# UT to Sandy Creek

Randolph County, North Carolina

2010 Year 3 Monitoring Report - Final
EEP Project Number: 403
USGS HUC 03030003020010
EcoEngineering Project Number: EEP-08030

Prepared for:

NCDENR Ecosystem Enhancement Program
2728 Capital Blvd., Suite 1H 103
Raleigh, NC 27604

EcoEngineering
A division of The John R. McAdams Company, Inc.
RESEARCH TRIANGLE PARK

P. O. Box 14005 Research Triangle Park, NC 27709
919-287-4262 FAX 919-361-2269
www.ecoengr.com

Table of Contents



**Project Conditions and Monitoring Data Appendices**

**Appendix A – General Figures and Plan Views**



**Appendix B – General Project Tables**



**Appendix C – Vegetation Assessment Data**



**Appendix D – Stream Assessment Data**

**Appendix E – Wetland Assessment**

Table 10. Wetland Criteria Attainment (omitted, not applicable)
– Precipitation and Water Level Plots (omitted, not applicable)

**Appendix F – Project Photo Stations**

# 1.0 Executive Summary/Project Abstract

## *1.1 Project Goals and Objectives*

The goal of the restoration project is to improve the water quality and biological habitat of the site's streams, wetlands, and riparian buffers through the following:

-Restoration (pattern, dimension, and profile) of unstable streams using natural channel design techniques
-Re-establishment of riparian buffers (Kimley-Horn, 2008)

## *1.2 Vegetation Condition and Comparison*

It should be noted; Vegetation Plots 1, 2, and 3 are located in a planned low-height planting zone. These plots will not be re-sampled in the future. Original baseline vegetation monitoring data was not provided prior to the 2008 Monitoring Year 1 and 2008 is considered a drought year. The 2009 Monitoring Year 2 is considered the baseline datum because after two years of monitoring it is assumed all planted stems within a vegetation monitoring plot have been surveyed and accounted for. Therefore, any additional species observed in proceeding monitoring years are considered volunteer species. During the 2009 Monitoring Year 2, some planted stems surveyed during the 2008 Monitoring Year 1 became dormant and missing due the drought. During the 2010 Monitoring Year 3, the missing planted stems of the 2009 Monitoring Year 2 were revitalized and were surveyed. A total of 9 stems which were missing during the 2009 Monitoring Year 2 was surveyed in during the 2010 Monitoring Year 3. A total of 3 stems surveyed during the 2009 Monitoring Year 2 were listed as missing during the 2010 Monitoring Year 3.

Current stem counts were calculated using vegetation plot monitoring data. For stream restoration, interim density targets (stems/acre) are 320 at year 3 and 288 at year 4, final stem count criteria are 260 stems per acre at the end of the five (5) year monitoring. For buffer mitigation, final stem count criteria are 320 stems per acre at the end of the five (5) year monitoring. As for monitored Year 3, UT Sandy Creek had 6 plots encompassing 0.15 acres, containing 83 planted and volunteer stems, which yielded a density of 560 trees per acre including planted and volunteer species. Planted and volunteer vegetation survival threshold was met for each of the plots.

Various invasive species were observed at the site. The following invasive species were observed at the site: Chinese privet (*Ligustrum sinense*) and cattail (*Typha latifolia*). The extent of exotic/invasive species is depicted in the Consolidated Current Condition Plan View **Appendix A**.

## *1.3 Stream Stability/Condition and Comparison*

The primary concern at UT to Sandy Creek is the sporadic flow conditions observed in the channel. The stream was dry during a site visit this year in August, although flow was observed during the survey work in September. Flowing water in the stream channel has been observed approximately half of the time the site has been monitored. To document bankfull events a crest gage is located approximately 50 feet upstream of cross-section 4 and is depicted in the Consolidated Current Condition Plan View **Appendix A**. Evidence of a bankfull event was observed this monitoring year.

### *1.4 Wetland Conditions and Performance*

No wetlands are being monitored for mitigation credits at this project site.

### *1.5 Monitoring Plan View*

Summary information/data related to the occurrence of items such as beaver or encroachment and statistics related to performance of various project and monitoring elements can be found in the tables and figures in the report appendices. Narrative background and supporting information formerly found in these reports can be found in the mitigation and restoration plan documents available on the EEP website. All raw data supporting the tables and figures in the appendices is available from EEP upon request.

## 2.0 Methodology

All monitoring methodologies follow the most current templates and guidelines provided by EEP (EEP, 2006; EEP, 2009). Photographs were taken at high resolution using an Olympus FE-115 5.0 megapixel digital camera. GPS location information was collected using a Trimble Geo XT handheld mapping grade GPS unit. Stream and vegetation problem areas were noted in the field on As-Built Plan Sheets.

The methods used to generate the data in this report are standard fluvial geomorphology techniques as described in *Applied River Morphology* (Rosgen, 1996) and related publications from US Forest Service and the interagency Stream Mitigation Guidelines (USACE, 2003).

Vegetation monitoring methods followed the 2008, Version 4.2 CVS-EEP Protocol for Recording Vegetation (Lee et. al., 2008). Vegetation plot photographs were collected for each vegetation plot. Vegetation monitoring plots were re-marked in the field by replacing all old flagging with new orange flagging. Monitoring taxonomy follows *Flora of the Carolinas, Virginia, Georgia, and Surrounding Areas* (Weakley, 2007). Stem height was measured with a folding one-meter rule. Diameter at breast height and decimeter height were measured with calipers.

## 3.0 References

Ecosystem Enhancement Program (EEP), 2006. Monitoring Report Guidelines, November 16, 2006.

Ecosystem Enhancement Program (EEP), 2009. Monitoring Report Guidelines, June 1, 2009.

Kimley-Horn and Associates, Inc., 2008. UT to Sandy Creek Stream Mitigation Report. Submitted to NCDENR-EEP, March 2008.

Lee, Michael T., R. K. Peet, S. D. Roberts, and T. R. Wentworth. 2008. CVS-EEP Protocol for Recording Vegetation, Version 4.2 (http://cvs.bio.unc.edu/methods.htm)

Rosgen, D.L. 1996. Applied Morphology. Wildland Hydrology, Pagosa Springs, CO.

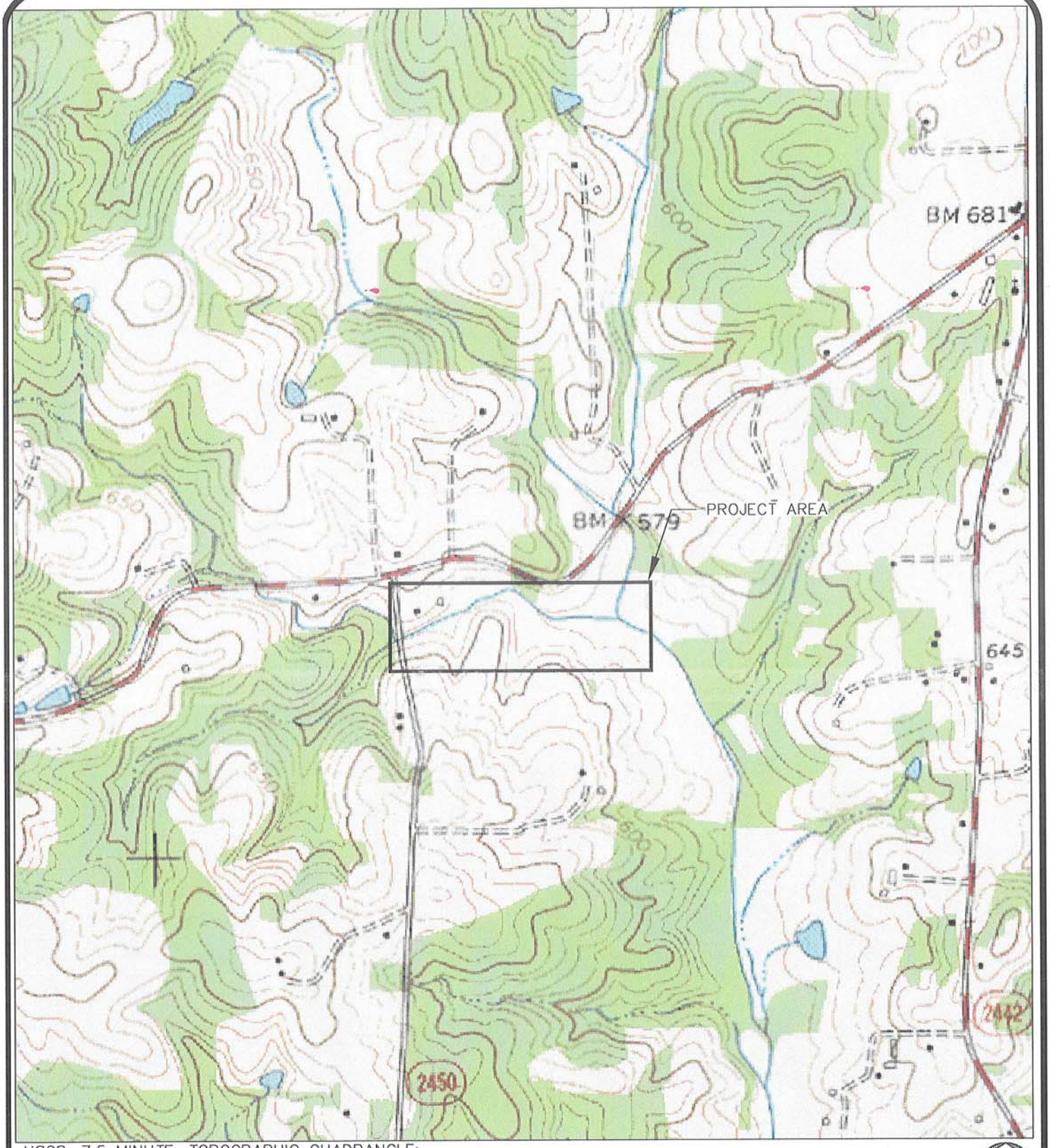
US Army Corps of Engineers (USACE), 2003. April 2003 Stream Mitigation Guidelines.

US Army Corps of Engineers (USACE), 2005. Information Regarding Stream Restoration In The Outer Coastal Plain of North Carolina. US Army Corps of Engineers, Wilmington District, Regulatory Division and North Carolina Department of Environment and Natural Resources, Division of Water Quality, December 1, 2005.

Weakley, A. S., 2008. Flora of the Carolinas, Virginia, Georgia, Northern Florida, and surrounding areas. University of North Carolina Herbarium (NCU), North Carolina Botanical Garden, University of North Carolina at Chapel Hill, working Draft as of April 7, 2008.

# APPENDIX A

## General Figures and Plan View




USGS, 7.5 MINUTE, TOPOGRAPHIC QUADRANGLE;
GRAYS CHAPEL, N.C.; 1974; LAT: 35.8380510° N
LON: 79.6601200° W

NORTH

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP-08030 |
| SCALE: | 1" = 1,000 |
| DATE: | 08-13-10 |

McADAMS

Ecosystem Enhancement Program

# UT TO SANDY CREEK

## VICINITY MAP

RANDOLPH COUNTY, NORTH CAROLINA

EcoEngineering
A division of The John R. McAdams Company, Inc.
ENGINEERS • PLANNERS • SURVEYORS • ENVIRONMENTAL
RESEARCH TRIANGLE PARK • CHARLOTTE
2905 Meridian Parkway, Durham NC 27713
800-733-5646 • www.johnrmcadams.com • License No.: C-0293

# UT TO SANDY CREEK

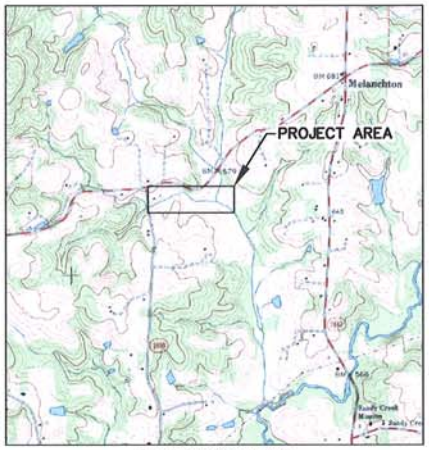
## CONSOLIDATED CURRENT CONDITIONS PLAN VIEW - YEAR THREE MONITORING

RANDOLPH COUNTY, NORTH CAROLINA
EEP PROJECT NUMBER: 403
DATE: AUGUST 23, 2010

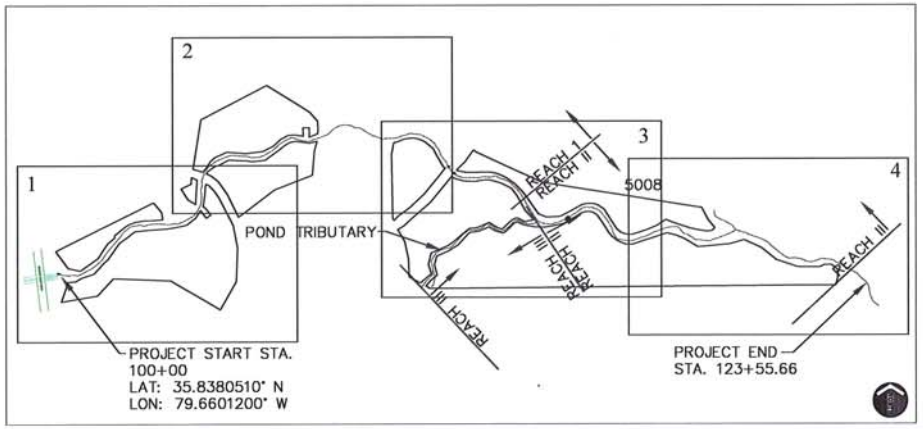
NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM
NC-EEP CONTACT: MELONIE ALLEN (919) 368-9352

SHEET INDEX






VICINITY MAP
NTS



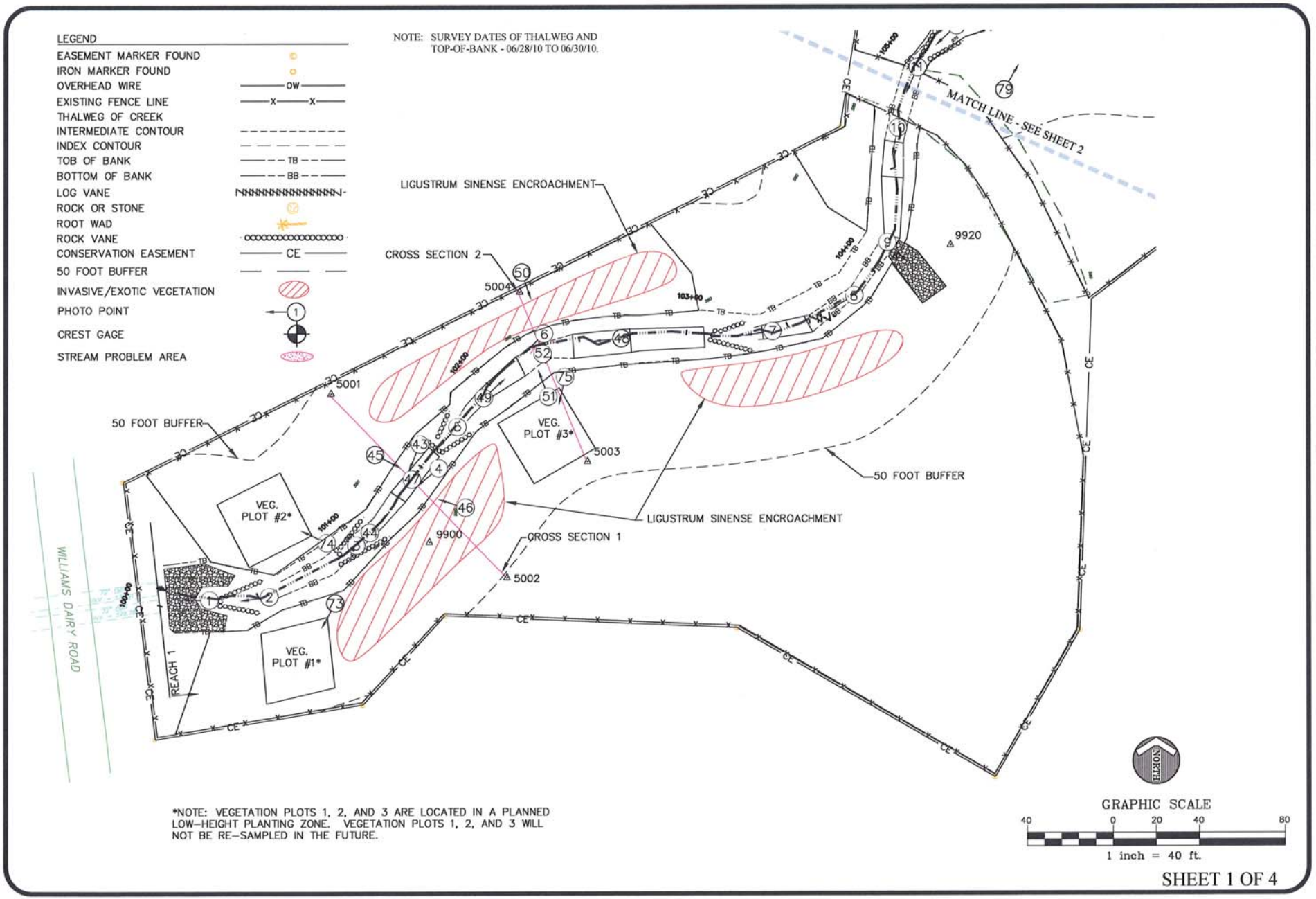

CONTROL TABLE

| POINT NUMBER | NORTHING | EASTING | ELEVATION | DESCRIPTION |
|---|---|---|---|---|
| 1 | 761098.82 | 1804283.17 | 604.12 | GS FAY-3 NCDOT |
| 3 | 760572.44 | 1804562.50 | 586.59 | TRAV |
| 4 | 760923.56 | 1804836.83 | 575.70 | TRAV |
| 5 | 760864.93 | 1805782.55 | 585.77 | TRAV |
| 6 | 760953.87 | 1804700.85 | 581.55 | BM 1 IRS 1/2 |
| 7 | 760999.25 | 1805280.34 | 576.72 | BM 2 IRS 1/2 |
| 8 | 760921.29 | 1805746.59 | 568.03 | BM 3 IRS 1/2 |
| 501 | 760539.44 | 1804403.40 | 585.47 | NAIL SET |
| 502 | 760812.18 | 1804778.30 | 577.51 | NAIL SET |
| 503 | 760985.74 | 1805071.84 | 574.80 | NAIL SET |
| 504 | 760714.88 | 1805598.90 | 568.93 | NAIL SET |
| 505 | 760863.85 | 1806056.94 | 564.44 | NAIL SET |
| 5001 | 760889.52 | 1804485.13 | 583.18 | X-SEC1LT(T120) |
| 5002 | 760804.10 | 1804546.58 | 581.97 | X-SEC1RT(T121) |
| 5003 | 760856.08 | 1804584.08 | 579.79 | X-SEC2RT(TIP123) |
| 5004 | 760736.88 | 1804552.53 | 583.04 | X-SEC2LT(TIP122) |
| 5005 | 760679.38 | 1805448.41 | 570.08 | X-SEC8RT(TIP130) |
| 5006 | 760690.86 | 1805414.54 | 570.30 | X-SEC9RT(TIP128) |
| 5007 | 760736.90 | 1805442.44 | 568.95 | X-SEC5/6LT(PT29) |
| 5008 | 760751.13 | 1805571.36 | 568.50 | X-SEC3LT |
| 5009 | 760893.80 | 1805593.56 | 567.24 | X-SEC3RT |
| 5010 | 760704.95 | 1805653.55 | 567.85 | X-SEC4RT |
| 5011 | 760790.71 | 1805682.80 | 567.61 | X-SEC4LT |
| 9900 | 760820.66 | 1804510.60 | 580.97 | NLF |
| 9901 | 760879.11 | 1804723.68 | 577.63 | NLF |
| 9902 | 760923.80 | 1804836.79 | 575.62 | TI NLF 4 |
| 9903 | 760914.33 | 1805085.28 | 574.81 | NLS |
| 9904 | 760955.55 | 1805335.31 | 576.39 | NLS |
| 9905 | 760818.90 | 1805536.39 | 583.47 | NLS |
| 9906 | 760833.61 | 1805785.78 | 586.14 | NLS |
| 9907 | 760690.08 | 1805974.43 | 585.64 | NLS |
| 9908 | 760999.44 | 1805570.42 | 587.15 | NLS |
| 9909 | 761073.35 | 1805201.41 | 590.62 | NLS |
| 9910 | 761161.75 | 1804709.24 | 598.94 | NLS |
| 9911 | 761098.82 | 1804283.17 | 604.12 | TI 1 |
| 9912 | 760595.72 | 1804329.27 | 591.20 | TI 2 |
| 9913 | 760528.75 | 1804383.66 | 589.04 | TI 123 |
| 9914 | 760725.38 | 1805628.07 | 567.05 | NLS |
| 9915 | 760851.83 | 1804521.18 | 580.08 | NLF |
| 9916 | 760917.91 | 1804988.69 | 573.58 | NLS |
| 9917 | 761012.69 | 1805022.84 | 576.62 | NLS |
| 9918 | 761006.02 | 1805180.43 | 575.10 | NLS |
| 9919 | 760783.20 | 1805305.43 | 571.09 | NLS |
| 9920 | 760758.60 | 1804752.58 | 577.37 | NLS |
| 9921 | 760829.03 | 1804839.28 | 587.57 | NLS |
| 9922 | 761030.59 | 1804704.32 | 585.90 | NLS |
| 9923 | 760955.49 | 1804994.15 | 573.60 | NLS |
| 9924 | 760715.22 | 1805939.13 | 566.22 | NLS |
| 9925 | 760582.71 | 1806288.27 | 562.28 | NLS |
| 9926 | 760976.47 | 1805070.00 | 574.09 | NLS |
| 9950 | 760544.95 | 1804479.83 | 583.08 | IRF W\DISC |

NOTE: SURVEY DATES OF THALWEG AND TOP-OF-BANK - 06/28/10 TO 06/30/10.

