 404 Water Quality Certification Number	3626
USACE 401 Action ID Number	200702632
Total acreage of easement	3
Total vegetated acreage within easement	2
Total planted acreage as part of the restoration	1
Rosgen stream classification of pre-existing	C4
Rosgen stream classification of as-built	C4
Valley Type	VIII
Valley Slope	1.3%
Valley side slope range (e.g. 2-3%)	25-45%
Valley toe slope range (e.g. 2-3%)	15-25%
Cowardin classification (Reference: Coward 1979)	Riverine, upper perennial, unconsolidated bottom
Trout Waters Designation	Tr
Species of concern, endangered, etc.? (Y/N)	Bog turtle
Dominant soil series and characteristics	
Series	Toxaway
Depth	0 to 72 inches
Clay percent	17%
K	0.17
T	5

N/A = Not applicable "-" = Items that are unavailable U = Unknown

Table A.5─General Criteria Used to Evaluate Success and Required Remedial Actions.
Bowlin-Peak Creek/Project Number: 92606

Mitigation Component	Success (Requires No Action)	Failure	Action
Photograph Reference Sites			
Longitudinal Photographs	No significant[a] aggradation, degradaton, or erosion	Significant[a] aggradation, degradation, or erosion	When significant[a] aggradation, degradation, or erosion occurs, remedial actions will be undertaken.
Lateral Photographs			
Channel Stability			
Cross-Sections	Minimal evidence of instability (down-cutting, deposition, erosion, decrease in particle size)	Significant[a] evidence of instability	When signicant[a] evidence of instability occurs, remedial actions will be undertaken.
Longitudinal Profiles			
Pebble Counts			
Plant Survival			
Survival Plots	≥ 75 percent coverage in Photo Points	< 75 percent coverage in Photo Plots	Areas of less than 75 percent coverage will be re-seeded and /or fertilized, live stakes and bare-rooted trees will be replanted to achieve > 80 percent survival.
Stake Counts	Survival and growth of at least 320 trees/acre through year 3, then 10% mortality allowed in Year 4 (288 trees/acre) and additional 10% mortality in year 5 (260 trees/acre).	< 80 percent survival of stakes, 4/m^2	
Tree Counts		< 80 percent survival of bare-rooted trees	
Biological Indicators (only used for projects with potential to make watershed level changes)			
Invertebrate Populations	Population measures remain the same or improve	Population measures indicate a negative trend	Reasons for the failure will be evaluated and remedial action plans developed and implemented.
Fish Populations			
Overall success or failure will be based on success of 3 of the 4 criteria.			

[a]Significant or subjective determinations of success will be determined by the mitigation sponsor and confirmed byUSACE and review agencies.

Source: USACE (2003).

Appendix B Morphological Summary Data

B.1 Morphological Summary Tables

Table B.1.1–Baseline Stream Data Summary.
Bowlin-Peak Creek/Project Number: 92606

Parameter	Regional Curve Interval			Pre-Existing Condition			Reference Reach(es) Data			Design			As-built / Baseline					
Dimension and Substrate – Riffle	LL	UL	Eq.	Min	Max	Mean	Min	Max	Typical	Min	Max	Typical	Min	Max	Median	Mean	SD	n
Bankfull Width (ft)		34.0		22.4	44.9	33.2			28.1	28.4	35.8	34.0	20.6	36.8	31.6	30.1	7.4	4
Floodprone Width (ft)				66.0	100.0	100.0			125.0	100.0	300.0	100.0	48.3	166.8	94.9	101.2	53.0	4
Bankfull Cross-Sectional Area (ft^2)	56.0	60.0	$=20.87x^{0.68}$	52.3	61.3	56.9			62.0	56.0	60.0	58.0	35.3	60.4	47.9	47.9	11.8	4
Bankfull Mean Depth (ft)		1.8		1.3	2.6	1.7			2.2	1.6	2.1	1.8	1.0	2.0	1.8	1.6	0.5	4
Bankfull Max Depth (ft)				3.4	3.8	3.5			3.1	3.0	3.4	3.5	2.5	3.5	2.8	2.9	0.4	4
Width/Depth Ratio				8.8	34.9	19.4			12.7	13.8	21.7	>12.0	10.4	34.6	18.5	20.5	10.7	4
Entrenchment Ratio				1.5	4.5	3.0			4.4			>2.2	1.4	5.9	3.3	3.5	1.9	4
Bank Height Ratio				1.0	1.3	1.1			1.2	1.0	1.04	1.03	1.0	2.1	1.6	1.6	0.5	4
Bankfull Wetted Perimeter (ft)				26.2	46.8	34.1			30.5				24.2	39.6	33.9	32.9	7.1	4
Hydraulic Radius (ft)				1.2	2.2	1.7			2.0				0.9	1.8	1.6	1.5	0.4	4
D50 (mm)						36.9			15.9			Gravel	34.8	42.4	40.5	39.5	3.7	4
Profile																		
Riffle Length (ft)				30.0	247.0	100.0	24.0	132.0	78.0				6.4	123.6	28.5	30.8	22.9	30
Riffle Slope (ft/ft)				0.007	0.027	0.015	0.002	0.018	0.015				0.0021	0.0538	0.0192	0.0205	0.0138	30
Pool Length (ft)				14.0	89.0	50.0	10.0	66.0	66.0				4.5	81.2	30.8	35.1	19.4	29
Pool Max depth (ft)						5.0			3.3				2.8	6.4	4.1	4.2	0.6	31
Pool to Pool Spacing (ft)				36.0	264.0	100.0	44.0	225.0	80.0				34.8	194.3	80.6	91.6	40.5	28
Pattern																		
Channel Beltwidth (ft)				64.0	68.0	66.0			240.0				35.8	63.0	53.3	51.2	11.6	6
Radius of Curvature (ft)				10	15.4	12.7	10	15.4	12.7				16.3	43.3	30.2	30.8	10.3	9
Rc:Bankfullwidth (ft/ft)				0.3	0.5	0.4			0.5				0.5	1.4	0.9	0.9	0.4	6
Meander Wavelength (ft)				68.0	100.0	84.0	335.0	440.0	380.0				57.0	132.8	117.1	106.1	28.3	6
Meander Width Ratio				1.9	2.0	2.0			8.5				1.9	4.4	3.9	3.5	0.9	6

Table B.1.1.—Continued

Parameter	Regional Curve			Pre-Existing Condition							Reference Reach(es) Data							Design	As-built / Baseline						
Substrate, bed and transport parameters																									
[a]Ri % / Ru % / P % / G % / S %				65.0				35.0			58.0				42.0				34.6		10.2		38.1	17.1	
[a]SC % / Sa % / G % / C % / B % / Be %				10.0		18.0	50.0	31.0	0.0	0.0	11.0		20.0	35.0	33.0	1.0	0.0									
[a]D16 / D35 / D50 / D84 / Di^{p} / Di^{sp}				0.8	7.9	22.4	78.0	101.0	300.0	110.0	0.2	3.4	15.9	107.0	164.0										
Reach Sheer Stress (competency) lb/.ft[b]				0.9														0.9	1.1						
Max part size (mm) mobilized at bankfull				350.0														140.7	159.9						
Stream Power (transport capacity) W/m[b]																		93.2	99.8						
Additional Reach Parameters																									
Drainage Area (mi^2)				4.4							4.5							4.5	4.4						
Impervious cover estimate (%)				<10							<10							<10	<10						
Rosgen Classification				C4							C4							C4	C4, B4, F4						
Bankfull Velocity (fps)				6.2														6.2	6.12						
Bankfull Discharge (cfs)		254.9	$=84.6x^{0.74}$	350														350	338.4						
Valley Length (ft)				2,065							520							2,065	2,065						
Channel Thalweg Length (ft)				2,710							864							2,710	2,719						
Sinuosity (ft)				1.3							1.6							1.3	1.3						
Water Surface Slope (Channel) (ft/ft)				0.0097							0.0077							0.0097	0.0097						
Bankfull Slope (ft/ft)				0.0091							0.0077							0.0097	0.0091						

[a]Riffle, Run, Pool, Glide, Step; Subpavement Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock, Di^{p} = max pavement, Di^{sp} = max subpave. Shaded cells indicate that these will typically not be filled in

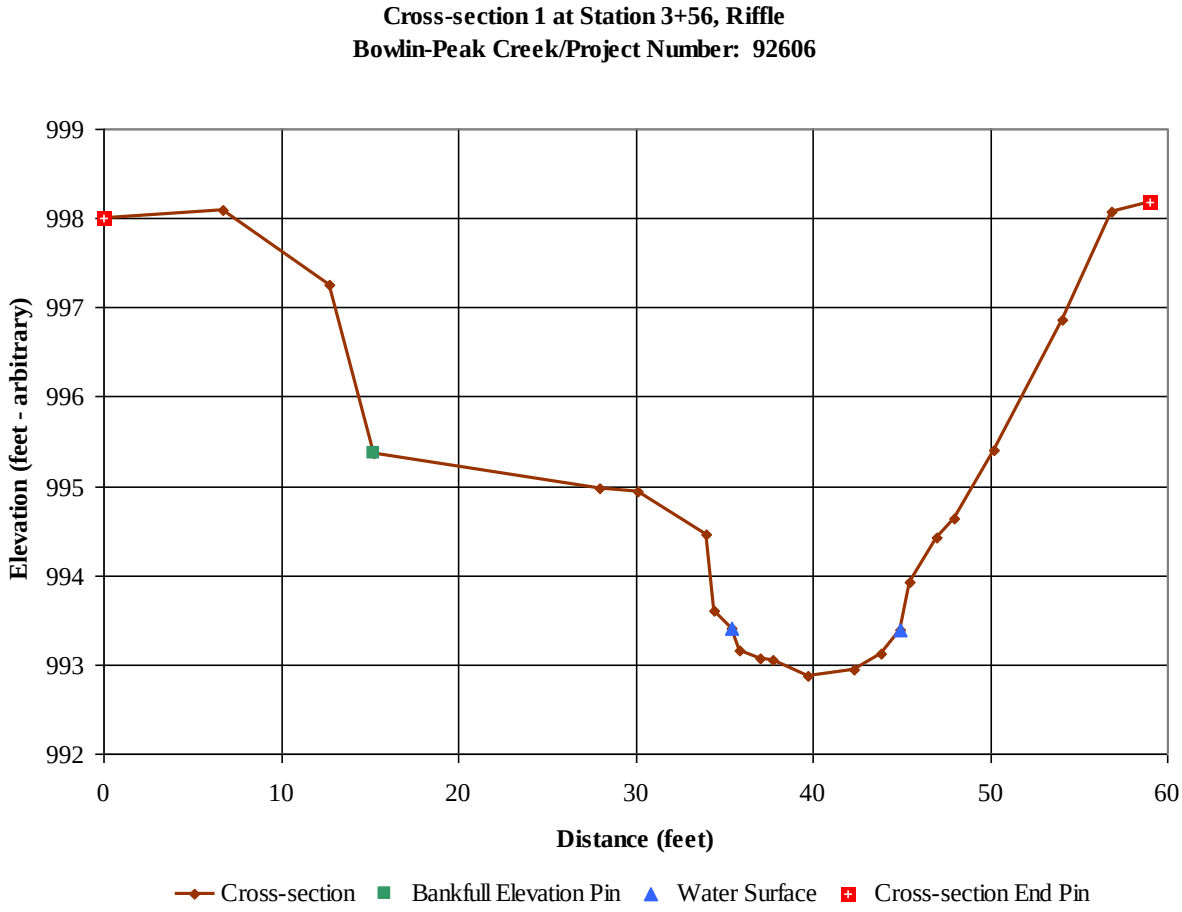
[b] Methodology described in report and RiverMorph (2008).

Table B.1.2–Morphology and Hydraulic Summary (Dimensional Parameters - Cross Section).
Bowlin-Peak Creek/Project Number: 92606

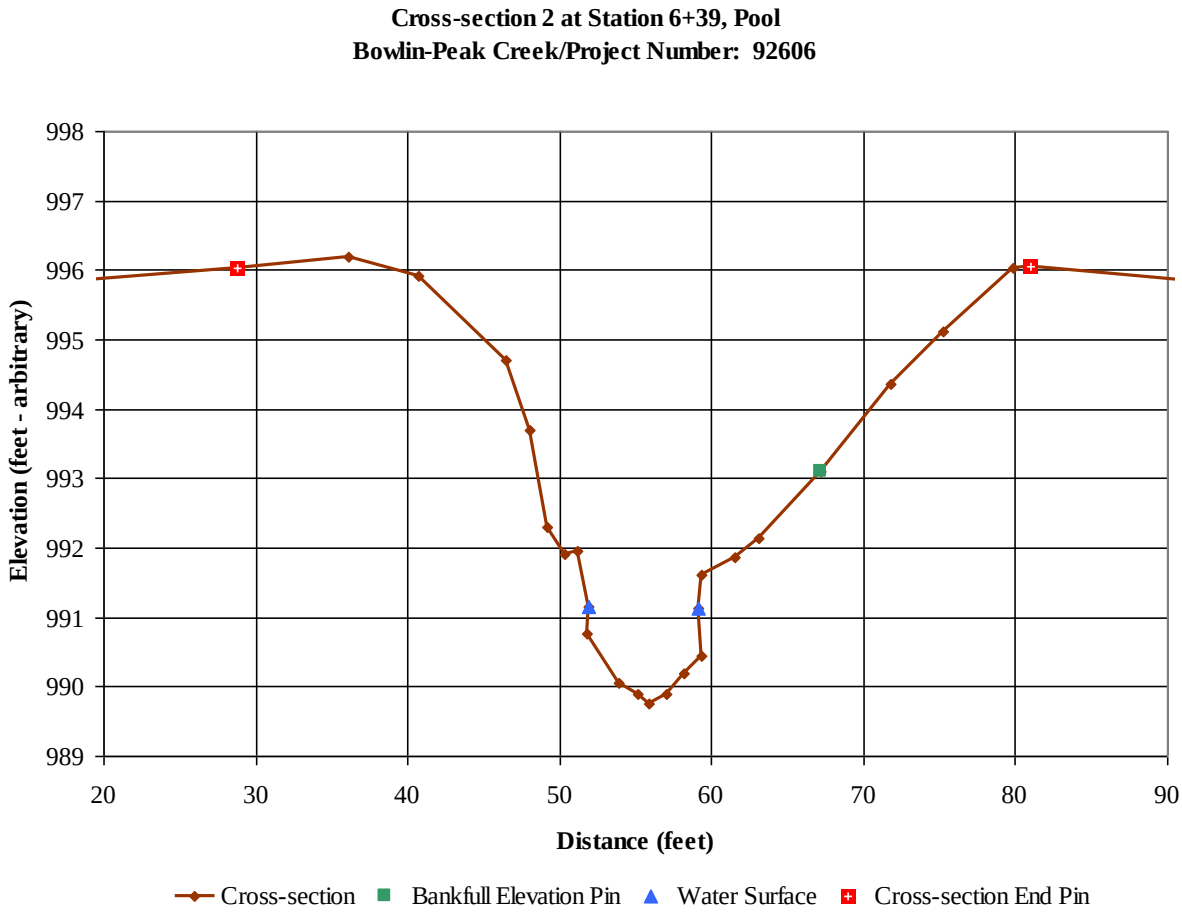
	Cross Section 1 at Station 3+56 (Riffle)							Cross Section 2 at Station 6+39 (Pool)							Cross Section 3 at Station 7+62 (Pool)							Cross Section 4 at Station 10+43 (Riffle)						
Dimension and Substrate	MY0	MY1	MY2	MY3	MY4	MY5	MY+	MY0	MY1	MY2	MY3	MY4	MY5	MY+	MY0	MY1	MY2	MY3	MY4	MY5	MY+	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Based on fixed baseline bankfull elevation																												
Bankfull Width (ft)	34.9							18.7							19.9							25.8						
Floodprone Width (ft)	48.3							159.7							218.4							121.7						
Bankfull Cross-sectional Area (ft^2)	35.3							32.4							48.5							48.5						
Bankfull Mean Depth (ft)	1.0							1.7							2.4							1.9						
Bankfull Max Depth (ft)	2.5							3.3							3.9							2.8						
Bankfull Width/Depth Ratio	34.6							10.8							8.1							13.7						
Bankfull Entrenchment Ratio	1.4							8.6							11.0							4.7						
Bankfull Bank Height Ratio	2.1							1.9							1.2							1.5						
Based on current/developing bankfull feature																												
Bankfull Width (ft)																						28.2						
Floodprone Width (ft)																						166.8						
Bankfull Cross-sectional Area (ft^2)																						55.0						
Bankfull Mean Depth (ft)																						2.0						
Bankfull Max Depth (ft)																						3.0						
Bankfull Width/Depth Ratio																						14.5						
Bankfull Entrenchment Ratio																						5.9						
Bankfull Bank Height Ratio																						1.4						
Cross-sectional Area between end pins (ft^2)	141.4							180.7							152.8							79.9						
D50	38.5							49.3							20.7							34.8						

	Cross Section 5 at Station 14+80 (Pool)							Cross Section 6 at Station 16+80 (Riffle)							Cross Section 7 at Station 20+97 (Riffle)						
Dimension and Substrate	MY0	MY1	MY2	MY3	MY4	MY5	MY+	MY0	MY1	MY2	MY3	MY4	MY5	MY+	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Based on fixed baseline bankfull elevation																					
Bankfull Width (ft)	20.4							25.4							20.6						
Floodprone Width (ft)	171.9							86.7							70.0						
Bankfull Cross-sectional Area (ft^2)	48.3							33.2							40.8						
Bankfull Mean Depth (ft)	2.4							1.3							2.0						
Bankfull Max Depth (ft)	4.8							2.7							2.7						
Bankfull Width/Depth Ratio	8.6							19.6							10.4						
Bankfull Entrenchment Ratio	8.4							3.4							3.4						
Bankfull Bank Height Ratio	1.5							1.3							1.9						
Based on current/developing bankfull feature																					
Bankfull Width (ft)								36.8													
Floodprone Width (ft)								119.7													
Bankfull Cross-sectional Area (ft^2)								60.4													
Bankfull Mean Depth (ft)								1.6													
Bankfull Max Depth (ft)								3.5													
Bankfull Width/Depth Ratio								22.5													
Bankfull Entrenchment Ratio								3.3													
Bankfull Bank Height Ratio								1.0													
Cross-sectional Area between end pins (ft^2)	124.0							176.4							101.4						
D50	67.1							42.4							42.4						

B.2 As-built Overlays of Cross-Section Plots



Cross-section 1; 25 Sep 07.



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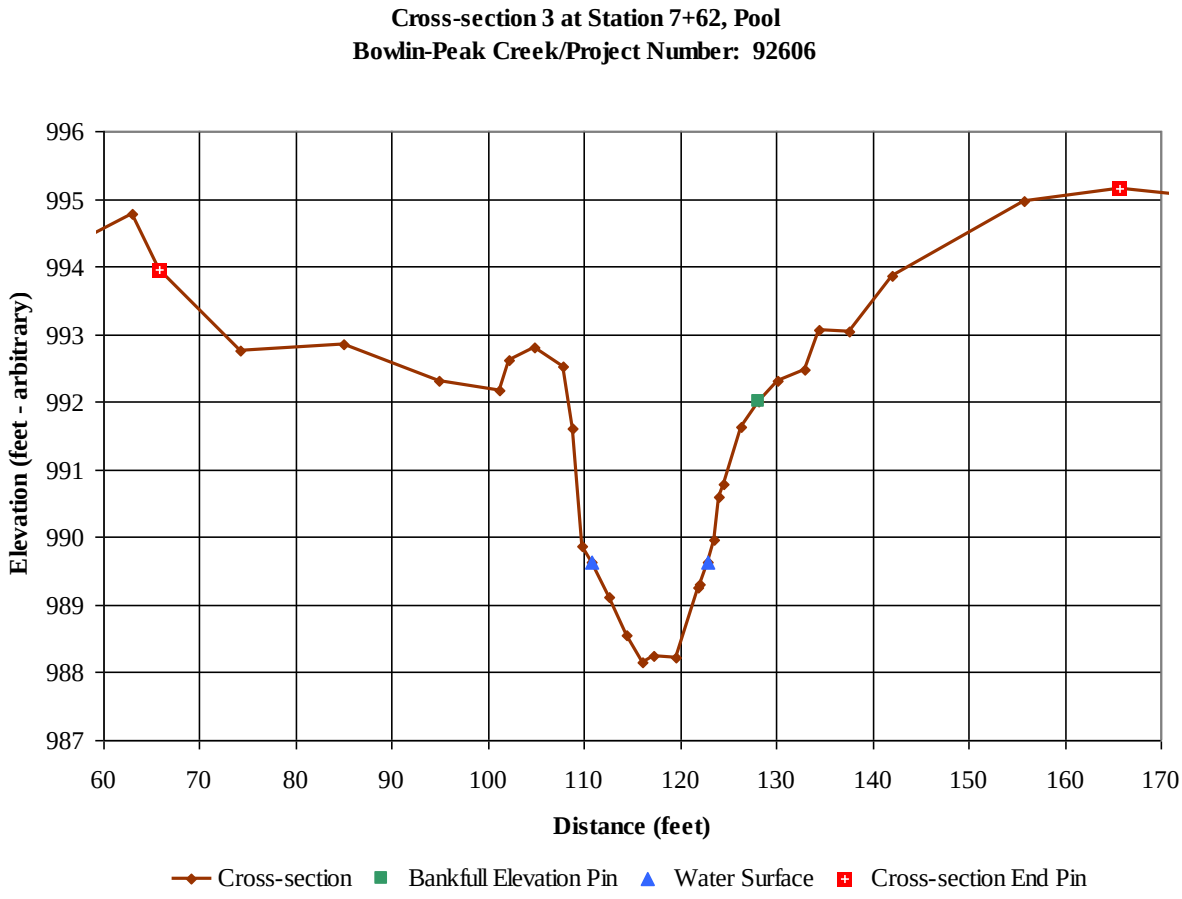
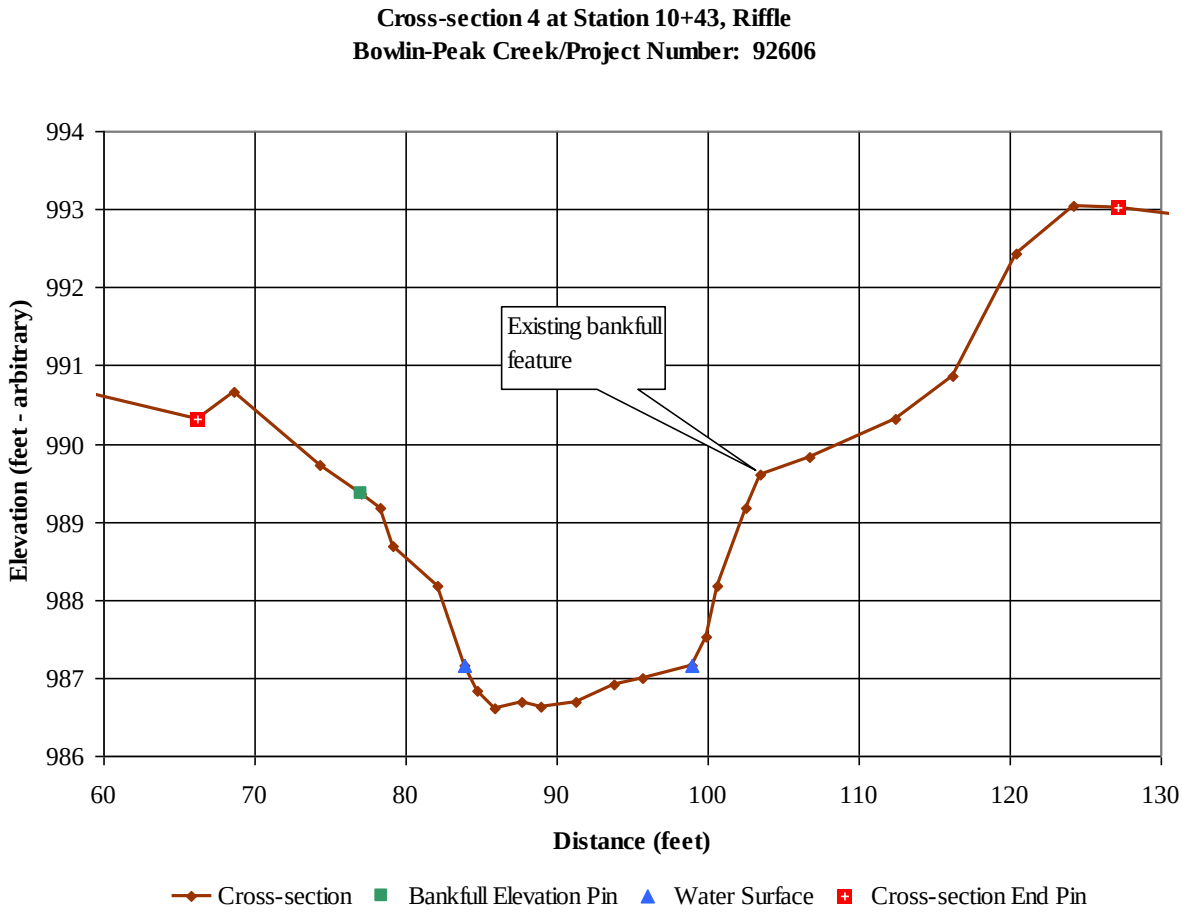
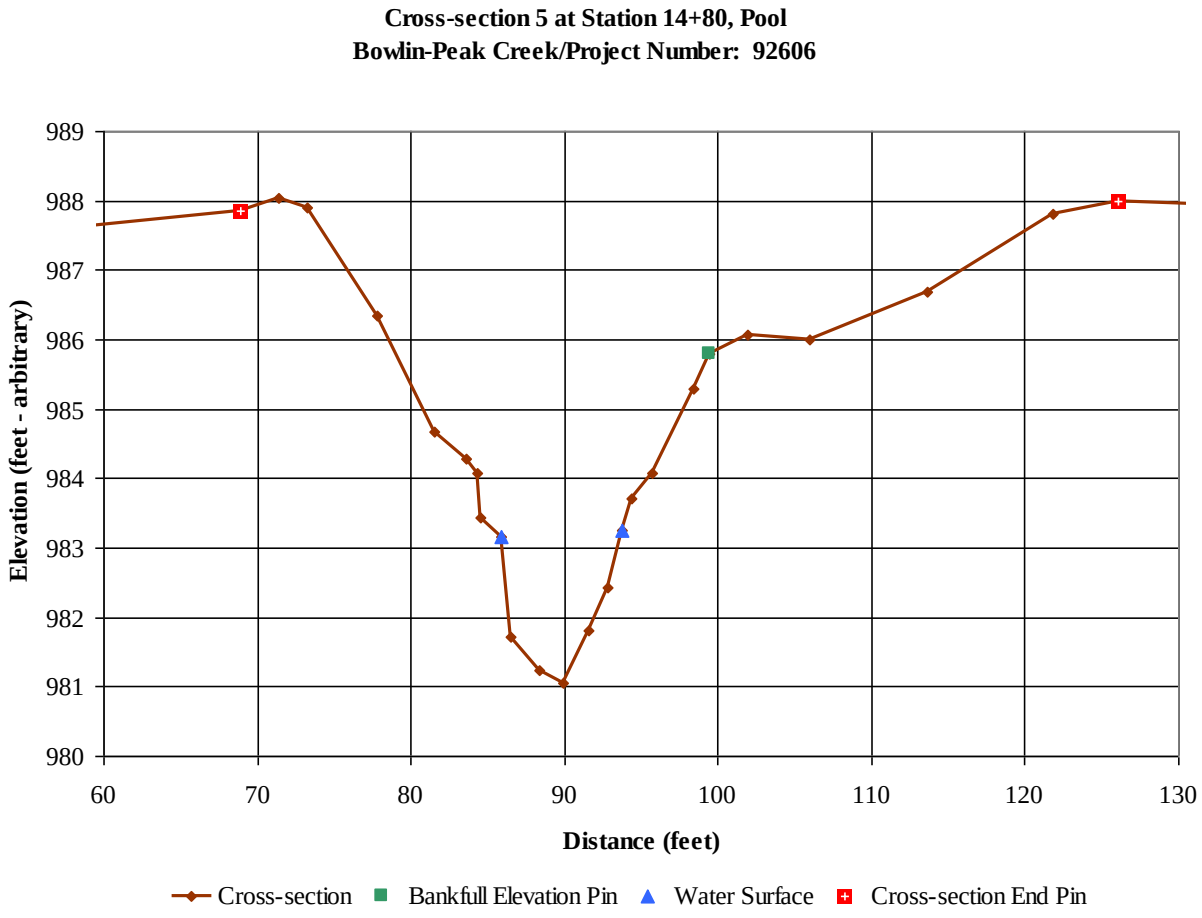


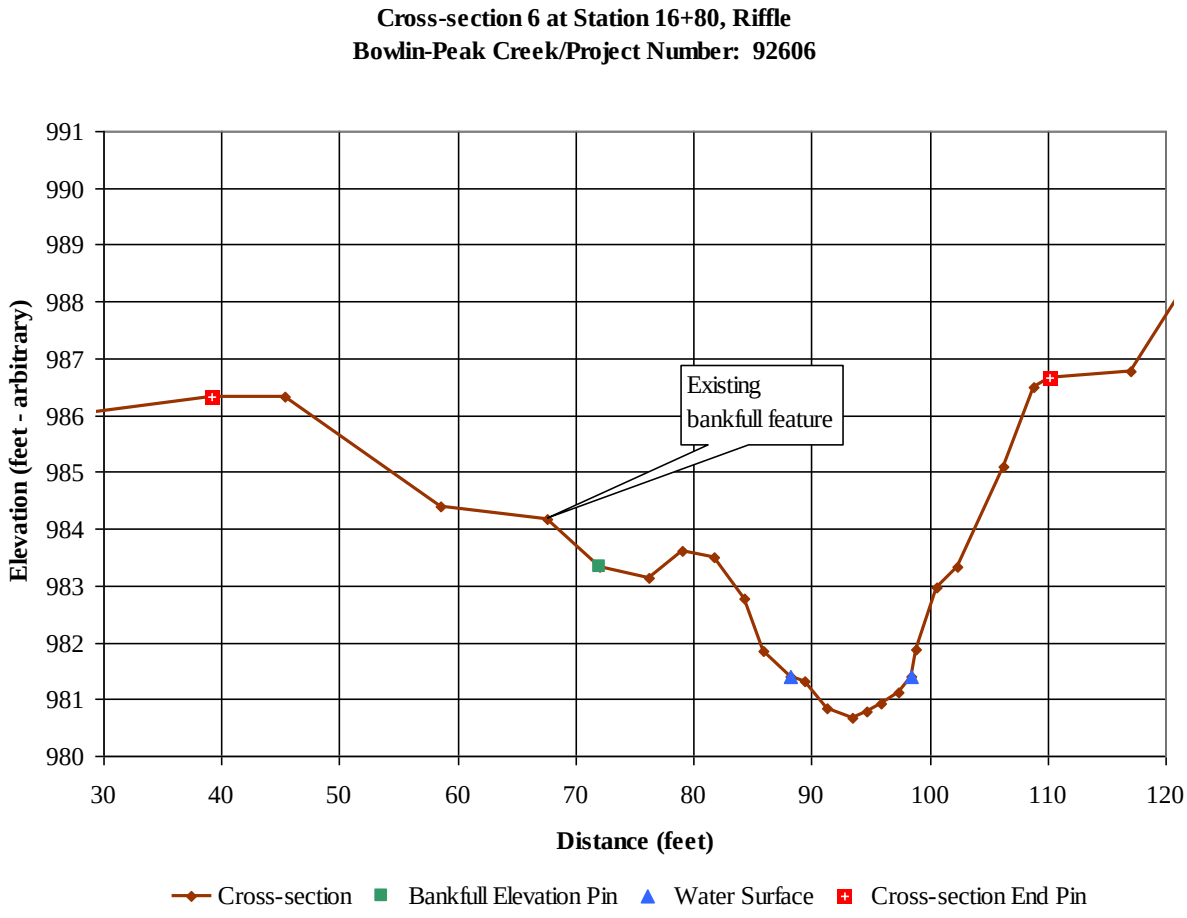
Cross-section 3; 08 Jan 08.



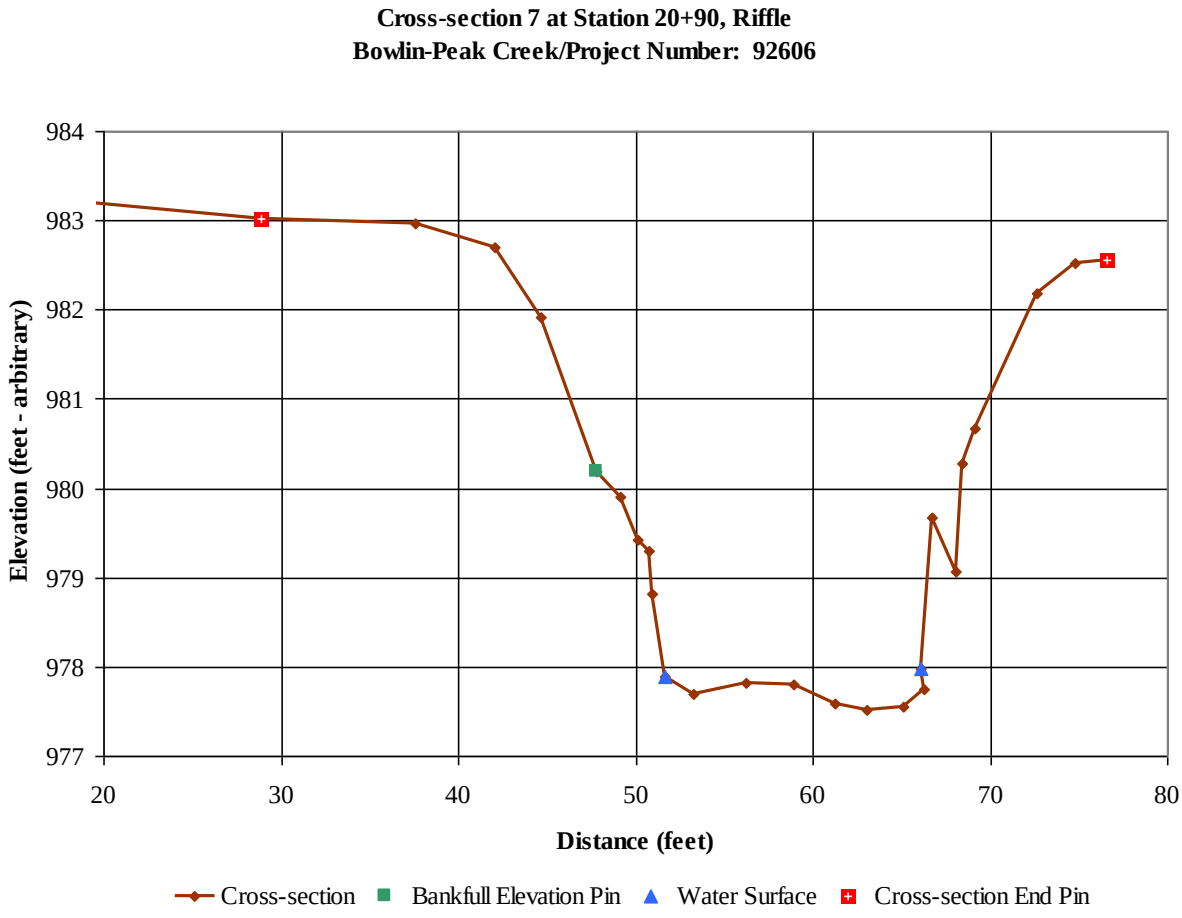
Cross-section 4; 08 Jan 08.