Ecosystem Enhancement Program


EcoEngineering
A division of The John R. McAdams Company, Inc.
ENGINEERS • PLANNERS • SURVEYORS • ENVIRONMENTAL
RESEARCH TRIANGLE PARK • CHARLOTTE
2905 Meridian Parkway, Durham NC 27713
800-733-5646 • www.johnrmcadams.com • License No.: C-0293




*NOTE: VEGETATION PLOTS 1, 2, AND 3 ARE LOCATED IN A PLANNED LOW-HEIGHT PLANTING ZONE. VEGETATION PLOTS 1, 2, AND 3 WILL NOT BE RE-SAMPLED IN THE FUTURE.

SHEET 1 OF 4

EcoEngineering
A division of The John R. McAdams Company, Inc.
ENGINEERS • PLANNERS • SURVEYORS • ENVIRONMENTAL
RESEARCH TRIANGLE PARK • CHARLOTTE
2905 Meridian Parkway, Durham NC 27713
919-755-5600 • www.johnrmcadams.com • License No.: C-0293

Ecosystem Enhancement

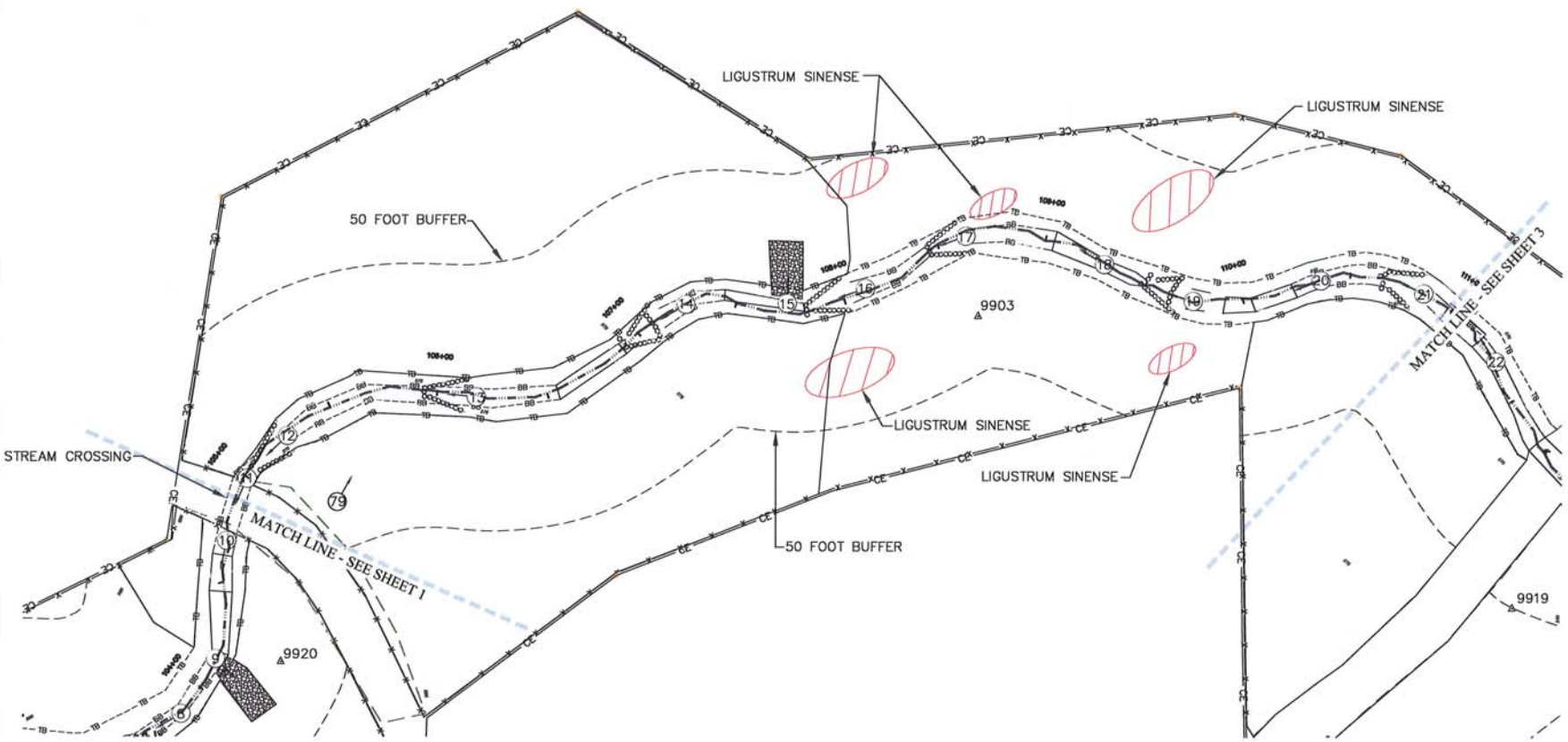
# UT TO SANDY CREEK

## CONSOLIDATED CURRENT CONDITIONS PLAN VIEW - YEAR THREE MONITORING

RANDOLPH COUNTY, NORTH CAROLINA

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP-08030X |
| SCALE: | 1" = 40' |
| DATE: | 08-13-10 |

McADAMS




NORTH

GRAPHIC SCALE

50 0 25 50 100

1 inch = 50 ft.

SHEET 2 OF 4

EcoEngineering
A division of The John R. McAdams Company, Inc.
ENGINEERS • PLANNERS • SURVEYORS • ENVIRONMENTAL
RESEARCH TRIANGLE PARK • CHARLOTTE
2905 Meridian Parkway, Durham, NC 27713
919-755-5641 • www.johnrmcadams.com • License No. C-0293

Ecosystem Enhancement

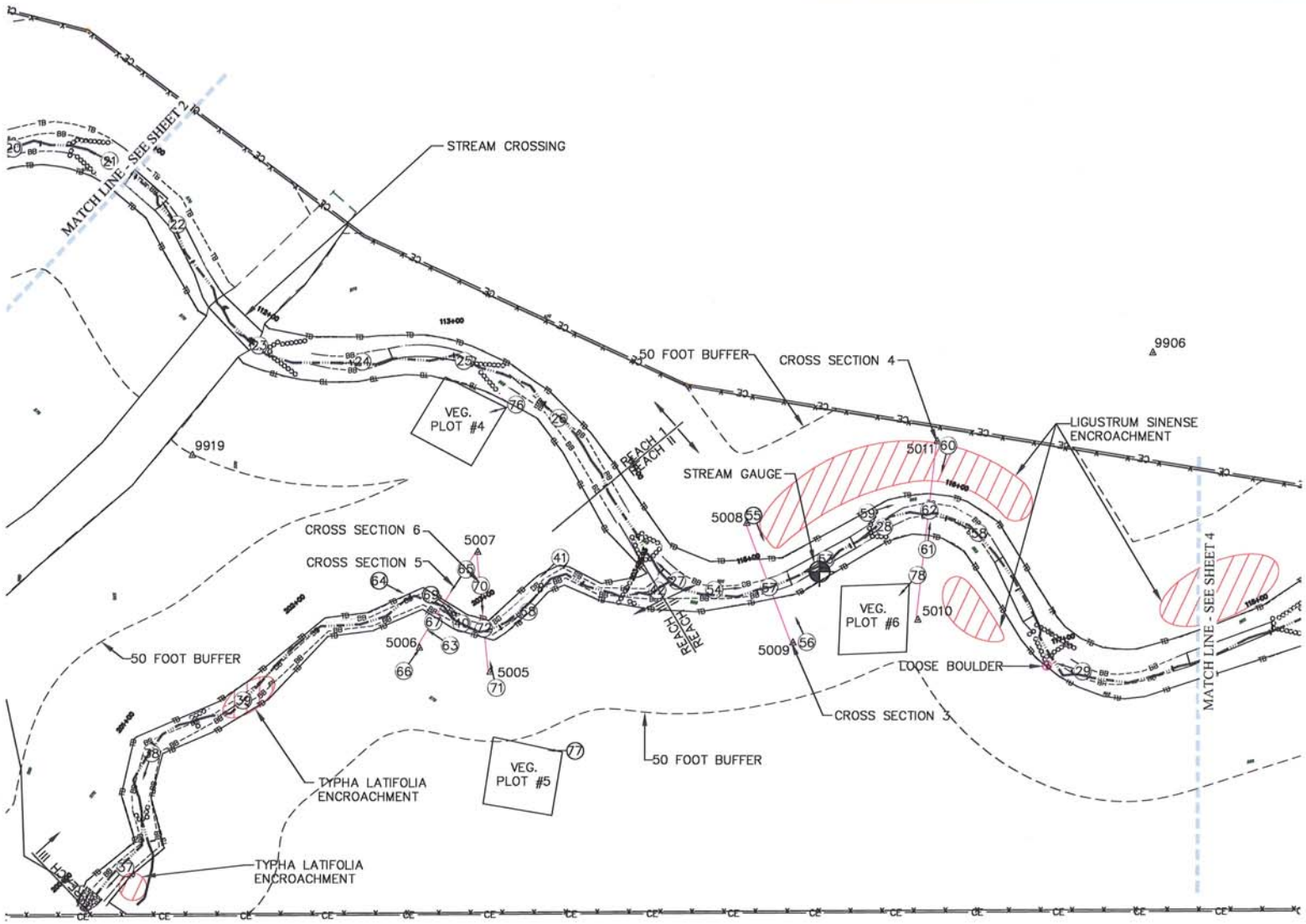
# UT TO SANDY CREEK

## CONSOLIDATED CURRENT CONDITIONS PLAN VIEW - YEAR THREE MONITORING

RANDOLPH COUNTY, NORTH CAROLINA

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP-08030X |
| SCALE: | 1" = 50' |
| DATE: | 08-13-10 |

McADAMS




SHEET 3 OF 4

EcoEngineering
A division of The John R. McAdams Company, Inc.
ENGINEERS • PLANNERS • SURVEYORS • ENVIRONMENTAL
RESEARCH TRIANGLE PARK • CHARLOTTE
5605 Meridian Parkway, Durham, NC 27713
800-733-5643 • www.johnrmcadams.com • License No.: C-0205

Ecosystem Enhancement Program

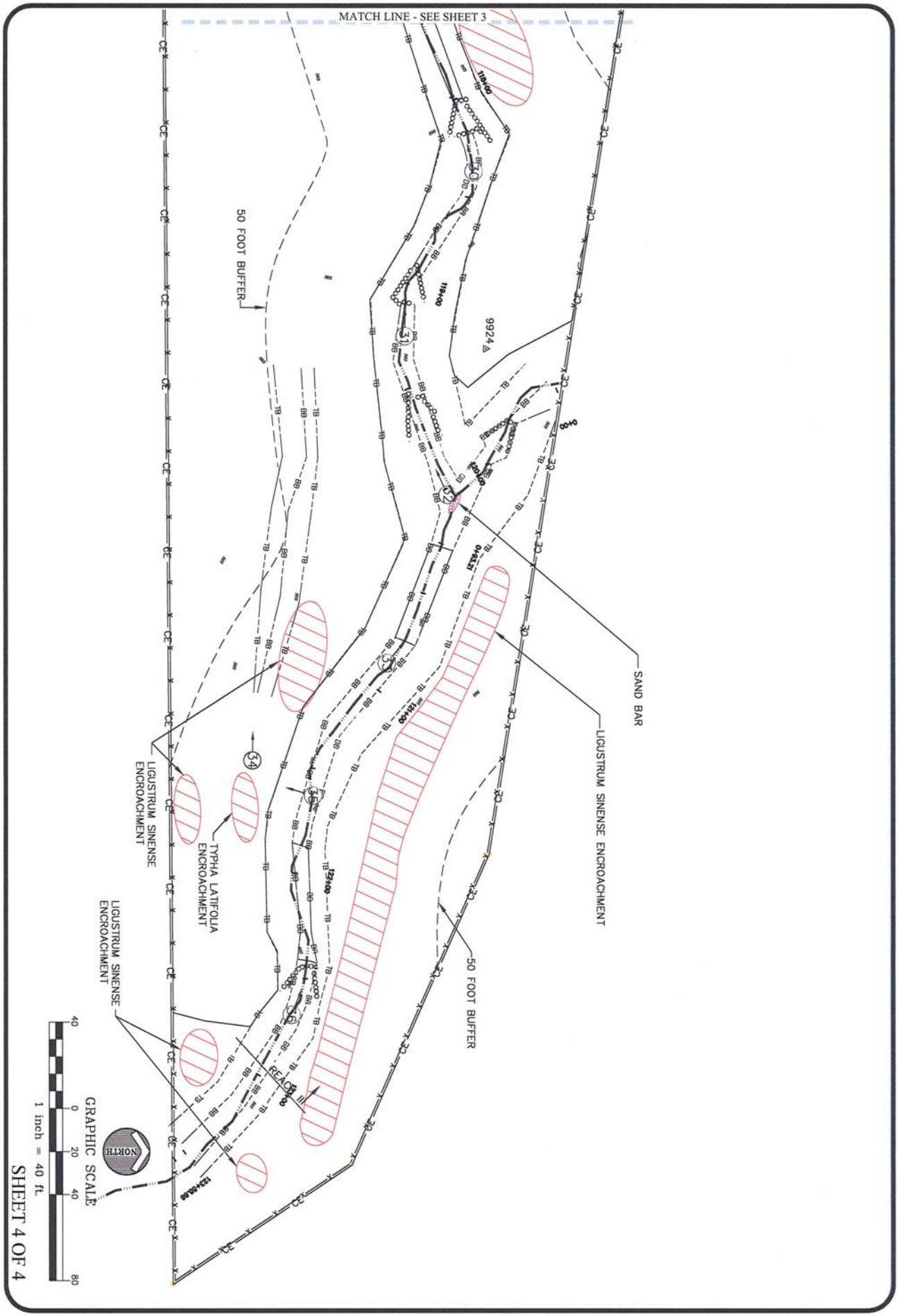
# UT TO SANDY CREEK

## CONSOLIDATED CURRENT CONDITIONS PLAN VIEW - YEAR THREE MONITORING

RANDOLPH COUNTY, NORTH CAROLINA

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP-08030X |
| SCALE: | 1" = 50' |
| DATE: | 08-13-10 |

McADAMS




| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP-08030X |
| SCALE: | 1" = 50' |
| DATE: | 08-13-10 |

# UT TO SANDY CREEK

CONSOLIDATED CURRENT CONDITIONS PLAN VIEW - YEAR THREE MONITORING

RANDOLPH COUNTY, NORTH CAROLINA

McADAMS

Ecosystem Enhancement

EcoEngineering
A division of The John R. McAdams Company, Inc.
ENGINEERS • PLANNERS • SURVEYORS • ENVIRONMENTAL
RESEARCH TRIANGLE PARK • CHARLOTTE
2905 Meridian Parkway, Durham NC 27713
800-733-5646 • www.johnrmcadams.com • License No.: C-0293

# APPENDIX B

## General Project Tables

| Exhibit Table 1. Project Restoration Components<br>UT to Sandy Creek Stream Restoration Project/EEP Project Number: 403 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Project Segment or Reach ID** | **Existing Feet/Acres** | **Type** | **Approach** | **Footage or Acreage** | **Mitigation Ratio** | **Mitigation Units** | **Stationing** | **Comment** |
| Reach 1 | 1,000 | R | P1 | 1,400 | 1 | 1,350 | 100+00 - 114+00 | Mitigation Units exclude 2 ford structures which total 50 feet |
| Reach II | 870 | R | P1 | 900 | 1 | 900 | 114+00 - 123+00 | |
| Reach III | 290 | R | P1 | 384 | 1 | 384 | 200+00 - 203+84 | Pond Tributary |
| **Mitigation Unit Summations** | | | | | | | | |
| Stream | Riparian Wetland (Ac) | | Nonriparian Wetland (Ac) | | Total Wetland (Ac) | | Buffer (Ac) | Comment |
| 2,634 | 0 | | 0 | | 0 | | 4.13 | |

R= Restoration
EI= Enhancement
EII= Enhancement II
S= Stabilization
P1= Priority I
P2= Priority II
P3= Priority III
SS=Stream Bank Stabilization

| Exhibit Table 2. Project Activity and Reporting History<br>UT to Sandy Creek Stream Restoration Project/EEP Project Number: 403 | | |
|---|---|---|
| **Activity or Report** | **Data Collection Complete** | **Actual Completion or Delivery** |
| Restoration Plan | Winter 04 | Jan-05 |
| Final Design – 90% | Summer 06 | Winter 06 |
| Construction | Summer 07 | Fall 07 |
| Temporary S&E mix applied to entire project area | Summer 07 | Fall 07 |
| Permanent seed mix applied to reach/segments 1 & 2 | Fall 07 | Fall 07 |
| Containerized and B&B plantings for reach/segments 1 & 2 | Fall 07 | Winter 07 |
| Mitigation Plan / As-built (Year 0 Monitoring – baseline) | Winter 07 | Mar-08 |
| Year 1 Monitoring | Oct-08 | Nov-08 |
| Year 2 Monitoring | Sep-09 | Nov-09 |
| Year 3 Monitoring | Jun-10 | 0ct-10 |

Note: Timeframe estimated from information provided by EEP.

| Exhibit Table 3. Project Contacts Table<br>UT to Sandy Creek Stream Restoration Project/EEP Project Number: 403 | |
|---|---|
| **Designer**<br><br>Primary project design POC | Kimley-Horn and Associates, Inc.<br>P.O Box 33068, Raleigh, North Carolina 27636<br>POC name and phone 919-677-2050 |
| **Construction Contractor**<br><br>Construction contractor POC | Appalachian Environmental Services<br>PO Box 52, Webster, NC 28788<br>phone: 828-586-1973 |
| **Planting Contractor**<br><br>Planting contractor POC | Contact: Appalachian Environmental Services<br>PO Box 52, Webster, NC 28788<br>phone: 828-586-1973 |
| **Seeding Contractor**<br><br>Planting contractor POC | Contact: Appalachian Environmental Services<br>PO Box 52, Webster, NC 28788<br>phone: 828-586-1973 |
| Seed Mix Sources | Contact: Appalachian Environmental Services<br>phone: 828-586-1973 |
| Nursery Stock Suppliers | Contact: Appalachian Environmental Services<br>phone: 828-586-1973 |
| **Monitoring Performers** | EcoEngineering - A Division of The John R. McAdams Co.<br>2905 Meridian Parkway, Durham, NC 27713 |
| Stream Monitoring POC Jim Halley | 919-287-4262 |
| Vegetation Monitoring POC Jim Halley | 919-287-4262 |
| Wetland Monitoring POC NA | NA |

Note: Information obtained from EEP documents and bid tabulation results. Use contacts in table for additional information or to verify data.

| Exhibit Table 4. Project Background Table<br>UT to Sandy Creek Stream Restoration Project/EEP Project Number: 403 | |
|---|---|
| Project County | Randolph County |
| Drainage Area | 4.2 square miles |
| Drainage impervious cover estimate (%) For example | Estimated at 1% |
| Stream Order | 1st for UT to Sandy Creek |
| Physiographic Region | Piedmont |
| Ecoregion | Carolina Slate Belt |
| Rosgen Classification of As-built | C |
| Cowardin Classification | R3UBH |
| Dominant soil types | Chewacla loam, Vance |
| Reference site ID | Reference Reach Tributary to Sandy Creek |
| USGS HUC for Project and Reference | 3030003020010 |
| NCDWQ Sub-basin for Project and Reference | 03-06-09 |
| NCDWQ classification for Project and Reference | WSIII |
| Any portion of any project segment 303d listed? | No |
| Any portion of any project segment upstream of a 303d listed segment? | No |
| Reasons for 303d listing or stressor | NA |
| % of project easement fenced | 100% |