Cross-section 5; 26 Mar 08.

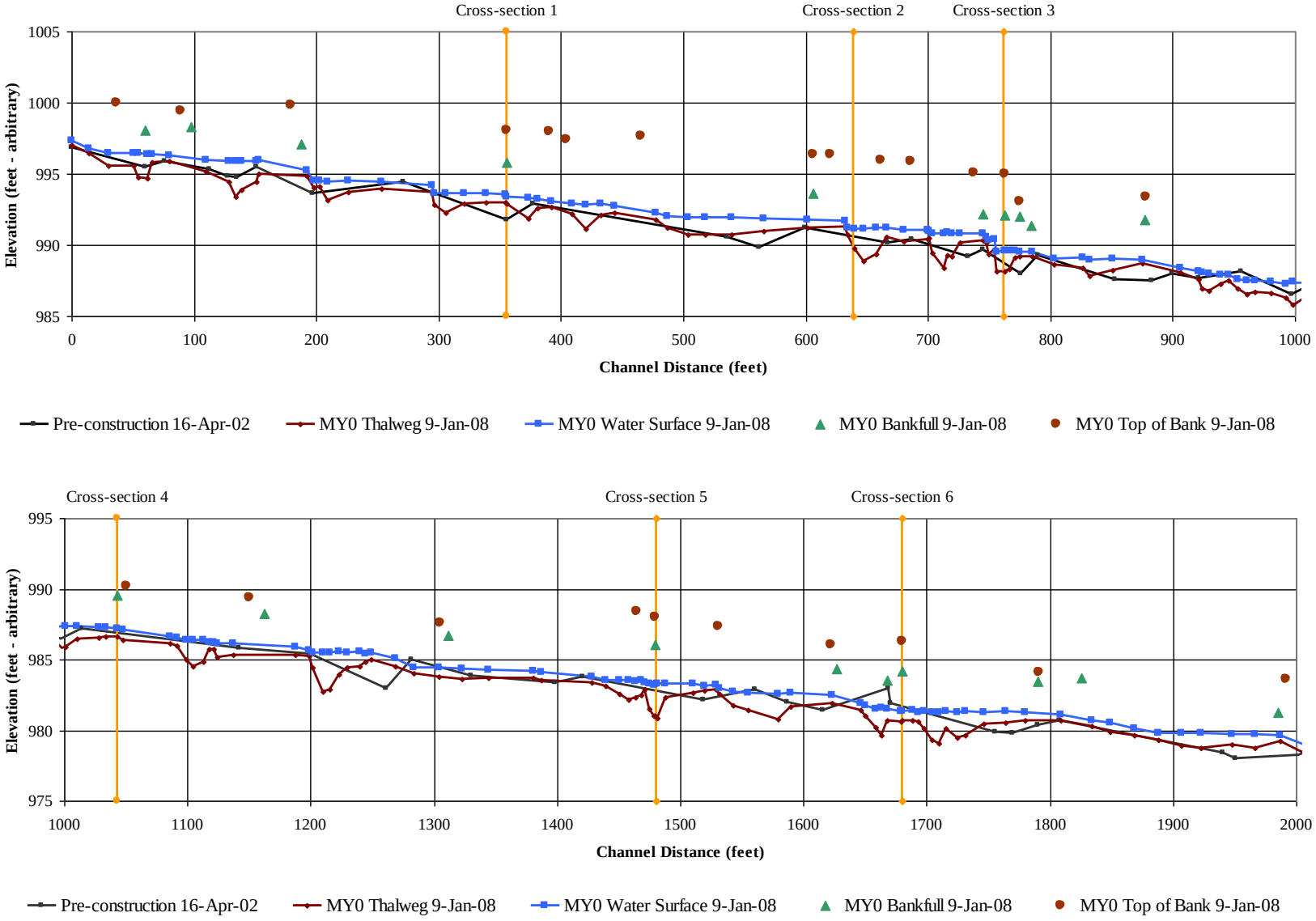


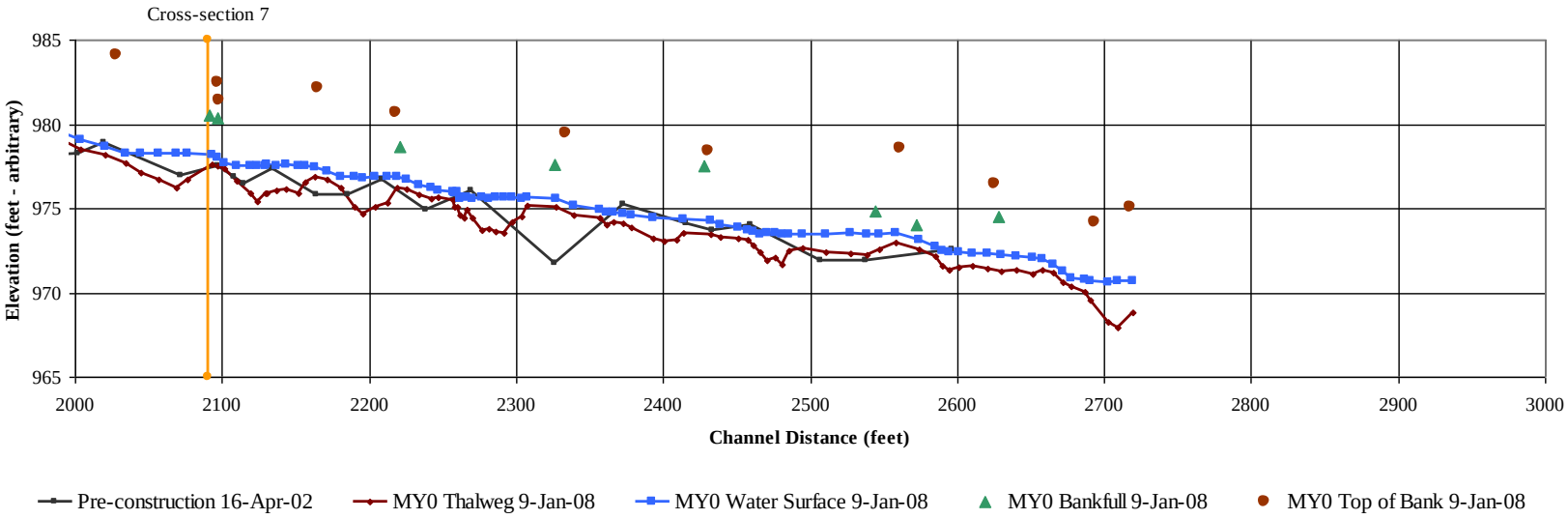
Cross-section 6; 08 Jan 08.



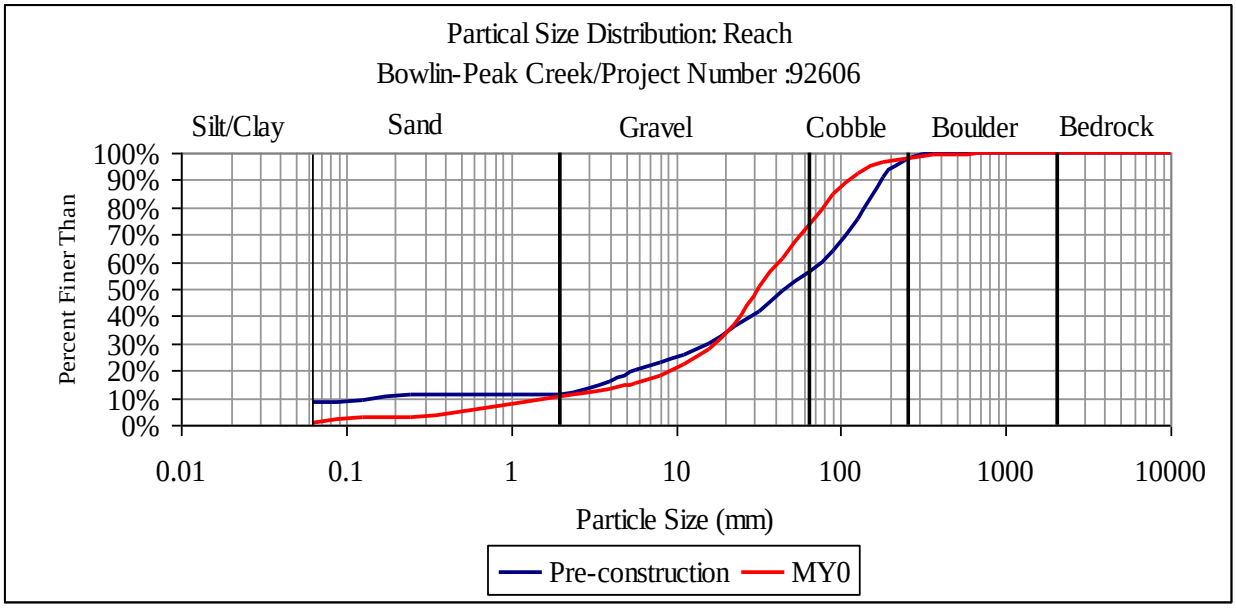
Cross-section 7; 08 Jan 08.

B.3 As-built Overlay of Longitudinal Profile Plot

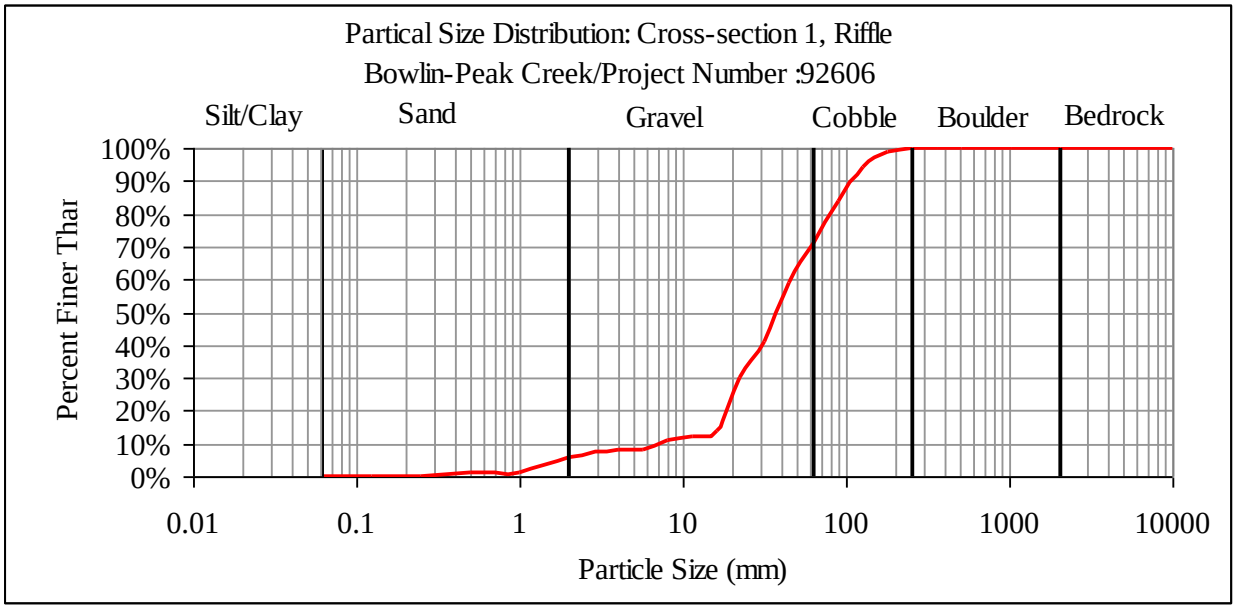



Cross-section 7
985
980
975
970
965
Elevation (feet - arbitrary)
2000
2100
2200
2300
2400
2500
2600
2700
2800
2900
3000
Channel Distance (feet)
Pre-construction 16-Apr-02
MY0 Thalweg 9-Jan-08
MY0 Water Surface 9-Jan-08
MY0 Bankfull 9-Jan-08
MY0 Top of Bank 9-Jan-08

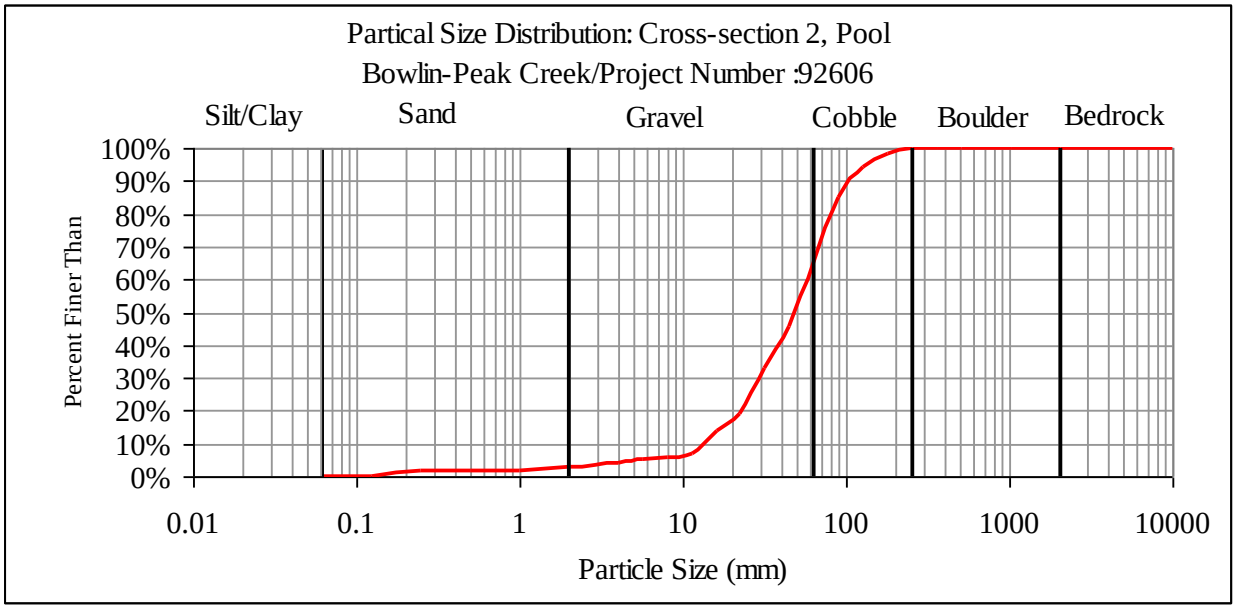
B.4 Pebble Count Cumulative Frequency Distribution Plots



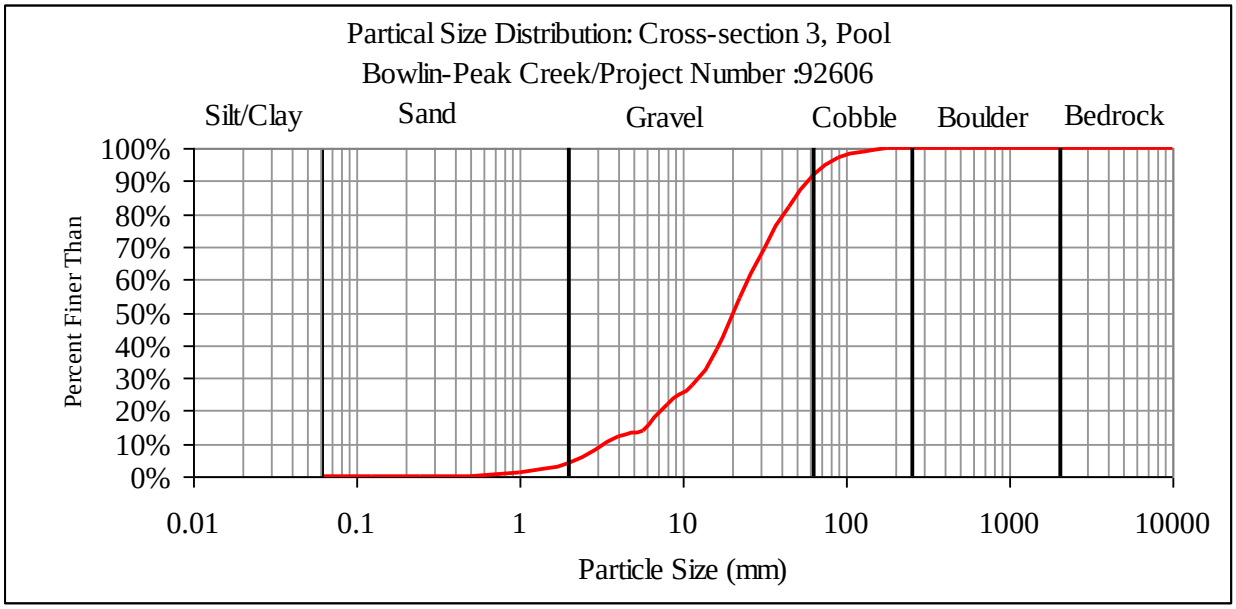
Size Class Index	Particle size (mm) in year sampled	
	Pre-construction	MY0
D16	4.0	6.3
D35	21.5	21.1
D50	47.7	31.7
D84	155.7	88.3
D95	223.4	163.8
D100	362.0	1,024.0



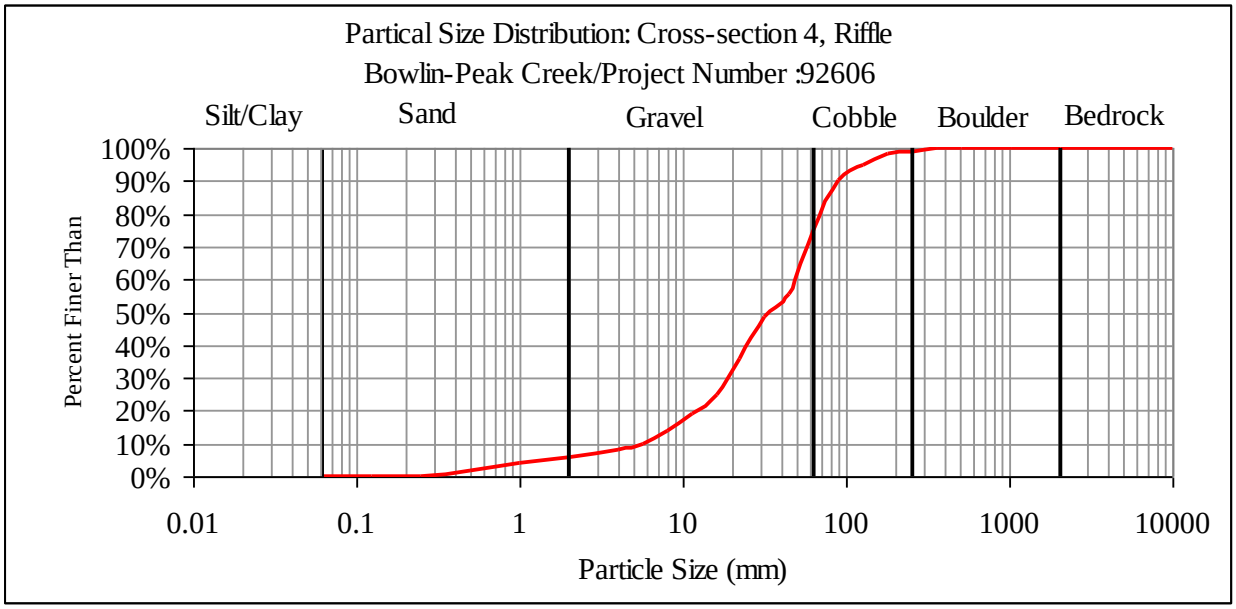
Size Class Index	Particle size (mm) in year sampled
	MY0
D16	6.3
D35	21.1
D50	31.7
D84	88.3
D95	163.8
D100	1,024.0



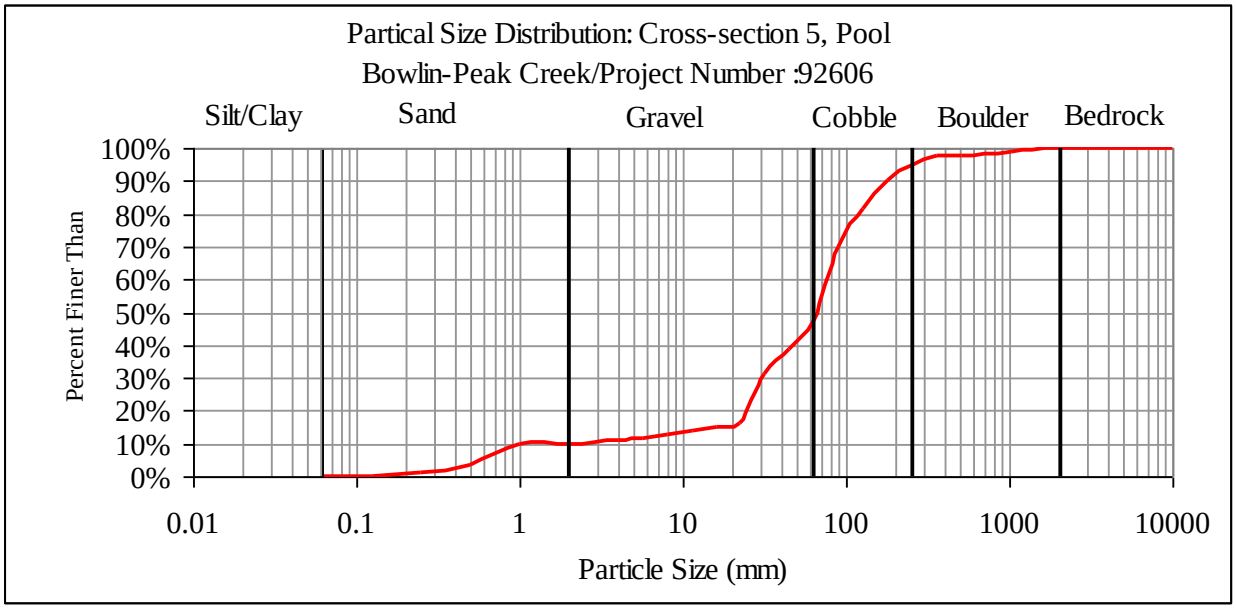
Size Class Index	Particle size (mm) in year sampled MY0
D16	18.9
D35	34.4
D50	49.3
D84	88.5
D95	104.3
D100	256.0



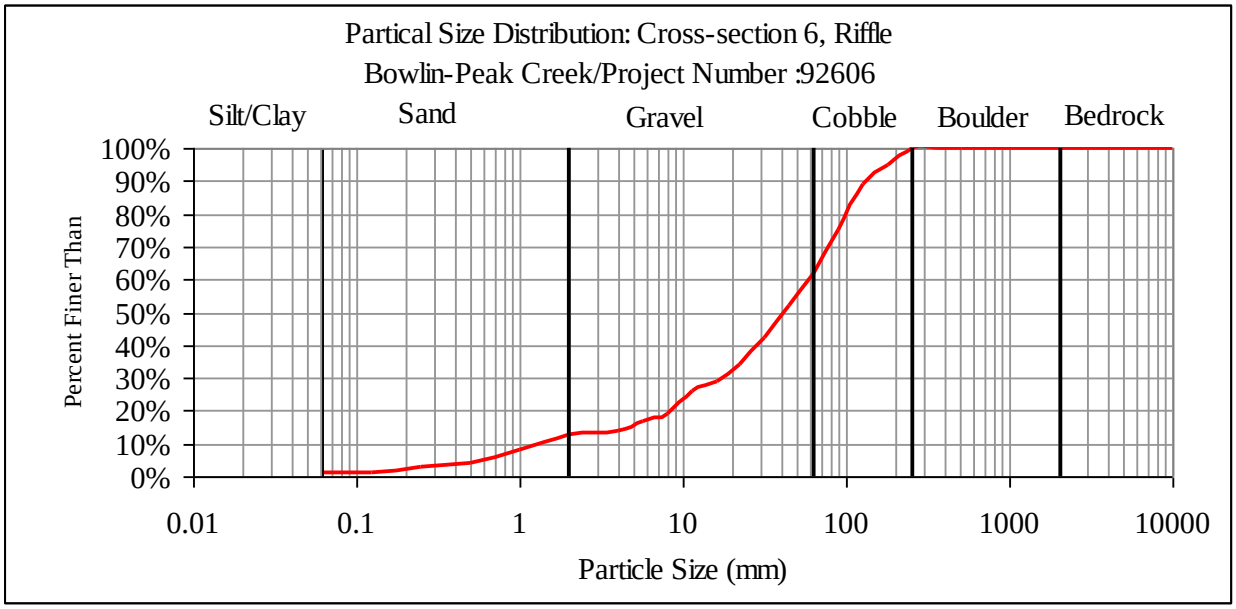
Size Class Index	Particle size (mm) in year sampled
	MY0
D16	6.5
D35	14.0
D50	20.0
D84	48.0
D95	78.0
D100	180.0



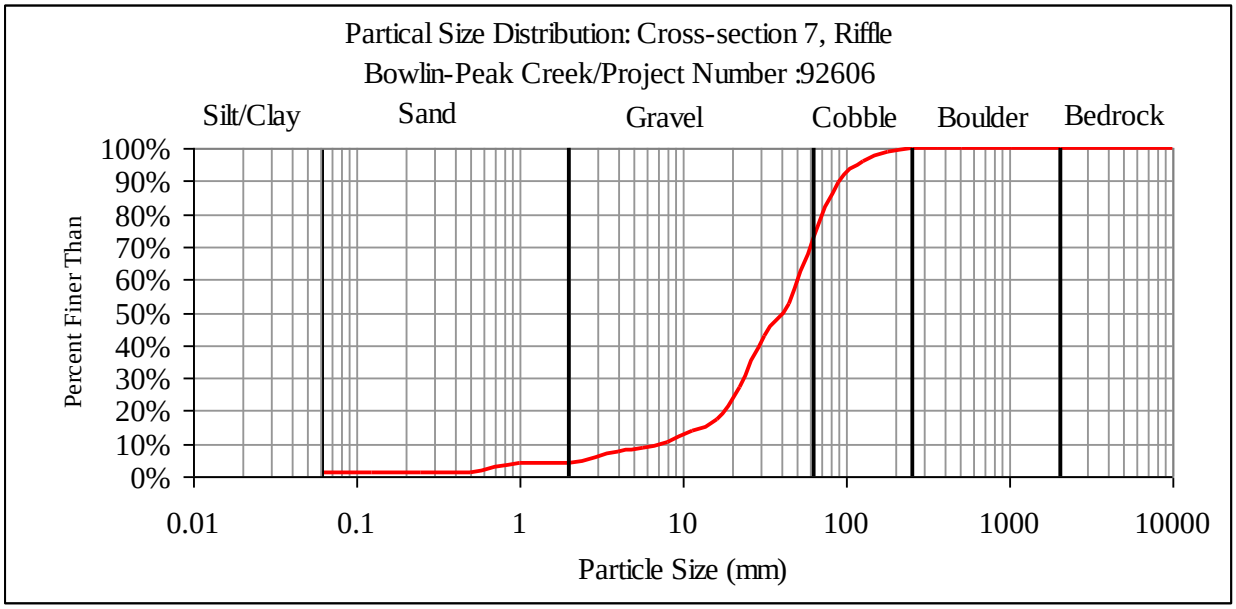
Size Class Index	Particle size (mm) in year sampled MY0
D16	9.2
D35	22.0
D50	34.0
D84	78.0
D95	130.0
D100	362.0



Size Class Index	Particle size (mm) in year sampled
	MY0
D16	23.0
D35	45.0
D50	67.0
D84	150.0
D95	250.0
D100	2,048.0



Size Class Index	Particle size (mm) in year sampled MY0
D16	5.2
D35	23.0
D50	42.0
D84	110.0
D95	180.0
D100	256.0



Size Class Index	Particle size (mm) in year sampled MY0
D16	15.0
D35	27.0
D50	42.0
D84	81.0
D95	120.0
D100	256.0

B.5 Stream Photographic Points

PS-1, bearing 230°: Pre-construction view of station 1+75 to station 2+48; 17 Apr 02.

PS-1, bearing 230°: Post-construction view of station 1+75 to station 2+48; 26 Mar 08.

PS-2, bearing 220°: Post-construction view of station 3+00 to station 0+00; 29 Jan 08.

PS-2, bearing 315°: Post-construction view of station 3+00 to station 8+50; 29 Jan 08.

PS-3, bearing 330°: Pre-construction view of cross-section 1 at station 3+56; 17 Apr 02.

PS-3, bearing 330°: Pre-construction view of cross-section 1 at station 3+56; 19 Sep 07.

PS-3, bearing 330°: Post-construction view of cross-section 1 at station 3+56; 25 Sep 07.

PS-4, bearing 335°: Pre-construction view of cross-section 2 at station 6+39; 17 Apr 02.

PS-4, bearing 335°: Post-construction view of cross-section 2 at station 6+39; 01 Jan 08.

PS-5, bearing 35°: Pre-construction view of station 7+25 to station 8+50; 24 Sep 02.

PS-5, bearing 45°: Post-construction view of station 7+25 to station 8+50; 26 Mar 08. Note: stream channel moved to the right.

PS-6, bearing 18°: Post-construction view of cross-section 3 at station 7+62; 08 Jan 08.

Pre-construction view of cross-section 4 at station 10+43 looking upstream; 17 Apr 02.

PS-7, bearing 320°: Post-construction view of cross-section 4 at station 10+43 looking down stream; 08 Jan 08.

PS-8, bearing 350°: Pre-construction view of cross-section 5 at station 14+80; 17 Apr 02.

PS-8, bearing 350°: Post-construction view of cross-section 5 at station 14+80; 26 Mar 08.

PS-9, bearing 310°: Pre-construction view of low water crossing at station 15+25; 17 Apr 02.

PS-9, bearing 310°: Post-construction view of low water crossing at station 15+25; 26 Mar 08.

PS-10, bearing 25°: Pre-construction view of low water crossing at station 16+25; 17 Apr 02.

PS-10, bearing 25°: Post-construction view of low water crossing at station 16+25; 26 Mar 08.

PS-11, bearing 20°: Pre-construction view of cross-section 6 at station 20+90; 19 Mar 07.

PS-11, bearing 20°: Post-construction view of cross-section 6 at station 20+90; 08 Jan 08.

PS-12, bearing 210°: Pre-construction view of cross-section 7 at station 20+90; 17 Apr 02.

PS-12, bearing 210°: Post-construction view of cross-section 7 at station 20+90; 08 Jan 08.

PS-13, bearing 330°: Pre-construction view of station 21+50 to station 22+00; 19 Mar 07.

PS-13, bearing 330°: Post-construction view of station 21+50 to station 22+00; 26 Mar 08.

PS-14, bearing 50°: Post-construction view of station 23+00 to station 27+00; 29 Jan 08.

PS-15, bearing 50°: Post-construction view of station 20+00 to station 27+00; 29 Jan 08.

PS-15, bearing 80°: Post-construction view of station 16+50 to station 12+50; 29 Jan 08.

PS-15, bearing 145°: Post-construction view of station 5+00 to station 9+00; 29 Jan 08.

Appendix C Vegetation Data

C.1 Vegetation Data Summary Tables

Table C.1.1─Herbaceous Seed Mixture.
Bowlin-Peak Creek/Project Number: 92606

Scientific name	Common name	Percent
Andropogon gerardii [a]	Big bluestem	5.0
Bidens aristosa [a]	Tickseed sunflower	7.0
Carex lupulina	Hop sedge	1.0
Carex vulpinoidea	Fox sedge	1.0
Chamaecrista fasciculata	Partridge pea	5.0
Coreopsis lanceolata [a]	Lance leaved coreopsis	5.0
Elymus virginicus	Virgina wild rye	14.0
Juncus effusus	Soft rush	0.5
Helianthus angustifolius [a]	Swamp sunflower	4.0
Oenothera biennis	Evening primrose	2.0
Panicum clandestinum	Deer tongue	10.0
Panicum dichotomiflorum	Smooth panic grass	5.0
Panicum virgatum	Switchgrass	8.5
Polygonum lapathifolium	Nodding smartweed	5.0
Polygonum pensylvanicum	Pennsylvania smartweed	5.0
Rubeckia hirta [a]	Black eyed susan	2.0
Schizachyrium scoparium	Little bluestem	8.0
Sorghastrum nutans	Indiangrass	10.0
Verbena hastata	Blue vervain	2.0
	Total	100.0

[a] *North Carolina Ecotype.*

Table C.1.2─Woody Vegetation Planted.
Bowlin-Peak Creek/Project Number: 92606

Scientific name	Common name	Type of Material Planted			
		Livestake	Bare Root	Containerized	Large Bare Root
Shrub and Small Trees		Number Planted			
Carpinus caroliniana	Ironwood			36	
Cornus amomum	Silky dogwood	600			
Lindera benzoin	Spicebush			50	
Physocarpus opulifolius	Ninebark	300			
Rhododendron maximum	Great laurel			20	
Rhododendron cawtawabiense	Mountain rosebay			20	
Rhododendron calendulaceum	Flame azalea			17	
Kalmia latifolia	Mountain laurel			21	
Salix nigra	Black willow	150			
Salix sericea	Silky willow	600			
Sambucus canadensis	Elderberry	350			
Vaccinium spp.	Blueberry			50	
Xanthorhiza simplicissima	Yellow root			36	
Large Trees					
Acer rubrum	Red maple			10	
Acer saccharinum	Sugar maple				2
Betula lenta	Sweet birch				1
Betula nigra	River birch		100		1
Juglans nigra	Black walnut		100		
Quercus alba	White oak		100		
Quercus rubra	Northern red oak		100		
Robinia pseudoacacia	Black locust		100		
Tsuga caroliniana	Carolina hemlock			5	
Total		2,000	500	265	4

Table C.1.3─Vegetation Plot Attribute Data.
Bowlin-Peak Creek/Project Number: 92606

Plot Identification	Community Type	Planting Zone Identification	Reach Identification	Associated Gauge(s)	Method[a]	CVS Level
92606-Elkin-VP1	Riparian	N/A	Peak Creek	No	N/A	2
92606-Elkin-VP2	Riparian	N/A	Peak Creek	No	N/A	1
92606-Elkin-VP3	Riparian	N/A	Peak Creek	No	N/A	2

N/A = Not applicable.

[a]Denote method if other than CVS method.