# APPENDIX C

## Vegetation Assessment Data

| Table 5. Vegetation Plot Mitigation Success Summary Table | | | |
|---|---|---|---|
| **UT to Sandy Creek Restoration Project/EEP Project ID: 403** | | | |
| **Tract** | **Vegetation Plot ID** | **Vegetation Survival Threshold Met?** | **Tract Mean** |
| UT to Sandy Creek | VP1 | Y | 100% |
| | VP2 | Y | |
| | VP3 | Y | |
| | VP4 | Y | |
| | VP5 | Y | |
| | VP6 | Y | |

Note: Threshold criteria based on planted and volunteer species.

| Table 6. Vegetation Metadata | |
|---|---|
| **UT to Sandy Creek Restoration Project/EEP Project ID: 403** | |
| **Report Prepared By** | George Buchholz |
| **Date Prepared** | 10/4/2010 15:27 |
| | |
| | |
| **database name** | EcoEngineering-2010-C.mdb |
| **database location** | X:\Projects\EEP\EEP-08030 (UT to Sandy Creek)\Storm\CVS Vegetation Data\2010 Vegetation Data |
| **computer name** | BUCHHOLZGEO |
| **file size** | 48701440 |
| | |
| | |
| **DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------** | |
| **Metadata** | Description of database file, the report worksheets, and a summary of project(s) and project data. |
| **Proj, planted** | Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes. |
| **Proj, total stems** | Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems. |
| **Plots** | List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.). |
| **Vigor** | Frequency distribution of vigor classes for stems for all plots. |
| **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. |
| **Planted Stems by Plot and Spp** | A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded. |
| **ALL Stems by Plot and spp** | A matrix of the 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** | 403 |
| **project Name** | UT to Sandy Creek (Williams Tract) |
| **Description** | |
| **River Basin** | Cape Fear |
| **length(ft)** | 2,680 |
| **stream-to-edge width (ft)** | 25 |
| **area (sq m)** | 0.02 sq miles (10.2) |
| **Required Plots (calculated)** | 6 |
| **Sampled Plots** | 6 |

## Table 6A. Vegetation Condition Assessment
## UT to Sandy Creek Restoration Project/EEP Project ID: 403

**Planted Acreage** **6.86**

| Vegetation Category | Definitions | Mapping Threshold | CCPV Depiction | Number of Polygons | Combined Acreage | % of Planted Acreage |
|---|---|---|---|---|---|---|
| 1. Bare Areas | Very limited cover of both woody and herbaceous material. | 0.1 acres | ---- | 0 | 0 | 0.0% |
| 2. Low Stem Density Areas | Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria. | 0.1 acres | ---- | 0 | 0 | 0.0% |
| | | | Total | | | |
| 3. Areas of Poor Growth Rates or Vigor | Areas with woody stems of a size class that are obviously small given the monitoring year. | 0.25 acres | ---- | 0 | 0 | 0.0% |
| | | | Cumaltive Total | | | 0.0% |

**Easement Acreage** **10.18**

| Vegetation Category | Definitions | Mapping Threshold | CCPV Depiction | Number of Polygons | Combined Acreage | % of Easement Acreage |
|---|---|---|---|---|---|---|
| 4. Invasive Areas of Concern | Areas or points (if too small to render as polygons at map scale). | 1000 SF | diagonal, red | 19 | 0.5 | 0.05% |
| | | | | | | |
| 5. Easement Encroachment Areas | Areas or points (if too small to render as polygons at map scale). | none | ---- | 0 | 0 | 0.0% |

## Table 7. Stem Count Total and Planted by Plot Species
## UT to Sandy Creek Restoration Project/EEP Project ID: 403

| | | | Current Plot Data (MY3 2010) | | | | | | | | | | | | | | | | | | Annual Means | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | E403-01-VP1[6] | | | E403-01-VP2[6] | | | E403-01-VP3[6] | | | E403-01-VP4 | | | E403-01-VP5 | | | E403-01-VP6 | | | MY3 (2010) | | | MY2 (2009)[1] | | | MY1 (2008) | | |
| Scientific Name | Common Name | Species Type | P-LS | P-all | T[2] | P-LS | P-all | T[2] | P-LS | P-all | T[2] | P-LS | P-all | T[2] | P-LS | P-all | T[2] | P-LS | P-all | T[2] | P-LS | P-all | T[2] | P-LS | P-all | T[3] | P-LS | P-all | T[3] |
| Acer rubrum | red maple | Tree | | | | | | | | | | | | | | 1[4] | 3 | | | | | 1 | 3 | | 1 | 1 | | 1 | 1 |
| Betula nigra | river birch | Tree | | | | | | | | | | | | | | | | | 4 | 4 | | 4 | 4 | | 4 | 4 | | 3 | 3 |
| Celtis laevigata | sugarberry | Shrub Tree | | 2 | 2 | | | | | | | | | | | | | | | | | 2 | 2 | | 2 | 2 | | 2 | 2 |
| Cornus amomum | silky dogwood | Shrub | | | | | 2 | 5 | | 6[5] | 9 | | 10 | 10 | | | | | | | | 18 | 24 | | 19 | 19 | | 14 | 14 |
| Fraxinus pennsylvanica | green ash | Tree | | 3 | 6 | | 3 | 5 | | 4[5] | 7 | | 7[5] | 7 | | | | | | | | 17 | 25 | | 11 | 11 | | 14 | 14 |
| Hamamelis virginiana | American witchhazel | Shrub Tree | | | | | 2 | 2 | | | | | | | | 5 | 5 | | | | | 7 | 7 | | 7 | 7 | | 3 | 3 |
| Juglans nigra | black walnut | Tree | | | | | | | | | | | | | | | | | 1 | 1 | | 1 | 1 | | 1 | 1 | | 1 | 1 |
| Lindera benzoin | northern spicebush | Shrub Tree | | | | | | | | 1[5] | 1 | | | | | | | | | | | 1 | 1 | | | | | 1 | 1 |
| Nyssa sylvatica | blackgum | Tree | | | | | | | | | | | 1 | 1 | | | | | | | | 1 | 1 | | 1 | 1 | | | |
| Prunus serotina | black cherry | Shrub Tree | | | | | | | | | | | | | | | | | | | | | | | 1 | 1 | | 1 | 1 |
| Quercus phellos | willow oak | Tree | | 1 | 1 | | 1 | 1 | | 1 | 1 | | | | | | | | | | | 3 | 3 | | 3 | 3 | | 1 | 1 |
| Rhus copallinum | flameleaf sumac | Shrub Tree | | | | | | 2 | | | | | | | | | | | | | | | 2 | | | | | | |
| Viburnum dentatum | southern arrowwood | Shrub Tree | | 1 | 1 | | 3 | 3 | | | | | 1 | 1 | | 1 | 1 | | 4[5] | 4 | | 10 | 10 | | 9 | 9 | | 7 | 7 |
| | Stem count | | 0 | 7 | 10 | 0 | 11 | 18 | 0 | 12 | 18 | 0 | 19 | 19 | 0 | 7 | 9 | 0 | 9 | 9 | 0 | 65[5] | 83 | 0 | 59 | 59 | 0 | 48 | 48 |
| | size (ares) | | 1 | | | 1 | | | 1 | | | 1 | | | 1 | | | 1 | | | 6 | | | 6 | | | 6 | | |
| | size (ACRES) | | 0.02 | | | 0.02 | | | 0.02 | | | 0.02 | | | 0.02 | | | 0.02 | | | 0.15 | | | 0.15 | | | 0.15 | | |
| | Species count | | 0 | 4 | 4 | 0 | 5 | 6 | 0 | 4 | 4 | 0 | 4 | 4 | 0 | 3 | 3 | 0 | 3 | 3 | 0 | 11 | 12 | 0 | 11 | 11 | 0 | 11 | 11 |
| | Stems per ACRE | | 0 | 283.3 | 404.7 | 0 | 445.2 | 728.4 | 0 | 485.6 | 728.4 | 0 | 768.9 | 768.9 | 0 | 283.3 | 364.2 | 0 | 364.2 | 364.2 | 0 | 438.4 | 559.8 | 0 | 397.9 | 397.9 | 0 | 323.7 | 323.7 |

Notes:

1 = Original baseline vegetation monitoring data was not provided prior to the 2008 Monitoring Year 1 and 2008 is considered a drought year. The 2009 Monitoring Year 2 is considered the baseline datum because after two years of monitoring it is assumed all planted stems within a vegetation monitoring plot have been surveyed and accounted for. Therefore, any additional species observed in proceeding monitoring years are considered volunteer species.

2 = Total of planted stems and volunteer stems.

3 = Total of planted stems only.

4 = An acer rubrum was surveyed during 2008 monitoring season even though it is not a species listed as being planted. Although acer rubrum is a volunteer stem, it was determined that this specific stem would continued to be monitored in the proceeding monitoring years.

5 = During the 2009 Monitoring Year 2, some planted stems surveyed during the 2008 Monitoring Year 1 became dormant and missing due the drought during the 2009 Monitoring Year 2. During the 2010 Monitoring Year 3, the missing planted stems of the 2009 Monitoring Year 2 were revitalized and were surveyed. A total of 9 stems which were missing during the 2009 Monitoring Year 2 was surveyed in during the 2010 Monitoring Year 3. A total of 3 stems surveyed during the 2009 Monitoring Year 2 were listed as missing during the 2010 Monitoring Year 3.

6 = Vegetation Plots 1, 2, and 3 are located in a planned low-height planting zone. These plots will not be re-sampled in the future.

# APPENDIX D

## Stream Assessment Data

## Table 8a. Visual Morphological Stability Assessment
## UT to Sandy Creek Stream Restoration Project/EEP Project Number: 403
## Reach 1: 1,410 Linear Feet

| Feature Category | Metric (per As-built and reference baselines) | (# Stable) Number Performing as Intended | Total number per As-built | Total Number / feet in unstable state | % Perform in Stable Condition | Feature Perform. Mean or Total |
|---|---|---|---|---|---|---|
| A. Riffles | 1. Present ? | 12 | 12 | NA | 100 | |
| | 2. Armor stable (e.g. n o displacement)? | 12 | 12 | NA | 100 | |
| | 3. Facet grade appears stable? (slope ≤ design range) | 1 | 12 | NA | 12 | |
| | 4. Minimal evidence of embedding/fining? | 12 | 12 | NA | 100 | |
| | 5. Length appropriate? | NA | NA | NA | NA | **78** |
| B. Pools | 1. Present? (e.g. not subject to severe aggrad. or migrat.?) | 15 | 15 | NA | 100 | |
| | 2. Sufficiently deep (Max Pool D:Mean Bkf>1.6?) | Max Pool / 1.2 > 1.6, 12 of 15 | Design = 3.5/1.2 = 2.9 15 | NA | 77 | |
| | 3. Length appropriate? (p-p spacing) | NA | NA | NA | NA | **89** |
| C. Thalweg | 1. Upstream of meander bend (run/inflection) centering? | 10 | 10 | NA | 100 | |
| | 2. Downstream of meander (glide/inflection) centering? | 9 | 10 | NA | 100 | **100** |
| D. Meander | 1. Outer bend in state of limited/controlled erosion? | 10 | 10 | NA | 100 | |
| | 2. Of those eroding, # w/concomitant point bar formation | 10 | 10 | NA | 100 | |
| | 3. Apparent Rc within spec? | 8 | 10 | NA | 85 | |
| | 4. Sufficient floodplain access and relief? | 10 | 10 | NA | 100 | **95** |
| E. Bed General | 1. General channel bed aggradation areas (bar formation) | NA | NA | 5/25 | 99 | |
| | 2. Channel bed degradation – areas of increasing down-cutting or head cutting? | NA | NA | NA | 100 | **100** |
| F. Bank | 1. Actively eroding, wasting, or slumping bank | NA | 1/18 | NA | 99 | **99** |
| G. Vanes | 1. Free of bank or arm scour? | 10 | 10 | NA | 100 | |
| | 2. Height appropriate? | 10 | 10 | NA | 100 | |
| | 3. Angle and geometry appear appropriate? | 10 | 10 | NA | 100 | |
| | 4. Free of piping or other structural failures? | 10 | 10 | NA | 100 | **100** |
| H. Wads/ Boulders | 1. Free of scour? | NA | NA | NA | 100 | |
| | 2. Footing stable? | NA | NA | NA | 100 | **100** |

## Table 8b. Visual Morphological Stability Assessment
## UT to Sandy Creek Stream Restoration Project/EEP Project Number: 403
## Reach II: 886 Linear Feet

| Feature Category | Metric (per As-built and reference baselines) | (# Stable) Number Performing as Intended | Total number per As-built | Total Number / feet in unstable state | % Perform in Stable Condition | Feature Perform. Mean or Total |
|---|---|---|---|---|---|---|
| A. Riffles | 1. Present ? | 13 | 13 | NA | 100 | |
| | 2. Armor stable (e.g. n o displacement)? | 13 | 13 | NA | 100 | |
| | 3. Facet grade appears stable? (slope ≤ design range) | 2 | 13 | NA | 12 | |
| | 4. Minimal evidence of embedding/fining? | 13 | 13 | NA | 100 | |
| | 5. Length appropriate? | NA | NA | NA | NA | **78** |
| B. Pools | 1. Present? (e.g. not subject to severe aggrad. or migrat.?) | 16 | 16 | NA | 100 | |
| | 2. Sufficiently deep (Max Pool D:Mean Bkf>1.6?) | Max Pool / 1.2 > 1.6, 12 of 16 | Design = 3.5/1.2 = 2.9 16 | NA | 77 | |
| | 3. Length appropriate? (p-p spacing) | NA | NA | NA | NA | **89** |
| C. Thalweg | 1. Upstream of meander bend (run/inflection) centering? | 10 | 10 | NA | 100 | |
| | 2. Downstream of meander (glide/inflection) centering? | 10 | 10 | NA | 100 | **100** |
| D. Meander | 1. Outer bend in state of limited/controlled erosion? | 10 | 10 | NA | 100 | |
| | 2. Of those eroding, # w/concomitant point bar formation | 10 | 10 | NA | 100 | |
| | 3. Apparent Rc within spec? | 9 | 10 | NA | 85 | |
| | 4. Sufficient floodplain access and relief? | 10 | 10 | NA | 100 | **95** |
| E. Bed General | 1. General channel bed aggradation areas (bar formation) | NA | NA | 5/25 | 99 | |
| | 2. Channel bed degradation – areas of increasing down-cutting or head cutting? | NA | NA | NA | 100 | **100** |
| F. Bank | 1. Actively eroding, wasting, or slumping bank | NA | 1/18 | NA | 99 | **99** |
| G. Vanes | 1. Free of bank or arm scour? | 11 | 11 | NA | 100 | |
| | 2. Height appropriate? | 11 | 11 | NA | 100 | |
| | 3. Angle and geometry appear appropriate? | 11 | 11 | NA | 100 | |
| | 4. Free of piping or other structural failures? | 11 | 11 | NA | 100 | **100** |
| H. Wads/ Boulders | 1. Free of scour? | NA | NA | NA | 100 | |
| | 2. Footing stable? | NA | NA | NA | 100 | **100** |

## Table 8c. Visual Morphological Stability Assessment
## UT to Sandy Creek Stream Restoration Project/EEP Project Number: 403
## Reach III: 384 Linear Feet

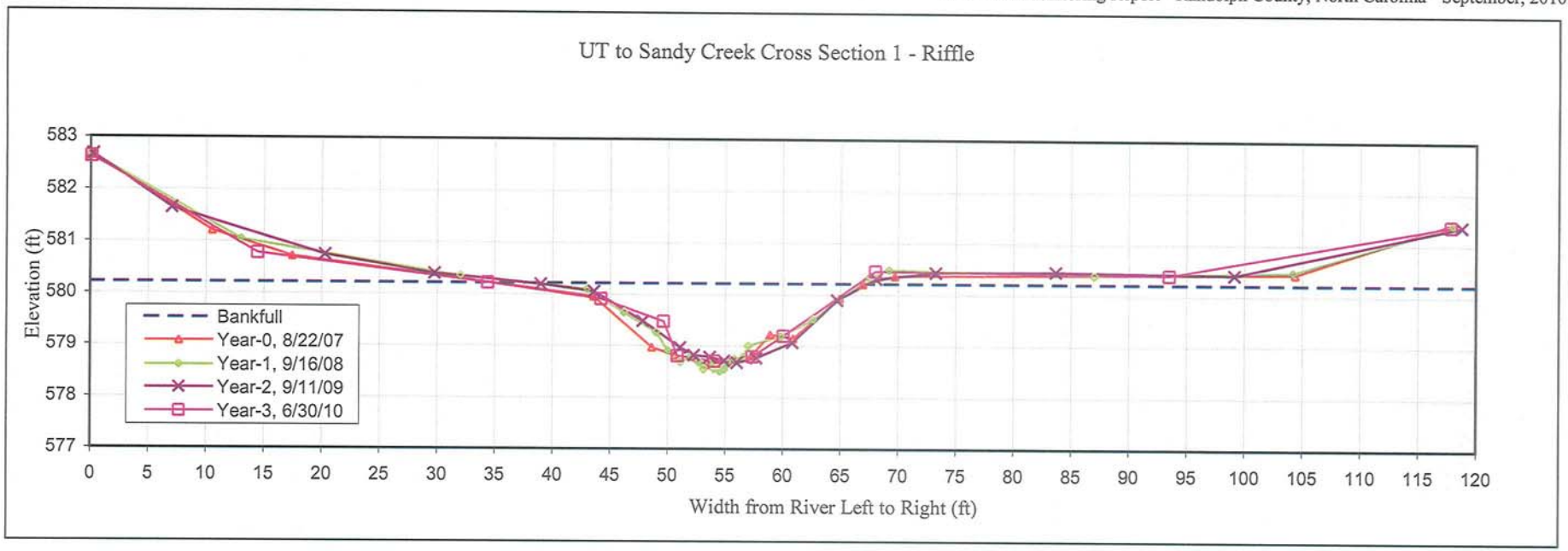
| Feature Category | Metric (per As-built and reference baselines) | (# Stable) Number Performing as Intended | Total number per As-built | Total Number / feet in unstable state | % Perform in Stable Condition | Feature Perform. Mean or Total |
|---|---|---|---|---|---|---|
| A. Riffles | 1. Present ? | 7 | 7 | NA | 100 | |
| | 2. Armor stable (e.g. n o displacement)? | 7 | 7 | NA | 100 | |
| | 3. Facet grade appears stable? (slope ≤ design range) | 5 | 7 | NA | 71 | |
| | 4. Minimal evidence of embedding/fining? | 7 | 7 | NA | 100 | |
| | 5. Length appropriate? | NA | NA | NA | NA | **93** |
| B. Pools | 1. Present? (e.g. not subject to severe aggrad. or migrat.?) | 5 | 5 | NA | 100 | |
| | 2. Sufficiently deep (Max Pool D:Mean Bkf>1.6?) | Max Pool / 0.5 > 1.6, 4 of 5 | Design = 1.9/0.5 = 3.8 5 | NA | 80 | |
| | 3. Length appropriate? (p-p spacing) | NA | NA | NA | NA | **90** |
| C. Thalweg | 1. Upstream of meander bend (run/inflection) centering? | 7 | 8 | NA | 100 | |
| C. Thalweg | 2. Downstream of meander (glide/inflection) centering? | 8 | 8 | NA | 100 | **100** |
| D. Meander | 1. Outer bend in state of limited/controlled erosion? | 8 | 8 | NA | 100 | |
| | 2. Of those eroding, # w/concomitant point bar formation | 8 | 8 | NA | 100 | |
| | 3. Apparent Rc within spec? | 8 | 8 | NA | 100 | |
| | 4. Sufficient floodplain access and relief? | 8 | 8 | NA | 100 | **100** |
| E. Bed General | 1. General channel bed aggradation areas (bar formation) | NA | NA | 1/200 | 48 | |
| | 2. Channel bed degradation – areas of increasing down-cutting or head cutting? | NA | NA | NA | 100 | **74** |
| F. Bank | 1. Actively eroding, wasting, or slumping bank | NA | NA | NA | 100 | **100** |
| G. Vanes | 1. Free of bank or arm scour? | 5 | 5 | NA | 100 | |
| | 2. Height appropriate? | 5 | 5 | NA | 100 | |
| | 3. Angle and geometry appear appropriate? | 5 | 5 | NA | 100 | |
| | 4. Free of piping or other structural failures? | 5 | 5 | NA | 100 | **100** |
| H. Wads/ Boulders | 1. Free of scour? | NA | NA | NA | 100 | |
| | 2. Footing stable? | NA | NA | NA | 100 | **100** |

| Table 9. Verification of Bankfull Events<br>UT to Sandy Creek Stream Restoration Project/EEP Project Number: 403 | | | |
|---|---|---|---|
| **Date of Data Collection** | **Date of Occurrence** | **Method** | **Photo # (if available)** |
| 06/29/10 | Between 09/09/09 and 06/29/10 | On-Site Crest Gage located at Station 115+32. Observed elevation on gage at elevation 566.63 | Not Available |

Note: A crest gage was installed during the 2009 Monitoring Year 2 field investigations so that bankfull events can be documented during the 2010 Monitoring Year 3 field investigations. Monitoring Year 3 is the first monitoring year in which bankfull events were documented.