Table C.1.4─Vegetation Metadata.
Bowlin-Peak Creek/Project Number: 92606

Report Prepared By	Jim Wasseen II
Date Prepared	4/3/2008 7:44
Database Name	NCWRCElkin-08-A.mdb
Database Location	C:\Documents and Settings\Staci Hining\My Documents\Stream Mitigation\EEP\Veg Monitoring Stuff
Computer Name	WASSEEN
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	This worksheet, which is a summary of the project and the project data.
Project Planted	Each project is listed with its PLANTED stems, for each year. This excludes live stakes and lists stems per acre.
Project Total Stems	Each project is listed with its TOTAL stems, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems. Listed in stems per acre.
Plots	List of plots surveyed.
Vigor	Frequency distribution of vigor classes.
Vigor by Spp.	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp.	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
ALL Stems by Plot and Spp.	Count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
PROJECT SUMMARY----------	
Project Code	92606
Project Name	Bowlin-Peak Creek
Description	Enhanced approximately 2,800 ft of Peak Creek on the Bowlin property. The enhncement included: bank sloping, placement of rock and log vanes, and rootwads. The site was replanted with native vegetation upon completion of the
River Basin	New
Length(ft)	
Stream-to-Edge Width (ft)	
Area (sq m)	8093.71
Required Plots (calculated)	3
Sampled Plots	3

Table C.1.5─Vegetation Vigor by Species.
Bowlin-Peak Creek/Project Number: 92606

Species	Vigor Class[a]					
	4	**3**	**2**	**1**	**0**	**Missing**
Acer rubrum	1					
Acer saccharum	2					
Betula nigra	3					
Carpinus caroliniana	1					
Cornus amomum	4					
Juglans nigra	2					
Lindera benzoin	6					
Physocarpus opulifolius	3					
Quercus alba	3					
Quercus rubra	1					
Rhododendron calendulaceum	3					
Rhododendron catawbiense	2					
Rhododendron maximum	1					
Robinia pseudoacacia	5					
Sambucus canadensis	1					
Salix sericea	2					
Tsuga caroliniana	1					
Vaccinium sp.	4					
Total: 18	**45**					

[a]4 = Excellent, 3 = Good, 2 = Weak, 1 = Unlikely to survive, 0 = Dead, Missing = Plant missing

Table C.1.6─Vegetation Damage by Species.
Bowlin-Peak Creek/Project Number: 92606

Species	All Damage Categories	No Damage
Acer rubrum	1	1
Acer saccharum	2	2
Betula nigra	3	3
Carpinus caroliniana	1	1
Cornus amomum	4	4
Juglans nigra	2	2
Lindera benzoin	6	6
Physocarpus opulifolius	3	3
Quercus alba	3	3
Quercus rubra	1	1
Rhododendron calendulaceum	3	3
Rhododendron catawbiense	2	2
Rhododendron maximum	1	1
Robinia pseudoacacia	5	5
Salix sericea	2	2
Sambucus canadensis	1	1
Tsuga caroliniana	1	1
Vaccinium sp.	4	4
TOTAL: 18	**45**	**45**

Table C.1.7─Vegetation Damage by Plot.
Bowlin-Peak Creek/Project Number: 92606

Plot	All Damage Categories	No Damage
92606-Elkin-VP1	14	14
92606-Elkin-VP2	18	18
92606-Elkin-VP3	13	13
TOTAL: 3	**45**	**45**

Table C.1.8─Planted Stems Counted by Plot and Species.
Bowlin-Peak Creek/Project Number: 92606

Species	Total Planted Stems	Number of Plots	Average Number of Stems	Plot 92606-01-VP1	Plot 92606-01-VP2	Plot 92606-01-VP3
Acer rubrum	1	1	1	1		
Acer saccharum	2	1	2		2	
Betula nigra	3	2	1.5		2	1
Carpinus caroliniana	1	1	1		1	
Cornus amomum	4	2	2	3	1	
Juglans nigra	2	2	1	1		1
Lindera benzoin	6	3	2	2	3	1
Physocarpus opulifolius	3	1	3	3		
Quercus alba	3	2	1.5	1	2	
Quercus rubra	1	1	1			1
Rhododendron calendulaceum	3	2	1.5		2	1
Rhododendron catawbiense	2	2	1		1	1
Rhododendron maximum	1	1	1		1	
Robinia pseudoacacia	5	2	2.5		1	4
Salix sericea	2	1	2	2		
Sambucus canadensis	1	1	1	1		
Tsuga caroliniana	1	1	1		1	
Vaccinium sp.	4	2	2		1	3
TOTAL: 18	**45**	**28**		**14**	**18**	**13**

Table C.1.9─All Stems Counted by Plot and Species.
Bowlin-Peak Creek/Project Number: 92606

Species	Total Stems	Number of Plots Species Were Found	Average Number of Stems	Plot 92606-01-VP1	Plot 92606-01-VP2	Plot 92606-01-VP3
Acer rubrum	3	2	1.5	1		2
Acer saccharum	2	1	2		2	
Alnus serrulata	47	2	23.5	44		3
Betula nigra	3	2	1.5		2	1
Carpinus caroliniana	1	1	1		1	
Cornus amomum	4	2	2	3	1	
Crataegus sp.	14	1	14			14
Juglans nigra	2	2	1	1		1
Lindera benzoin	6	3	2	2	3	1
Physocarpus opulifolius	10	1	10	10		
Quercus alba	3	2	1.5	1	2	
Quercus rubra	1	1	1			1
Rhododendron calendulaceum	3	2	1.5		2	1
Rhododendron catawbiense	2	2	1		1	1
Rhododendron maximum	1	1	1		1	
Robinia pseudoacacia	5	2	2.5		1	4
Salix nigra	1	1	1	1		
Salix sericea	2	1	2	2		
Sambucus canadensis	1	1	1	1		
Sassafras albidum	10	1	10			10
Tsuga caroliniana	1	1	1		1	
Vaccinium sp.	4	2	2		1	3
TOTAL: 22	**126**	**22**		**66**	**18**	**42**

C.2 Vegetation Plot Photographs

Table C.2.1─Permanent Vegetation Photograph Points.
Bowlin-Peak Creek/Project Number: 92606

Stream	Location[a]	Bearing (° from North)
Peak Creek	92606-01-VP1a	345
	92606-01-VP1b	185
	92606-01-VP2a	32
	92606-01-VP2b	213
	92606-01-VP3a	348
	92606-01-VP3b	190

[a]GPS coordinates are included in plan view (Appendix D).

Vegetation plot 92606-01-VP1a, monitoring year 1, 20 Mar 08.

Vegetation plot 92606-01-VP1b, monitoring year 1, 20 Mar 08.

Vegetation plot 92606-01-VP2a, monitoring year 1, 20 Mar 08.

Vegetation plot 92606-01-VP2b, monitoring year 1, 20 Mar 08.

Vegetation plot 92606-01-VP3a, monitoring year 1, 20 Mar 08.

Vegetation plot 92606-01-VP3b, monitoring year 1, 20 Mar 08.

Figure D.1.- Bowlin-Peak Creek Stream Enhancement Project As-built Plan View.

Monitoring Pin Locations - Peak Creek

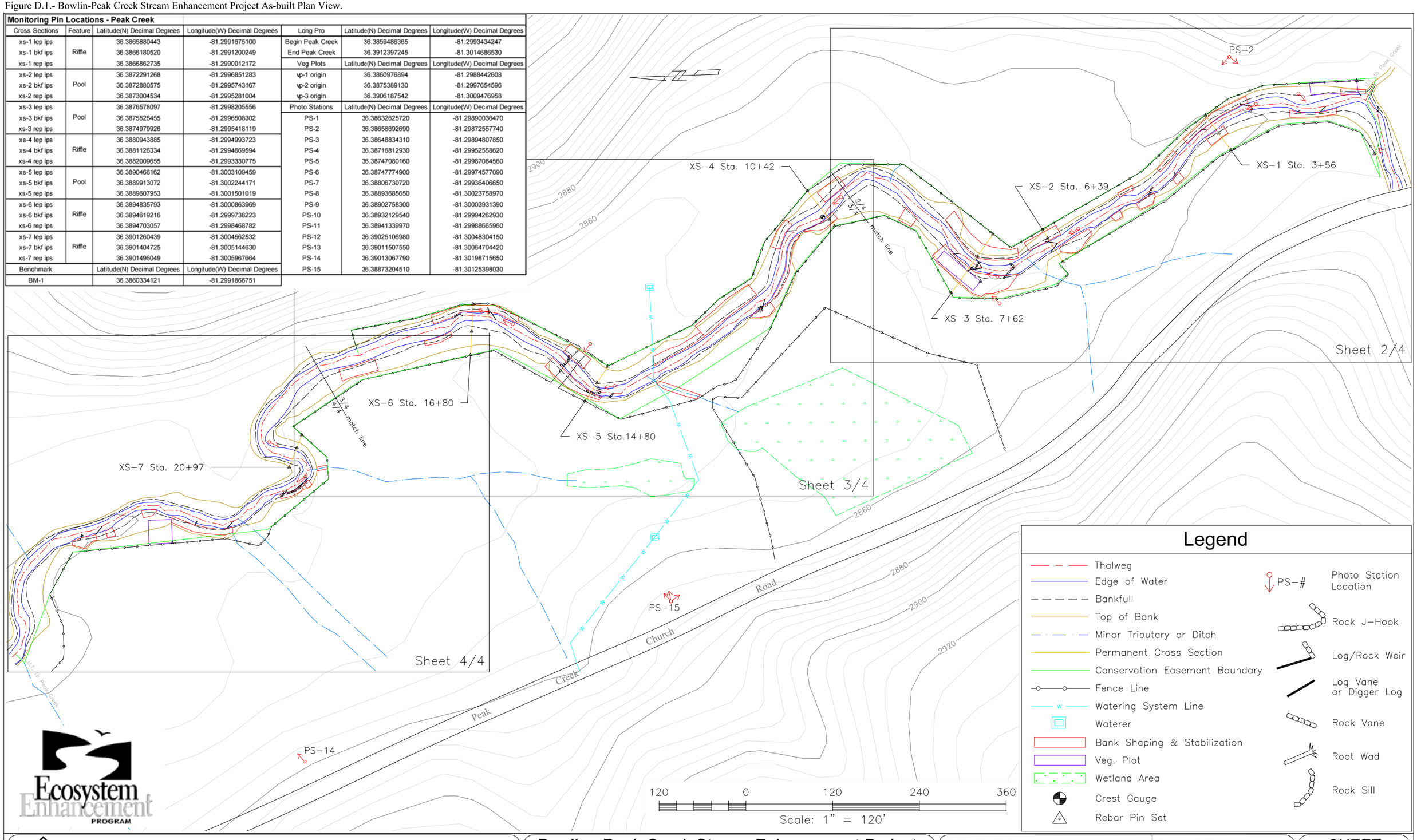
Cross Sections	Feature	Latitude(N) Decimal Degrees	Longitude(W) Decimal Degrees
xs-1 lep ips	Riffle	36.3865880443	-81.2991675100
xs-1 bkf ips		36.3866180520	-81.2991200249
xs-1 rep ips		36.3866862735	-81.2990012772
xs-2 lep ips	Pool	36.3872291268	-81.2996851283
xs-2 bkf ips		36.3872880575	-81.2995743167
xs-2 rep ips		36.3873004534	-81.2995281004
xs-3 lep ips	Pool	36.3876578097	-81.2998205556
xs-3 bkf ips		36.3875525455	-81.2996508302
xs-3 rep ips		36.3874979926	-81.2995418119
xs-4 lep ips	Riffle	36.3880943885	-81.2994993723
xs-4 bkf ips		36.3881126334	-81.2994669594
xs-4 rep ips		36.3882009655	-81.2993330775
xs-5 lep ips	Pool	36.3890466162	-81.3003109459
xs-5 bkf ips		36.3889913072	-81.3002244171
xs-5 rep ips		36.3889607953	-81.3001501019
xs-6 lep ips	Riffle	36.3894835793	-81.3000863969
xs-6 bkf ips		36.3894619216	-81.2999738223
xs-6 rep ips		36.3894703057	-81.2998468782
xs-7 lep ips	Riffle	36.3901260439	-81.3004562532
xs-7 bkf ips		36.3901404725	-81.3005144630
xs-7 rep ips		36.3901496049	-81.3005967664

Benchmark	Latitude(N) Decimal Degrees	Longitude(W) Decimal Degrees
BM-1	36.3860334121	-81.2991866751

Long Pro	Latitude(N) Decimal Degrees	Longitude(W) Decimal Degrees
Begin Peak Creek	36.3859486365	-81.2993434247
End Peak Creek	36.3912397245	-81.3014686530

Veg Plots	Latitude(N) Decimal Degrees	Longitude(W) Decimal Degrees
vp-1 origin	36.3860976894	-81.2988442608
vp-2 origin	36.3875389130	-81.2997654596
vp-3 origin	36.3906187542	-81.3009476958

Photo Stations	Latitude(N) Decimal Degrees	Longitude(W) Decimal Degrees
PS-1	36.38632625720	-81.29890036470
PS-2	36.38658692690	-81.29872557740
PS-3	36.38648834310	-81.29894807850
PS-4	36.38716812930	-81.29952558620
PS-5	36.38747080160	-81.29987084560
PS-6	36.38747774900	-81.29974577090
PS-7	36.38806730720	-81.29936406650
PS-8	36.38893685650	-81.30023758970
PS-9	36.38902758300	-81.30003931390
PS-10	36.38932129540	-81.29994262930
PS-11	36.38941339970	-81.29988665960
PS-12	36.39025106980	-81.30048304150
PS-13	36.39011507550	-81.30064704420
PS-14	36.39013067790	-81.30198715650
PS-15	36.38873204510	-81.30125398030



Legend

- Thalweg
- Edge of Water
- Bankfull
- Top of Bank
- Minor Tributary or Ditch
- Permanent Cross Section
- Conservation Easement Boundary
- Fence Line
- Watering System Line
- Waterer
- Bank Shaping & Stabilization
- Veg. Plot
- Wetland Area
- Crest Gauge
- Rebar Pin Set
- PS-# Photo Station Location
- Rock J-Hook
- Log/Rock Weir
- Log Vane or Digger Log
- Rock Vane
- Root Wad
- Rock Sill

Ecosystem Enhancement PROGRAM

NORTH CAROLINA WILDLIFE RESOURCES COMMISSION
WATERSHED ENHANCEMENT GROUP
P.O. BOX 387
ELKIN, NORTH CAROLINA 28621
336.527.1547 OFFICE
336.527.1548 FAX

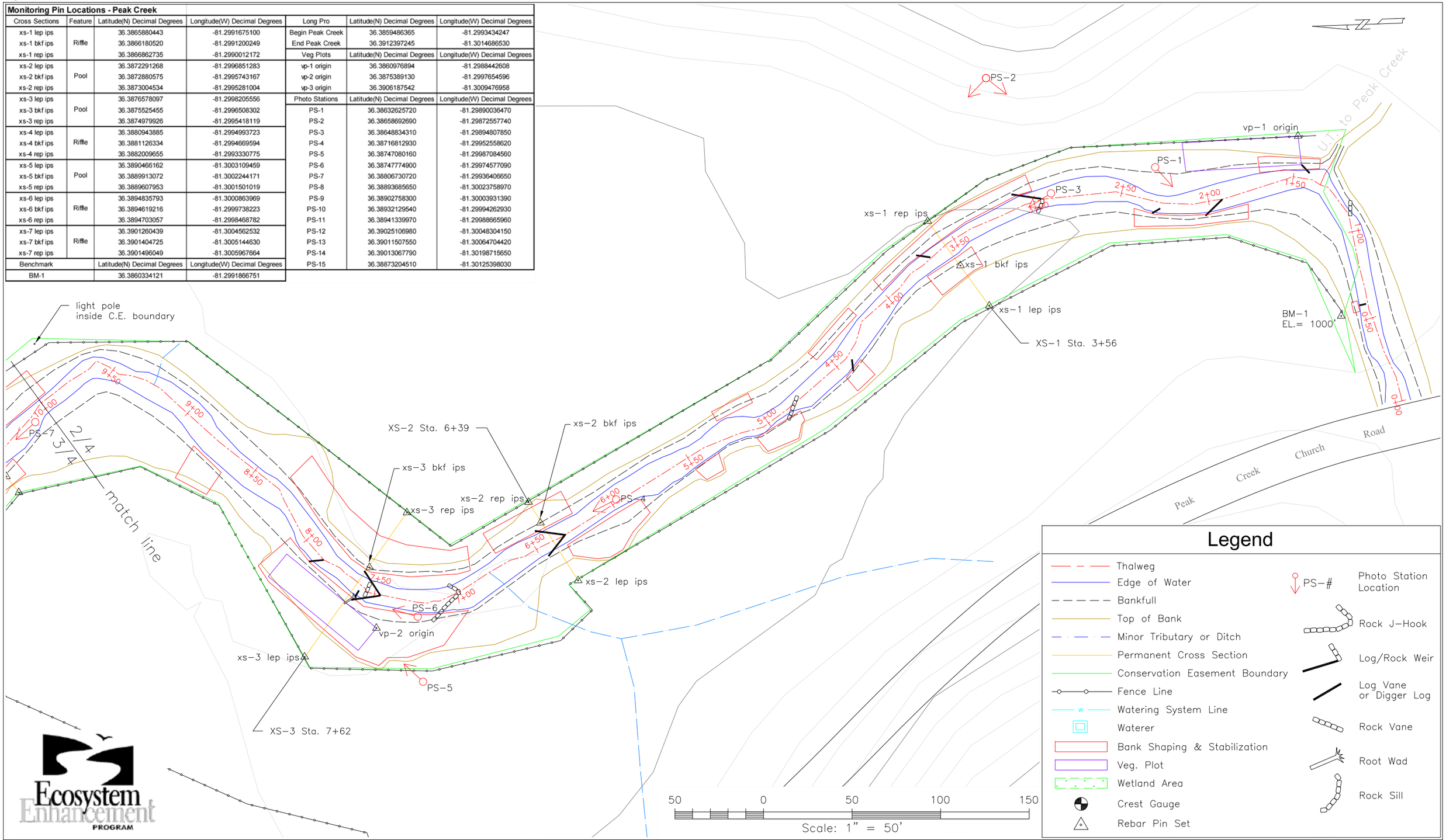
Bowlin - Peak Creek Stream Enhancement Project
Ashe County — EEP Project Number 92606
As-Built Overall Plan View

SURVEYED BY: JF, MF, JW	DATE: 01/08
DRAWN BY: JF	DATE: 08/08
REVISION: JF	DATE: 09/08
CAD FILE ID: Bowlin AB.dwg	

SHEET 1 OF 4

Figure D.1.- Continued.

Monitoring Pin Locations - Peak Creek							
Cross Sections	Feature	Latitude(N) Decimal Degrees	Longitude(W) Decimal Degrees	Long Pro	Latitude(N) Decimal Degrees	Longitude(W) Decimal Degrees	
xs-1 lep ips		36.3865880443	-81.2991675100	Begin Peak Creek	36.3859486365	-81.2993434247	
xs-1 bkf ips	Riffle	36.3866180520	-81.2991200249	End Peak Creek	36.3912397245	-81.3014686530	
xs-1 rep ips		36.3866862735	-81.2990012172	Veg Plots	Latitude(N) Decimal Degrees	Longitude(W) Decimal Degrees	
xs-2 lep ips		36.3872291268	-81.2996851283	vp-1 origin	36.3860976894	-81.2988442608	
xs-2 bkf ips	Pool	36.3872880575	-81.2995743167	vp-2 origin	36.3875389130	-81.2997654596	
xs-2 rep ips		36.3873004534	-81.2995281004	vp-3 origin	36.3906187542	-81.3009476958	
xs-3 lep ips		36.3876578097	-81.2998205556	Photo Stations	Latitude(N) Decimal Degrees	Longitude(W) Decimal Degrees	
xs-3 bkf ips	Pool	36.3875525455	-81.2996508302	PS-1	36.38632625720	-81.29890036470	
xs-3 rep ips		36.3874979926	-81.2995418119	PS-2	36.38658692690	-81.29872557740	
xs-4 lep ips		36.3880943885	-81.2994993723	PS-3	36.38648834310	-81.29894807850	
xs-4 bkf ips	Riffle	36.3881126334	-81.2994669594	PS-4	36.38716812930	-81.29952558620	
xs-4 rep ips		36.3882009655	-81.2993330775	PS-5	36.38747080160	-81.29987084560	
xs-5 lep ips		36.3890466162	-81.3003109459	PS-6	36.38747774900	-81.29974577090	
xs-5 bkf ips	Pool	36.3889913072	-81.3002244171	PS-7	36.38806730720	-81.29936406650	
xs-5 rep ips		36.3889607953	-81.3001501019	PS-8	36.38893685650	-81.30023758970	
xs-6 lep ips		36.3894835793	-81.3000863969	PS-9	36.38902758300	-81.30003931390	
xs-6 bkf ips	Riffle	36.3894619216	-81.2999738223	PS-10	36.38932129540	-81.29994262930	
xs-6 rep ips		36.3894703057	-81.2998468782	PS-11	36.38941339970	-81.29988665960	
xs-7 lep ips		36.3901260439	-81.3004562532	PS-12	36.39025106980	-81.30048304150	
xs-7 bkf ips	Riffle	36.3901404725	-81.3005144630	PS-13	36.39011507550	-81.30064704420	
xs-7 rep ips		36.3901496049	-81.3005967664	PS-14	36.39013067790	-81.30198715650	
Benchmark		Latitude(N) Decimal Degrees	Longitude(W) Decimal Degrees	PS-15	36.38873204510	-81.30125398030	
BM-1		36.3860334121	-81.2991866751				



Legend

- Thalweg
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Ecosystem Enhancement Program

NORTH CAROLINA WILDLIFE RESOURCES COMMISSION
WATERSHED ENHANCEMENT GROUP
P.O. BOX 387
ELKIN, NORTH CAROLINA 28621
336.527.1547 OFFICE
336.527.1548 FAX

Bowlin - Peak Creek Stream Enhancement Project
Ashe County — EEP Project Number 92606
As-Built Plan View Sta. 0+00 to Sta. 10+00

SURVEYED BY: JF, MF, JW	DATE: 01/08
DRAWN BY: JF	DATE: 08/08
REVISION: JF	DATE: 09/08
CAD FILE ID: Bowlin AB.dwg	

SHEET 2 OF 4

Figure D.1.- Continued.

Monitoring Pin Locations - Peak Creek

Cross Sections	Feature	Latitude(N) Decimal Degrees	Longitude(W) Decimal Degrees
xs-1 lep ips	Riffle	36.3865880443	-81.2991675100
xs-1 bkf ips		36.3866180520	-81.2991200249
xs-1 rep ips		36.3866862735	-81.2990012172
xs-2 lep ips	Pool	36.3872291268	-81.2996851283
xs-2 bkf ips		36.3872880575	-81.2995743167
xs-2 rep ips		36.3873004534	-81.2995281004
xs-3 lep ips	Pool	36.3876578097	-81.2998205556
xs-3 bkf ips		36.3875525455	-81.2996508302
xs-3 rep ips		36.3874979926	-81.2995418119
xs-4 lep ips	Riffle	36.3880943885	-81.2994993723
xs-4 bkf ips		36.3881126334	-81.2994669594
xs-4 rep ips		36.3882009655	-81.2993330775
xs-5 lep ips	Pool	36.3890466162	-81.3003109459
xs-5 bkf ips		36.3889913072	-81.3002244171
xs-5 rep ips		36.3889607953	-81.3001501019
xs-6 lep ips	Riffle	36.3894835793	-81.3000863969
xs-6 bkf ips		36.3894619216	-81.2999738223
xs-6 rep ips		36.3894703057	-81.2998468782
xs-7 lep ips	Riffle	36.3901260439	-81.3004562532
xs-7 bkf ips		36.3901404725	-81.3005144630
xs-7 rep ips		36.3901496049	-81.3005967664

Benchmark	Latitude(N) Decimal Degrees	Longitude(W) Decimal Degrees
BM-1	36.3860334121	-81.2991866751

Long Pro	Latitude(N) Decimal Degrees	Longitude(W) Decimal Degrees
Begin Peak Creek	36.3859486365	-81.2993434247
End Peak Creek	36.3912397245	-81.3014686530

Veg Plots	Latitude(N) Decimal Degrees	Longitude(W) Decimal Degrees
vp-1 origin	36.3860976894	-81.2988442608
vp-2 origin	36.3875389130	-81.2997654596
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Photo Stations	Latitude(N) Decimal Degrees	Longitude(W) Decimal Degrees
PS-1	36.38632625720	-81.29890036470
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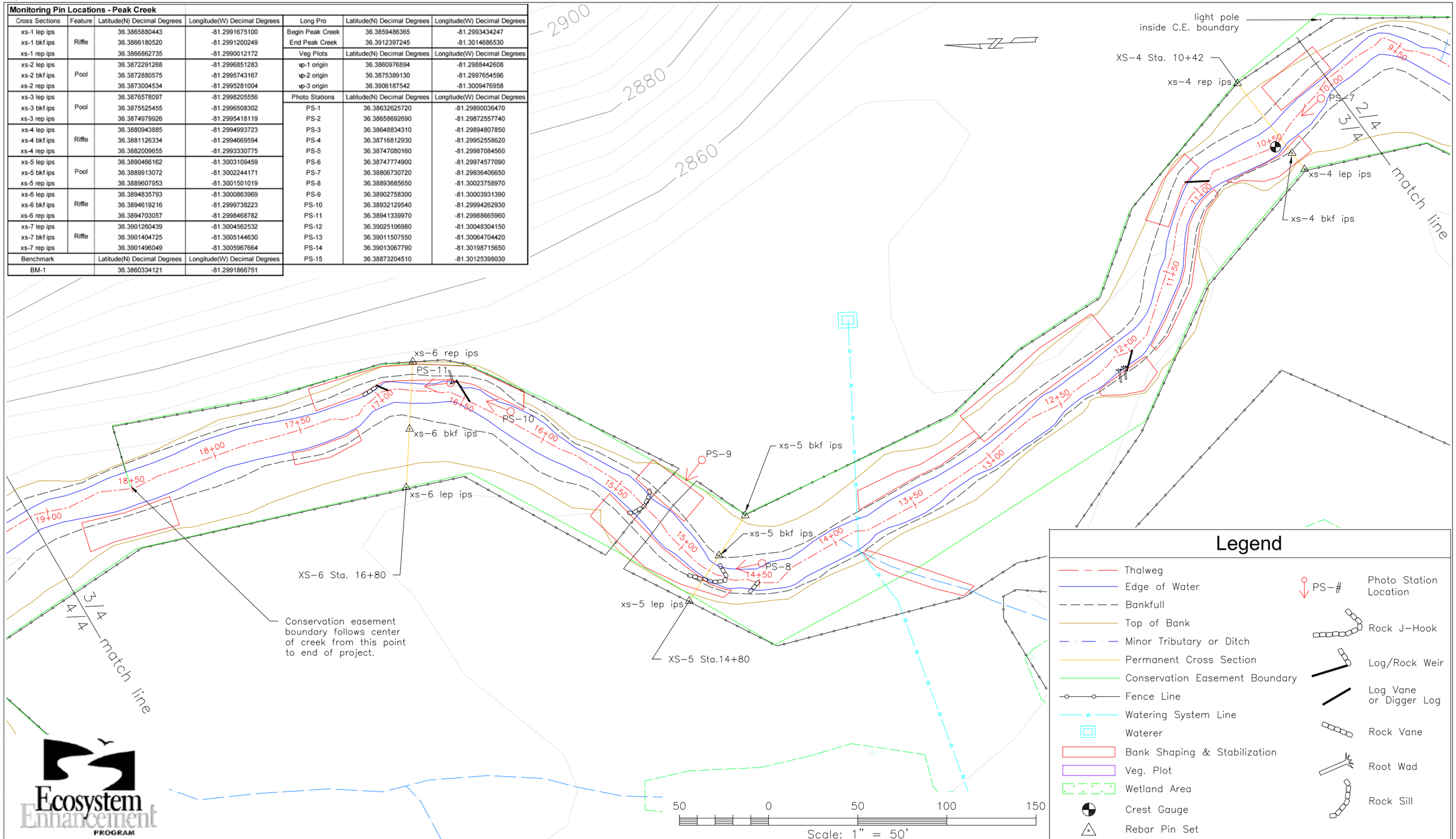
PS-11	36.38941339970	-81.29988665960
PS-12	36.39025106980	-81.30048304150
PS-13	36.39011507550	-81.30064704420
PS-14	36.39013067790	-81.30198715650
PS-15	36.38873204510	-81.30125398030



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Ecosystem Enhancement Program

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WATERSHED ENHANCEMENT GROUP
P.O. BOX 387
ELKIN, NORTH CAROLINA 28621
336.527.1547 OFFICE
336.527.1548 FAX

Bowlin - Peak Creek Stream Enhancement Project
Ashe County — EEP Project Number 92606
As-Built Plan View Sta. 10+00 to Sta. 19+10

SURVEYED BY: JF, MF, JW	DATE: 01/08
DRAWN BY: JF	DATE: 08/08
REVISION: JF	DATE: 09/08
CAD FILE ID: Bowlin AB.dwg	

SHEET 3 OF 4

Figure D.1.- Continued.

Monitoring Pin Locations - Peak Creek

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xs-1 lep ips	Riffle	36.3865880443	-81.2991675100
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xs-6 lep ips	Riffle	36.3894835793	-81.3000863969
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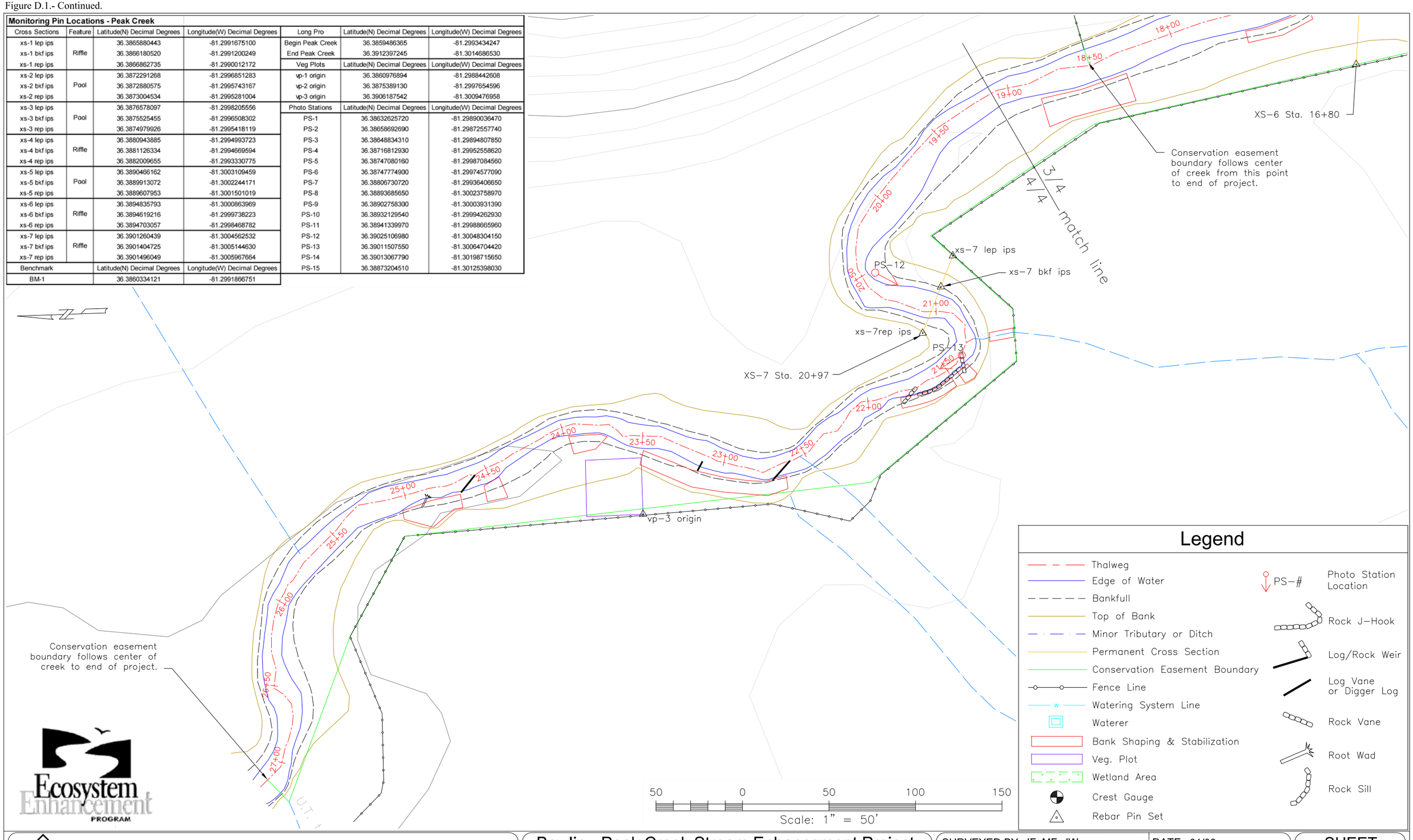
PS-13	36.39011507550	-81.30064704420
PS-14	36.39013067790	-81.30198715650
PS-15	36.38873204510	-81.30125398030



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- Thalweg
- Edge of Water
- Bankfull
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- Watering System Line
- Waterer
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- Crest Gauge
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- PS-# Photo Station Location
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- Log Vane or Digger Log
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Ecosystem Enhancement PROGRAM

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Bowlin - Peak Creek Stream Enhancement Project
Ashe County — EEP Project Number 92606
As-Built Plan View Sta. 19+10 to Sta. 27+20

SURVEYED BY: JF, MF, JW	DATE: 01/08
DRAWN BY: JF	DATE: 08/08
REVISION: JF	DATE: 09/08
CAD FILE ID: Bowlin AB.dwg	

SHEET 4 OF 4

Appendix E USACE, NCDWQ, NCDLQ Permits

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action ID. **200702632** County: **Ashe** USGS Quad: **Laurel Springs**

GENERAL PERMIT (REGIONAL AND NATIONWIDE) VERIFICATION

Property Owner / Authorized Agent: **Harold Bowlin**
Address: **625 Harold Bowlin Road**
Laurel Springs, NC 28644

Telephone No.: **336-982-4041**
Size and location of property (water body, road name/number, town, etc.): **The project site is along Peak Creek and begins where Peak Creek Church Road crosses the creek, continuing for 2,747 linear feet and is identified as the Bowlin Stream Mitigation Site. The project site is near Laurel Springs, Ashe County, North Carolina. Peak Creek is a tributary to the South Fork of the New River.**

Description of projects area and activity: **This permit verifies impacts to Peak Creek associated with enhancement and restoration activities as described within the permit application for 2,747 linear feet of stream channel. The applicant states that this is to satisfy the mitigation requirements associated with impacts from US 421. This project had previously been permitted under Action ID 19970761.**

Applicable Law: ☒ Section 404 (Clean Water Act, 33 USC 1344)
☐ Section 10 (Rivers and Harbors Act, 33 USC 403)
Authorization: Regional General Permit Number: ____
Nationwide Permit Number: **27**

Your work is authorized by the above referenced permit provided it is accomplished in strict accordance with the attached conditions and your submitted plans. Any violation of the attached conditions or deviation from your submitted plans may subject the permittee to a stop work order, a restoration order and/or appropriate legal action.