**UT to SANDY CREEK** **EEP PROJECT # 403** CROSS-SECTION: 1

| Year-0 | | Year-1 | | Year-2 | | Year-3 | | Year-4 | | Year-5 | | Year-6 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) |
| 0.00 | 582.65 | 0.00 | 582.68 | 0.21 | 582.67 | 0.08 | 582.63 | | | | | | |
| 0.14 | 582.65 | 13.00 | 581.05 | 7.00 | 581.64 | 14.44 | 580.77 | | | | | | |
| 10.49 | 581.20 | 32.00 | 580.35 | 20.26 | 580.75 | 34.37 | 580.21 | | | | | | |
| 17.42 | 580.72 | 43.00 | 580.10 | 29.73 | 580.39 | 44.19 | 579.90 | | | | | | |
| 43.54 | 579.95 | 46.20 | 579.65 | 38.96 | 580.19 | 49.63 | 579.47 | | | | | | |
| 48.60 | 578.96 | 49.00 | 579.27 | 43.59 | 580.05 | 50.82 | 578.80 | | | | | | |
| 50.60 | 578.81 | 50.00 | 578.91 | 47.81 | 579.48 | 54.04 | 578.70 | | | | | | |
| 53.53 | 578.63 | 51.10 | 578.69 | 51.08 | 578.96 | 57.34 | 578.79 | | | | | | |
| 55.21 | 578.71 | 52.00 | 578.80 | 52.25 | 578.82 | 60.02 | 579.19 | | | | | | |
| 57.30 | 578.81 | 52.70 | 578.69 | 53.64 | 578.78 | 68.01 | 580.45 | | | | | | |
| 58.88 | 579.22 | 53.10 | 578.56 | 54.89 | 578.71 | 93.49 | 580.39 | | | | | | |
| 60.87 | 579.14 | 53.60 | 578.67 | 55.99 | 578.67 | 117.82 | 581.37 | | | | | | |
| 64.91 | 579.93 | 54.00 | 578.57 | 57.68 | 578.76 | | | | | | | | |
| 66.93 | 580.20 | 54.50 | 578.52 | 60.81 | 579.07 | | | | | | | | |
| 69.69 | 580.36 | 54.90 | 578.56 | 64.69 | 579.89 | | | | | | | | |
| 104.36 | 580.42 | 55.20 | 578.67 | 68.08 | 580.30 | | | | | | | | |
| 118.02 | 581.43 | 55.80 | 578.75 | 73.26 | 580.43 | | | | | | | | |
| 118.10 | 581.43 | 56.60 | 578.80 | 83.64 | 580.45 | | | | | | | | |
| | | 57.00 | 579.01 | 99.12 | 580.40 | | | | | | | | |
| | | 59.80 | 579.19 | 118.73 | 581.37 | | | | | | | | |
| | | 62.60 | 579.52 | | | | | | | | | | |
| | | 67.50 | 580.35 | | | | | | | | | | |
| | | 69.20 | 580.49 | | | | | | | | | | |
| | | 87.00 | 580.39 | | | | | | | | | | |
| | | 104.20 | 580.47 | | | | | | | | | | |
| | | 118.00 | 581.40 | | | | | | | | | | |




**CROSS SECTION PLOT - LOOKING DOWNSTREAM**

**YEAR-3, 2010 SURVEY DATA** **CROSS-SECTION:** 1
**PROJECT** SANDY CREEK **FEATURE:** Riffle
**TASK** CROSS SECTION
**REACH** SANDY CREEK
**DATE** 06/28/2010 to 06/30/2010
**CREW** BUCHHOLZ/PARRISH/PICKENS

**Summary Data**
All dimensions in feet.

| | | |
|---|---|---|
| Bankfull X-sec area | 21.8 | sq. ft. |
| Bankfull Width | 32.1 | ft. |
| Bankfull Mean Depth | 0.7 | ft. |
| Bankfull Max Depth | 1.5 | ft. |
| Width/Depth Ratio | >12 | |
| Entrenchment Ratio | >2.2 | |
| Classification | C | |
| Bankfull Elevation: | 580.21 | ft. |

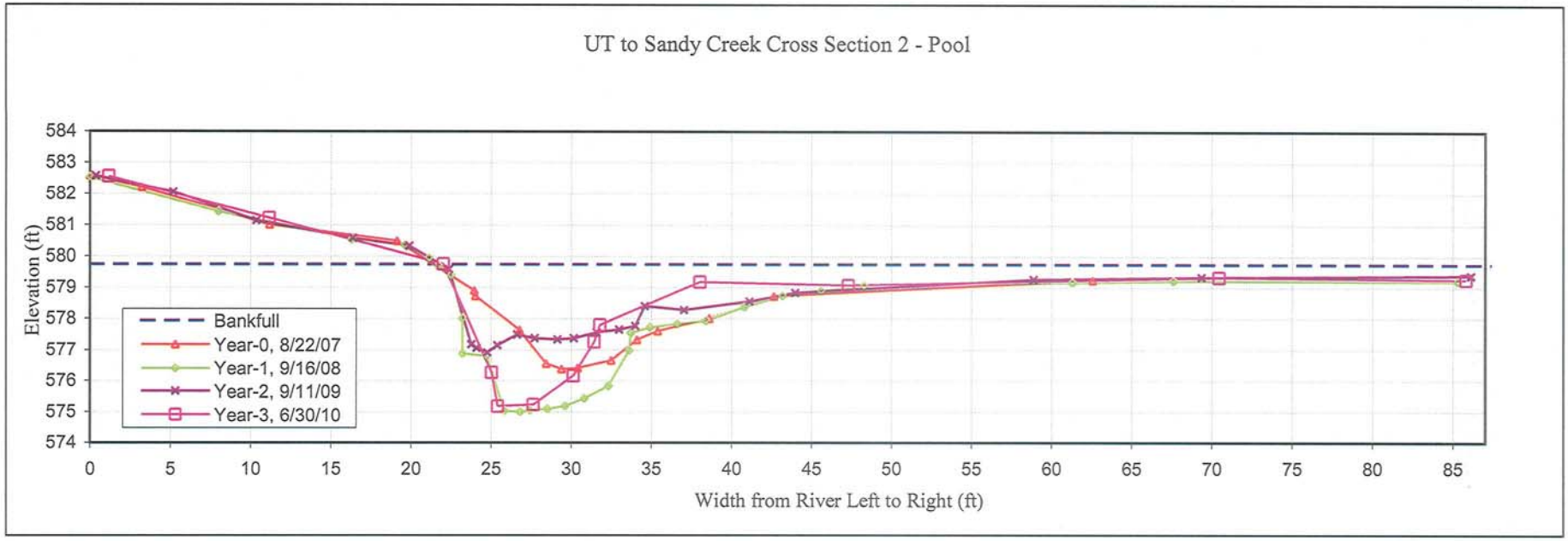
**CROSS SECTION PHOTO - LOOKING DOWNSTREAM**

Ecosystem Enhancement Program

EcoEngineering
A division of The John R. McAdams Company, Inc.

**UT to SANDY CREEK** **EEP PROJECT # 403** CROSS-SECTION: 2

| Year-0 | | Year-1 | | Year-2 | | Year-3 | | Year-4 | | Year-5 | | Year-6 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) |
| 0.00 | 582.59 | 0.00 | 582.55 | 0.36 | 582.58 | 0.17 | 582.56 | | | | | | |
| 0.09 | 582.59 | 8.00 | 581.44 | 5.18 | 582.05 | 10.14 | 581.21 | | | | | | |
| 3.22 | 582.21 | 16.30 | 580.54 | 10.34 | 581.13 | 21.00 | 579.74 | | | | | | |
| 11.17 | 581.00 | 19.60 | 580.36 | 16.37 | 580.57 | 24.01 | 576.25 | | | | | | |
| 19.11 | 580.47 | 21.10 | 579.95 | 19.88 | 580.32 | 24.39 | 575.17 | | | | | | |
| 23.93 | 578.88 | 21.70 | 579.70 | 22.34 | 579.57 | 26.62 | 575.22 | | | | | | |
| 24.00 | 578.71 | 22.50 | 579.40 | 23.74 | 577.17 | 29.11 | 576.15 | | | | | | |
| 26.75 | 577.62 | 23.20 | 578.01 | 24.07 | 577.05 | 30.42 | 577.25 | | | | | | |
| 28.41 | 576.54 | 23.20 | 576.90 | 24.73 | 576.90 | 30.77 | 577.78 | | | | | | |
| 29.38 | 576.37 | 24.70 | 576.82 | 25.37 | 577.15 | 37.03 | 579.17 | | | | | | |
| 30.39 | 576.40 | 25.80 | 575.04 | 26.60 | 577.48 | 46.30 | 579.06 | | | | | | |
| 32.48 | 576.65 | 26.80 | 575.02 | 27.69 | 577.36 | 69.44 | 579.32 | | | | | | |
| 34.08 | 577.32 | 27.40 | 575.06 | 29.11 | 577.33 | 84.81 | 579.25 | | | | | | |
| 35.39 | 577.60 | 28.50 | 575.11 | 30.15 | 577.37 | | | | | | | | |
| 38.60 | 577.99 | 29.60 | 575.20 | 31.58 | 577.55 | | | | | | | | |
| 42.65 | 578.71 | 30.80 | 575.45 | 32.96 | 577.64 | | | | | | | | |
| 62.56 | 579.23 | 32.30 | 575.85 | 33.99 | 577.75 | | | | | | | | |
| 80.54 | 579.51 | 33.60 | 577.00 | 34.58 | 578.39 | | | | | | | | |
| 84.82 | 579.31 | 33.70 | 577.56 | 37.02 | 578.27 | | | | | | | | |
| 84.91 | 579.31 | 34.90 | 577.74 | 41.11 | 578.54 | | | | | | | | |
| | | 36.60 | 577.84 | 43.99 | 578.82 | | | | | | | | |
| | | 38.40 | 577.94 | 58.87 | 579.26 | | | | | | | | |
| | | 40.80 | 578.38 | 69.36 | 579.33 | | | | | | | | |
| | | 43.20 | 578.74 | 86.12 | 579.38 | | | | | | | | |
| | | 45.60 | 578.90 | | | | | | | | | | |
| | | 48.30 | 579.07 | | | | | | | | | | |
| | | 61.30 | 579.18 | | | | | | | | | | |
| | | 67.60 | 579.23 | | | | | | | | | | |
| | | 85.30 | 579.22 | | | | | | | | | | |




**CROSS SECTION PLOT - LOOKING DOWNSTREAM**

**YEAR-3, 2010 SURVEY DATA** **CROSS-SECTION:** 2
**PROJECT** SANDY CREEK **FEATURE:** Pool
**TASK** CROSS SECTION
**REACH** SANDY CREEK
**DATE** 06/28/2010 to 06/30/2010
**CREW** BUCHHOLZ/PARRISH/PICKENS

**Summary Data**
All dimensions in feet.

| | | |
|---|---|---|
| Bankfull X-sec area | 65.3 | sq. ft. |
| Bankfull Width | 64.0 | ft. |
| Bankfull Mean Depth | 1.0 | ft. |
| Bankfull Max Depth | 4.6 | ft. |
| Width/Depth Ratio | n/a | |
| Entrenchment Ratio | n/a | |
| Classification | n/a | |
| Bankfull Elevation: | 579.74 | ft. |

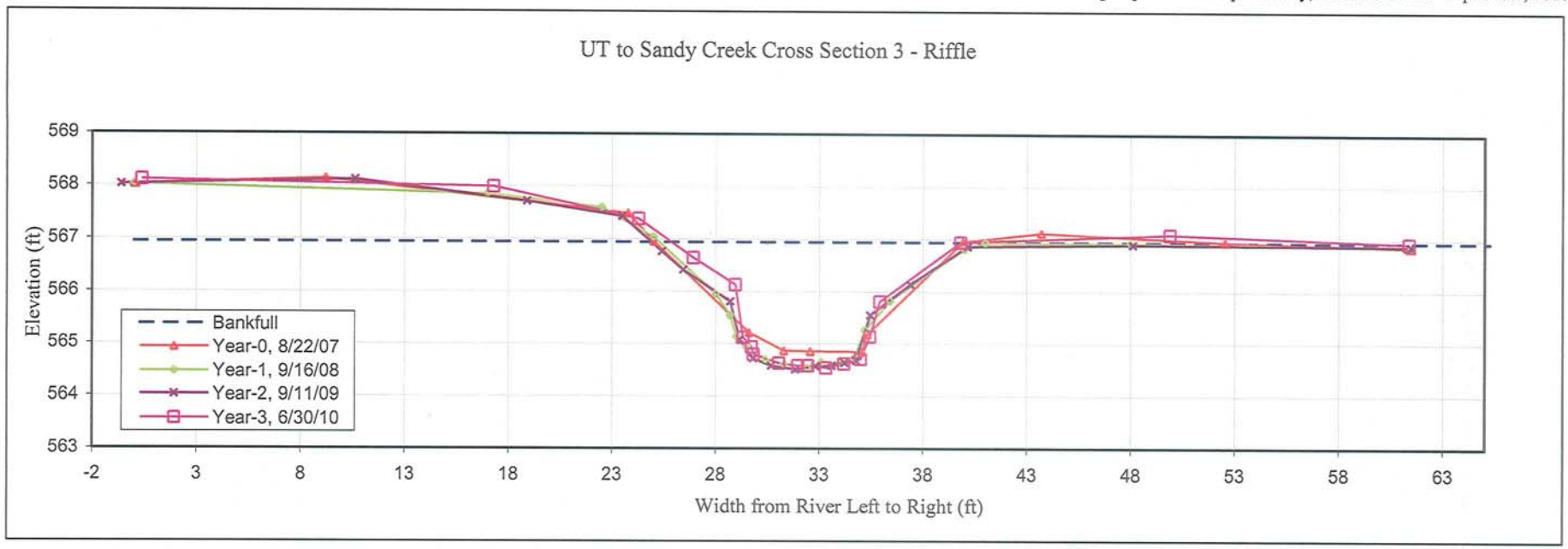
**CROSS SECTION PHOTO - LOOKING DOWNSTREAM**

Ecosystem Enhancement Program

EcoEngineering
A division of The John R. McAdams Company, Inc.

**UT to SANDY CREEK** **EEP PROJECT # 403** CROSS-SECTION: 3

| Year-0 | | Year-1 | | Year-2 | | Year-3 | | Year-4 | | Year-5 | | Year-6 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) |
| 0.00 | 568.02 | 0.00 | 568.03 | -0.62 | 568.02 | 0.37 | 568.11 | | | | | | |
| 0.09 | 568.02 | 17.00 | 567.86 | 10.62 | 568.12 | 17.28 | 567.99 | | | | | | |
| 9.21 | 568.14 | 22.50 | 567.60 | 18.89 | 567.71 | 24.28 | 567.38 | | | | | | |
| 23.76 | 567.49 | 25.00 | 567.04 | 23.48 | 567.43 | 26.91 | 566.64 | | | | | | |
| 25.00 | 566.95 | 28.00 | 565.96 | 25.40 | 566.76 | 28.95 | 566.13 | | | | | | |
| 29.60 | 565.22 | 28.70 | 565.55 | 26.42 | 566.41 | 29.31 | 565.12 | | | | | | |
| 31.28 | 564.86 | 29.00 | 565.15 | 28.69 | 565.81 | 29.73 | 564.94 | | | | | | |
| 32.56 | 564.86 | 29.50 | 564.95 | 29.16 | 565.08 | 29.82 | 564.80 | | | | | | |
| 35.05 | 564.85 | 30.40 | 564.70 | 29.81 | 564.72 | 31.04 | 564.63 | | | | | | |
| 35.31 | 565.18 | 31.30 | 564.61 | 30.68 | 564.58 | 31.97 | 564.58 | | | | | | |
| 39.92 | 566.95 | 32.40 | 564.54 | 31.84 | 564.51 | 32.45 | 564.58 | | | | | | |
| 43.70 | 567.12 | 33.10 | 564.65 | 32.82 | 564.57 | 33.32 | 564.54 | | | | | | |
| 52.54 | 566.95 | 34.00 | 564.65 | 33.59 | 564.58 | 34.18 | 564.62 | | | | | | |
| 61.36 | 566.85 | 34.70 | 564.74 | 34.21 | 564.64 | 34.99 | 564.71 | | | | | | |
| 61.50 | 566.85 | 35.20 | 565.27 | 34.76 | 564.68 | 35.44 | 565.14 | | | | | | |
| | | 36.40 | 565.83 | 35.46 | 565.55 | 35.92 | 565.81 | | | | | | |
| | | 40.00 | 566.82 | 37.39 | 566.14 | 39.81 | 566.94 | | | | | | |
| | | 41.00 | 566.93 | 40.15 | 566.86 | 49.89 | 567.09 | | | | | | |
| | | 48.00 | 566.93 | 48.11 | 566.90 | 61.37 | 566.93 | | | | | | |
| | | 61.50 | 566.86 | 61.47 | 566.88 | | | | | | | | |




**CROSS SECTION PLOT - LOOKING DOWNSTREAM**

**YEAR-3, 2010 SURVEY DATA** **CROSS-SECTION:** 3
**PROJECT** SANDY CREEK **FEATURE:** Riffle
**TASK** CROSS SECTION
**REACH** SANDY CREEK
**DATE** 06/28/2010 to 06/30/2010
**CREW** BUCHHOLZ/PARRISH/PICKENS

**Summary Data**
All dimensions in feet.

| | | |
|---|---|---|
| Bankfull X-sec area | 18.5 | sq. ft. |
| Bankfull Width | 14.7 | ft. |
| Bankfull Mean Depth | 1.3 | ft. |
| Bankfull Max Depth | 2.4 | ft. |
| Width/Depth Ratio | 11.6 | |
| Entrenchment Ratio | >2.2 | |
| Classification | C | |
| Bankfull Elevation: | 566.94 | ft. |

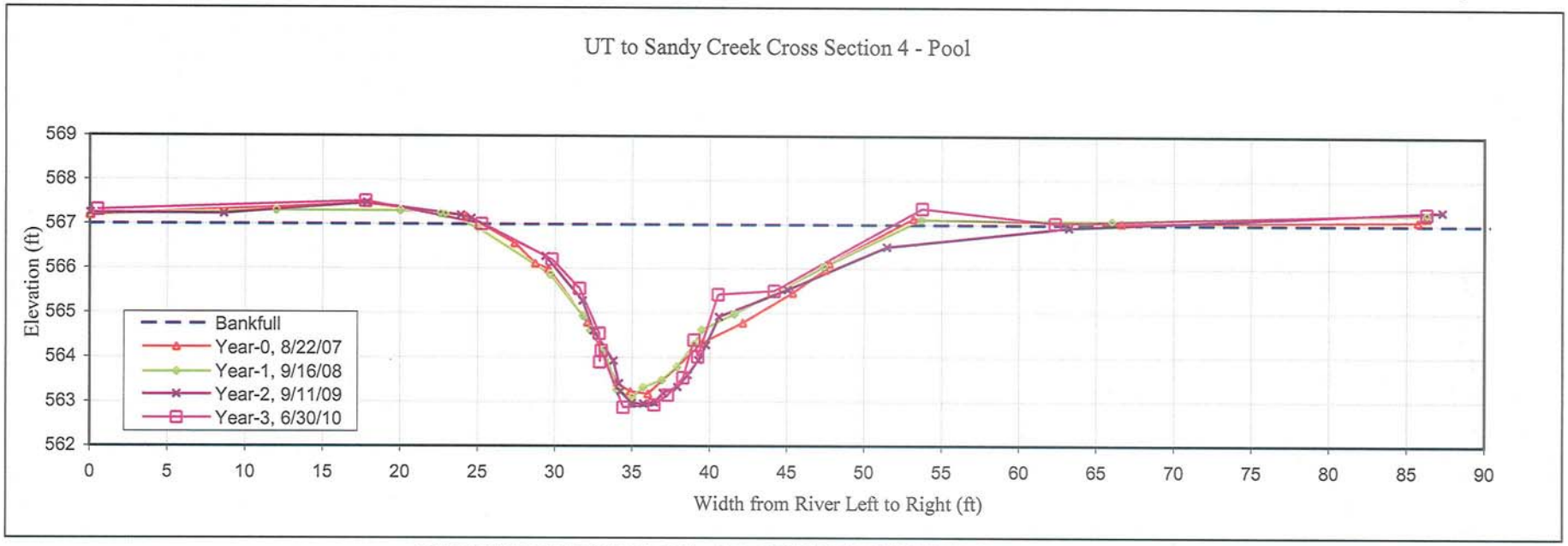
**CROSS SECTION PHOTO - LOOKING DOWNSTREAM**

Ecosystem Enhancement Program

EcoEngineering
A division of The John R. McAdams Company, Inc.

**UT to SANDY CREEK** **EEP PROJECT # 403** CROSS-SECTION: 4

| Year-0 | | Year-1 | | Year-2 | | Year-3 | | Year-4 | | Year-5 | | Year-6 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) |
| 0.00 | 567.19 | 0.00 | 567.20 | 0.03 | 567.23 | 0.00 | 567.30 | | | | | | |
| 0.07 | 567.19 | 12.00 | 567.31 | 8.62 | 567.22 | 17.27 | 567.51 | | | | | | |
| 17.84 | 567.46 | 20.00 | 567.31 | 17.85 | 567.48 | 24.76 | 566.99 | | | | | | |
| 24.27 | 567.17 | 22.60 | 567.24 | 23.91 | 567.20 | 29.31 | 566.19 | | | | | | |
| 27.39 | 566.55 | 22.90 | 567.22 | 24.58 | 567.12 | 31.10 | 565.54 | | | | | | |
| 28.73 | 566.10 | 25.00 | 566.91 | 29.38 | 566.26 | 32.37 | 564.53 | | | | | | |
| 29.60 | 565.97 | 29.70 | 565.87 | 31.79 | 565.27 | 32.40 | 563.89 | | | | | | |
| 32.11 | 564.78 | 31.80 | 564.94 | 32.50 | 564.59 | 32.51 | 564.14 | | | | | | |
| 34.04 | 563.41 | 32.30 | 564.61 | 33.79 | 563.92 | 33.93 | 562.86 | | | | | | |
| 34.88 | 563.22 | 33.20 | 564.19 | 34.15 | 563.41 | 35.92 | 562.92 | | | | | | |
| 36.03 | 563.17 | 34.00 | 563.29 | 34.24 | 563.23 | 36.79 | 563.14 | | | | | | |
| 39.56 | 564.32 | 35.00 | 563.10 | 35.00 | 562.96 | 37.79 | 563.54 | | | | | | |
| 42.14 | 564.77 | 35.70 | 563.33 | 35.73 | 562.95 | 38.49 | 564.38 | | | | | | |
| 45.37 | 565.44 | 36.90 | 563.50 | 36.43 | 562.97 | 38.75 | 564.01 | | | | | | |
| 47.50 | 565.97 | 37.90 | 563.80 | 37.00 | 563.19 | 40.05 | 565.41 | | | | | | |
| 47.74 | 566.10 | 39.00 | 564.30 | 37.93 | 563.33 | 43.69 | 565.49 | | | | | | |
| 53.16 | 567.13 | 39.50 | 564.63 | 38.59 | 563.60 | 53.25 | 567.36 | | | | | | |
| 66.62 | 567.03 | 41.60 | 564.98 | 39.29 | 563.93 | 61.84 | 567.03 | | | | | | |
| 85.71 | 567.08 | 47.40 | 566.05 | 39.78 | 564.27 | 85.78 | 567.27 | | | | | | |
| 86.21 | 567.18 | 53.70 | 567.12 | 40.61 | 564.91 | | | | | | | | |
| 86.29 | 567.18 | 66.00 | 567.09 | 45.05 | 565.52 | | | | | | | | |
| | | 86.30 | 567.25 | 51.46 | 566.48 | | | | | | | | |
| | | | | 63.23 | 566.92 | | | | | | | | |
| | | | | 87.29 | 567.32 | | | | | | | | |




**CROSS SECTION PLOT - LOOKING DOWNSTREAM**

**YEAR-3, 2010 SURVEY DATA** **CROSS-SECTION:** 4
**PROJECT** SANDY CREEK **FEATURE:** Pool
**TASK** CROSS SECTION
**REACH** SANDY CREEK
**DATE** 06/28/2010 to 06/30/2010
**CREW** BUCHHOLZ/PARRISH/PICKENS

**Summary Data**
All dimensions in feet.

| | | |
|---|---|---|
| Bankfull X-sec area | 44.1 | sq. ft. |
| Bankfull Width | 26.6 | ft. |
| Bankfull Mean Depth | 1.7 | ft. |
| Bankfull Max Depth | 4.1 | ft. |
| Width/Depth Ratio | n/a | ft. |
| Entrenchment Ratio | n/a | ft. |
| Classification | n/a | |
| Bankfull Elevation: | 566.99 | ft. |

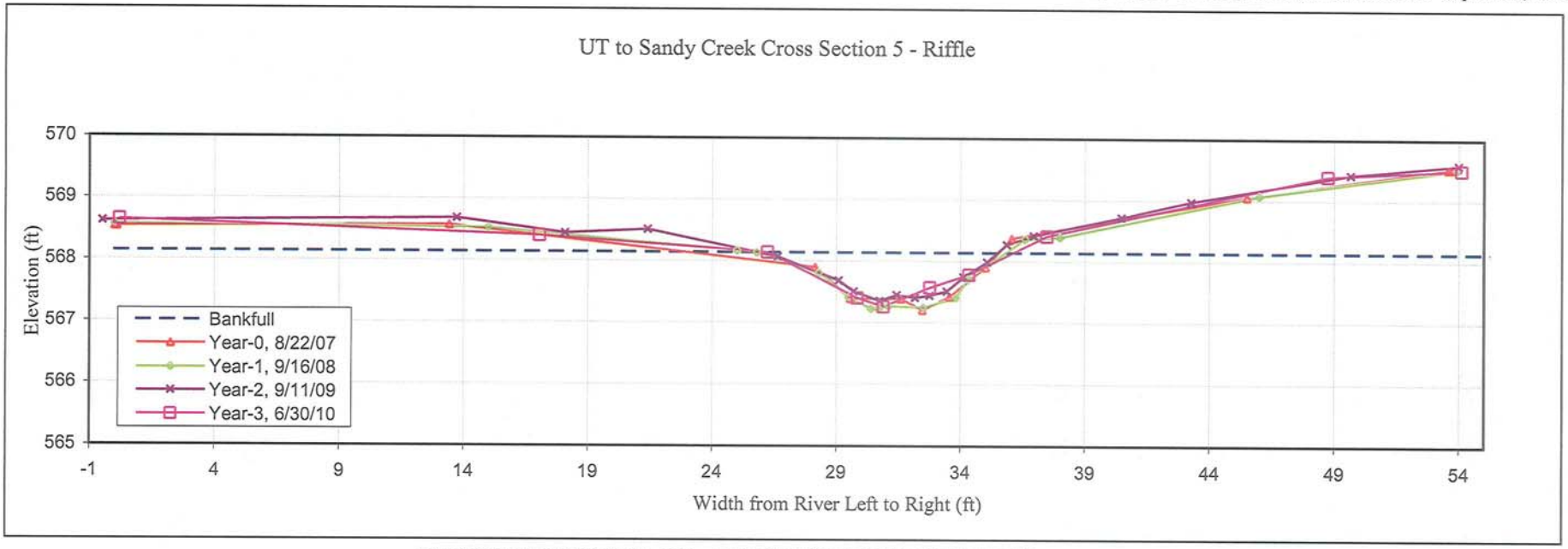
**CROSS SECTION PHOTO - LOOKING DOWNSTREAM**

Ecosystem Enhancement Program

EcoEngineering
A division of The John R. McAdams Company, Inc.

**UT to SANDY CREEK** **EEP PROJECT # 403** CROSS-SECTION: 5

| Year-0 | | Year-1 | | Year-2 | | Year-3 | | Year-4 | | Year-5 | | Year-6 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) |
| 0.00 | 568.53 | 0.00 | 568.57 | -0.49 | 568.61 | 0.20 | 568.64 | | | | | | |
| 0.09 | 568.53 | 15.00 | 568.53 | 13.72 | 568.67 | 17.05 | 568.40 | | | | | | |
| 13.42 | 568.56 | 25.00 | 568.17 | 18.08 | 568.44 | 26.23 | 568.14 | | | | | | |
| 28.15 | 567.90 | 25.80 | 568.14 | 21.40 | 568.50 | 29.84 | 567.40 | | | | | | |
| 29.56 | 567.39 | 28.30 | 567.81 | 26.64 | 568.07 | 30.89 | 567.26 | | | | | | |
| 31.60 | 567.39 | 29.50 | 567.41 | 29.10 | 567.68 | 32.76 | 567.57 | | | | | | |
| 32.47 | 567.20 | 30.40 | 567.23 | 29.70 | 567.51 | 34.34 | 567.78 | | | | | | |
| 33.55 | 567.42 | 30.70 | 567.22 | 30.75 | 567.35 | 37.47 | 568.41 | | | | | | |
| 35.00 | 567.90 | 31.10 | 567.27 | 31.43 | 567.45 | 48.74 | 569.39 | | | | | | |
| 36.06 | 568.37 | 32.50 | 567.25 | 32.17 | 567.40 | 54.10 | 569.50 | | | | | | |
| 45.50 | 569.05 | 33.80 | 567.41 | 32.75 | 567.44 | | | | | | | | |
| 53.56 | 569.52 | 34.30 | 567.70 | 33.44 | 567.51 | | | | | | | | |
| 53.69 | 569.52 | 36.60 | 568.37 | 34.12 | 567.74 | | | | | | | | |
| | | 38.00 | 568.40 | 35.07 | 567.99 | | | | | | | | |
| | | 46.00 | 569.08 | 35.86 | 568.27 | | | | | | | | |
| | | 53.90 | 569.51 | 36.94 | 568.42 | | | | | | | | |
| | | | | 40.46 | 568.72 | | | | | | | | |
| | | | | 43.26 | 568.97 | | | | | | | | |
| | | | | 49.66 | 569.42 | | | | | | | | |
| | | | | 53.98 | 569.58 | | | | | | | | |

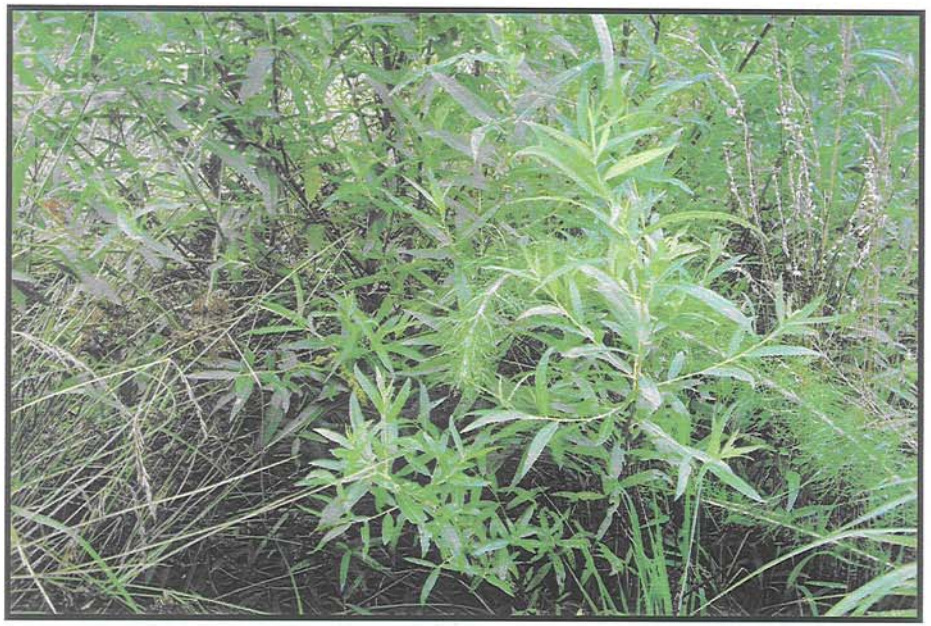



**CROSS SECTION PLOT - LOOKING DOWNSTREAM**

**YEAR-3, 2010 SURVEY DATA** **CROSS-SECTION:** 5
**PROJECT** SANDY CREEK **FEATURE:** Riffle
**TASK** CROSS SECTION
**REACH** SANDY CREEK
**DATE** 06/28/2010 to 06/30/2010
**CREW** BUCHHOLZ/PARRISH/PICKENS

**Summary Data**
All dimensions in feet.

| | | |
|---|---|---|
| Bankfull X-sec area | 4.6 | sq. ft. |
| Bankfull Width | 9.9 | ft. |
| Bankfull Mean Depth | 0.5 | ft. |
| Bankfull Max Depth | 0.9 | ft. |
| Width/Depth Ratio | >12 | ft. |
| Entrenchment Ratio | >2.2 | ft. |
| Classification | C | |
| Bankfull Elevation: | 568.14 | ft. |



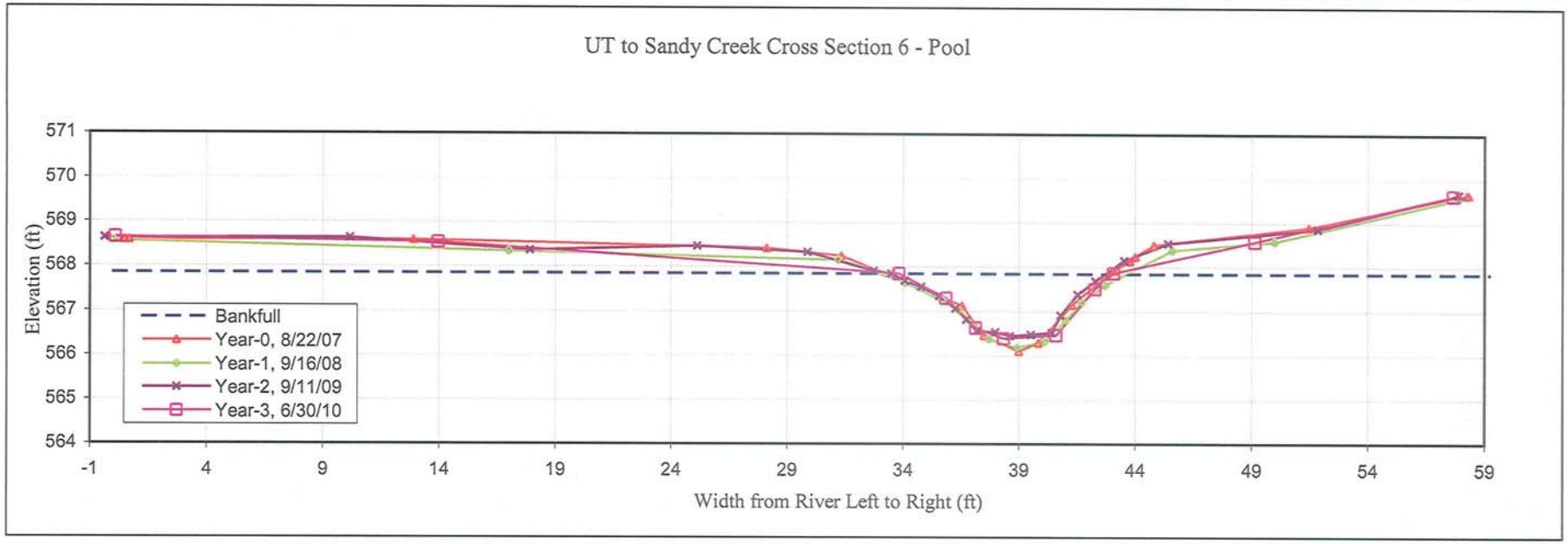
**CROSS SECTION PHOTO - LOOKING DOWNSTREAM**

Ecosystem Enhancement Program

EcoEngineering
A division of The John R. McAdams Company, Inc.

**UT to SANDY CREEK** **EEP PROJECT # 403** CROSS-SECTION: 6

| Year-0 | | Year-1 | | Year-2 | | Year-3 | | Year-4 | | Year-5 | | Year-6 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) | Station (ft) | Elev. (ft) |
| 0.50 | 568.58 | 0.00 | 568.57 | -0.37 | 568.62 | 0.08 | 568.64 | | | | | | |
| 0.68 | 568.58 | 17.00 | 568.35 | 10.17 | 568.63 | 13.95 | 568.53 | | | | | | |
| 12.89 | 568.59 | 31.20 | 568.16 | 17.91 | 568.36 | 33.81 | 567.84 | | | | | | |
| 28.12 | 568.41 | 34.10 | 567.65 | 25.12 | 568.46 | 35.85 | 567.29 | | | | | | |
| 31.34 | 568.24 | 35.70 | 567.24 | 29.87 | 568.33 | 37.13 | 566.63 | | | | | | |
| 36.54 | 567.12 | 36.40 | 567.04 | 32.73 | 567.90 | 38.34 | 566.39 | | | | | | |
| 37.49 | 566.46 | 37.70 | 566.39 | 33.48 | 567.84 | 40.59 | 566.46 | | | | | | |
| 38.98 | 566.10 | 38.90 | 566.19 | 34.07 | 567.68 | 42.27 | 567.50 | | | | | | |
| 39.82 | 566.29 | 40.10 | 566.33 | 34.77 | 567.54 | 43.07 | 567.86 | | | | | | |
| 41.29 | 567.15 | 41.00 | 566.80 | 35.55 | 567.34 | 49.14 | 568.57 | | | | | | |
| 43.08 | 567.92 | 41.70 | 567.21 | 36.26 | 567.06 | 57.65 | 569.62 | | | | | | |
| 43.76 | 568.13 | 42.70 | 567.60 | 36.73 | 566.81 | | | | | | | | |
| 44.00 | 568.24 | 45.60 | 568.39 | 37.18 | 566.56 | | | | | | | | |
| 44.80 | 568.50 | 50.00 | 568.59 | 37.97 | 566.54 | | | | | | | | |
| 51.46 | 568.90 | 57.90 | 569.57 | 38.61 | 566.45 | | | | | | | | |
| 58.25 | 569.65 | | | 39.50 | 566.48 | | | | | | | | |
| 58.30 | 569.65 | | | 40.41 | 566.52 | | | | | | | | |
| | | | | 40.79 | 566.91 | | | | | | | | |
| | | | | 41.52 | 567.38 | | | | | | | | |
| | | | | 42.29 | 567.68 | | | | | | | | |
| | | | | 43.52 | 568.15 | | | | | | | | |
| | | | | 45.41 | 568.54 | | | | | | | | |
| | | | | 51.85 | 568.86 | | | | | | | | |
| | | | | 57.89 | 569.65 | | | | | | | | |




**CROSS SECTION PLOT - LOOKING DOWNSTREAM**

**YEAR-3, 2010 SURVEY DATA** **CROSS-SECTION:** 6
**PROJECT** SANDY CREEK **FEATURE:** Pool
**TASK** CROSS SECTION
**REACH** SANDY CREEK
**DATE** 06/28/2010 to 06/30/2010
**CREW** BUCHHOLZ/PARRISH/PICKENS

**Summary Data**
All dimensions in feet.

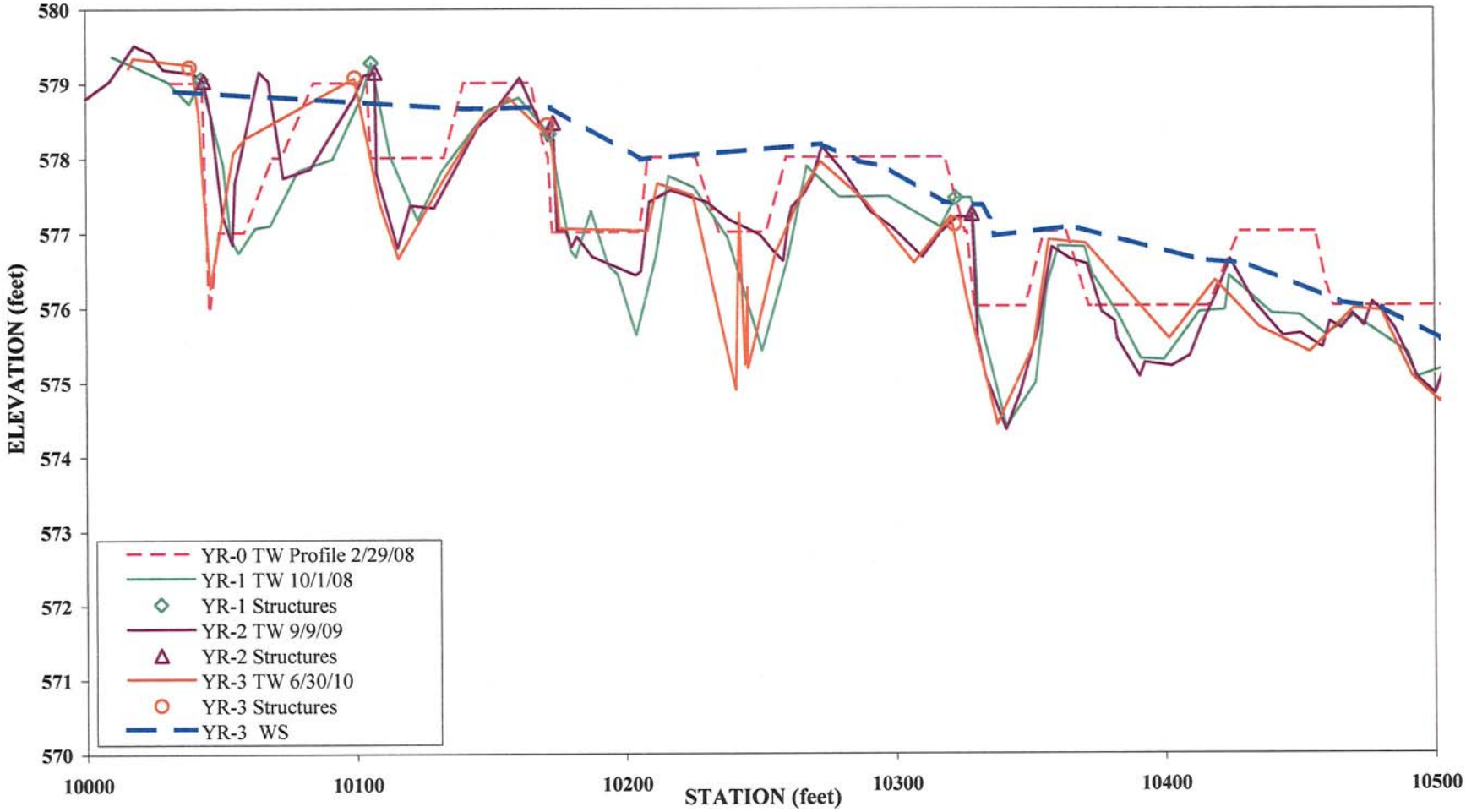
| | | |
|---|---|---|
| Bankfull X-sec area | 8.1 | sq. ft. |
| Bankfull Width | 9.2 | ft. |
| Bankfull Mean Depth | 0.9 | ft. |
| Bankfull Max Depth | 1.5 | ft. |
| Width/Depth Ratio | n/a | |
| Entrenchment Ratio | n/a | |
| Classification | n/a | |
| Bankfull Elevation: | 567.84 | ft. |

**CROSS SECTION PHOTO - LOOKING DOWNSTREAM**

Ecosystem Enhancement Program

EcoEngineering
A division of The John R. McAdams Company, Inc.

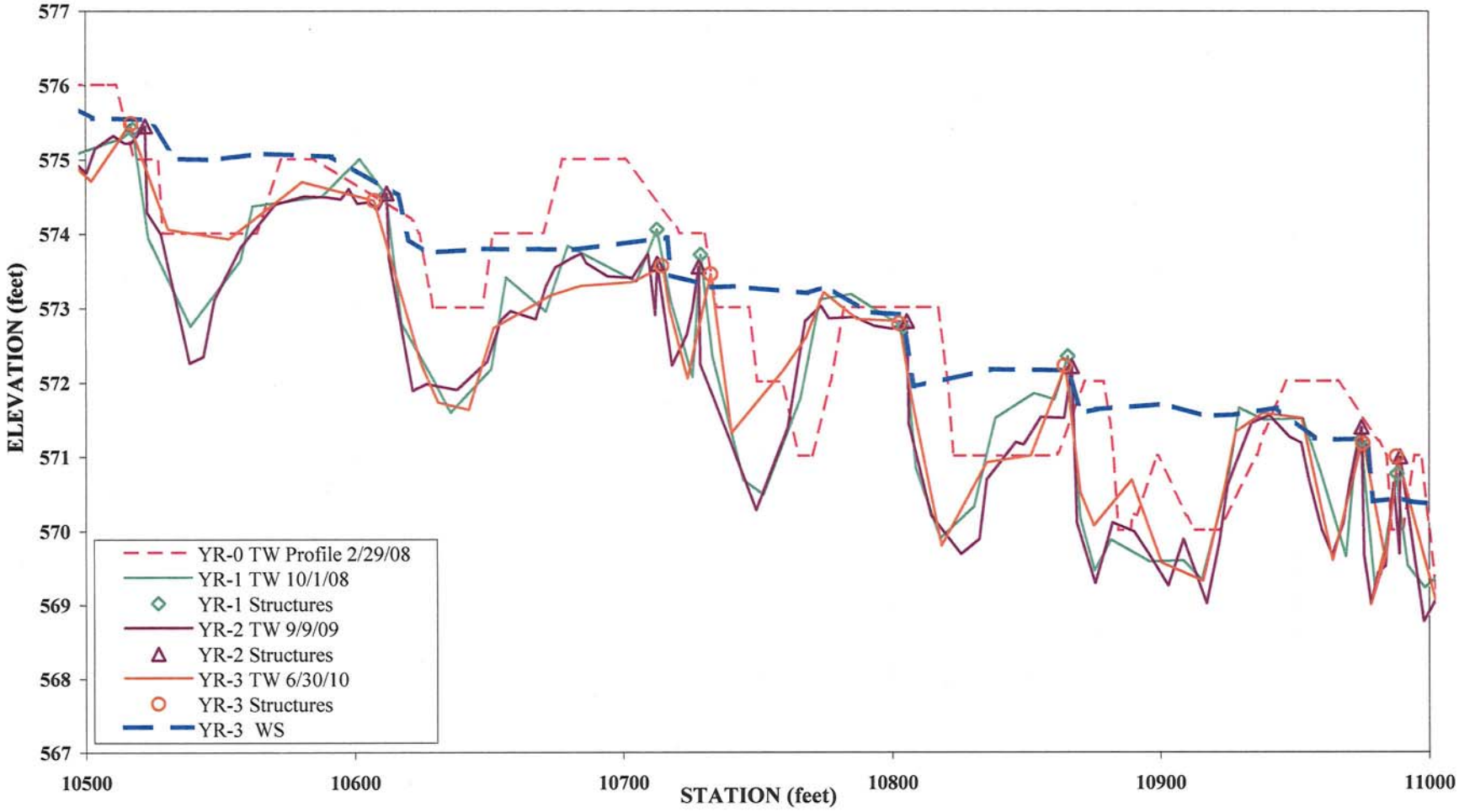
**UT to Sandy Creek**
**Longitudinal Profile**
**2010 (Year-3) Monitoring**




Note: Due to slight differences in thalweg length, longitudinal profile was adjusted horizontally on average 10 feet. Structures were used as a guide. Year-3 water surface was sporadic due to low / absent flow; therefore, when connecting water surface data points the dashed line is plotted below ground surface in some locations.

EcoEngineering
A division of The John R. McAdams Company, Inc.

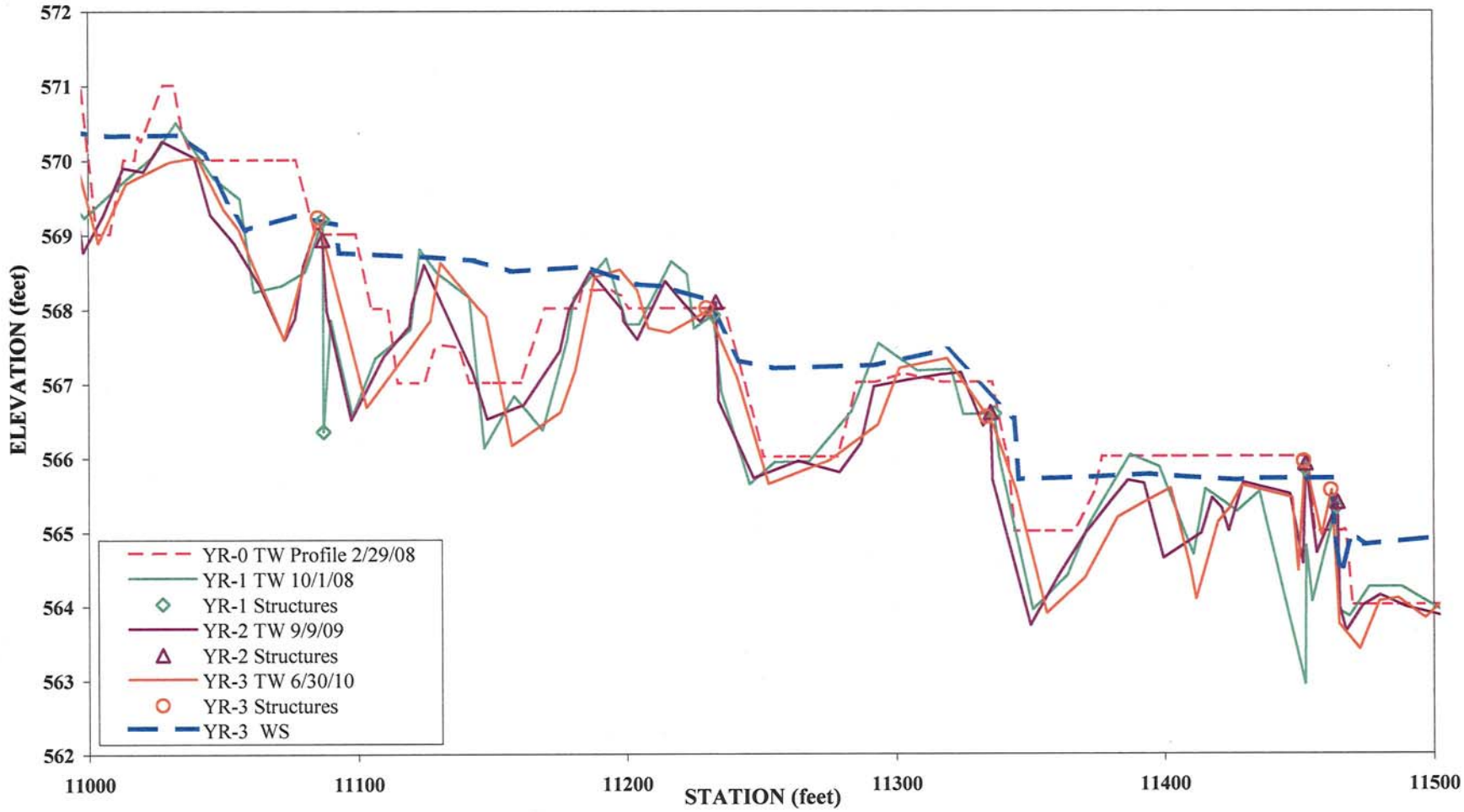
**UT to Sandy Creek**
**Longitudinal Profile**
**2010 (Year-3) Monitoring**




Note: Due to slight differences in thalweg length, longitudinal profile was adjusted horizontally on average 10 feet. Structures were used as a guide. Year-3 water surface was sporadic due to low / absent flow; therefore, when connecting water surface data points the dashed line is plotted below ground surface in some locations.

EcoEngineering
A division of The John R. McAdams Company, Inc.

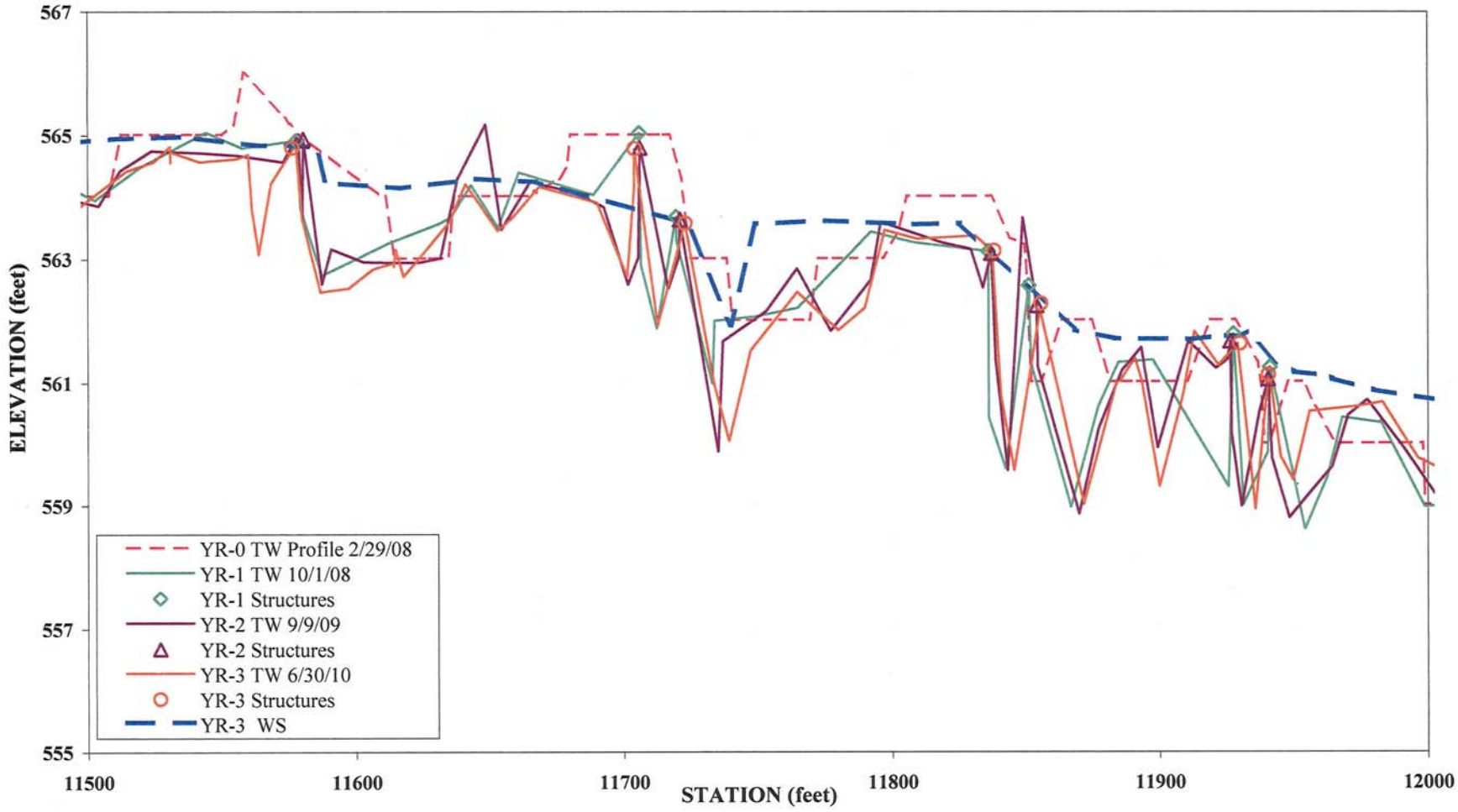
**UT to Sandy Creek**
**Longitudinal Profile**
**2010 (Year-3) Monitoring**




Note: Due to slight differences in thalweg length, longitudinal profile was adjusted horizontally on average 10 feet. Structures were used as a guide. Year-3 water surface was sporadic due to low / absent flow; therefore, when connecting water surface data points the dashed line is plotted below ground surface in some locations.

EcoEngineering
A division of The John R. McAdams Company, Inc.

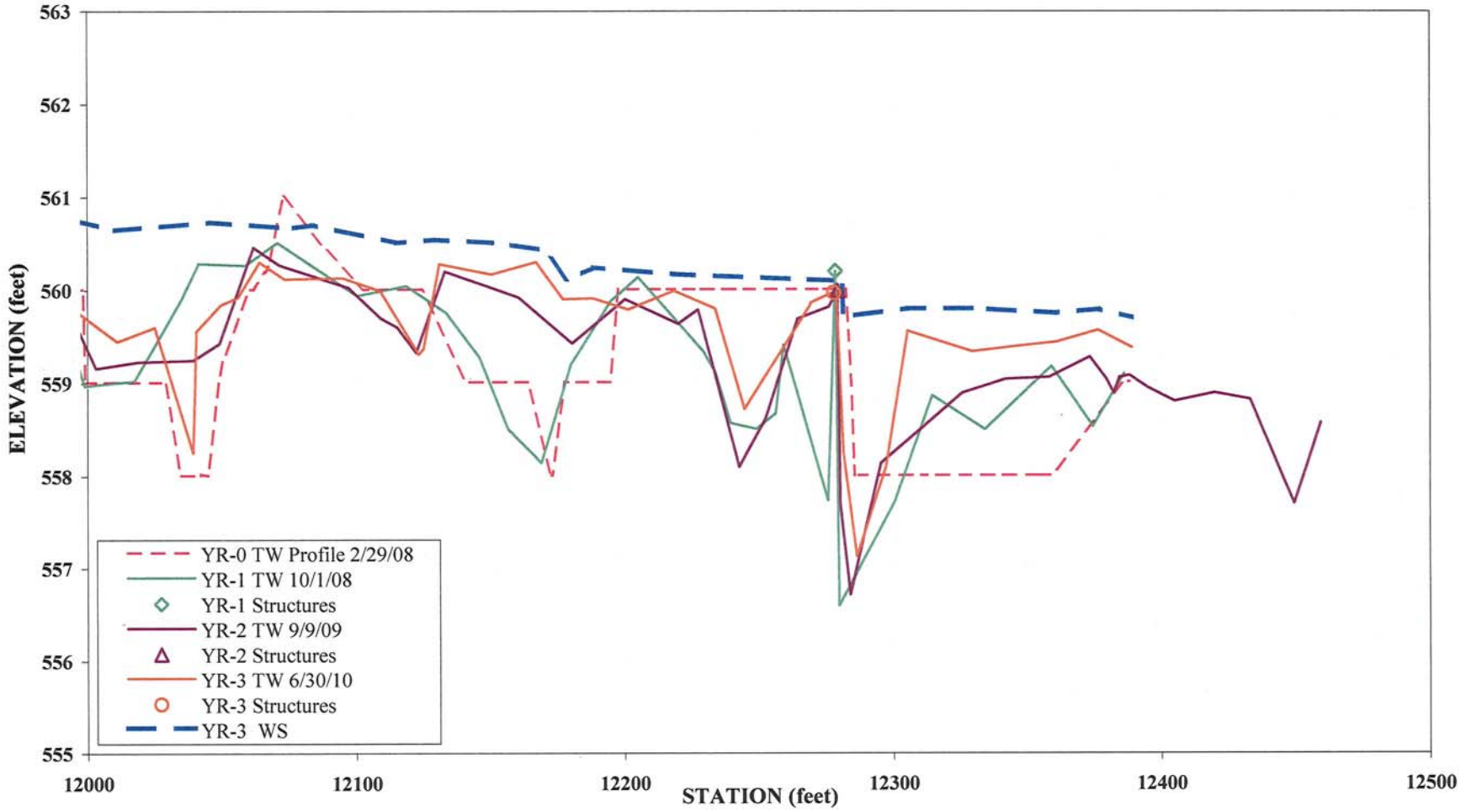
**UT to Sandy Creek**
**Longitudinal Profile**
**2010 (Year-3) Monitoring**




Note: Due to slight differences in thalweg length, longitudinal profile was adjusted horizontally on average 10 feet. Structures were used as a guide. Year-3 water surface was sporadic due to low / absent flow; therefore, when connecting water surface data points the dashed line is plotted below ground surface in some locations.

EcoEngineering
A division of The John R. McAdams Company, Inc.

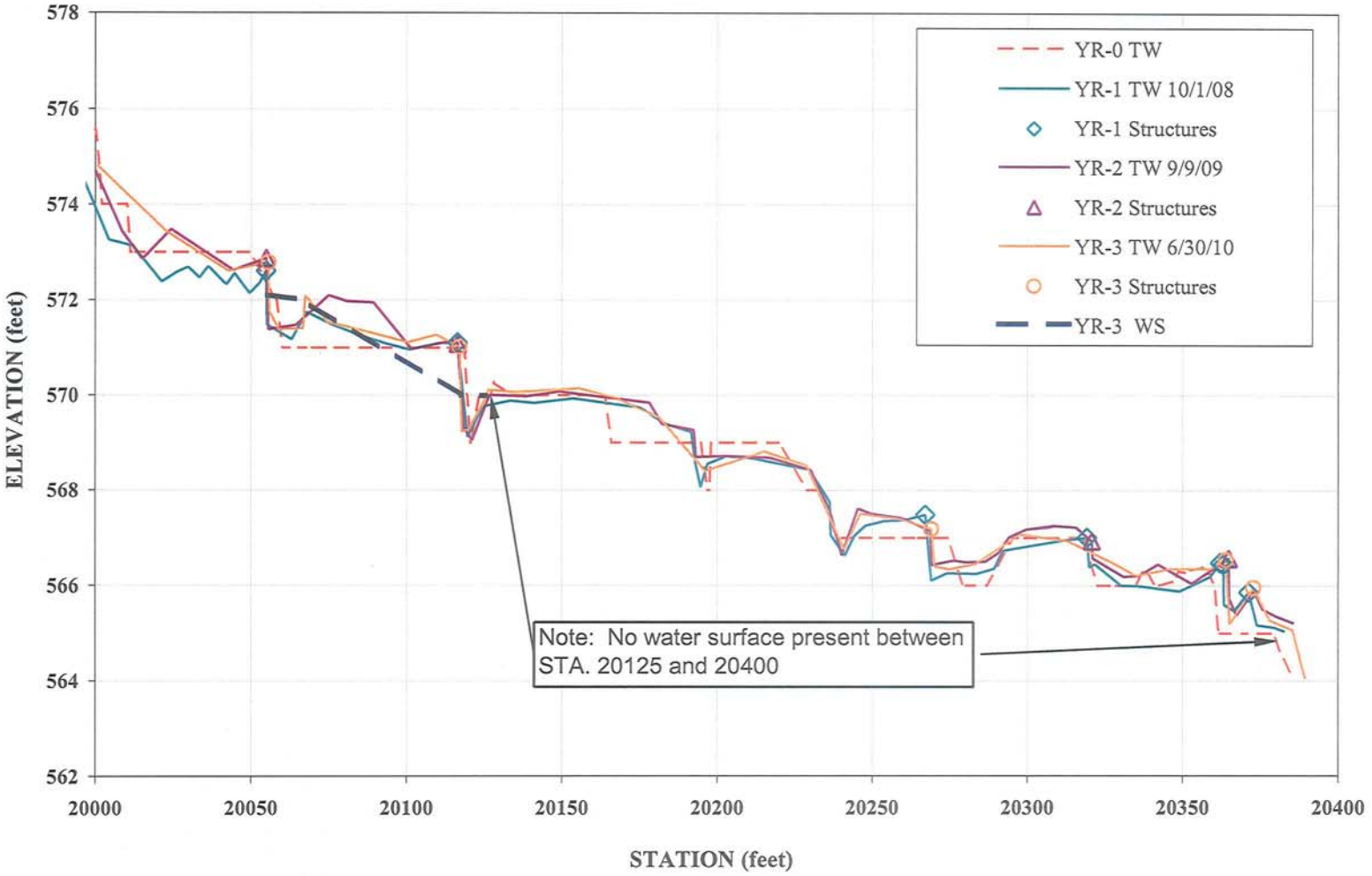
**UT to Sandy Creek**
**Longitudinal Profile**
**2010 (Year-3) Monitoring**




Note: Due to slight differences in thalweg length, longitudinal profile was adjusted horizontally on average 10 feet. Structures were used as a guide. Year-3 water surface was sporadic due to low / absent flow; therefore, when connecting water surface data points the dashed line is plotted below ground surface in some locations.

EcoEngineering
A division of The John R. McAdams Company, Inc.

**UT to Sandy Creek - Tributary**
**Longitudinal Profile**
**2010 (Year-3) Monitoring**




EcoEngineering
A division of The John R. McAdams Company, Inc.

**3-YEAR, 2010 SURVEY DATA**

**PROJECT NAME** UT TO SANDY CREEK

**TASK** LONGITUDINAL PROFILE

**FEATURE/FACET SLOPE LENGTH, AND SPACING AND LONGITUDINAL PROFILE DATA**

**REACHES** UT to Sandy Creek and Minor Tributary

**DATE** 06/28/2010 to 06/30/2010

**CREW** BUCHHOLZ/PARRISH/PICKENS

**UT to Sandy Creek Reach I**

| | | | | | |
|---|---|---|---|---|---|
| Overall water surface slope = | 1.0% | | **DESIGN** | | **AVG.** |
| | | | Riffle | | 0.4% |
| WS sta. start = | 10032.26 ft | | Run | | --- |
| WS sta. end = | 11403.56 ft | | p-p spacing | | 62 |
| ELEV. Start = | 578.89 ft msl | | | | |
| ELEV. End = | 565.70 ft msl | | | | |
| | | Results | | | |
| | n = | MIN. | MEDIAN. | AVG. | MAX. |
| Riffle slopes measured = | 13 | 0.37% | 1.22% | 2.57% | 12.37% |
| Run slopes measured = | 6 | 0.78% | 13.35% | 11.91% | 18.47% |
| Pools measured = | 20 | 15 | 64 | 71 | 193 |

**UT to Sandy Creek Reach II**

| | | | | | |
|---|---|---|---|---|---|
| Overall water surface slope = | 0.6% | | **DESIGN** | | **AVG.** |
| | | | Riffle | | 0.4% |
| WS sta. start = | 11427.48 ft | | Run | | --- |
| WS sta. end = | 12352.16 ft | | p-p spacing | | 62 |
| ELEV. Start = | 565.70 ft msl | | | | |
| ELEV. End = | 559.69 ft msl | | | | |
| | | Results | | | |
| | n = | MIN. | MEDIAN. | AVG. | MAX. |
| Riffle slopes measured = | 6 | 0.69% | 3.81% | 6.10% | 14.40% |
| Run slopes measured = | 3 | 2.11% | 14.80% | 14.12% | 25.44% |
| Pools measured = | 12 | 14 | 68 | 73 | 173 |

**UT to Sandy Creek Reach III**

| | | | | | |
|---|---|---|---|---|---|
| Overall water surface slope = | 3.0% | | **DESIGN** | | **AVG.** |
| | | | Riffle | | 1.7% |
| WS sta. start = | 20061.26 ft | | Run | | --- |
| WS sta. end = | 20131.37 ft | | p-p spacing | | 46 |
| ELEV. Start = | 572.11 ft msl | | | | |
| ELEV. End = | 569.99 ft msl | Results | | | |
| | n = | MIN. | MEDIAN. | AVG. | MAX. |
| Riffle slopes measured = | 2 | 1.62% | 1.64% | 1.64% | 1.66% |
| Run slopes measured = | 5 | 3.14% | 9.37% | 10.65% | 18.55% |
| Pools measured = | 3 | 61 | 153 | 153 | 245 |

All data reported in units of **feet** unless otherwise specified.

| Feature | Station | Length | Slope | | |
|---|---|---|---|---|---|
| | | **UT to Sandy Creek I** | | | |
| RIFFLE | 10051 | 41 | 1.20% | n = | 13 |
| RIFFLE | 10133 | 26 | 1.21% | MIN = | 0.37% |
| RIFFLE | 10198 | 13 | 1.22% | MEDIAN = | 1.22% |
| RIFFLE | 10252 | 55 | 0.60% | AVG. = | 2.57% |
| RIFFLE | 10343 | 14 | 0.37% | MAX = | 12.37% |
| RIFFLE | 10751 | 28 | 2.39% | | |

| | | | | | |
|---|---|---|---|---|---|
| RIFFLE | 10904 | 25 | 12.37% | | |
| RIFFLE | 11004 | 26 | 3.55% | | |
| RIFFLE | 11100 | 17 | 4.30% | | |
| RIFFLE | 11157 | 16 | 1.13% | | |
| RIFFLE | 11271 | 31 | 2.52% | | |
| RIFFLE | 11361 | 11 | 1.92% | | |
| RIFFLE | 11404 | 23 | 0.60% | | |
| **Feature** | **Station** | **Length** | **Slope** | | |
| | | **UT to Sandy Creek II** | | | |
| RIFFLE | 11854 | 2 | 14.40% | n = | 6 |
| RIFFLE | 11876 | 9 | 6.10% | MIN = | 0.69% |
| RIFFLE | 12027 | 45 | 0.69% | MEDIAN = | 3.81% |
| RIFFLE | 12232 | 10 | 13.00% | AVG. = | 6.10% |
| RIFFLE | 12269 | 24 | 0.92% | MAX = | 14.40% |
| RIFFLE | 12340 | 13 | 1.51% | | |
| **Feature** | **Station** | **Length** | **Slope** | | |
| | | **UT to Sandy Creek III** | | | |
| RIFFLE | 20116 | 9 | 1.62% | n = | 2 |
| RIFFLE | 20289 | 29 | 1.66% | MIN = | 1.62% |
| | | | | MEDIAN = | 1.64% |
| | | | | AVG. = | 1.64% |
| | | | | MAX = | 1.66% |
| **Feature** | **Station** | **Length** | **Slope** | | |
| | | **UT to Sandy Creek I** | | | |
| RUN | 11177 | 8 | 0.78% | n = | 6 |
| RUN | 11199 | 23 | 11.84% | MIN = | 0.78% |
| RUN | 10211 | 16 | 16.66% | MEDIAN = | 13.35% |
| RUN | 11030 | 17 | 8.83% | AVG. = | 11.91% |
| RUN | 11117 | 9 | 18.47% | MAX = | 18.47% |
| RUN | 11372 | 7 | 14.86% | | |
| **Feature** | **Station** | **Length** | **Slope** | | |
| | | **UT to Sandy Creek II** | | | |
| RUN | 11856 | 7 | 25.44% | n = | 3 |
| RUN | 12072 | 14 | 14.80% | MIN = | 2.11% |
| RUN | 12151 | 56 | 2.11% | MEDIAN = | 14.80% |
| | | | | AVG. = | 14.12% |
| | | | | MAX = | 25.44% |
| **Feature** | **Station** | **Length** | **Slope** | | |
| | | **UT to Sandy Creek III** | | | |
| RUN | 20106 | 20 | 9.37% | n = | 5 |
| RUN | 20187 | 15 | 7.60% | MIN = | 3.14% |
| RUN | 20235 | 12 | 14.58% | MEDIAN = | 9.37% |
| RUN | 20319 | 15 | 3.14% | AVG. = | 10.65% |
| RUN | 20365 | 6 | 18.55% | MAX = | 18.55% |
| **Feature** | **Station** | **Length** | **p-p spacing** | | |
| | | **UT to Sandy Creek I** | | | |
| POOL | 10038 | 13 | | n = | 20 |
| POOL | 10102 | 23 | 64 | MIN = | 15 (p-p spacing) |
| POOL | 10227 | 30 | 125 | MEDIAN = | 64 |
| POOL | 10324 | 25 | 97 | AVG. = | 71 |
| POOL | 10517 | 59 | 193 | MAX = | 193 |
| POOL | 10602 | 27 | 85 | | |
| POOL | 10700 | 14 | 98 | | |
| POOL | 10716 | 35 | 16 | | |

| | | | |
|---|---|---|---|
| POOL | 10795 | 28 | 78 |
| POOL | 10851 | 54 | 57 |
| POOL | 10937 | 14 | 86 |
| POOL | 10953 | 8 | 15 |
| POOL | 10978 | 26 | 25 |
| POOL | 11047 | 25 | 69 |
| POOL | 11072 | 30 | 26 |
| POOL | 11127 | 33 | 54 |
| POOL | 11185 | 26 | 59 |
| POOL | 11222 | 52 | 37 |
| POOL | 11325 | 25 | 103 |
| POOL | 11379 | 23 | 54 |

| Feature | Station | Length | p-p spacing |
|---|---|---|---|
| | | **UT to Sandy Creek II** | |
| POOL | 11449 | 103 | 70 |
| POOL | 11563 | 55 | 114 |
| POOL | 11629 | 18 | 66 |
| POOL | 11702 | 67 | 73 |
| POOL | 11809 | 14 | 106 |
| POOL | 11835 | 29 | 26 |
| POOL | 11863 | 16 | 28 |
| POOL | 11899 | 12 | 36 |
| POOL | 11913 | 11 | 14 |
| POOL | 12087 | 16 | 173 |
| POOL | 12208 | 81 | 121 |
| POOL | 12250 | 16 | 42 |

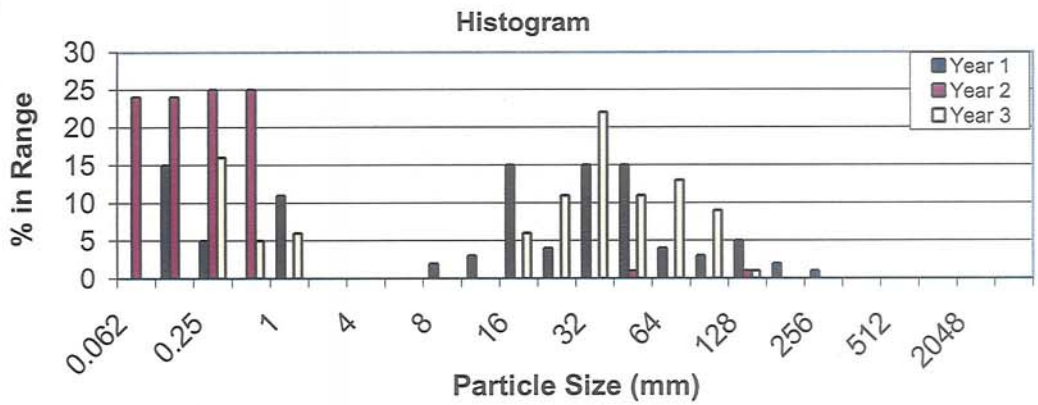
| | |
|---|---|
| n = | 12 |
| MIN = | 14 |
| MEDIAN = | 68 |
| AVG. = | 73 |
| MAX = | 173 |

(p-p spacing)

| Feature | Station | Length | p-p spacing |
|---|---|---|---|
| | | **UT to Sandy Creek III** | |
| POOL | 20065 | 11 | |
| POOL | 20126 | 7 | 61 |
| POOL | 20371 | 9 | 245 |

| | |
|---|---|
| n = | 3 |
| MIN = | 61 |
| MEDIAN = | 153 |
| AVG. = | 153 |
| MAX = | 245 |

(p-p spacing)



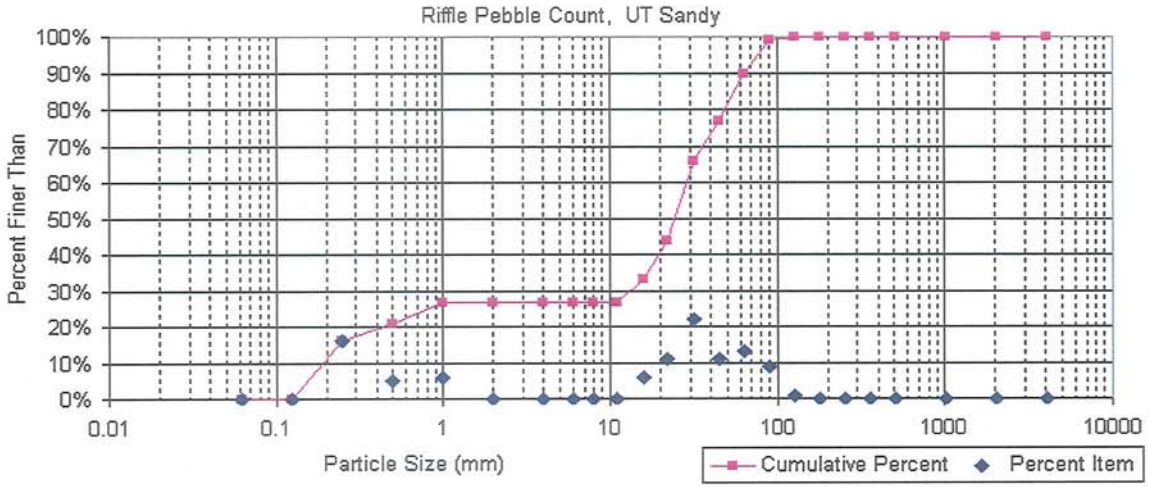

**EEP PROJECT ID:** 403
**CROSS-SECTION:** 1 **FEATURE:** RIFFLE

Ecosystem Enhancement PROGRAM

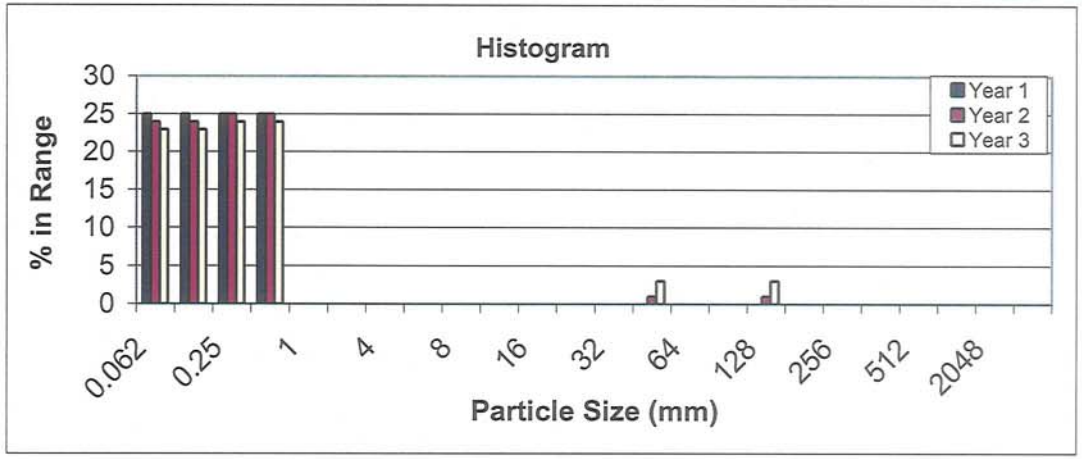
**PROJECT** UT to SANDY CREEK
**TASK** PEBBLE COUNT
**REACH** UT to SANDY CREEK
**DATE** 06/28/2010 to 06/28/2010
**CREW** BUCHHOLZ/PARRISH/PICKENS

| Material | Size Range (mm) | | Count |
|---|---|---|---|
| silt/clay | 0 | 0.062 | |
| very fine sand | 0.062 | 0.13 | |
| fine sand | 0.13 | 0.25 | 16 |
| medium sand | 0.25 | 0.5 | 5 |
| coarse sand | 0.5 | 1 | 6 |
| very coarse sand | 1 | 2 | |
| very fine gravel | 2 | 4 | |
| fine gravel | 4 | 6 | |
| fine gravel | 6 | 8 | |
| medium gravel | 8 | 11 | |
| medium gravel | 11 | 16 | 6 |
| coarse gravel | 16 | 22 | 11 |
| coarse gravel | 22 | 32 | 22 |
| very coarse gravel | 32 | 45 | 11 |
| very coarse gravel | 45 | 64 | 13 |
| small cobble | 64 | 90 | 9 |
| medium cobble | 90 | 128 | 1 |
| large cobble | 128 | 180 | |
| very large cobble | 180 | 256 | |
| small boulder | 256 | 362 | |
| small boulder | 362 | 512 | |
| medium boulder | 512 | 1024 | |
| large boulder | 1024 | 2048 | |
| very large boulder | 2048 | 4096 | |
| bedrock | | | |
| Total Particle Count: | | | 100 |

| | |
|---|---|
| | UT Sandy |
| | --- |
| | --- |
| Note: | |




| Size percent less than (mm) | | | | | Percent by substrate type | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| D16 | D35 | D50 | D84 | D95 | silt/clay | sand | gravel | cobble | boulder | bedrock |
| 0.250 | 16.95 | 24.4 | 54 | 77 | 0% | 27% | 63% | 10% | 0% | 0% |

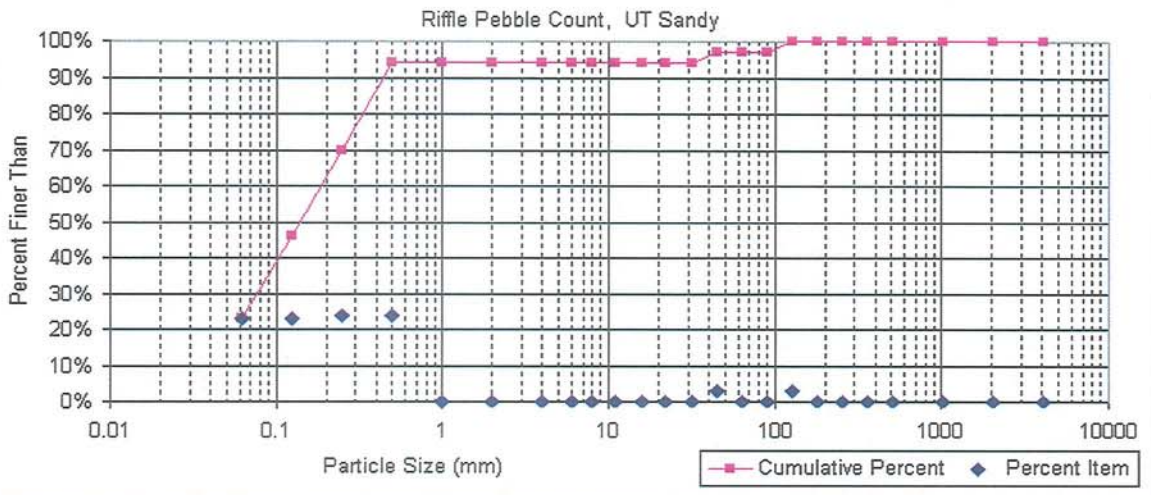



**EEP PROJECT ID:** 403
**CROSS-SECTION:** 3 **FEATURE:** RIFFLE

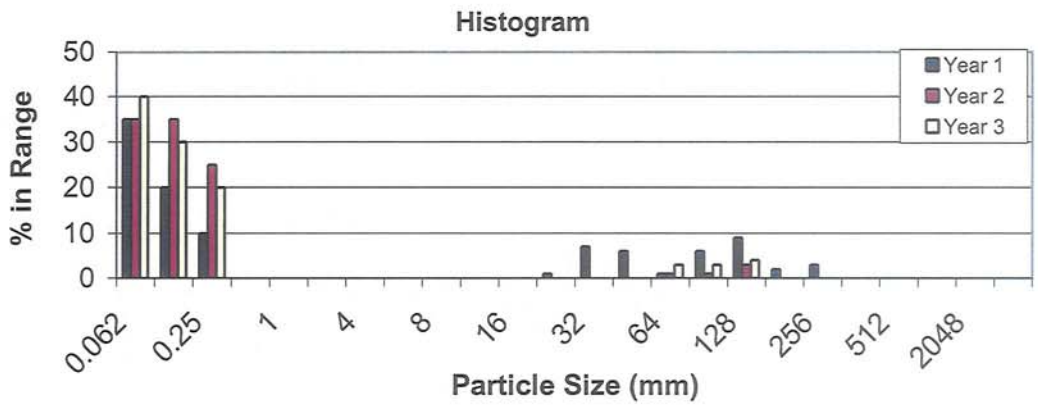
**PROJECT** UT to SANDY CREEK
**TASK** PEBBLE COUNT
**REACH** UT to SANDY CREEK
**DATE** 06/28/2010 to 06/28/2010
**CREW** BUCHHOLZ/PARRISH/PICKENS

| Material | Size Range (mm) | | Count |
|---|---|---|---|
| silt/clay | 0 | 0.062 | 23 |
| very fine sand | 0.062 | 0.13 | 23 |
| fine sand | 0.13 | 0.25 | 24 |
| medium sand | 0.25 | 0.5 | 24 |
| coarse sand | 0.5 | 1 | |
| very coarse sand | 1 | 2 | |
| very fine gravel | 2 | 4 | |
| fine gravel | 4 | 6 | |
| fine gravel | 6 | 8 | |
| medium gravel | 8 | 11 | |
| medium gravel | 11 | 16 | |
| coarse gravel | 16 | 22 | |
| coarse gravel | 22 | 32 | |
| very coarse gravel | 32 | 45 | 3 |
| very coarse gravel | 45 | 64 | |
| small cobble | 64 | 90 | |
| medium cobble | 90 | 128 | 3 |
| large cobble | 128 | 180 | |
| very large cobble | 180 | 256 | |
| small boulder | 256 | 362 | |
| small boulder | 362 | 512 | |
| medium boulder | 512 | 1024 | |
| large boulder | 1024 | 2048 | |
| very large boulder | 2048 | 4096 | |
| bedrock | | | |
| | Total Particle Count: | | 100 |

| | |
|---|---|
| | UT Sandy |
| | --- |
| | --- |
| Note: | |




| Size percent less than (mm) | | | | | Percent by substrate type | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| D16 | D35 | D50 | D84 | D95 | silt/clay | sand | gravel | cobble | boulder | bedrock |
| #N/A | 0.09 | 0.1 | 0 | 36 | 23% | 71% | 3% | 3% | 0% | 0% |



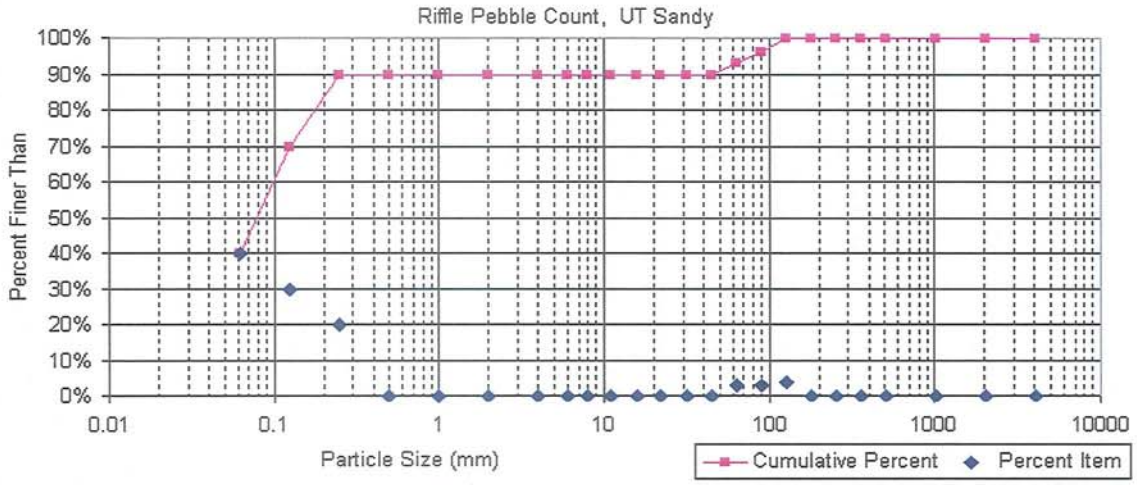

**EEP PROJECT ID:** 403
**CROSS-SECTION:** 5 **FEATURE:** RIFFLE

Ecosystem Enhancement PROGRAM

**PROJECT** UT to SANDY CREEK
**TASK** PEBBLE COUNT
**REACH** UT to SANDY CREEK
**DATE** 06/28/2010 to 06/28/2010
**CREW** BUCHHOLZ/PARRISH/PICKENS

| Material | Size Range (mm) | | Count |
|---|---|---|---|
| silt/clay | 0 | 0.062 | 40 |
| very fine sand | 0.062 | 0.13 | 30 |
| fine sand | 0.13 | 0.25 | 20 |
| medium sand | 0.25 | 0.5 | |
| coarse sand | 0.5 | 1 | |
| very coarse sand | 1 | 2 | |
| very fine gravel | 2 | 4 | |
| fine gravel | 4 | 6 | |
| fine gravel | 6 | 8 | |
| medium gravel | 8 | 11 | |
| medium gravel | 11 | 16 | |
| coarse gravel | 16 | 22 | |
| coarse gravel | 22 | 32 | |
| very coarse gravel | 32 | 45 | |
| very coarse gravel | 45 | 64 | 3 |
| small cobble | 64 | 90 | 3 |
| medium cobble | 90 | 128 | 4 |
| large cobble | 128 | 180 | |
| very large cobble | 180 | 256 | |
| small boulder | 256 | 362 | |
| small boulder | 362 | 512 | |
| medium boulder | 512 | 1024 | |
| large boulder | 1024 | 2048 | |
| very large boulder | 2048 | 4096 | |
| bedrock | | | |
| | Total Particle Count: | | 100 |

| | |
|---|---|
| | UT Sandy |
| | --- |
| | --- |
| Note: | |




| Size percent less than (mm) | | | | | Percent by substrate type | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| D16 | D35 | D50 | D84 | D95 | silt/clay | sand | gravel | cobble | boulder | bedrock |
| #N/A | #N/A | 0.1 | 0 | 80 | 40% | 50% | 3% | 7% | 0% | 0% |

# APPENDIX E

## Wetland Assessment

(Omitted, Not Applicable)

# APPENDIX F

## Project Photo Stations

PHOTOGRAPH 1: RIP-RAP. HEAD OF UT-1.

PHOTOGRAPH 2: CROSS VANE. STA: 100+12.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 06-07-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.

RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 3: CROSS VANE. STA: 100+73.

PHOTOGRAPH 4: CONSTRUCTED RIFFLE. STA: 101+09.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 06-07-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.
RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 5: CROSS VANE. STA: 101+40.

PHOTOGRAPH 6: CONSTRUCTED RIFFLE. STA: 102+25.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.
RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 7: CROSS VANE. STA: 102+85.

PHOTOGRAPH 8: CONSTRUCTED RIFFLE. STA: 103+15.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.
RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 9: RIP-RAP FOR WETLAND AREA.

PHOTOGRAPH 10: CONSTRUCTED RIFFLE. STA: 103+88.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.
RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 11: CROSSING. STA: 104+23.

PHOTOGRAPH 12: CROSS VANE. STA: 104+75.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.
RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 13: CROSS VANE. STA: 105+62.

PHOTOGRAPH 14: "A" VANE. STA: 106+60.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.

RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 15: RIP-RAP.

PHOTOGRAPH 16: CROSS VANE. STA: 107+49.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement PROGRAM

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.

RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 17: CROSS VANE. STA: 108+11.

PHOTOGRAPH 18: CONSTRUCTED RIFFLE. STA: 108+77.

| | | | | |
|---|---|---|---|---|
| McADAMS | PROJECT NO. EEP–08030<br>FILENAME: EEP08030X.DWG<br>SCALE: NTS<br>DATE: 07–01–10 | Ecosystem Enhancement Program | UT to SANDY CREEK RESTORATION<br>MONITORING PHOTOGRAPHS<br>RANDOLPH COUNTY, NC | EcoEngineering<br>A division of The John R. McAdams Company, Inc.<br>RESEARCH TRIANGLE PARK, NC<br>P.O. BOX 14005 ZIP 27709–4005<br>(919) 361–5000 |

PHOTOGRAPH 19: "A" VANE. STA: 109+14.

PHOTOGRAPH 20: CONSTRUCTED RIFFLE. STA:109+58.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.

RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 21: CROSS VANE. STA: 110+26.

PHOTOGRAPH 22: CONSTRUCTED RIFFLE. STA: 110+58.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.

RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 23: CROSSING. STA: 111+32.

PHOTOGRAPH 24: CROSS VANE. STA: 111+66.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.
RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 25: CONSTRUCTED RIFFLE. STA: 112+15.

PHOTOGRAPH 26: CROSS VANE. STA: 112+70.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.

RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 27: "A" VANE. STA: 113+80.

PHOTOGRAPH 28: CROSS VANE. STA: 115+15.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.
RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 29: "A" VANE. STA: 116+29.

PHOTORGAPH 30: "A" VANE. STA: 117+58.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.

RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 31: "A" VANE. STA: 118+46.

PHOTOGRAPH 32: CROSS VANE. STA: 119+07.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.
RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 33: CONSTRUCTED RIFFLE. STA: 120+25.

PHOTOGRAPH 34: RIP-RAP. WETLAND DRAINAGE.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.
RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 35: RIP-RAP. WELTAND DRAINAGE.

PHOTOGRAPH 36: CROSS VANE. STA: 122+00.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.
RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 37: RIP-RAP. HEAD OF UT-2.

PHOTOGRAPH 38: CROSS VANE. STA: 200+57.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.

RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 39: CROSS VANE. STA: 201+16.

PHOTOGRAPH 40: CROSS VANE. STA: 202+64.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.

RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 41: CROSS VANE. STA: 203+15.

PHOTOGRAPH 42: CROSS VANE. STA: 203+58.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement PROGRAM

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.
RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 43: CROSS SECTION I LOOKING UPSTREAM.

PHOTOGRAPH 44: CROSS SECTION I LOOKING DOWNSTREAM.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.
RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 45: CROSS SECTION I LOOKING AT THE LEFT BANK.

PHOTOGRAPH 46: CROSS SECTION I LOOKING AT THE RIGHT BANK.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.
RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 47: CROSS SECTION 1 LOOKING AT THE SUBSTRATE COMPOSITION.

PHOTOGRAPH 48: CROSS SECETION 2 LOOKING UPSTREAM.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.
RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 49: CROSS SECTION 2 LOOKING DOWNSTREAM.

PHOTOGRAPH 50: CROSS SECTION 2 LOOKING AT THE LEFT BANK.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.

RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 51. CROSS SECTION 2 LOOKING AT THE RIGHT BANK.

PHOTOGRAPH 52: CROSS SECTION 2 LOOKING AT THE SUBSTRATE COMPOSITION.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.

RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 53: CROSS SEECTION 3 LOOKING UPSTREAM.

PHOTOGRAPH 54: CROSS SECTION 3 LOOKING DOWNSTREAM.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

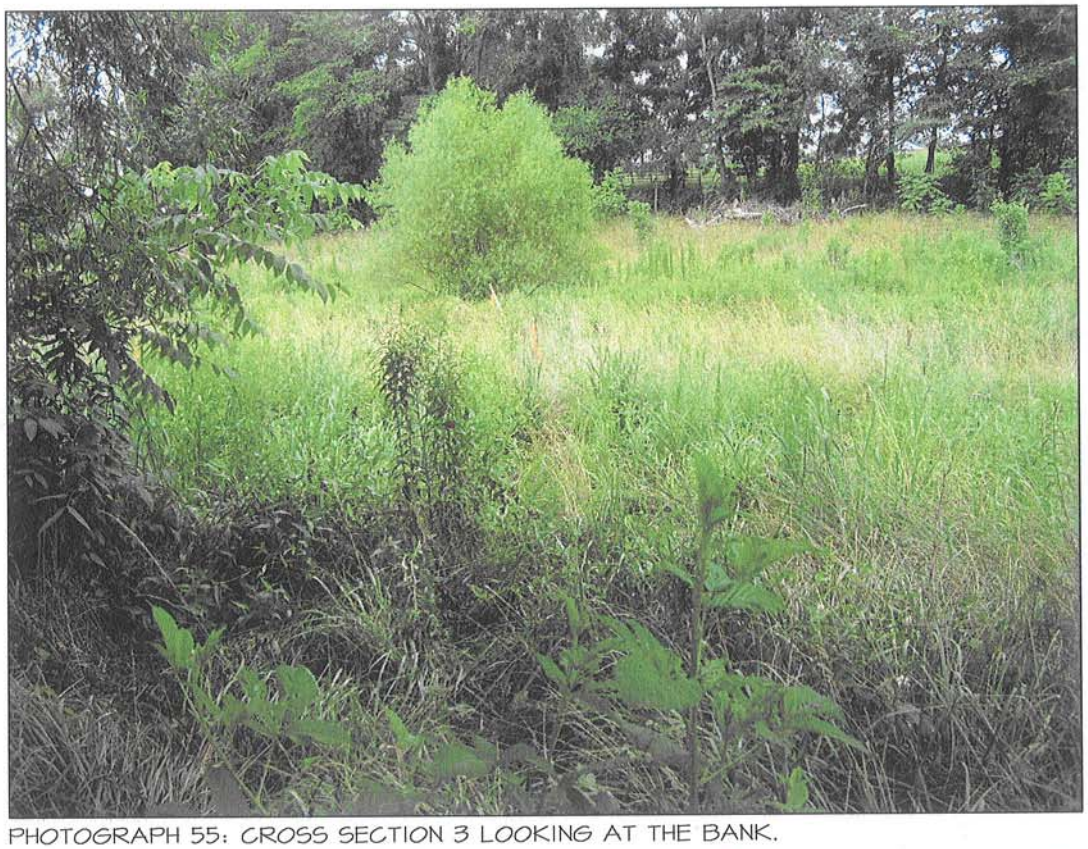
Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.
RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000



PHOTOGRAPH 55: CROSS SECTION 3 LOOKING AT THE BANK.

PHOTOGRAPH 56: CROSS SECTION 3 LOOKING AT THE RIGHT BANK.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.
RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 57: CROSS SECTION 3 LOOKING AT THE SUBSTRATE COMPOSITION.

PHOTOGRAPH 58: CROSS SECTION 4 LOOKING UPSTREAM.

| | | | | |
|---|---|---|---|---|
| McADAMS | PROJECT NO. EEP–08030<br>FILENAME: EEP08030X.DWG<br>SCALE: NTS<br>DATE: 07–01–10 | Ecosystem Enhancement PROGRAM | UT to SANDY CREEK RESTORATION<br>MONITORING PHOTOGRAPHS<br>RANDOLPH COUNTY, NC | EcoEngineering<br>A division of The John R. McAdams Company, Inc.<br>RESEARCH TRIANGLE PARK, NC<br>P.O. BOX 14005 ZIP 27709–4005<br>(919) 361–5000 |

PHOTOGRAPH 59: CROSS SECTION 4 LOOKING DOWNSTREAM.

PHOTOGRAPH 60: CROSS SECTION 4 LOOKING AT THE LEFT BANK.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement PROGRAM

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.
RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 61: CROSS SECTION 4 LOOKING AT THE RIGHT BANK.

PHOTOGRAPH 62: CROSS SECTION 4 LOOKING AT THE SUBSTRATE COMPOSITION.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.
RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 63: CROSS SECTION 5 LOOKING UPSTREAM.

PHOTOGRAPH 64: CROSS SECTION 5 LOOKING DOWNSTREAM.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.
RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 65: CROSS SECTION 5 LOOKING AT THE LEFT BANK.

PHOTOGRAPH 66: CROSS SECTION 5 LOOKING AT THE RIGHT BANK.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.
RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 67: CROSS SECTION 5 LOOKING AT THE SUBSTRATE COMPOSITION.

PHOTOGRAPH 68. CROSS SECTION 6 LOOKING UPSTREAM.

| | | | | |
|---|---|---|---|---|
| McADAMS | PROJECT NO. EEP–08030<br>FILENAME: EEP08030X.DWG<br>SCALE: NTS<br>DATE: 07–01–10 | Ecosystem Enhancement Program | UT to SANDY CREEK RESTORATION<br>MONITORING PHOTOGRAPHS<br>RANDOLPH COUNTY, NC | EcoEngineering<br>A division of The John R. McAdams Company, Inc.<br>RESEARCH TRIANGLE PARK, NC<br>P.O. BOX 14005 ZIP 27709–4005<br>(919) 361–5000 |

PHOTOGRAPH 69: CROSS SECTION 6 LOOKING DOWNSTREAM.

PHOTOGRAPH 70: CROSS SECTION 6 LOOKING AT THE LEFT BANK.

| | | | | |
|---|---|---|---|---|
| McADAMS | PROJECT NO. EEP–08030<br>FILENAME: EEP08030X.DWG<br>SCALE: NTS<br>DATE: 07–01–10 | Ecosystem Enhancement Program | UT to SANDY CREEK RESTORATION<br>MONITORING PHOTOGRAPHS<br>RANDOLPH COUNTY, NC | EcoEngineering<br>A division of The John R. McAdams Company, Inc.<br>RESEARCH TRIANGLE PARK, NC<br>P.O. BOX 14005 ZIP 27709–4005<br>(919) 361–5000 |

PHOTOGRAPH 71: CROSS SECTION 6 LOOKING AT THE RIGHT BANK.

PHOTOGRAPH 72: CROSS SECTION 6 LOOKING AT THE SUBSTRATE COMPOSITION.

| | | | | |
|---|---|---|---|---|
| McADAMS | PROJECT NO. EEP-08030<br>FILENAME: EEP08030X.DWG<br>SCALE: NTS<br>DATE: 07-01-10 | Ecosystem Enhancement Program | UT to SANDY CREEK RESTORATION<br>MONITORING PHOTOGRAPHS<br>RANDOLPH COUNTY, NC | EcoEngineering<br>A division of The John R. McAdams Company, Inc.<br>RESEARCH TRIANGLE PARK, NC<br>P.O. BOX 14005 ZIP 27709-4005<br>(919) 361-5000 |

PHOTOGRAPH 73: VEGETATION PLOT 1 IS LOCATED IN A PLANNED LOW-HEIGHT PLANTING ZONE. THIS PLOT WILL NOT BE RE-SAMPLED IN THE FUTURE.

PHOTOGRAPH 74: VEGETATION PLOT 2 IS LOCATED IN A PLANNED LOW-HEIGHT PLANTING ZONE. THIS PLOT WILL NOT BE RE-SAMPLED IN THE FUTURE.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 06-07-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.
RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000

PHOTOGRAPH 75: VEGETATION PLOT 3 IS LOCATED IN A PLANNED LOW-HEIGHT PLANTING ZONE. THIS PLOT WILL NOT BE RE-SAMPLED IN THE FUTURE.

PHOTOGRAPH 76: VEGETATION PLOT 4.

| | | | | |
|---|---|---|---|---|
| McADAMS | PROJECT NO. EEP-08030<br>FILENAME: EEP08030X.DWG<br>SCALE: NTS<br>DATE: 06-07-10 | Ecosystem Enhancement Program | UT to SANDY CREEK RESTORATION<br>MONITORING PHOTOGRAPHS<br>RANDOLPH COUNTY, NC | EcoEngineering<br>A division of The John R. McAdams Company, Inc.<br>RESEARCH TRIANGLE PARK, NC<br>P.O. BOX 14005 ZIP 27709-4005<br>(919) 361-5000 |

PHOTOGRAPH 77: VEGETATION PLOT 5.

PHOTOGRAPH 78: VEGETATION PLOT 6.

| | | | | |
|---|---|---|---|---|
| McADAMS | PROJECT NO. EEP-08030<br>FILENAME: EEP08030X.DWG<br>SCALE: NTS<br>DATE: 06-07-10 | Ecosystem Enhancement Program | UT to SANDY CREEK RESTORATION<br>MONITORING PHOTOGRAPHS<br>RANDOLPH COUNTY, NC | EcoEngineering<br>A division of The John R. McAdams Company, Inc.<br>RESEARCH TRIANGLE PARK, NC<br>P.O. BOX 14005 ZIP 27709-4005<br>(919) 361-5000 |

PHOTOGRAPH 79: VIEW OF FLOODPLAIN LOOKING DOWNSTREAM.

| | |
|---|---|
| PROJECT NO. | EEP-08030 |
| FILENAME: | EEP08030X.DWG |
| SCALE: | NTS |
| DATE: | 07-01-10 |

McADAMS

Ecosystem Enhancement Program

# UT to SANDY CREEK RESTORATION

## MONITORING PHOTOGRAPHS

RANDOLPH COUNTY, NC

EcoEngineering
A division of The John R. McAdams Company, Inc.
RESEARCH TRIANGLE PARK, NC
P.O. BOX 14005 ZIP 27709-4005
(919) 361-5000