This verification will remain valid until the expiration date identified below unless the nationwide authorization is modified, suspended or revoked. If, prior to the expiration date identified below, the nationwide permit authorization is reissued and/or modified, this verification will remain valid until the expiration date identified below, provided it complies with all requirements of the modified nationwide permit. If the nationwide permit authorization expires or is suspended, revoked, or is modified, such that the activity would no longer comply with the terms and conditions of the nationwide permit, activities which have commenced (i.e., are under construction) or are under contract to commence in reliance upon the nationwide permit, will remain authorized provided the activity is completed within twelve months of the date of the nationwide permit's expiration, modification or revocation, unless discretionary authority has been exercised on a case-by-case basis to modify, suspend or revoke the authorization.

Activities subject to Section 404 (as indicated above) may also require an individual Section 401 Water Quality Certification. You should contact the NC Division of Water Quality (telephone (919) 733-1786) to determine Section 401 requirements.

For activities occurring within the twenty coastal counties subject to regulation under the Coastal Area Management Act (CAMA), prior to beginning work you must contact the N.C. Division of Coastal Management .

This Department of the Army verification does not relieve the permittee of the responsibility to obtain any other required Federal, State or local approvals/permits.

If there are any questions regarding this verification, any of the conditions of the Permit, or the Corps of Engineers regulatory program, please contact Monte Matthews.

Permit Conditions: 1. All recommendations in the attached email from the North Carolina Wildlife Resources Commission dated July 16, 2007, are hereby incorporated as special conditions of this permit.
2. All recommendations in the attached email from the U.S. Fish and Wildlife Service dated August 24, 2007, are also incorporated as special conditions of this permit including a preconstruction survey and fencing of the nearby wetlands.

Corps Regulatory Official: Monte Matthews M. L. Matthews Date: **August 11, 2007**

Expiration Date of Verification: **August 11, 2009**

Matthews, Monte K SAW

From: Marella_Buncick@fws.gov
Sent: Friday, August 24, 2007 8:42 AM
To: Mark Fowlkes
Cc: Anita_Goetz@fws.gov; Matthews, Monte K SAW
Subject: RE: Bog turtle concerns at the Bowlin mitigation site on Peak Creek, Ashe County
Attachments: Bowlin - Threatened and Endangered Species.doc

Thanks Mark.

I think if you all will commit to performing a preconstruction survey to make sure there are no turtles in the way and make sure that the contractor knows to stay out of the wetland---it's fenced off and they know why the fencing is there---no equipment, no fill etc. we are comfortable with this project. I think this is an excellent opportunity to demonstrate ecosystem restoration, at least on a small scale.

Monte, if you need something further from me, please let me know.

marella

marella buncick
USFWS
160 Zillicoa St.
Asheville, NC 28801
828-258-3939 ext 237

"Dogs are our link to paradise. They don't know evil or jealousy or discontent. To sit with a dog on a hillside on a glorious afternoon is to be back in Eden, where doing nothing was not boring---it was peace." Milan Kundera

"Mark Fowlkes" <markfowlkes@earthlink.net>

08/22/2007 04:01 PM

To <Marella_Buncick@fws.gov>
cc <Anita_Goetz@fws.gov>, <monte.k.matthews@saw02.usace.army.mil>
Subject RE: Bog turtle concerns at the Bowlin mitigation site on Peak Creek, Ashe County

Marella,

The attached document details how the two projects (stream mitigation and bog turtle habitat enhancement) relate and the measures to minimize impacts to the bog turtle. Please let me know if you need any additional information. Thank you for reviewing this document.

Mark Fowlkes
Habitat Conservation Program
NC Wildlife Resources Commission
P. O. Box 387
Elkin, NC 28621
336/527-1547

Mark Fowlkes

From: Ron Linville [linvillejr@earthlink.net]
Sent: Monday, July 16, 2007 10:30 AM
To: 'Mark Fowlkes'
Subject: RE: NCWRC Bowlin stream mitigation project, Peak Creek, Ashe County

Mark, I'm not sure who commented on this earlier or when. Although trout are known in Peak Creek area, biologist previously indicated that reproduction is somewhat limited in Peak Creek (Class B, Trout +) in Ashe County. If memory serves me, we have wild BNT. The following conditions should be implemented:

1. The typical moratorium for ground disturbance in the trout buffer is the trout spawning seasons of October 15 through April 15 to protect the egg and fry stages of trout.
2. Floodplains and streams should be restored to natural geomorphic conditions.
3. Any concrete work must be accomplished so that wet concrete does not contact stream water.
4. Heavy equipment should be operated from the bank rather than in the stream channel to the extent practicable (use new or low hour equipment for any in channel work). Spill containment equipment/materials should be readily available on the site.
5. Sediment and erosion control measures should adhere to the design standards for sensitive watersheds.
6. Temporary and/or permanent vegetation should be planted on bare soil, preferably within five (5) days of ground disturbing activities in the twenty-five (25) foot trout buffer. Do as you go. We encourage use of native onsite vegetation and materials for stream bank stabilization when practicable.

-----Original Message-----
From: Mark Fowlkes [mailto:markfowlkes@earthlink.net]
Sent: Monday, July 16, 2007 9:32 AM
To: Linville, J.Ron WRC-HC
Subject: NCWRC Bowlin stream mitigation project, Peak Creek, Ashe County
Importance: High

Please provide comments on the attached NCWRC mitigation project. This is a project Joe started back in 2001-2002. It was originally part of the US 421 widening in Ashe & Watauga counties (TIP # R-0529). WRC was contracted by DOT to provide the mitigation for the project. Joe submitted plans in 2003 and received a permit from DWQ. He never received comments from the COE. He was able to renew the DWQ permit but not the COE. The COE did not have a paper trail or couldn't find it. Since the COE permit was never renewed the DWQ permit renewal was invalid. To make a short story long, we have to reapply for the COE and DWQ permits.

I have included a shortened enhancement plan and map. This is an enhancement project with bank reshaping and in-stream structures to provide bank stability and improve habitat. There is one small section (100 lf) that has migrated down valley that will be moved back to its original location. It is in trout waters (hatchery supported) and we will be pumping around. We plan to complete the project by October 15, 2007. Construction will not occur during the trout moratorium (October 15 through April 15) so trout spawning will not be impacted. Every effort will be made to reduce sediment from entering the stream, including the use of silt fence, construction entrances, stabilizing disturbed areas at the end of each day, etc.) To my knowledge T&E species are not present in the stream. Bog turtles have been found in adjacent wetlands. We are working with Faunal Diversity Group to fence of the wetland and only allow cattle seasonal access.

Let me know if you need any additional information. Thank you for your help. Let me know if you have any questions.

Mark Fowlkes
Habitat Conservation Program
NC Wildlife Resources Commission
P. O. Box 387
Elkin, NC 28621
336/527-1547
336/527-1548 FAX
markfowlkes@earthlink.net
www.ncwildlife.org

The Wilmington District is committed to providing the highest level of support to the public. To help us ensure we continue to do so, please complete the attached customer Satisfaction Survey or visit http://www.saw.usace.army.mil/WETLANDS/index.html to complete the survey online.

Copy Furnished:
Mark Fowlkes
NC Wildlife Resources Commission
PO Box 387
Elkin, NC 28621

Determination of Jurisdiction:

☐ Based on preliminary information, there appear to be waters of the US including wetlands within the above described project area. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331).

☐ There are Navigable Waters of the United States within the above described project area subject to the permit requirements of Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

☒ There are waters of the US and/or wetlands within the above described project area subject to the permit requirements of Section 404 of the Clean Water Act (CWA)(33 USC § 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

☐ The jurisdictional areas within the above described project area have been identified under a previous action. Please reference jurisdictional determination issued _____. Action ID _____

Basis of Jurisdictional Determination: **Streams exhibit an Ordinary High Water Mark and connected via surface water to a traditional navigable water.**

Corps Regulatory Official: Monte Matthews

Date **August 11, 2007**

SURVEY PLATS, FIELD SKETCH, WETLAND DELINEATION FORMS, PROJECT PLANS, ETC., MUST BE ATTACHED TO THE FILE COPY OF THIS FORM, IF REQUIRED OR AVAILABLE.

Copy Furnished:

Action ID Number: 2007-02632 **County:** Ashe

Permittee: Harold Bowlin

Date Permit Issued: August 11, 2007

Project Manager: Monte Matthews

Upon completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the following address:

US ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT
WILMINGTON REGULATORY FIELD OFFICE
POST OFFICE BOX 1890
WILMINGTON, NORTH CAROLINA 28402-1890

Please note that your permitted activity is subject to a compliance inspection by a U. S. Army Corps of Engineers representative. If you fail to comply with this permit you are subject to permit suspension, modification, or revocation.

I hereby certify that the work authorized by the above referenced permit has been completed in accordance with the terms and condition of the said permit, and required mitigation was completed in accordance with the permit conditions.

_____ _____

Signature of Permittee **Date**

B. ADDITIONAL COMMENTS TO SUPPORT JD:

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL		
Applicant: Harold Boxlin	File Number: 2007-02632	Date: August 11, 2007
Attached is:NWP		See Section below
☐ INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)		A
☐ PROFFERED PERMIT (Standard Permit or Letter of permission)		B
☐ PERMIT DENIAL		C
☐ APPROVED JURISDICTIONAL DETERMINATION		D
☐ PRELIMINARY JURISDICTIONAL DETERMINATION		E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/inet/functions/cw/cecwo/reg or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the district engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact: Monte Matthews	If you only have questions regarding the appeal process you may also contact: Mr. Mike Bell, Administrative Appeal Review Officer CESAD-ET-CO-R U.S. Army Corps of Engineers, South Atlantic Division 60 Forsyth Street, Room 9M15 Atlanta, Georgia 30303-8801

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

_____ Signature of appellant or agent.	Date:	Telephone number:

For appeals on Initial Proffered Permits and approved Jurisdictional Determinations send this form to:

District Engineer, Wilmington Regulatory Division, Attn: Monte Matthews, Project Manager, Raleigh Regulatory Field Office, 6508 Falls of Neuse Road Suite 120, Raleigh, North Carolina 27615

Michael F. Easley, Governor

William G. Ross Jr., Secretary
North Carolina Department of Environment and Natural Resources

Coleen H. Sullins, Director
Division of Water Quality

August 20, 2007
Ashe County
DWQ Project No. 03-0599
Bowlin Stream Mitigation Site (associated with TIP #R-0529)

APPROVAL of 401 Water Quality Certification

Mr. Mark Fowlkes
NCWRC
PO Box 387
Elkin, NC 28621

Dear Mr. Fowlkes:

You have our approval, in accordance with the attached conditions perform the Bowlin Stream Mitigation Site work in Ashe County as described in your original application dated May 5, 2003, and your re-application dated July 16, 2007. This project meets the definition of Enhancement Level 1 in the U.S. Army Corps of Engineers' stream mitigation guidance.

After reviewing your application, we have decided that this activity is covered by General Water Quality Certification No. 3626, corresponding to the U.S. Army Corps of Engineers Nationwide Permit Number 27. In addition, you should acquire any other federal, state or local permits before you proceed with your project including (but not limited to) Sediment and Erosion Control, Non-Discharge and Water Supply Watershed regulations. This approval will expire with the accompanying 404 federal permit.

This approval is valid solely for the purpose and design described in your application. Should your project change, you must notify the Division of Water Quality (Division) and submit a new application. If the property is sold, the new owner must be given a copy of this approval letter and certifications, and is thereby responsible for complying with all the conditions. If total wetland fills for this project (now or in the future) exceed one acre, or if total impacts to streams (now or in the future) exceed 150 linear feet, compensatory mitigation may be required as described in 15A NCAC 2H .0506 (h) (6) and (7). **For this approval to remain valid, you must adhere to the conditions listed in the attached certification and any additional conditions listed below.**

1. Upon completion of the project, the Applicant shall complete and return the enclosed "Certification of Completion Form" to notify DWQ when all work included in the 401 Certification has been completed. The responsible party shall complete the attached form and return it to the 401/Wetlands Unit of the Division of Water Quality upon completion of the project. In addition, "as-built" drawings shall be sent to the Division upon project completion.

If you do not accept any of the conditions of this certification, you may ask for an adjudicatory hearing. You must act within 60 days of the date that you receive this letter. To ask for a hearing, send a written petition, which conforms to Chapter 150B of the North Carolina General Statutes to the Office of Administrative Hearings, 6714 Mail Service Center, Raleigh, N.C. 27699-6714. This certification and its conditions are final and binding unless you ask for a hearing.

This letter completes the review of the Division of Water Quality under Section 401 of the Clean Water Act. If you have any questions, please contact Sue Homewood at 336-771-4964 or at Sue.Homewood@ncmail.net.

Sincerely,

Coleen H. Sullins, Director

Attachment

cc: Monte Matthews, USACE Raleigh Field Office
DWQ Wetlands/401 Transportation Unit
DWQ Winston Salem Regional Office
DWQ Central Files

DWQ Project No.: _____ County: _____

Applicant: _____

Project Name: _____

Date of Issuance of 401 Water Quality Certification: _____

Certificate of Completion
Upon completion of all work approved within the 401 Water Quality Certification or applicable Buffer Rules, and any subsequent modifications, the applicant is required to return this certificate to the 401/Wetlands Unit, North Carolina Division of Water Quality, 1621 Mail Service Center, Raleigh, NC, 27699-1621. This form may be returned to DWQ by the applicant, the applicant's authorized agent, or the project engineer. It is not necessary to send certificates from all of these.

Applicant's Certification
I, _____, hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the 401 Water Quality Certification and Buffer Rules, the approved plans and specifications, and other supporting materials.

Signature: _____ Date: _____

Agent's Certification
I, _____, hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the 401 Water Quality Certification and Buffer Rules, the approved plans and specifications, and other supporting materials.

Signature: _____ Date:_____

Engineer's Certification
_____ Partial _____ Final
I, _____, as a duly registered Professional Engineer in the State of North Carolina, having been authorized to observe (periodically, weekly, full time) the construction of the project,for the Permittee hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the 401 Water Quality Certification and Buffer Rules, the approved plans and specifications, and other supporting materials.

Signature _____ Registration No. _____

Date _____

WQC #3626

GENERAL CERTIFICATION FOR STREAM RESTORATION, ENHANCEMENT AND STABILIZATION PROJECTS AND WETLAND AND RIPARIAN RESTORATION AND CREATION ACTIVITIES INCLUDING THOSE ELIGIBLE FOR CORPS OF ENGINEERS NATIONWIDE PERMIT NUMBERS 13 (BANK STABILIZATION) AND 27 (AQUATIC HABITAT RESTORATION, ESTABLISHMENT AND ENHANCEMENT ACTIVITIES) AND REGIONAL PERMIT 197800080 (CONSTRUCTION AND MAINTENANCE OF BULKHEADS)

This General Certification is issued in conformity with the requirements of Section 401, Public Laws 92-500 and 95-217 of the United States and subject to the North Carolina Division of Water Quality Regulations in 15A NCAC 2H .0500 and 15A NCAC 2B .0200 for the discharge of fill material to waters as described in 33 CFR 330 Appendix A (B) (13) and (27) of the Corps of Engineers regulations (i.e. Nationwide Permit Numbers 13 and 27) and Regional Permit 197800080. The category of activities shall include stream bank stabilization or stream restoration activity as long as impacts to waters or significant wetlands are minimized. This Certification replaces Water Quality Certification (WQC) Number 3399 issued March 2003 and WQC Number 3495 issued March 28, 2003. This WQC is rescinded when the Corps of Engineers reauthorize Nationwide Permits 13 or 27 or Regional Permit 197800080 or when deemed appropriate by the Director of the Division of Water Quality (DWQ).

The State of North Carolina certifies that the specified category of activity will not violate applicable portions of Sections 301, 302, 303, 306 and 307 of the Public Laws 92-500 and 95-217 if conducted in accordance with the conditions set forth.

Conditions of Certification:

1. Wetland and/or riparian area restoration and creation projects which are for compensatory mitigation or compensatory mitigation credit (and not including projects that only involve stream restoration or enhancement work described in condition nos. 2 and 3 below) that are proposed under this General Certification require written application to and approval from the Division of Water Quality. All applications for written DWQ approval will be reviewed and a response will be prepared within 30 days of stamped receipt of the application in the Division of Water Quality's Central Office in Raleigh. This 30-day period does not include time spent by the application or DWQ's response within US Postal Service or North Carolina's Mail Service Center mail systems;

   Wetland and riparian area restoration and creation projects (not including projects that involve work in or impacts to streams) which are not for compensatory mitigation or compensatory mitigation credit proposed under this General Certification do not require written application to and approval from the Division of Water Quality. In these cases, the applicant is required to notify the Division in writing with three copies of project specifications before the impact occurs. If the Division determines that the project would not result in an ecologically viable wetland and riparian area, then the Division shall prepare a response to notify the applicant in writing within 30 days of DWQ's receipt of the notification. In such cases, the applicant will be required to submit a formal application and pay of the appropriate fee, and DWQ will be required to process the application through normal procedures;

2. Proposed stream restoration projects (as defined and limited below), that do not disturb wetlands and that are not being conducted for compensatory mitigation or compensatory mitigation credit do not require written application to and approval from the Division of Water Quality, and, therefore, do not require payment of an

application fee to the Division of Water Quality. Projects that are intended for compensatory mitigation or compensatory mitigation credit, that are intended to resolve a violation, or that are in association with a development project shall require an application, fee, and written concurrence from the Division of Water Quality.

Stream restoration is defined as the process of converting an unstable, altered or degraded stream corridor, including adjacent riparian zone and floodprone areas to its natural or referenced, stable conditions considering recent and future watershed conditions. This biological and chemical integrity, including transport of water and sediment is produced by the stream's watershed in order to achieve dynamic equilibrium. The applicant is required to notify the Division in writing with three copies of detailed restoration plans and specifications before the impact occurs. If the Division determines that the project does not meet the above definition of stream restoration, then the Division shall notify the applicant in writing within 30 days of receipt of the application. In such cases, the applicant will be required to submit a formal application and pay of the appropriate fee, and DWQ will be required to process the application through normal procedures;

3. Stream enhancement projects (as defined and limited below), that do not disturb wetlands and that are not being conducted for compensatory mitigation or compensatory mitigation credit and do not include any stream channel relocation, do not require written application to and approval from the Division of Water Quality, and, therefore, do not require payment of an application fee to the Division of Water Quality. Projects that are intended for compensatory mitigation or compensatory mitigation credit, that are intended to resolve a violation, or that are in association with a development project shall require an application, fee, and written concurrence from the Division of Water Quality.

4. Stream enhancement is defined as the process of implementing stream rehabilitation practices in order to improve water quality and/or ecological function. These practices must only be conducted on streams that are not experiencing severe aggradation or erosion. Stream enhancement does not include the relocation of the stream channel. Stream enhancement bank stabilization techniques include the use of woody vegetation as the primary means of long term stability, and "soft" techniques such as root wads that encourage the establishment of dense woody vegetation. Stream enhancement techniques do not typically include the use of stream bank or bed hardening techniques such as rip-rap or other rock, gabion, block or concrete structures. However, enhancement activities may also include the placement of in stream habitat or grade control structures such as cross vanes, j-hook vanes, and wing deflectors that do not affect the overall dimension, pattern, or profile of a stable stream.

   The applicant is required to notify the Division in writing with three copies of detailed enhancement plans and specifications before the impact occurs if the stream enhancement project disturbs greater than 500 feet of stream bank or if the project proposes the use of in stream structures. If the Division determines that the project does not meet the above definition of stream enhancement, then the Division shall notify the applicant in writing with an explanation within 30 days of receipt of the notification to require application and payment of the appropriate fee;

5. Stream stabilization projects that include the use of any structure or fill in the existing stream bed or disturb greater that 500 feet of stream bank that are proposed under this General Certification require written application to and approval from the Division of Water Quality.

Stream stabilization is defined as the in-place stabilization of an eroding stream bank using measures that consist primarily of "hard" engineering, such as but not limited to concrete lining, rip rap or other rock, and gabions. The use of "hard" engineering will not be considered as stream restoration or enhancement;

6. Impacts to any stream length in the Neuse, Tar-Pamlico or Randleman River Basins (or any other major river basins with Riparian Area Protection Rules [Buffer Rules] in effect at the time of application) requires written concurrence for this Certification from DWQ in accordance with 15A NCAC 2B.0200. Activities listed as "exempt" from these rules do not need to apply for written concurrence under this Certification. New development activities located in the protected 50-foot wide riparian areas (whether jurisdictional wetlands or not) within the Neuse and Tar-Pamlico River Basins shall be limited to "uses" identified within and constructed in accordance with 15A NCAC 2B .0200. All new development shall be located, designed, constructed, and maintained to have minimal disturbance to protect water quality to the maximum extent practicable through the use of best management practices;

7. In order for the above conditions to be valid, any plans not requiring written concurrence to use this Certification must be built according to the plans provided to the Division of Water Quality. If written concurrence is required, then the project must be built and maintained according to the plans approved by the written concurrence and Certification from the Division of Water Quality;

8. Appropriate sediment and erosion control practices which equal or exceed those outlined in the most recent version of the "North Carolina Erosion and Sediment Control Planning and Design Manual" or "North Carolina Surface Mining Manual" whichever is more appropriate (available from the Division of Land Resources at the DENR Regional and Central Offices) shall be designed, installed and maintained properly to assure compliance with the appropriate turbidity water quality standard (50 NTUs in streams and rivers not designated as trout waters by DWQ; 25 NTUs in all saltwater classes and all lakes and reservoirs; 10 NTUs in DWQ-classified trout waters);

9. All sediment and erosion control measures placed in wetlands or waters shall be removed and the original grade restored after the Division of Land Resources or delegated program has released the project;

10. Any rip-rap shall be of such a size and density so as not to be able to be carried off by wave or current action and consist of clean rock or masonry material free of debris or toxic pollutants. Rip-rap shall not be installed in the streambed except in specific areas required for velocity control and to ensure structural integrity of bank stabilization measures. If rip-rap is to be installed within the streambed, the amount and location must be approved in writing by the Division of Land Resources and Division of Water Quality. However rock vanes, wing deflectors, and similar structures for grade control and bank protection are acceptable;

11. Measures shall be taken to prevent live or fresh concrete from coming into contact with freshwaters of the state until the concrete has hardened;

12. If an environmental document is required, this Certification is not valid until a Finding of No Significant Impact or Record of Decision is issued by the State Clearinghouse;

13. Additional site-specific conditions may be added to projects which require written concurrence under this Certification in order to ensure compliance with all applicable water quality and effluent standards;

14. Projects with any impacts to streams, wetlands, and/or waters that have received a Notice of Violation from the Division of Land Resources and/or the Division of Water Quality are required to submit a complete application and receive written concurrence to use this Certification regardless of the proposed impact amount to streams, wetlands, and waters;

15. Concurrence from DWQ that this Certification applies to an individual project shall expire three years from the date of the cover letter from DWQ or the notification sent to DWQ;

16. Standard Erosion and Sediment Control Practices:

    Erosion and sediment control practices must be in full compliance with all specifications governing the proper design, installation and operation and maintenance of such Best Management Practices:

    a. Erosion and sediment control measures for the project must be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Sediment and Erosion Control Planning and Design Manual*.
    b. Design, installation, operation, and maintenance of the sediment and erosion control measures must be such that they equal, or exceed, the requirements specified in the most recent version of the *North Carolina Sediment and Erosion Control Manual*. The devices shall be maintained on all construction sites, borrow sites, and waste pile (spoil) projects, including contractor-owned or leased borrow pits associated with the project.
    c. For borrow pit sites, the erosion and sediment control measures must be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Surface Mining Manual*.
    d. Reclamation measures and implementation must comply with the reclamation in accordance with the requirements of the Sedimentation Pollution Control Act.
    e. Sufficient materials required for stabilization and/or repair of erosion control measures and stormwater routing and treatment shall be on site at all times.

17. No Impacts Beyond those in Application

    No waste, spoil, solids, or fill of any kind shall occur in wetlands, waters, or riparian areas beyond the footprint of the impacts depicted in the Pre-construction Notification. All construction activities, including the design, installation, operation, and maintenance of sediment and erosion control Best Management Practices, shall be performed so that no violations of state water quality standards, statutes, or rules occur.

18. No Sediment and Erosion Control Measures in Wetlands

    Sediment and erosion control measures shall not be placed in wetlands or waters to the maximum extent practicable. If placement of sediment and erosion control devices in wetlands and waters is unavoidable, they shall be removed and the natural grade restored within six months of the date that the Division of Land Resources or locally delegated program has released the project.

WQC #3626

Non-compliance with or violation of the conditions herein set forth by a specific project shall result in revocation of this Certification for the project and may also result in criminal and/or civil penalties.

The Director of the North Carolina Division of Water Quality may require submission of a formal application for Individual Certification for any project in this category of activity if it is determined that the project is likely to have a significant adverse effect upon water quality including state or federally listed endangered or threatened aquatic species or degrade the waters so that existing uses of the wetland or downstream waters are precluded.

Public hearings may be held for specific applications or group of applications prior to a Certification decision if deemed in the public's best interest by the Director of the North Carolina Division of Water Quality.

Effective date: 19 March 2007

DIVISION OF WATER QUALITY

By

Alan W. Klimek, P.E.

Director

WQC # 3626

North Carolina Department of Environment and Natural Resources
Division of Land Resources
Land Quality Section

James D. Simons, PG, PE
Director and State Geologist

Michael F. Easley, Governor
William G. Ross Jr., Secretary

May 24, 2007

LETTER OF APPROVAL WITH MODIFICATIONS

NC Wildlife Resources Commission
Attn: Shannon Deaton
1721 Mail Service Center
Raleigh, NC 27699-1721

RE: Project Name: Bowlin Mitigation Site
Project ID: Ashe-2007-027
County: Ashe
River Basin: New
Stream Classification: Trout
Submitted By: NC Wildlife Resources Commission
Date Received by LQS: 5-3-07
Plan Type: New

Dear Mr./Ms. Deaton:

This office has reviewed the subject erosion and sedimentation control plan. We find the plan to be acceptable with modifications and hereby issue this letter of Approval With Modifications. The Modifications Required for Approval are listed on the attached page. This plan approval shall expire three (3) years following the date of approval, if no land-disturbing activity has been undertaken, as is required by Title 15A NCAC 4B .0129.

Please be advised that Title 15A NCAC 4B .0118(a) requires that a copy of the approved erosion control plan be on file at the job site. Also, you should consider this letter to give the Notice required by G.S. 113A-61.1(a) of our right of periodic inspection to insure compliance with the approved plan.

North Carolina's Sedimentation Pollution Control Program is performance-oriented, requiring protection of existing natural resources and adjoining properties. If, following the commencement of this project, it is determined that the erosion and sedimentation control plan is inadequate to meet the requirements of the Sedimentation Pollution Control Act of 1973 (North Carolina General Statute 113A-51 through 66), this office may require revisions to the plan and implementation of the revisions to insure compliance with the Act.

Acceptance and approval of this plan is conditioned upon your compliance with Federal and State water quality laws, regulations, and rules. In addition, local city or county ordinances or rules may also apply to this land-disturbing activity. This approval does not supersede any other permit or approval.

Please be aware that your project will be covered by the enclosed NPDES General Stormwater Permit NCGO1000 (Construction Activities). You should first become familiar with all of the requirements for compliance with the enclosed general permit.

Please note that this approval is based in part on the accuracy of the information provided in the Financial Responsibility Form, which you have provided. You are requested to file an amended form if there is any change in the information included on the form. In addition, it would be helpful if you notify this office of the proposed starting date for this project. Please notify us if you plan to have a preconstruction conference.

Your cooperation is appreciated.

Sincerely,

Clif Whitfield, P.G.
Assistant Regional Engineer
Land Quality Section

Enclosures: Certificate of Approval
Modifications Required for Approval
NPDES Permit

cc: NC Wildlife Resources Commission
WSRO Files
WSRO DWQ

MODIFICATIONS REQUIRED FOR APPROVAL

Project Name: Bowlin Mitigation Site
Project ID: Ashe-2007-027
County: Ashe

1. A trout buffer waiver must be obtained for this project. To obtain a trout buffer waiver, please contact the NC Division of Land Resources, Land Quality Section central office at 919-733-4574.

2. Obtain any necessary 401 permits from the NC Division of Water Quality or 404 permits from the US Army Corps of Engineers.

CERTIFICATE OF PLAN APPROVAL

with Modifications

The posting of this certificate certifies that an erosion and sedimentation control plan has been approved for this project by the North Carolina Department of Environment and Natural Resources in accordance with North Carolina General Statute 113A - 57 (4) and 113A - 54 (d) (4) and North Carolina Administrative Code, Title 15A, Chapter 4B.0107 (c). This certificate must be posted at the primary entrance of the job site before construction begins and until establishment of permanent groundcover as required by North Carolina Administrative Code, Title 15A, Chapter 4B.0127 (b).

Bowlin Mitigation Site

Project Name and Location

5-24-07

Date of Plan Approval

Ashe-2007-027

NCDENR

Asst

Regional Engineer

NCDENR
North Carolina Department of Environment and Natural Resources
Division of Land Resources
Land Quality Section

James D. Simons, PG, PE
Director and State Geologist

Michael F. Easley, Governor
William G. Ross Jr., Secretary

June 13, 2007

Shannon L. Deaton
Habitat Conservation Program Manager
North Carolina Wildlife Resources Commission
1721 Mail Service Center
Raleigh, NC 27699-1721

Dear Ms. Deaton:

Subject: Trout Buffer Zone Waiver
Bowlin Mitigation Site on Peak Creek
Ashe County

This office has received your plan for the Bowlin Mitigation Site on Peak Creek, in Ashe County, North Carolina. Your plan was submitted to this office for approval because of the proposed encroachments on a designated trout waters buffer zone. In accordance with NCGS 113A-57(1) and Title 15A NCAC 4B .0125(c) this letter will serve as written approval to encroach on the buffer zone of Peak Creek, Class C, Trout. This authority has been delegated to me by the Director, Division of Land Resources, James D. Simons, in accordance with NCGS 143B-10. The following conditions will apply to this approval:

1. This approval is based on the plans received June 1, 2007.

2. This approval does not absolve the permittee from compliance with the surface water quality turbidity standard. More protective erosion and sedimentation control measures may be required in order to comply with this water quality standard.

Your cooperation in protecting our environment is most appreciated. If you have any questions about this approval, you may contact T. Gray Hauser, Jr., PE at (919) 733-4574.

Sincerely,

Francis M. Nevils, Jr., PE

cc: Matthew E. Gantt, PE, Winston-Salem Regional Engineer
Mark Fowlkes, NCWRC

NCDENR
North Carolina Department of Environment and Natural Resources
Division of Land Resources
Land Quality Section

James D. Simons, PG, PE
Director and State Geologist

Michael F. Easley, Governor
William G. Ross Jr., Secretary

SEDIMENTATION INSPECTION REPORT

Dear Sir or Madam:

Enclosed is a copy of the inspection report, which was prepared following an onsite inspection of the referenced project. This report is intended to provide you with information concerning the status of the project as it relates to compliance with the North Carolina Sedimentation Pollution Control Act of 1973.

Please review this report carefully, as it may contain corrective actions needed or comments, which will assist you in meeting the required standards of the Act.

It is our desire that any and all possible problems be discussed and resolved at the earliest possible time. To facilitate this effort, please contact me or the named inspector at the address shown on the inspection report if you have any questions.

Sincerely,

Clif Whitfield

Clif Whitfield, P.G.
Assistant Regional Engineer
Land Quality Section

ENCLOSURE: Sedimentation Inspection Report

SEDIMENTATION INSPECTION REPORT

North Carolina Department of Environment and Natural Resources
Land Quality Section: *585 Waughtown Street, Winston-Salem, NC 27107 (336) 771-5000*

5.9 A C

County: Ashe **Project:** Bowlin Mitigation Site **River basin:** New
Person financially responsible: NC Wildlife Resources Commission **Project #** Ashe-2007-027
Address: ATTN; Shannon Deaton 1721 mail service center Raleigh **Case #**
1. Project location: Peak Ck Church Rd (Laurel Springs) NC 27699-1721
Pictures: No: ☑ Yes: ☐ Prints: ☐ Slides: ☐ Video: ☐ Digital: ☐
2. Weather and soil conditions: 70's clear **Initial inspection:** Yes: ☐ No: ☑
3. Is site currently under notice of violation? Yes: ☐ No: ☑
4. Is the site in compliance with S.P.C.A. and rules? Yes: ☑ No: ☐ If no, check violations below:
5. Violations:

- ☐ a. No approved plan, G.S. 113A-57 (4) and 15A N.C.A.C 4B.0107(c)
- ☐ b. Failure to follow approved plan, G.S. 113A-57(5)
- ☐ c. Failure to submit revised plan, G.S. 113A-54.1(b) and 15A N.C.A.C. 4B.0118(a)
- ☐ d. Failure to provide adequate groundcover, G.S. 113A-57(3) and 15A N.C.A.C. 4B.0107(b) or 15A N.C.A.C. 4B.0124(e)
- ☐ e. Insufficient measures to retain sediment on site, G.S. 113A-57(3)
- ☐ f. Failure to take all reasonable measures, 15A N.C.A.C. 4B.0105
- ☐ g. Inadequate buffer zone, G.S. 113A-57(1)
- ☐ h. Graded slopes and fills too steep, G.S. 113A-57(2) or 15A N.C.A.C. 4B.0124(d)
- ☐ i. Unprotected exposed slopes, G.S. 113A-57(2)
- ☐ j. Failure to maintain erosion control measures, 15A N.C.A.C. 4B.0113
- ☐ k. Other (describe)

6. Potential NPDES Permit Violation? Yes: ☐ No: ☑ Describe:
7. Has sedimentation damage occurred since last inspection? Yes: ☐ If yes, where? (check all that apply) No: ☑
Lake/natural watercourse on the tract: ☐ Lake/natural watercourse off the tract: ☐ Other property: ☐
Description:
Degree of damage: **slight**: ☐ **moderate**: ☐ **severe**: ☐
8. Contact made with (name): no one on site Title:
Inspection report given: ☐ or sent: ☒ to person financially responsible. Date given/sent: 8-14-08 LW
9. Corrective actions needed:

10. Comments: Project complete and stabilized
Project file will be closed
DED FILE

Report by: Timothy R. Latham **Others present:**
Date of inspection: 8-12-08 **Time arriving on site:** 11:95 Am **Time leaving site:** 11:55 Am
cc: