# UT to Little Hunting Creek (Johnson Site)
# Stream Restoration
## EEP Project No. 197
## 2010 Monitoring Report: Year 3 of 5

**Construction Completed: November 2007**
**Submission Date: September 2011**

**Prepared for:**

NCDENR-EEP
1652 Mail Service Center
Raleigh, NC 27699

**Prepared by:**

Jordan, Jones and Goulding
309 East Morehead Street, Suite 110
Charlotte, NC 28202

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4.6 Pebble Count Plots and Raw Data Tables

# SECTION 1
# EXECUTIVE SUMMARY

# SECTION 1
## EXECUTIVE SUMMARY

The unnamed tributary to Little Hunting Creek (UTLHC) Stream Restoration Project (Site) is located west of Harmony Highway (NC 21) and north of Hunting Creek Road (SR 1111) in Iredell County, North Carolina (Appendix 1.1). The Site lies within the 197 acre parcel owned by Mrs. Lottie V. Johnson. UTLHC is a first order perennial stream located in the Northern Inner Piedmont ecoregion in the Yadkin River Basin (USGS HUC 03040102). The stream restoration plan was designed by KCI Associates of North Carolina. Construction and seeding activities were completed in the fall of 2007.

This report serves as the third year of the five year monitoring plan for the Site.

## 1.1 Goals and Objectives

UTLHC is an active dairy farm with several structures located on the property for housing livestock and storing farm machinery. The primary land uses on the site are dairy operation, rangeland, agriculture (small grain), and forest. A private residence is located on the northeastern section of the property. The following goals and objectives were established for the Site.

*Restoration Goals*

1. Restore a stable channel that is capable of moving the flows and sediment provided by its watershed.
2. Improve water quality and reduce land and riparian vegetation loss resulting from lateral erosion and bed degradation.
3. Enhance aquatic and terrestrial habitat.

*Restoration Objectives*

1. Build an appropriate B4c type channel with stable dimensions.
2. Plant a riparian buffer of native trees and shrubs.
3. Install in-stream structures that will promote bed feature diversity and prevent vertical instability.
4. Exclude livestock from the riparian buffer.

The stream was restored by establishing appropriate dimension and profile to 2,209 lf of UTLHC (Restoration, Priority 3) and stabilize in-place approximately 417 linear feet (lf) of UTLHC's tributaries (Stabilization, Priority 4). UTLHC's main channel was designed and constructed as a B4c type channel. The restoration reach was restored using native vegetation and in-stream structures, such as cross-vanes and rock sill grade controls. Riparian areas were planted with native bare root seedlings and herbaceous cover to enhance the riparian areas and stabilize

streambanks. Construction of the restoration project was completed in the fall of 2007. Appendix 2 provides more detailed project activity, history, contact information, and watershed/site background information for this project.

## 1.2 Vegetative Assessment

The CVS protocol (Level 2) was conducted to assess the vegetation plots for the 2010 monitoring year (MY-3). Vegetative monitoring success criteria as stated in the 2008 mitigation plan requires that planted woody vegetation must meet a minimum survival success rate of 320 stems/acre after three years, 288 stems/acre after four years, and 260 stems/acre after five years (KCI, 2008). Previously, land access issues resulted in the monitoring activities to be postponed during the 2008 calendar year. The first survey opportunity occurred in the month of January 2009 during the vegetative dormant season; therefore, the 2009 survey was the first year of the CVS vegetation monitoring.

The monitoring data recorded an average of 6 planted live stems per plot. The average site density is approximately 254 planted stems per acre, which does not meet the year 1-3 goal of 320 planted stems per acre. Two out of the seven Plots (Plots 2 and 3) met the vegetation success threshold for the 2010 monitoring year. Plots 1, 5, and 7 would meet the vegetation success threshold with the inclusion of the volunteer species recorded within the plot.

Planted stem mortality within the plots is most likely due to the stress associated with the drought like conditions that occurred throughout North Carolina in 2007 during plant installation; however, it could also be attributed to wildlife grazing. The vigor of the live planted stems within the plots that appear to have been affected by wildlife activity and drought conditions within the 2009 growing season and did not show improvements in the 2010 growing season. Approximately 41 percent of the planted stems scored a vigor level lower than 3 including those missing (23%) or dead (14%). Supplemental plantings may be warranted within planted areas along the Site if the planted stems vigor level continues to decline to ensure the site meets vegetation success criteria in monitoring year 5.

In conclusion, the Site did not meet the success criterion of 320 stems per acre for the 2010 monitoring year. Please refer to Appendix 1.2 for the Current Condition Plan View (CCPV) and Appendix 3 for vegetation photos and raw data tables.

## 1.3 Stream Assessment

A total of five cross-sections and 2,156 linear feet of longitudinal profile were monitored within the main reach of UTLHC. Overall, sediment deposition rates have impacted the channel's profile in that the channel has begun to aggrade in the upper and lower reaches, while the dimension and pattern have remained stable. These areas of aggradation appear to have resulted from different sediment sources. The upstream reach is most likely due to on-site agricultural practices. The downstream reach's aggradation is most likely due to the backwater effects from its confluence with the main channel of Little Hunting Creek. In areas of aggradation, in-stream vegetation is common, which is most likely due to the low flow conditions that were occurring in

previous monitoring years. There are a few areas with bare banks due to lack of vegetation growth, but overall they have not progressed from previous monitoring years.

Over the last three monitoring years, the bankfull mean depth has decreased, which has most likely resulted from the high sediment deposition. The average bankfull width (10.30 ft) of the surveyed cross-sections is wider than the 2009 result of 9.52 ft, resulting in an average Width/Depth ratio of 12.44. This is a significant increase from the 2009 average Width/Depth ratio of 9.63. This shift in dimension is likely due to the sediment deposition occurring along the entire project reach. However, the average riffle entrenchment ratio has remained within the proposed design classification (2.04), which a B-type stream channel. For the 2010 monitoring year, the stream's classification was determined to be a B5c.

Due to aggradation and deposition, the bedform distribution diversity has declined over the past monitoring years. The substrate analysis illustrates a trend toward finer sediment composition compared to the 2009 monitoring year. The upstream reach of the project stream has adjusted from a riffle-pool sequence into a continuous run with micro-pools forming. The average water surface slope and the average bankfull slope were very similar for the surveyed reach, 0.0192 ft/ft and 0.0193 ft/ft, respectively. The structures appear to be in good condition and continue to maintain grade, preventing degradation; however, the high sediment deposition has resulted in a few structures being buried by sediment.

It is assumed that three bankfull or greater events occurred within the Site in the 2010 monitoring year. Since a gauge is not located on-site to record bankfull events, the local USGS gauge number 02118500 located on the main channel of Hunting Creek near Harmony, NC, was used to evaluate the recorded significant rainfall events that could have resulted in a bankfull or greater event within the Site (Appendix 4.3).

In conclusion, although the stream is experiencing aggradation in the upper and lower sections of the stream, the Site did meet the stream mitigation goals for the 2010 monitoring year. It is recommended that the source of the fine sediment in the upper reach be identified and stabilized to prevent the fines from depositing in the stream and thereby resulting in further aggradation. Please refer to Appendix 1.2 for the current conditions and Appendix 4 for morphological plots and data tables.

## 1.4 Annual Monitoring Summary

In summary, the Site has met the stream mitigation goals for monitoring year three. The Site did not meet the vegetation success goal for the 2010 monitoring year. Planted stem mortality within the plots is most likely due to the drought like conditions that occurred throughout North Carolina in 2007 during plant installation; however, it may also be attributed to wildlife grazing. Results from the 2010 stream monitoring effort indicate that aggradation along UTLHC is a concern and has prevented the stream from sustaining a diverse bed profile. Some areas are illustrating bare banks and in-stream vegetation, however visual assessments along the channel indicate that there are no major advancements towards streambank instability within the reach.

The background information provided in this report is referenced from the mitigation plan prepared by KCI and Associates (2008). 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 EEP's website. All raw data supporting the tables and figures in the appendices is available from EEP upon request.

# SECTION 2
# METHODOLOGY

# SECTION 2
# METHODOLOGY

## 2.1 Methodology

Methods employed for the Site were a combination of those established by standard regulatory guidance and procedure documents as well as previous monitoring reports completed by KCI. Geomorphic and stream assessments were performed following guidelines outlined in the Stream Channel Reference Sites: An Illustrated Guide to Field Techniques (Harrelson et al., 1994) and in the Stream Restoration a Natural Channel Design Handbook (Doll et al, 2003). Precipitation data for the bankfull verification was obtained from an off-site resource. Vegetation assessments were performed following the Carolina Vegetation Survey-NCEEP Level 2 Protocol (Lee et al., 2006). JJG used the *Flora of the Carolinas, Virginia, Georgia, and surrounding areas* by Alan S. Weakley as the taxonomic standard for vegetation nomenclature for this report. Off-site daily precipitation was obtained from the USGS gauge station number 02118500 on Hunting Creek near Harmony, NC (the closest location offering daily precipitation data) through the USGS URL (http://waterdata.usgs.gov/nwis/dv?cb_00060=on&cb_00065=on&cb_00045=on&format=html&begin_date=2008-01-01&end_date=2009-12-1&site_no=02118500&referred_module=sw).

# SECTION 3
# REFERENCES

# SECTION 3
## REFERENCES


Doll, B.A., Grabow, G.L., Hall, K.A., Halley, J., Harman, W.A., Jennings, G.D., and Wise, D.E., 2003. Stream Restoration A Natural Channel Design Handbook.

Harrelson, Cheryl C; Rawlins, C.L.; Potyondy, John P. 1994. *Stream Channel Reference Sites: An Illustrated Guide to Field Technique.* Gen. Tech. Rep. RM-245. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 61 p.

KCI Associates of NC. 2008. Johnson Site Stream Restoration Mitigation Plan and As-Built Report (2008). Raleigh, NC.

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

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

Weakley, A.S. 2008. *Flora of the Carolinas, Virginia, Georgia, Northern Florida, and Surrounding Areas* (Draft April 2008). University of North Carolina at Chapel Hill: Chapel Hill, NC.

# SECTION 4
# APPENDICES

**Appendix 1 - General Figures and Plan Views**

**Appendix 2 - General Project Tables**

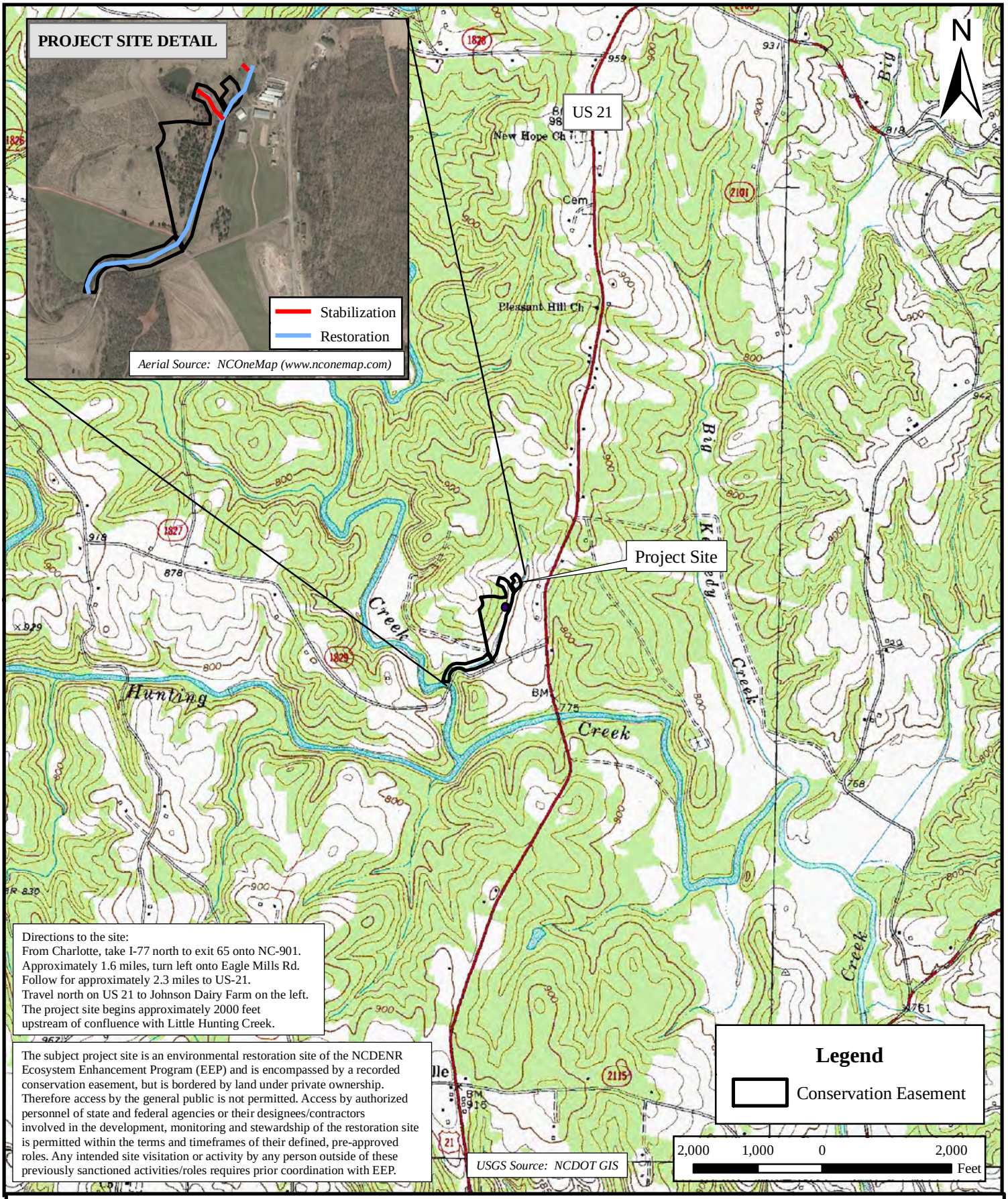
**Appendix 3 - Vegetation Assessment Data**

**Appendix 4 – Stream Assessment Data**

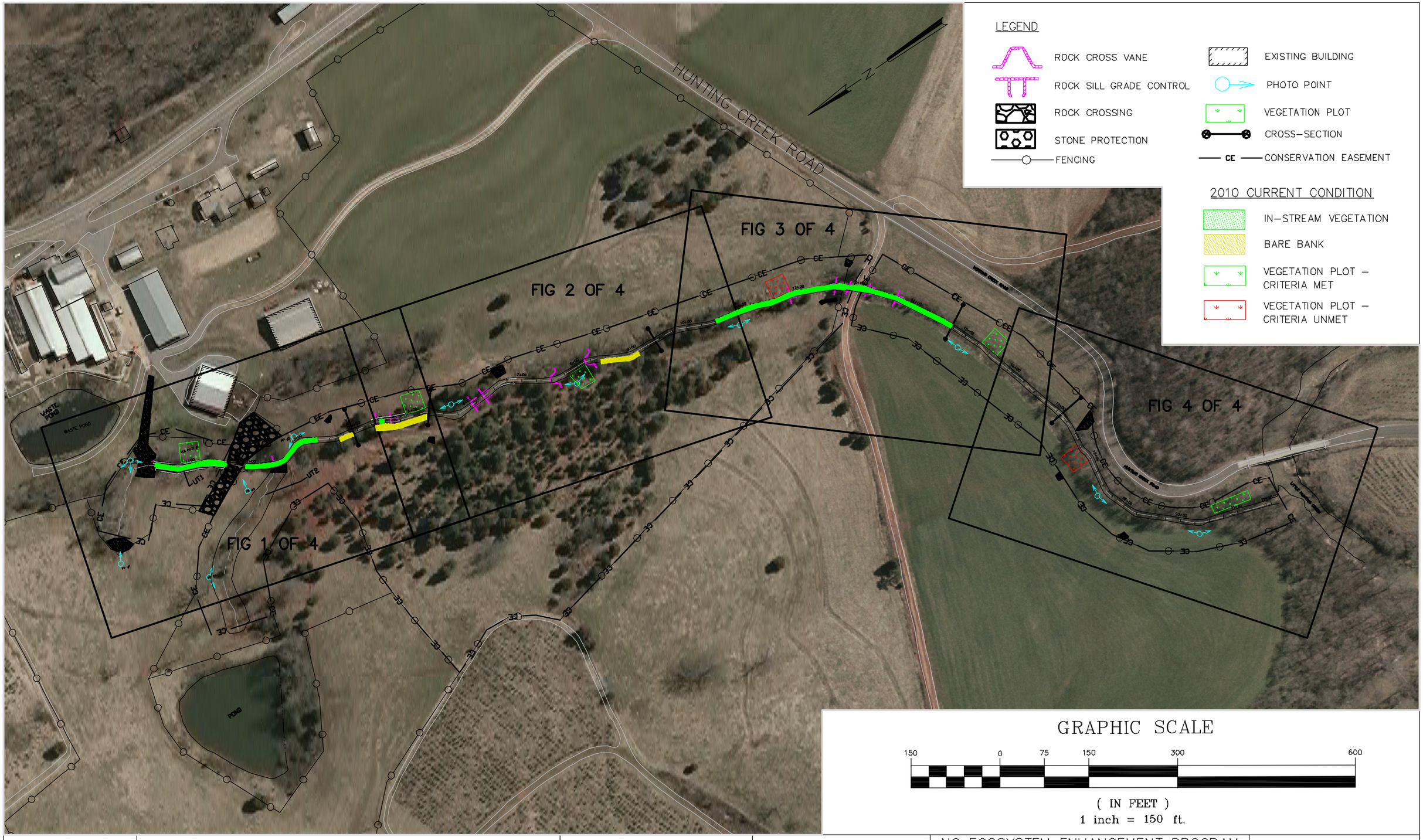
# APPENDIX 1
# GENERAL FIGURES AND PLAN VIEWS

## 1.1 Project Vicinity Map

## 1.2 Current Condition Plan View




Appendix 1.1 Project Vicinity Map
Johnson Site Stream Restoration/EEP Project No. 197
Iredell County, NC
Monitoring Year 3 of 5
Submittal Date: August 2011




LEGEND

- ROCK CROSS VANE
- ROCK SILL GRADE CONTROL
- ROCK CROSSING
- STONE PROTECTION
- FENCING
- EXISTING BUILDING
- PHOTO POINT
- VEGETATION PLOT
- CROSS-SECTION
- CE — CONSERVATION EASEMENT

2010 CURRENT CONDITION

- IN-STREAM VEGETATION
- BARE BANK
- VEGETATION PLOT – CRITERIA MET
- VEGETATION PLOT – CRITERIA UNMET

GRAPHIC SCALE

150 0 75 150 300 600

( IN FEET )

1 inch = 150 ft.

NOTES:
1. GENERAL SITE DATA PROVIDED BY NCEEP.
2. ALL LOCATIONS ARE APPROXIMATE.

EEP PROJECT NO. 197
IREDELL COUNTY,
NORTH CAROLINA
MONITORING YEAR 3 of 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
UT TO LITTLE HUNTING CREEK

CURRENT CONDITION PLAN VIEW

DATE : AUGUST 2011

JOB NO.: JJX31100

FIGURE KEY

WASTE POND

N

PP #1

PP #2

0+00

VEG PLOT #1

1+00

UT1

2+00

PP #3

PP #4

UT2

PP #5

3+00

X-SECTION #1

4+00

MATCHLINE STA. 4+75
SEE FIGURE 2 OF 4

CE

## LEGEND

- ROCK CROSS VANE
- ROCK SILL GRADE CONTROL
- ROCK CROSSING
- STONE PROTECTION
- FENCING
- EXISTING BUILDING
- PHOTO POINT
- VEGETATION PLOT
- CROSS-SECTION
- CE — CONSERVATION EASEMENT

## 2010 CURRENT CONDITION

- IN-STREAM VEGETATION
- BARE BANK
- VEGETATION PLOT – CRITERIA MET
- VEGETATION PLOT – CRITERIA UNMET

GRAPHIC SCALE

40 0 20 40 80 160

( IN FEET )
1 inch = 40 ft.

Ecosystem Enhancement PROGRAM

NOTES:
1. GENERAL SITE DATA PROVIDED BY NCEEP.
2. ALL LOCATIONS ARE APPROXIMATE.

EEP PROJECT NO. 197
IREDELL COUNTY,
NORTH CAROLINA
MONITORING YEAR 3 of 5

JJG

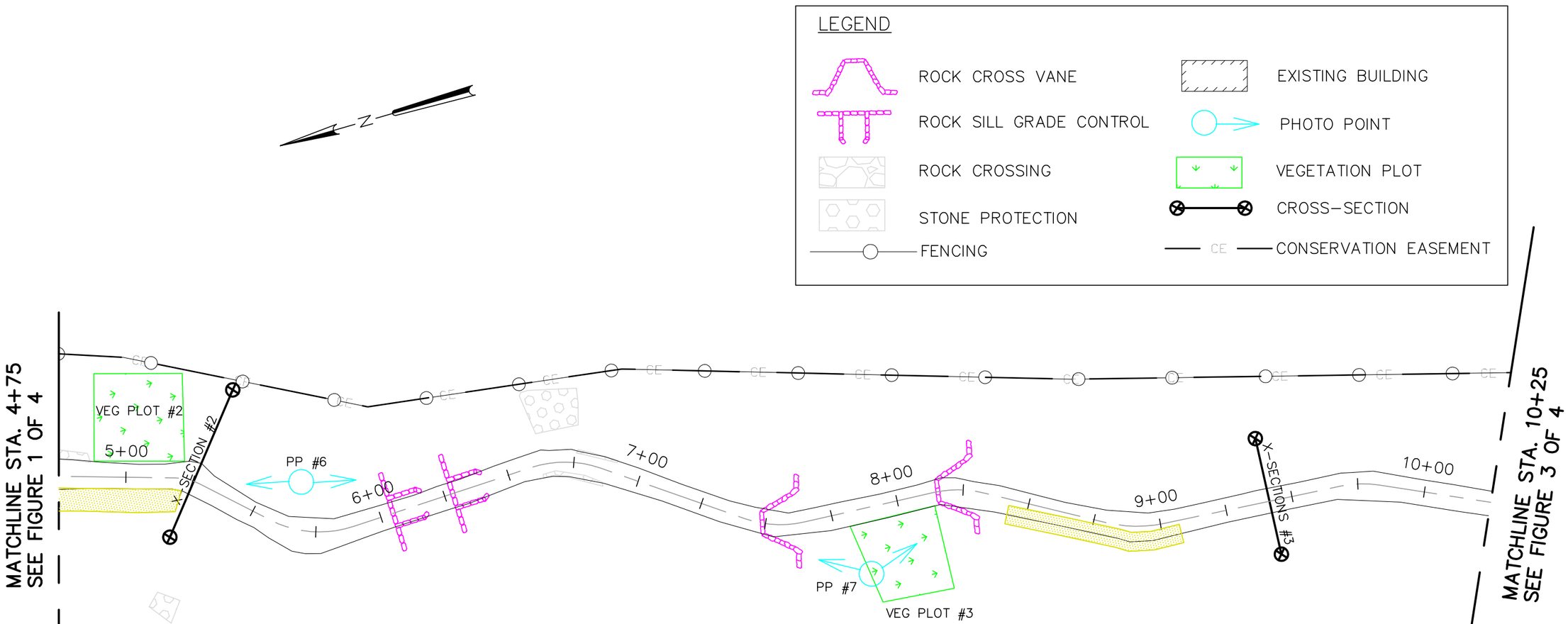
NC ECOSYSTEM ENHANCEMENT PROGRAM
UT TO LITTLE HUNTING CREEK

CURRENT CONDITION PLAN VIEW

DATE : AUGUST 2011

JOB NO.: JJX31100

FIGURE 1 OF 4




GRAPHIC SCALE

40 0 20 40 80 160

( IN FEET )

1 inch = 40 ft.

2010 CURRENT CONDITION

- IN-STREAM VEGETATION
- BARE BANK
- VEGETATION PLOT – CRITERIA MET
- VEGETATION PLOT – CRITERIA UNMET

NOTES:
1. GENERAL SITE DATA PROVIDED BY NCEEP.
2. ALL LOCATIONS ARE APPROXIMATE.

EEP PROJECT NO. 197
IREDELL COUNTY,
NORTH CAROLINA
MONITORING YEAR 3 of 5

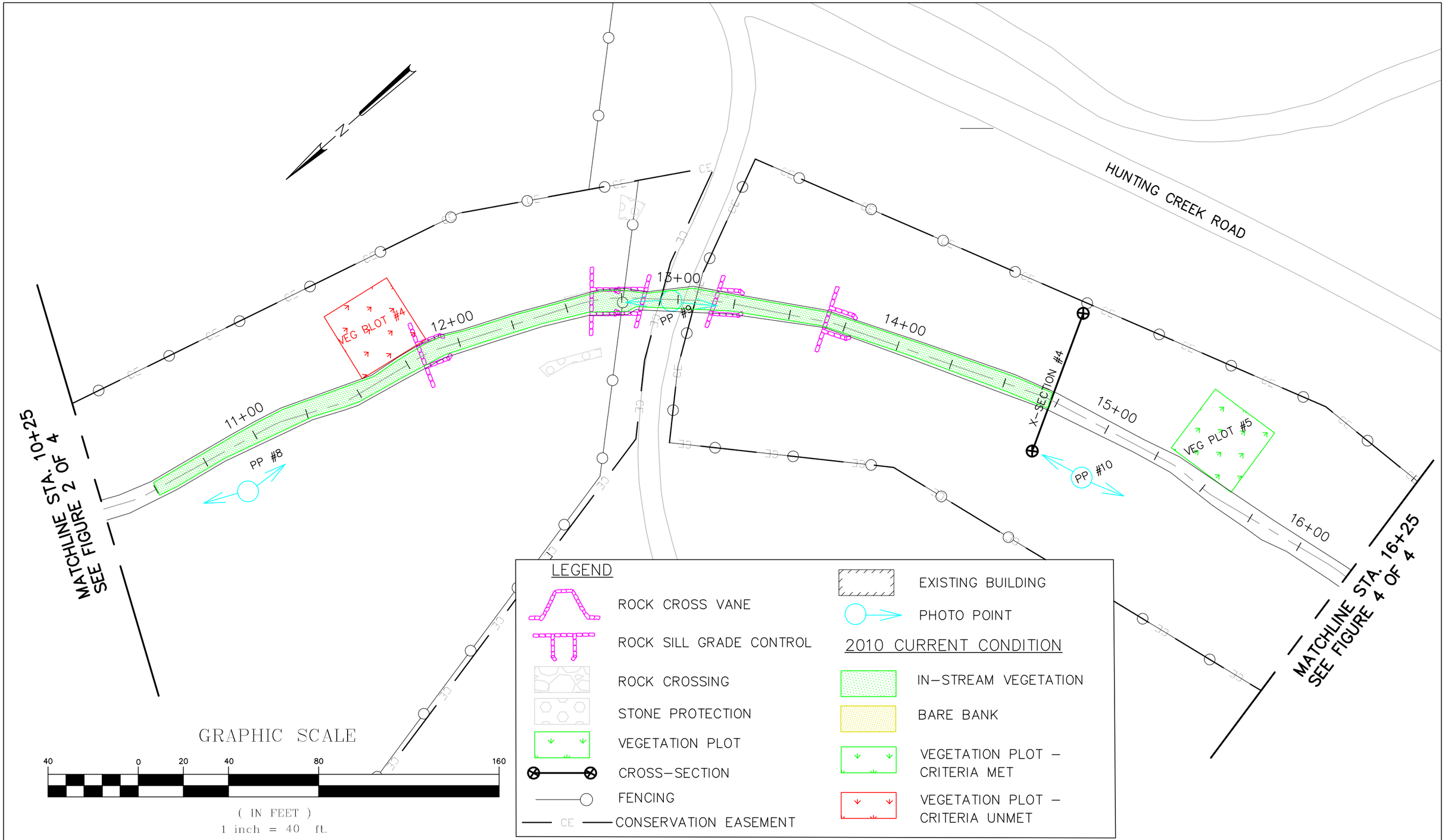
NC ECOSYSTEM ENHANCEMENT PROGRAM
UT TO LITTLE HUNTING CREEK

CURRENT CONDITION PLAN VIEW

DATE : AUGUST 2011

JOB NO.: JJX31100

FIGURE 2 OF 4

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EEP PROJECT NO. 197
IREDELL COUNTY,
NORTH CAROLINA
MONITORING YEAR 3 of 5

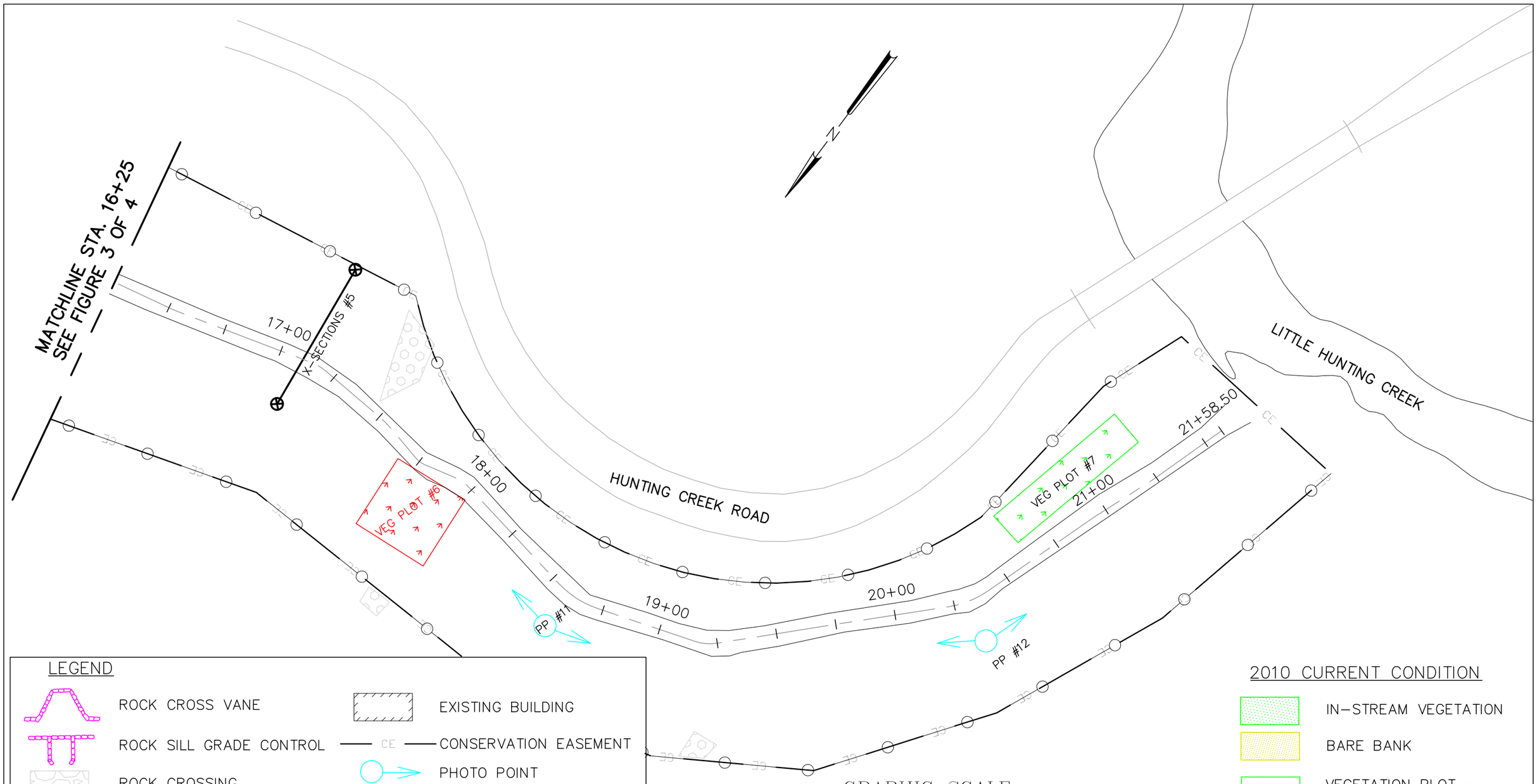
NC ECOSYSTEM ENHANCEMENT PROGRAM
UT TO LITTLE HUNTING CREEK

CURRENT CONDITION PLAN VIEW

DATE : AUGUST 2011

JOB NO.: JJX31100

FIGURE 3 OF 4




LEGEND

- ROCK CROSS VANE
- ROCK SILL GRADE CONTROL
- ROCK CROSSING
- STONE PROTECTION
- VEGETATION PLOT
- EXISTING BUILDING
- CE — CONSERVATION EASEMENT
- PHOTO POINT
- FENCING
- CROSS-SECTION

2010 CURRENT CONDITION

- IN-STREAM VEGETATION
- BARE BANK
- VEGETATION PLOT – CRITERIA MET
- VEGETATION PLOT – CRITERIA UNMET

GRAPHIC SCALE

40 0 20 40 80 160

( IN FEET )

1 inch = 40 ft.

NOTES:
1. GENERAL SITE DATA PROVIDED BY NCEEP.
2. ALL LOCATIONS ARE APPROXIMATE.

EEP PROJECT NO. 197
IREDELL COUNTY,
NORTH CAROLINA
MONITORING YEAR 3 of 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
UT TO LITTLE HUNTING CREEK

CURRENT CONDITION PLAN VIEW

DATE : AUGUST 2011

JOB NO.: JJX31100

FIGURE 4 OF 4

# APPENDIX 2
# GENERAL PROJECT TABLES

**2.1 Project Mitigation Structure and Objectives**

**2.2 Project Activity and Reporting History**

**2.3 Project Contacts**

**2.4 Project Attribute Table**

**Appendix 2.1 Project Mitigation Structure and Objectives**
**UT to Little Hunting Creek (Johnson Site)/EEP Project No. 197**
**Monitoring Year 3 of 5**

| Segment/Reach | Mitigation Type | Approach | Linear Footage or Acres | Stationing (ft) | Comments |
|---|---|---|---|---|---|
| UTLHC | Restoration | P3 | 2,209 lf | 10+00-32+09 | Channel restoration, established dimension and profile with use of grade control and bank protection structures; livestock exclusion. Project length includes a 27-foot wide easement exception |
| UT1 | Enhancement | E2 | 117 lf | | Channel stabilization; livestock exclusion |
| UT2 | Enhancement | E2 | 300 lf | | Channel stabilization; livestock exclusion |

**Component Summations**

| Restoration Level | Stream (lf) | Wetland (ac) | | Upland (ac) | Buffer (ac) | BMP |
|---|---|---|---|---|---|---|
| | | Riparian | Non-Riparian | | | |
| Restoration (R) | 2,209 | N/A | N/A | N/A | N/A | N/A |
| Enhancement (E) | N/A | N/A | N/A | N/A | N/A | N/A |
| Enahncement I (E) | N/A | N/A | N/A | N/A | N/A | N/A |
| Enhancement II (E) | 417 | N/A | N/A | N/A | N/A | N/A |
| Creation (C) | N/A | N/A | N/A | N/A | N/A | N/A |
| Preservation (P) | N/A | N/A | N/A | N/A | N/A | N/A |
| HQ Preservation (P) | N/A | N/A | N/A | N/A | N/A | N/A |
| **Totals** | **2,626** | **N/A** | **N/A** | **N/A** | **N/A** | **N/A** |

**Appendix 2.2 Project Activity and Reporting History**
**UT to Little Hunting Creek (Johnson Site)/EEP Project No. 197**
**Monitoring Year 3 of 5**

**Elapsed Time Since Grading Complete: 3 Years**
**Elapsed Time Since Initial Planting Complete: 3 Years**
**Number of Reporting Years: 3**

| Activity or Report | Data Collection Completed | Actual Completion or Delivery |
|---|---|---|
| Restoration Plan | Nov-05 | Feb-06 |
| Final Design-90% | Nov-05 | Feb-06 |
| Construction | N/A | Nov-07 |
| Temporary S&E mix applied to entire project area* | N/A | Nov-07 |
| Permanent seed mix applied to reach | N/A | Nov-07 |
| Containerized and B&B plantings for reach | N/A | Dec-07 |
| Mitigation Plan/ As-Built (Year 0 Monitoring) | Dec-07 | Jun-08 |
| Year 1 Monitoring | Jan-09 | Feb-09 |
| Year 2 Monitoring | Jun-09 | Dec-09 |
| Year 3 Monitoring | Sept-10/Nov-10 | Jan-11 |
| Year 4 Monitoring | 2011 | 2011 |
| Year 5 Monitoring | 2012 | 2012 |

*Seed and mulch is added as each section of construction is completed.

**Appendix 2.3 Project Contacts**
**UT to Little Hunting Creek (Johnson Site)/EEP Project No. 197**
**Monitoring Year 3 of 5**

| | |
|---|---|
| **Designer** | KCI Associates of North Carolina, P.A. |
| | Landmark Center II, Suite 220 |
| | 4601 Six Forks Road |
| | Raleigh, NC 27609 |
| **Construction** | Quartermaster Environmental Inc. |
| | P.O. Drawer 400 |
| | Shelby, NC 28150 |
| **Planting Contractor** | Carolina Wetland Services |
| | 550 E. Westinghouse Blvd. |
| | Charlotte, NC 28273 |
| **Seeding Contractor** | Quartermaster Environmental Inc. |
| | P.O. Drawer 400 |
| | Shelby, NC 28150 |
| **Monitoring Performers** | Jordan, Jones and Goulding |
| | 309 E. Morehead Street, Suite 110 |
| | Charlotte, NC 28202 |
| **Stream Monitoring, POC** | Alison Nichols, 704-527-4106 ext.227 |
| **Vegetation Monitoring, POC** | |

**Appendix 2.4 Project Attribute Table**
**UT to Little Hunting Creek (Johnson Site)/EEP Project No. 197**
**Monitoring Year 3 of 5**

| | | | |
|---|---|---|---|
| Project County | Iredell County, North Carolina | | |
| Physiographic Region | Piedmont | | |
| Ecoregion | Northern Inner Piedmont | | |
| Project River Basin | Yadkin | | |
| USGS HUC for Project (14 digit) | 03040102020030 | | |
| NCDWQ Sub-basin for Project and Reference | 03-07-06 | | |
| Within extent of EEP Watershed Plan? | U | | |
| WRC Class (Warm, Cool, Cold) | Warm | | |
| % of project easement fenced or demarcated? | 100% | | |
| Beaver activity observed during design phase? | No | | |
| | | | |
| **Restoration Component Attribute Table** | | | |
| | **Main Channel** | **UT1** | **UT2** |
| Drainage Area (sq.mi.) | 0.17 | >0.016 | >0.016 |
| Stream Order | 1st | 1st | 1st |
| Restored Length (ft) | 2,209 | 117 | 300 |
| Perennial or Intermittent | Perennial | Intermittent | Intermittent |
| Watershed type (Rural, Urban, Developing) | Rural | | |
| Watershed LULC Distribution | | | |
| Agriculture | - | | |
| Commercial | - | | |
| Public/Institutional | - | | |
| Residential | - | | |
| Transportation | - | | |
| Watershed Impervious Cover (%) | ~3 | | |
| NCDWQ AU/Index number | - | | |
| NCDWQ classification | WS-III | | |
| 303d listed? | No | | |
| Upstream of a 303d listed sedment? | Yes | | |
| Reasons for 303d listing or stressor | Turbidity | | |
| Total acreage of easement | 10.1 acres | | |
| Total vegetated acreage within the easement | - | | |
| Total planted acreage as part of the restoration | - | | |
| Rosgen classification of the pre-existing | - | - | - |
| Rosgen classification of the As-Built | B4 | N/A | N/A |
| Valley Type | - | | |
| Valley slope | - | | |
| Valley side slope range | - | | |
| Valley toe slope range | - | | |
| Cowardin classification | N/A | | |
| Trout waters designation | No | | |
| Species of concern, endangered, etc? (Y/N) | N/A | | |
| Dominant soil series and characteristics | Chewalca, Colfax Sandy Loam, Various Cecil Series | | |
| Series | - | | |
| Depth | - | | |
| Clay % | - | | |
| K | - | | |
| T | - | | |

"N/A": items do not apply / "-": items are unavailable / "U": items are unknown

# APPENDIX 3
# VEGETATION ASSESSMENT DATA

**3.1 Vegetation Plot Mitigation Success**

**3.2 Vegetation Monitoring Plot Photos**

**3.3 Vegetation Plot Summary Data Table**

**3.4 Vegetation Condition Assessment**

**Appendix 3.1 Vegetation Plot Mitigation Success**
**UT to Little Hunting Creek (Johnson Site) Stream Restoration/EEP Project No. 197**
**Monitoring Year 3 of 5**

| Vegetation Plot ID | Vegetation Survival Threshold Met (Y/N) |
|---|---|
| Plot 1 | N |
| Plot 2 | Y |
| Plot 3 | Y |
| Plot 4 | N |
| Plot 5 | N |
| Plot 6 | N |
| Plot 7 | N |

Vegetation Plot 1
(10/2010)

Vegetation Plot 2
(10/2010)

Vegetation Plot 3
(10/2010)

Vegetation Plot 4
(10/2010)

Prepared For:

Ecosystem Enhancement Program

Appendix 3.2 Vegetation Monitoring Plot Photos
UT to Little Hunting Creek (Johnson Site)/EEP Project No. 197
Monitoring Year 3 of 5
Submittal Date: September 2011

Prepared By:

JJG

Vegetation Plot 5
(10/2010)

Vegetation Plot 6
(10/2010)

Vegetation Plot 7
(10/2010)

Prepared For:

Ecosystem Enhancement Program

Appendix 3.2 Vegetation Monitoring Plot Photos
UT to Little Hunting Creek (Johnson Site)/EEP Project No. 197
Monitoring Year 3 of 5
Submittal Date: September 2011

Prepared By:

JJG

**Appendix 3.3 Vegetation Plot Summary Data Table**
**UT to Little Hunting Creek (Johnson Site) Stream Restoration/EEP Project No. 197**
**Monitoring Year 3 of 5**

| | | | Current Data (MY3-2010) | | | | | | | | | | | | | | Annual Means | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Plot 1 | | Plot 2 | | Plot 3 | | Plot 4 | | Plot 5 | | Plot 6 | | Plot 7 | | Current Mean | | MY1 - 2007 | | MY2 - 2009 | |
| **Species** | **Common Name** | **Type** | P | T | P | T | P | T | P | T | P | T | P | T | P | T | P | T | P | T | P | T |
| *Acer negundo* | box elder | | 0 | 20 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | **N/A** | **6** | | | **N/A** | **1** |
| *Betula nigra* | river birch | T | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | **1** | **1** | | | **1** | **1** |
| *Cornus amomum* | silky dogwood | S | 1 | 1 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 0 | 0 | **2** | **2** | | | **2** | **2** |
| *Diospyros virginiana* | common persimmon | T | 1 | 1 | 2 | 3 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | **1** | **1** | | | **N/A** | **N/A** |
| *Fraxinus pennsylvanica* | green ash | T | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 3 | **1** | **1** | | | **1** | **1** |
| *Liquidambar styraciflua* | sweetgum | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | **0** | **0** | | * | **N/A** | **N/A** |
| *Liriodendron tulipifera* | tuliptree | T | 1 | 3 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | **1** | | | **1** | **2** |
| *Pinus taeda* | loblolly pine | T | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | **0** | | | **N/A** | **N/A** |
| *Platanus occidentalis* | american sycamore | T | 0 | 0 | 0 | 0 | 2 | 2 | 1 | 1 | 2 | 2 | 0 | 0 | 1 | 1 | **1** | **1** | | | **2** | **2** |
| *Quercus falcata* | southern red oak | T | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | **1** | **1** | | | **2** | **2** |
| *Unknown sp.* | | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | **0** | **0** | | | **1** | **2** |
| **Plot Area (acres)** | | | **0.0247** | | | | | | | | | | | | | | | | | | | |
| **Species Count** | | | **10** | **10** | **10** | **10** | **10** | **10** | **10** | **10** | **10** | **10** | **10** | **10** | **10** | **10** | **10** | **10** | | | **7** | **7** |
| **Stem Count** | | | **6** | **8** | **9** | **10** | **9** | **11** | **5** | **5** | **5** | **9** | **4** | **4** | **6** | **8** | **6** | **8** | | * | **11** | **11** |
| **Stems per Acre** | | | **243** | **324** | **364** | **405** | **364** | **445** | **202** | **202** | **202** | **364** | **162** | **162** | **243** | **324** | **254** | **318** | | | **283** | **301** |

Type=**S**hrub or **T**ree
P = Planted
T = Total
*Data was not collected in MY1 due to land access issues

**Appendix 3.4 Vegetation Condition Assessment**
**UT to Little Hunting Creek (Johnson Site) Stream Restoration/EEP Project No. 197**
**Monitoring Year 3 of 5**

**Planted Acreage** **9.8**

| Vegetation Category | Definitions | Mapping Threshold (acres) | Number of Polygons | Combined Acreage | % of Planted Acreage* |
|---|---|---|---|---|---|
| **Bare Areas** | Very limited cover of both woody and herbaceous material. | 0.1 | 2 | U | U |
| **Low Stem Density Areas** | Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria. | 0.1 | 5 | 0.12 | 1% |
| | | **Total** | **0** | **0** | **1%** |
| **Areas of Poor Growth Rates or Vigor** | Areas with woody stems of a size class that are obviously small given the monitoring year. | | | | |

**Easement Acreage** **10.1**

| Vegetation Category | Definitions | Mapping Threshold (SF) | Number of Polygons | Combined Acreage | % of Planted Acreage |
|---|---|---|---|---|---|
| **Invasive Areas of Concern** | Areas of points (if too small to render as polygons at map scale). | 1000 | 0 | 0 | 0% |
| | | | | | |
| **Easement Encroachment Areas** | Areas of points (if too small to render as polygons at map scale). | none | 0 | 0 | 0% |

# APPENDIX 4
# STREAM ASSESSMENT DATA

**4.1 Stream Station Photos**

**4.2 Qualitative Visual Stability Assessment**

**4.3 Verification of Bankfull Events**

**4.4 Cross-Section Plots and Raw Data Tables***

**4.5 Longitudinal Plots and Raw Data Tables***

**4.6 Pebble Count Plots and Raw Data Tables***

*Raw data tables have been provided electronically.

Photo Point 1-View Downstream
Tributary (10/2010)

Photo Point 2-View Upstream
Tributary (10/2010)

Photo Point 2-View Downstream
Main Channel (10/2010)

Photo Point 2-View Upstream
Main Channel (10/2010)

Prepared For:

Ecosystem Enhancement Program

Appendix 4.1 Stream Station Photos
Hunting Creek Stream Restoration/EEP Project No. 197
Monitoring Year 3 of 5
Submittal Date: September 2011

Prepared For:

JJG

Photo Point 3-View Upstream
Main Channel (10/2010)

Photo Point 4-View Downstream
Tributary (10/2010)

Photo Point 4-View Upstream
Tributary (10/2010)

Photo Point 5-View Downstream
Main Channel (10/2010)

Photo Point 5-View Upstream
Main Channel (10/2010)

Photo Point 6-View Downstream
Main Channel (10/2010)

Photo Point 6-View Upstream
Main Channel (10/2010)

Photo Point 7-View Downstream
Main Channel (10/2010)

Photo Point 7-View Upstream
Main Channel (10/2010)

Photo Point 8-View Downstream
Main Channel (10/2010)

Photo Point 8-View Upstream
Main Channel (10/2010)

Photo Point 9-View Downstream
Main Channel (10/2010)

Photo Point 9-View Upstream
Main Channel (10/2010)

Photo Point 10-View Downstream
Main Channel (10/2010)

Photo Point 10-View Upstream
Main Channel (10/2010)

Prepared For:

Ecosystem Enhancement Program

Appendix 4.1 Stream Station Photos
Hunting Creek Stream Restoration/EEP Project No. 197
Monitoring Year 3 of 5
Submittal Date: September 2011

Prepared For:

JJG

Photo Point 11-View Downstream
Main Channel (10/2010)

Photo Point 11-View Upstream
Main Channel (10/2010)

Photo Point 12-View Downstream
Main Channel (10/2010)

Photo Point 12-View Upstream
Main Channel (10/2010)

**Appendix 4.2 Qualitative Visual Stability Assessment**
**Main Channel (2,209 lf)**
**UT to Little Hunting Creek (Johnson Site) Stream Restoration/EEP Project No. 197**
**Monitoring Year 3 of 5**

| Major Channel Category | Channel Sub-Category | Metric | Number Stable, Performing as Intended | Total Number in As-Built | Number of Unstable Segments | Amount of Unstable Footage | % Stable, Performing as Intended | Number with Stabilizing Woody Vegetation | Footage with Stabilizing Woody Vegetation | Adjust % for Stabilizing Woody Vegetation |
|---|---|---|---|---|---|---|---|---|---|---|
| **1. Bed** | **1. Vertical Stability (Riffle and Run units)** | Aggradation* | | | 2 | 360 | 89% | | | |
| | | Degradation | | | 0 | 0 | 100% | | | |
| | **2. Riffle Condition** | Texture/Substrate | 13 | 32 | | | 41% | | | |
| | **3. Meander Pool Condition** | Depth Sufficient | | 22 | | | 0% | | | |
| | | Length Appropriate | | 22 | | | 0% | | | |
| | **4. Thalweg Position** | Thalweg centering at upstream of meander bend (Run) | | 22 | | | 0% | | | |
| | | Thalweg centering at downstream of meander bend (Glide) | | 22 | | | 0% | | | |
| | | | | | | | | | | |
| **2. Bank** | **1. Scoured/Eroded** | Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion | | | 2 | 115 | 97% | 0 | 0 | 97% |
| | **2. Undercut** | Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat | | | 0 | 0 | 100% | 0 | 0 | 100% |
| | **3. Mass Wasting** | Bank slumping, calving, or collapse | | | 0 | 0 | 100% | 0 | 0 | 100% |
| | | | | **Totals** | 2 | 115 | 97% | 0 | 0 | 100% |
| **3. Engineered Structures** | **1. Overall Integrity** | Structures physically intact with no dislodged boulders or logs. | 11 | 11 | | | 100% | | | |
| | **2. Grade Control** | Grade control structures exhibiting maintenance of grade across the sill | 11 | 11 | | | 100% | | | |
| | **2a. Piping** | Structures lacking any substantial flow underneath sills or arms. | 11 | 11 | | | 100% | | | |
| | **3. Bank Protection** | Bank erosion within the structures extent of influence does not exceed 15%. | 11 | 11 | | | 100% | | | |
| | **4. Habitat** | Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow. | 9 | 11 | | | 82% | | | |

**Appendix 4.3 Verification of Bankfull Events**
**UT to Little Hunting Creek (Johnson Site) Stream Restoration/EEP Project No. 197**
**Monitoring Year 3 of 5**

| Date of Collection | Date of Occurrence | Method | Photo # (if available) |
|---|---|---|---|
| Unknown 2008 | Unknown | Land Owner Confirmation | N/A |
| 2009 | Unknown | USGS Data | N/A |
| 2010 | Unknown | USGS Data | N/A |

| Date of Rainfall | Amount (inches) | USGS Approved (A) or Provisional (P) |
|---|---|---|
| 8/26/2008 | 1.6 | A |
| 8/27/2008 | 2.96 | A |
| 12/10/2008 | 1.06 | P |
| 12/11/2008 | 2.04 | P |
| 1/6/2009-1/7/2009 | 2.55 | A |
| 6/3/2009-6/5/2009 | 4.59 | P |
| 1/24/2010-1/25/2010 | 2.56 | P |
| 2/05/2010-2/06/10 | 2.33 | P |
| 5/16/2010-5/17/2010 | 5.41 | P |

**Appendix 4.4 Cross-Section Plots and Raw Data Tables**
**UT to Little Hunting Creek (Johnson Site) Stream Restoration/EEP Project No. 197**
**Monitoring Year 3 of 5**

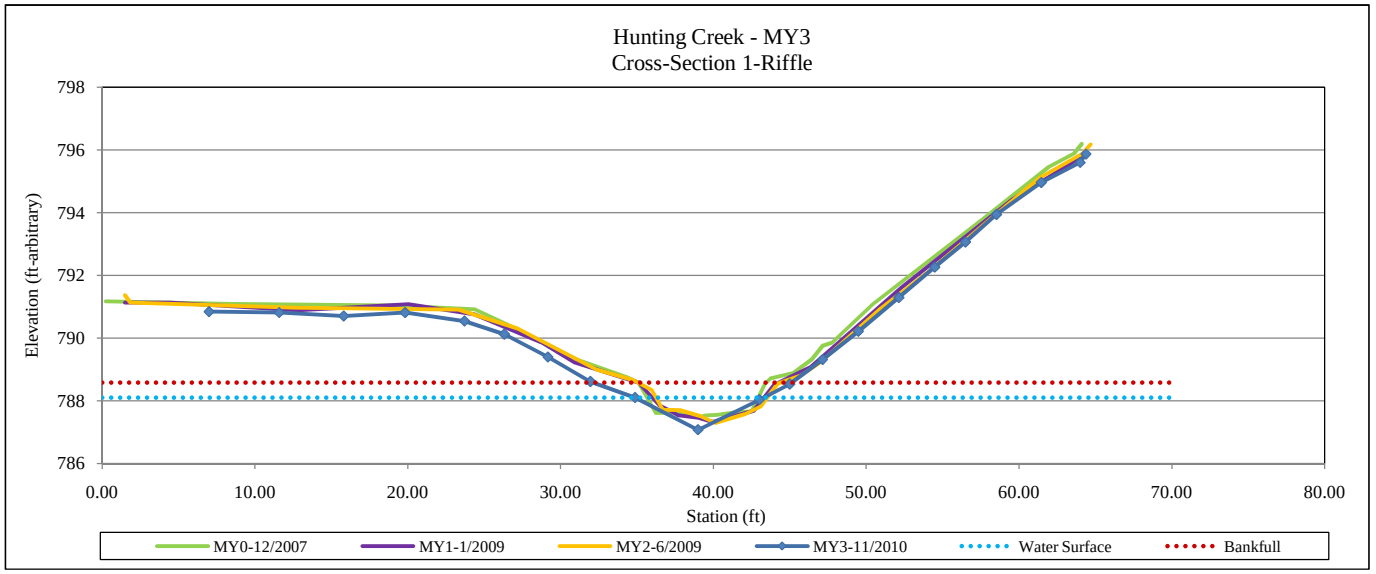
| | |
|---|---|
| **Project Name** | **Hunting Creek** |
| **EEP Project Number** | **197** |
| **Cross-Section ID** | **XS-1, Riffle, 3+92** |
| **Survey Date** | **11/2010** |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation (ft)** | 788.58 |
| **Bankfull Cross-Sectional Area ($ft^2$)** | 9.50 |
| **Bankfull Width (ft)** | 13.01 |
| **Flood Prone Area Elevation (ft)** | 790.09 |
| **Flood Prone Width (ft)** | 22.73 |
| **Bankfull Mean Depth (ft)** | 0.73 |
| **Bankfull Max Depth (ft)** | 1.51 |
| **W/D Ratio** | 17.82 |
| **Entrenchment Ratio** | 1.75 |
| **Bank Height Ratio** | 2.48 |

**XS-1: View Upstream**

**XS-1: View Downstream**

| Station | Elevation | Notes |
|---|---|---|
| 7.00 | 790.84 | xs1 |
| 11.59 | 790.81 | xs1 |
| 15.81 | 790.70 | xs1 |
| 19.83 | 790.81 | xs1 |
| 23.71 | 790.54 | xs1 |
| 26.32 | 790.12 | xs1 |
| 29.17 | 789.39 | xs1 |
| 31.95 | 788.61 | xs1 |
| 34.87 | 788.10 | xs1-lew |
| 38.99 | 787.07 | xs1 |
| 43.01 | 788.03 | xs1 |
| 44.99 | 788.53 | xs1 |
| 47.14 | 789.31 | xs1 |
| 49.48 | 790.21 | xs1 |
| 52.13 | 791.29 | xs1 |
| 54.47 | 792.26 | xs1 |
| 56.49 | 793.06 | xs1 |
| 58.52 | 793.94 | xs1 |
| 61.45 | 794.96 | xs1 |
| 63.99 | 795.60 | xs1 |
| 64.37 | 795.87 | xs1-rpt |



**Appendix 4.4 Cross-Section Plots and Raw Data Tables**
**UT to Little Hunting Creek (Johnson Site) Stream Restoration/EEP Project No. 197**
**Monitoring Year 3 of 5**

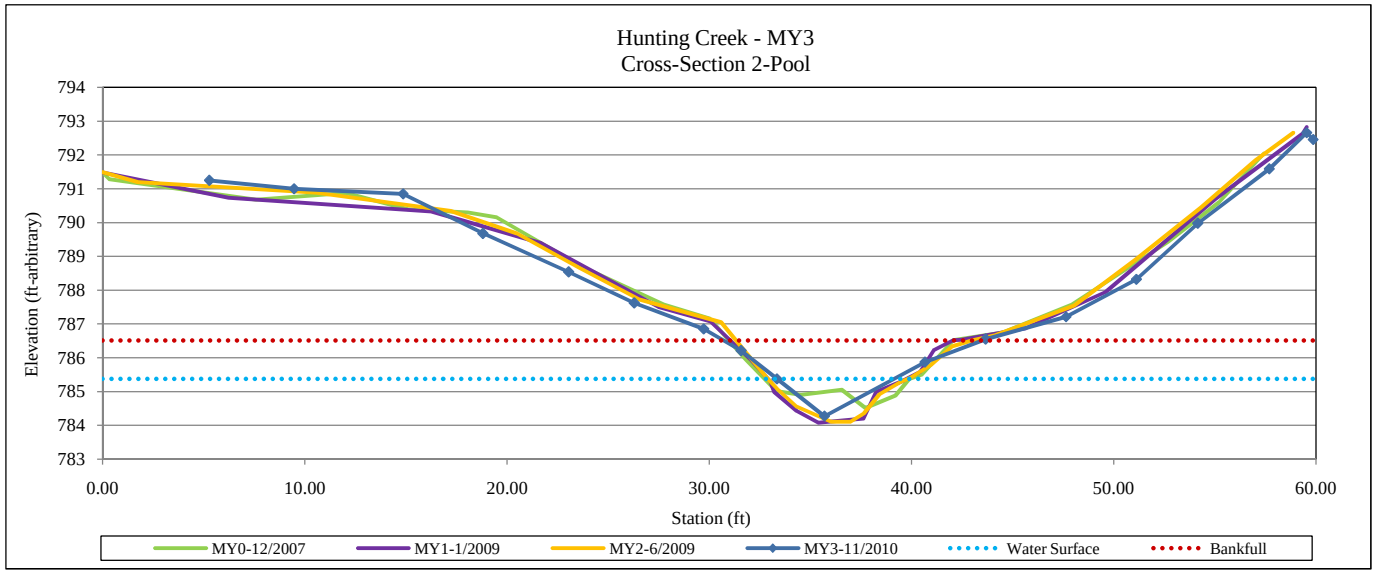
| | |
|---|---|
| **Project Name** | **Hunting Creek** |
| **EEP Project Number** | **197** |
| **Cross-Section ID** | **XS-2, Pool, 5+25** |
| **Survey Date** | **11/2010** |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation (ft)** | 786.51 |
| **Bankfull Cross-Sectional Area ($ft^2$)** | 13.44 |
| **Bankfull Width (ft)** | 12.78 |
| **Flood Prone Area Elevation (ft)** | 788.75 |
| **Flood Prone Width (ft)** | 29.65 |
| **Bankfull Mean Depth (ft)** | 1.05 |
| **Bankfull Max Depth (ft)** | 2.24 |
| **W/D Ratio** | 12.17 |
| **Entrenchment Ratio** | 2.32 |
| **Bank Height Ratio** | 2.94 |

**XS-2: View Upstream**

**XS-2: View Downstream**

| Station | Elevation | Notes |
|---|---|---|
| 5.28 | 791.25 | xs2 |
| 9.47 | 791 | xs2 |
| 14.86 | 790.85 | xs2 |
| 18.81 | 789.68 | xs2 |
| 23.05 | 788.54 | xs2 |
| 26.29 | 787.62 | xs2 |
| 29.73 | 786.85 | xs2 |
| 31.58 | 786.21 | xs2 |
| 33.35 | 785.37 | xs2-lew |
| 35.7 | 784.27 | xs2 |
| 40.67 | 785.37 | xs2-rew |
| 43.67 | 786.55 | xs2 |
| 47.65 | 787.21 | xs2 |
| 51.13 | 788.32 | xs2 |
| 54.16 | 789.98 | xs2 |
| 57.7 | 791.59 | xs2 |
| 59.55 | 792.66 | xs2-rpt |
| 59.87 | 792.46 | xs2 |



**Appendix 4.4 Cross-Section Plots and Raw Data Tables**
**UT to Little Hunting Creek (Johnson Site) Stream Restoration/EEP Project No. 197**
**Monitoring Year 3 of 5**

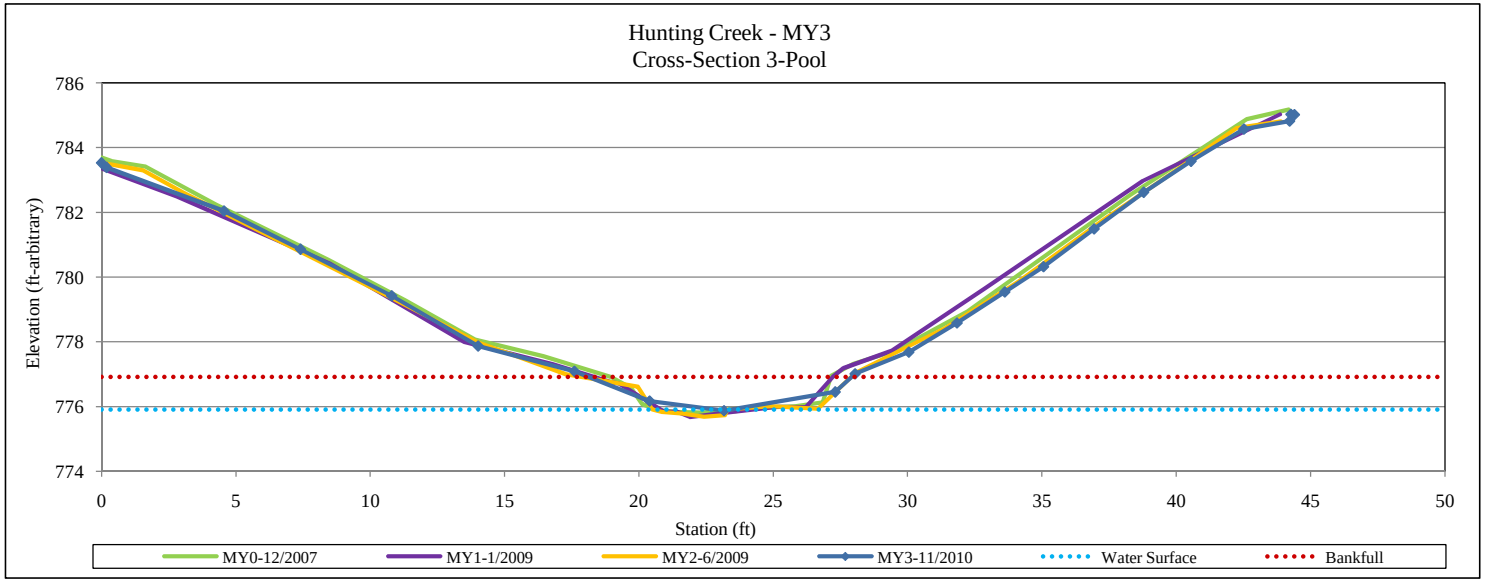
| | |
|---|---|
| **Project Name** | **Hunting Creek** |
| **EEP Project Number** | **197** |
| **Cross-Section ID** | **XS-3, Pool, 9+41** |
| **Survey Date** | **11/2010** |

| SUMMARY DATA | |
|---|---|
| **Bankfull Elevation (ft)** | 776.91 |
| **Bankfull Cross-Sectional Area ($ft^2$)** | 6.54 |
| **Bankfull Width (ft)** | 9.77 |
| **Flood Prone Area Elevation (ft)** | 777.95 |
| **Flood Prone Width (ft)** | 16.73 |
| **Bankfull Mean Depth (ft)** | 0.67 |
| **Bankfull Max Depth (ft)** | 1.04 |
| **W/D Ratio** | 14.58 |
| **Entrenchment Ratio** | 1.71 |
| **Bank Height Ratio** | 7.36 |

**XS-3: View Upstream**

**XS-3: View Downstream**

| Station | Elevation | Notes |
|---|---|---|
| 0.00 | 783.53 | x3-lpt |
| 0.19 | 783.39 | x3 |
| 4.56 | 782.04 | x3 |
| 7.41 | 780.86 | x3 |
| 10.80 | 779.42 | x3 |
| 14.02 | 777.87 | x3 |
| 17.60 | 777.09 | x3 |
| 20.40 | 776.17 | x3 |
| 23.17 | 775.87 | x3 |
| 27.31 | 776.45 | x3 |
| 28.05 | 777.01 | x3 |
| 30.05 | 777.68 | x3 |
| 31.84 | 778.58 | x3 |
| 33.62 | 779.54 | x3 |
| 35.06 | 780.32 | x3 |
| 36.94 | 781.49 | x3 |
| 38.79 | 782.62 | x3 |
| 40.55 | 783.58 | x3 |
| 42.52 | 784.57 | x3 |
| 44.22 | 784.82 | x3 |
| 44.27 | 785.03 | x3-rpt |
| 44.40 | 785.02 | x3 |



**Appendix 4.4 Cross-Section Plots and Raw Data Tables**
**UT to Little Hunting Creek (Johnson Site) Stream Restoration/EEP Project No. 197**
**Monitoring Year 3 of 5**

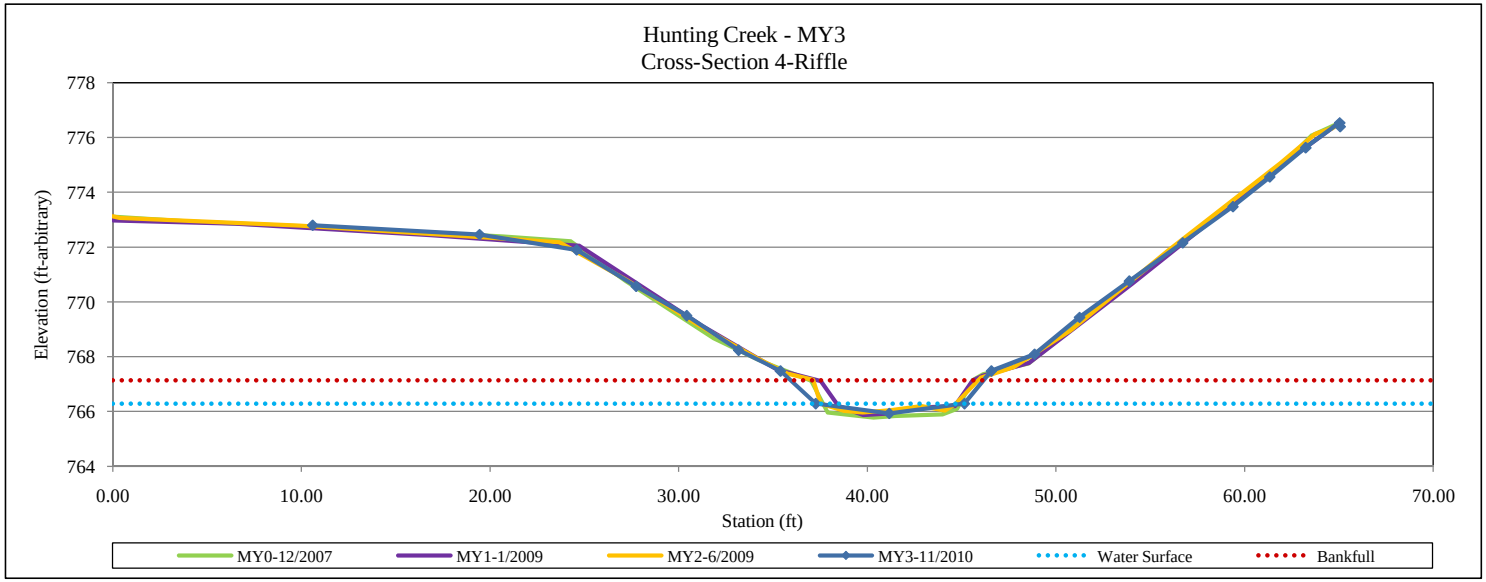
| | |
|---|---|
| **Project Name** | **Hunting Creek** |
| **EEP Project Number** | **197** |
| **Cross-Section ID** | **XS-4, Riffle, 14+72** |
| **Survey Date** | **11/2010** |

| **SUMMARY DATA** | |
|---|---|
| **Bankfull Elevation (ft)** | 767.14 |
| **Bankfull Cross-Sectional Area ($ft^2$)** | 7.48 |
| **Bankfull Width (ft)** | 9.92 |
| **Flood Prone Area Elevation (ft)** | 768.35 |
| **Flood Prone Width (ft)** | 16.39 |
| **Bankfull Mean Depth (ft)** | 0.75 |
| **Bankfull Max Depth (ft)** | 1.21 |
| **W/D Ratio** | 13.23 |
| **Entrenchment Ratio** | 1.65 |
| **Bank Height Ratio** | 4.93 |

**XS-4: View Upstream**

**XS-4: View Downstream**

| Station | Elevation | Notes |
|---|---|---|
| 10.59 | 772.8 | x4 |
| 19.44 | 772.46 | x4 |
| 24.59 | 771.9 | x4 |
| 27.74 | 770.57 | x4 |
| 30.42 | 769.5 | x4 |
| 33.17 | 768.24 | x4 |
| 35.39 | 767.48 | x4 |
| 37.26 | 766.29 | x4-lew |
| 41.16 | 765.93 | x4 |
| 45.15 | 766.29 | x4-rew |
| 46.58 | 767.48 | x4 |
| 48.86 | 768.09 | x4 |
| 51.25 | 769.44 | x4 |
| 53.89 | 770.76 | x4 |
| 56.72 | 772.16 | x4 |
| 59.38 | 773.48 | x4 |
| 61.33 | 774.56 | x4 |
| 63.24 | 775.63 | x4 |
| 65.04 | 776.54 | x4-rpt |
| 65.07 | 776.4 | x4 |



**Appendix 4.4 Cross-Section Plots and Raw Data Tables**
**UT to Little Hunting Creek (Johnson Site) Stream Restoration/EEP Project No. 197**
**Monitoring Year 3 of 5**

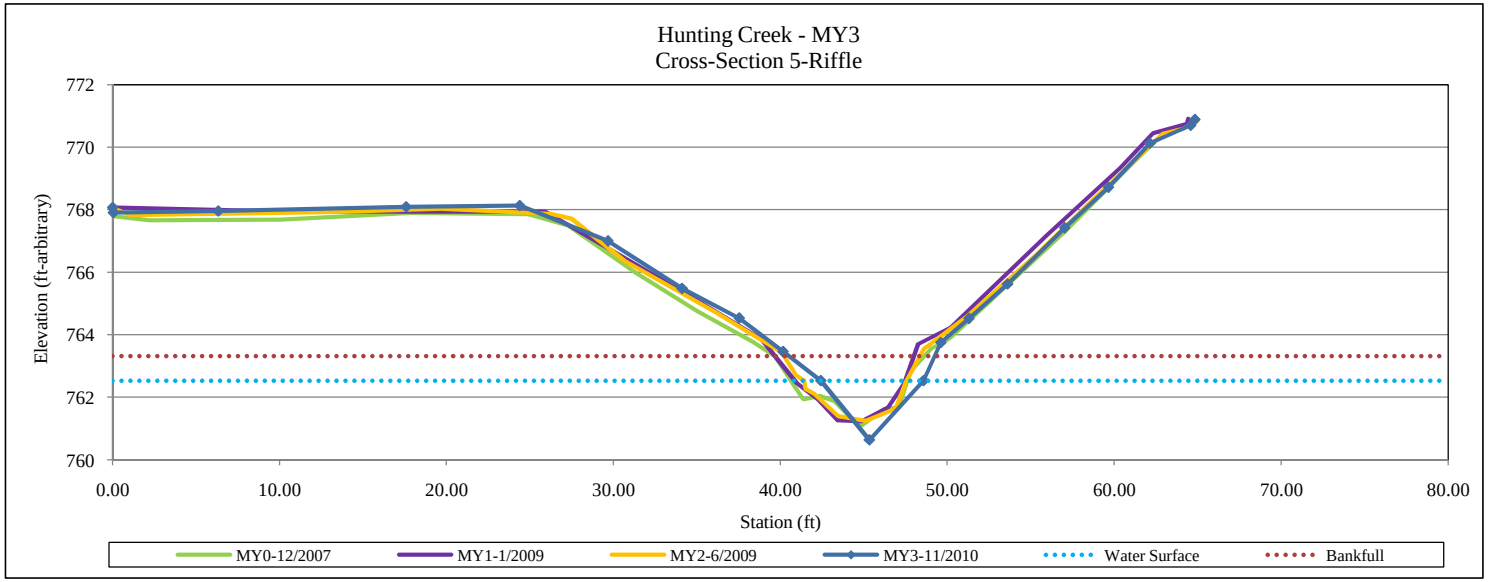
| | |
|---|---|
| **Project Name** | **Hunting Creek** |
| **EEP Project Number** | **197** |
| **Cross-Section ID** | **XS-5, Riffle, 17+10** |
| **Survey Date** | **11/2010** |

| **SUMMARY DATA** | |
|---|---|
| **Bankfull Elevation (ft)** | 763.30 |
| **Bankfull Cross-Sectional Area ($ft^2$)** | 10.10 |
| **Bankfull Width (ft)** | 7.97 |
| **Flood Prone Area Elevation (ft)** | 765.97 |
| **Flood Prone Width (ft)** | 21.58 |
| **Bankfull Mean Depth (ft)** | 1.27 |
| **Bankfull Max Depth (ft)** | 2.67 |
| **W/D Ratio** | 6.28 |
| **Entrenchment Ratio** | 2.71 |
| **Bank Height Ratio** | 2.81 |

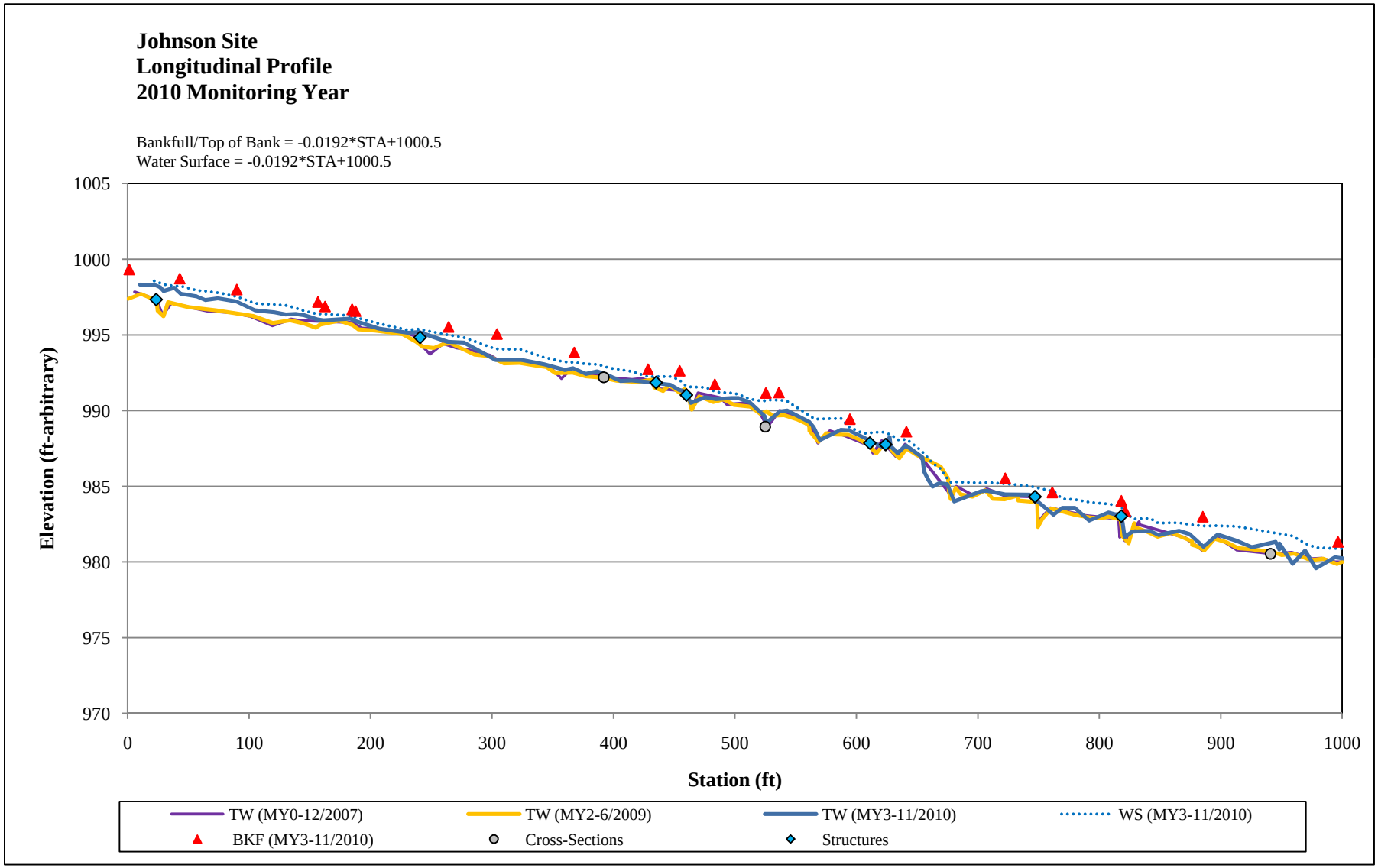
**XS-5: View Upstream**

**XS-5: View Downstream**

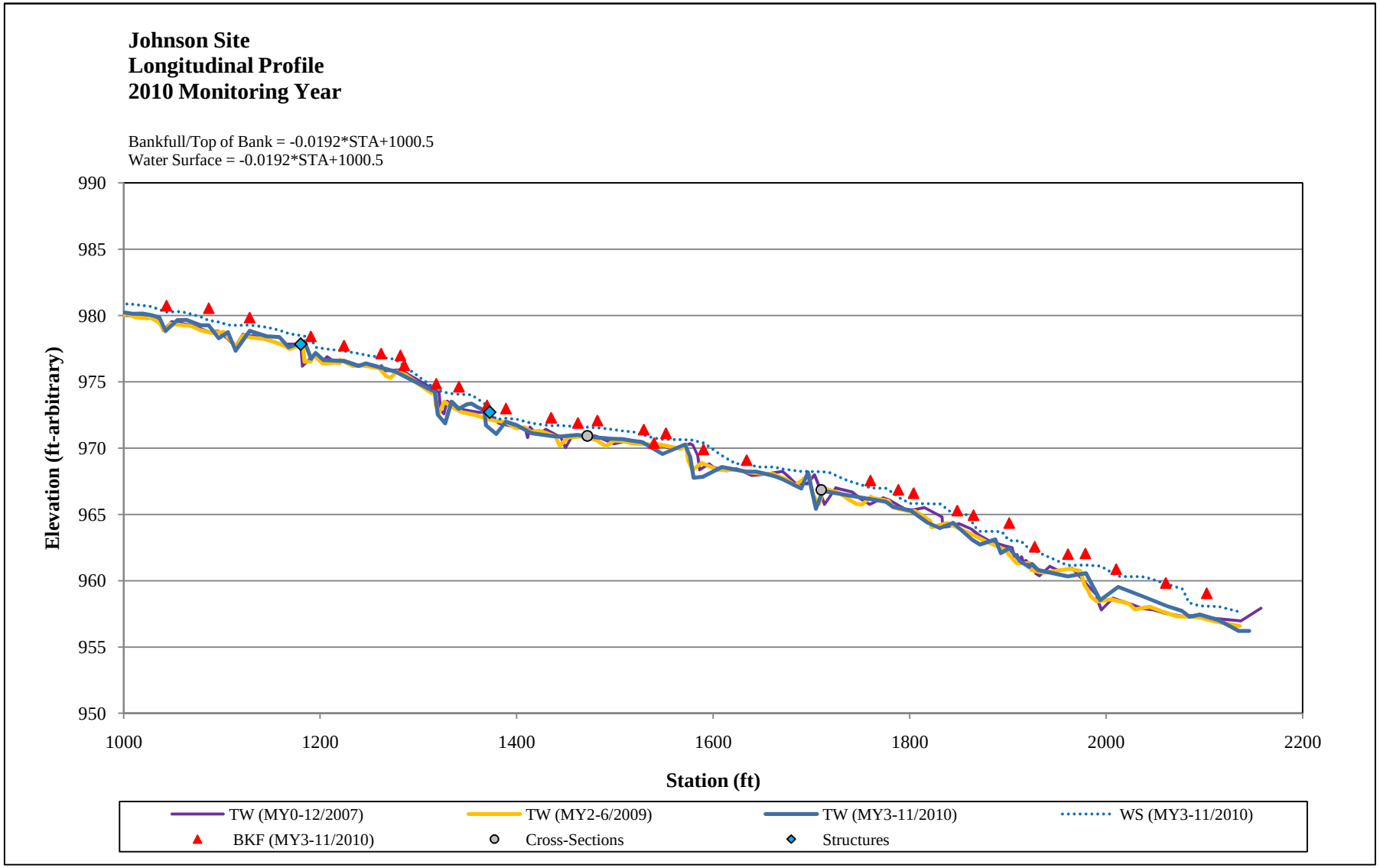
| **Station** | **Elevation** | **Notes** |
|---|---|---|
| 0.00 | 768.07 | x5-lpt |
| 0.05 | 767.91 | x5 |
| 6.33 | 767.96 | x5 |
| 17.59 | 768.09 | x5 |
| 24.39 | 768.13 | x5 |
| 29.69 | 767.00 | x5 |
| 34.12 | 765.48 | x5 |
| 37.55 | 764.53 | x5 |
| 40.17 | 763.46 | x5 |
| 42.43 | 762.53 | x5-lew |
| 45.34 | 760.63 | x5 |
| 48.58 | 762.53 | x5-rew |
| 49.62 | 763.75 | x5 |
| 51.31 | 764.52 | x5 |
| 53.62 | 765.62 | x5 |
| 57.04 | 767.42 | x5 |
| 59.67 | 768.72 | x5 |
| 62.15 | 770.13 | x5 |
| 64.59 | 770.70 | x5 |
| 64.85 | 770.89 | x5-rpt |



**Appendix 4.5 Longitudinal Plots and Raw Data Tables**
**UT to Little Hunting Creek (Johnson Site) Stream Restoration/EEP Project No. 197**
**Monitoring Year 3 of 5**



**Appendix 4.5 Longitudinal Plots and Raw Data Tables**
**UT to Little Hunting Creek (Johnson Site) Stream Restoration/EEP Project No. 197**
**Monitoring Year 3 of 5**

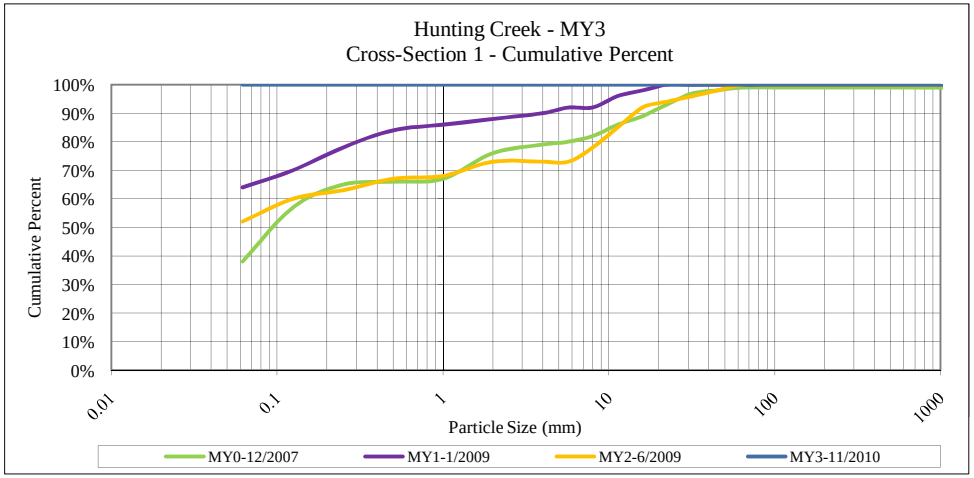


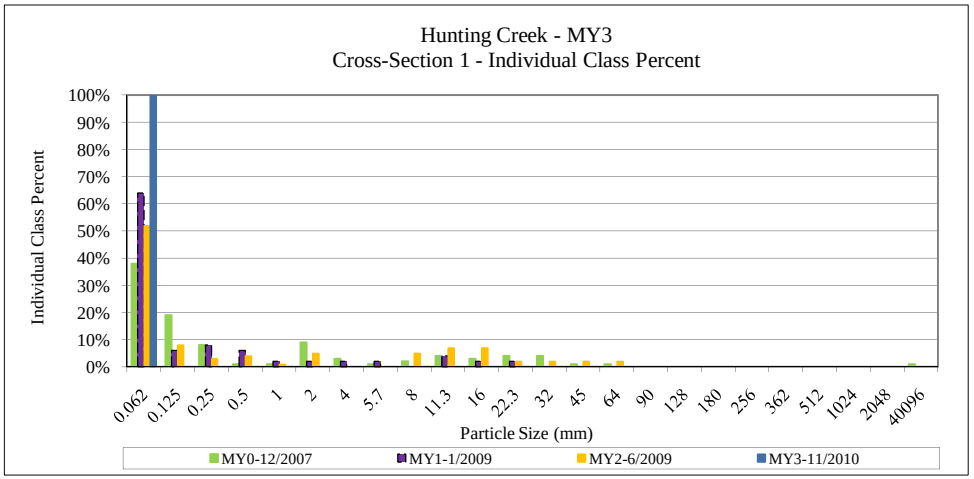
**Appendix 4.6 Pebble Count Plots and Raw Data Tables**
**UT to Little Hunting Creek (Johnson Site) Stream Restoration/EEP Project No. 197**
**Monitoring Year 3 of 5**

| | |
|---|---|
| **Project Name** | **Hunting Creek** |
| **EEP Project Number** | **197** |
| **Cross-Section ID** | **XS-1, Riffle, 3+92** |
| **Survey Date** | **11/2010** |

| Description | Material | Size (mm) | Total # | Item % | Cum % |
|---|---|---|---|---|---|
| **Silt/Clay** | silt/clay | 0.062 | 100 | 100% | 100% |
| **Sand** | very fine sand | 0.125 | 0 | 0% | 0% |
| | fine sand | 0.250 | 0 | 0% | 0% |
| | medium sand | 0.50 | 0 | 0% | 0% |
| | coarse sand | 1.00 | 0 | 0% | 0% |
| | very coarse sand | 2.0 | 0 | 0% | 0% |
| **Gravel** | very fine gravel | 4.0 | 0 | 0% | 0% |
| | fine gravel | 5.7 | 0 | 0% | 0% |
| | fine gravel | 8.0 | 0 | 0% | 0% |
| | medium gravel | 11.3 | 0 | 0% | 0% |
| | medium gravel | 16.0 | 0 | 0% | 0% |
| | course gravel | 22.3 | 0 | 0% | 0% |
| | course gravel | 32.0 | 0 | 0% | 0% |
| | very coarse gravel | 45 | 0 | 0% | 0% |
| | very coarse gravel | 64 | 0 | 0% | 0% |
| **Cobble** | small cobble | 90 | 0 | 0% | 0% |
| | medium cobble | 128 | 0 | 0% | 0% |
| | large cobble | 180 | 0 | 0% | 0% |
| | very large cobble | 256 | 0 | 0% | 0% |
| **Boulder** | small boulder | 362 | 0 | 0% | 0% |
| | small boulder | 512 | 0 | 0% | 0% |
| | medium boulder | 1024 | 0 | 0% | 0% |
| | large boulder | 2048 | 0 | 0% | 0% |
| **Bedrock** | bedrock | 40096 | 0 | 0% | 0% |
| **TOTAL % of whole count** | | | 100 | 100% | 100% |

| Summary Data | |
|---|---|
| D50 | 0.03 |
| D84 | 0.05 |
| D95 | 0.06 |



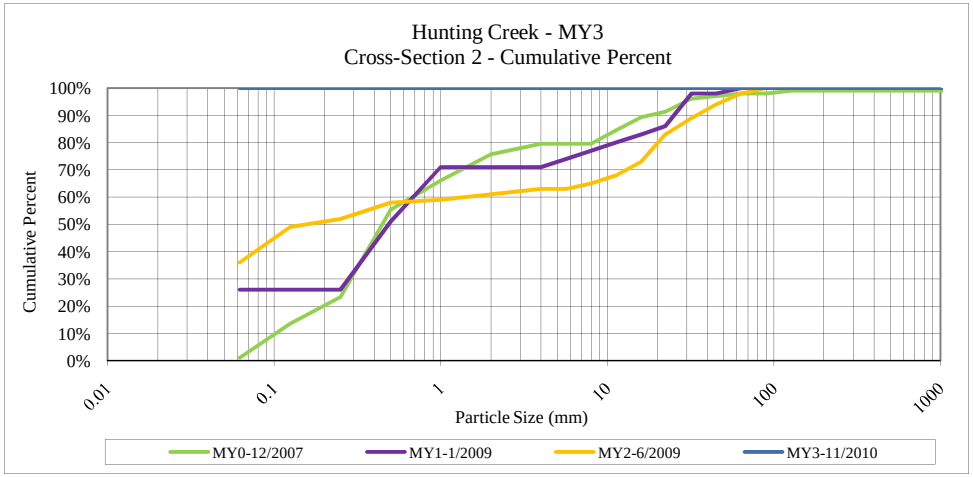



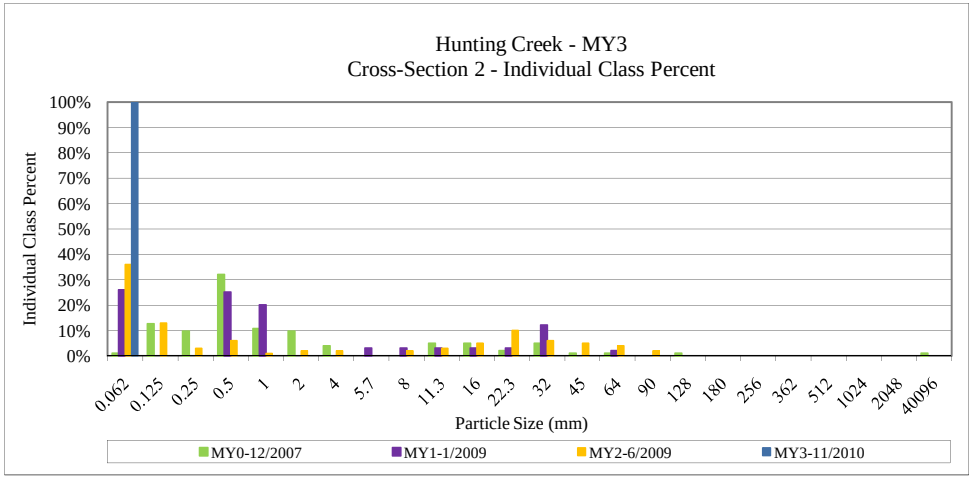
**Appendix 4.6 Pebble Count Plots and Raw Data Tables**
**UT to Little Hunting Creek (Johnson Site) Stream Restoration/EEP Project No. 197**
**Monitoring Year 3 of 5**

| | |
|---|---|
| **Project Name** | **Hunting Creek** |
| **EEP Project Number** | **197** |
| **Cross-Section ID** | **XS-2, Pool, 5+25** |
| **Survey Date** | **11/2010** |

| Description | Material | Size (mm) | Total # | Item % | Cum % |
|---|---|---|---|---|---|
| **Silt/Clay** | silt/clay | 0.062 | 100 | 100% | 100% |
| **Sand** | very fine sand | 0.125 | 0 | 0% | 0% |
| | fine sand | 0.250 | 0 | 0% | 0% |
| | medium sand | 0.50 | 0 | 0% | 0% |
| | coarse sand | 1.00 | 0 | 0% | 0% |
| | very coarse sand | 2.0 | 0 | 0% | 0% |
| **Gravel** | very fine gravel | 4.0 | 0 | 0% | 0% |
| | fine gravel | 5.7 | 0 | 0% | 0% |
| | fine gravel | 8.0 | 0 | 0% | 0% |
| | medium gravel | 11.3 | 0 | 0% | 0% |
| | medium gravel | 16.0 | 0 | 0% | 0% |
| | course gravel | 22.3 | 0 | 0% | 0% |
| | course gravel | 32.0 | 0 | 0% | 0% |
| | very coarse gravel | 45 | 0 | 0% | 0% |
| | very coarse gravel | 64 | 0 | 0% | 0% |
| **Cobble** | small cobble | 90 | 0 | 0% | 0% |
| | medium cobble | 128 | 0 | 0% | 0% |
| | large cobble | 180 | 0 | 0% | 0% |
| | very large cobble | 256 | 0 | 0% | 0% |
| **Boulder** | small boulder | 362 | 0 | 0% | 0% |
| | small boulder | 512 | 0 | 0% | 0% |
| | medium boulder | 1024 | 0 | 0% | 0% |
| | large boulder | 2048 | 0 | 0% | 0% |
| **Bedrock** | bedrock | 40096 | 0 | 0% | 0% |
| **TOTAL % of whole count** | | | 100 | 100% | 100% |

| Summary Data | |
|---|---|
| D50 | 0.05 |
| D84 | 0.06 |
| D95 | 0.06 |



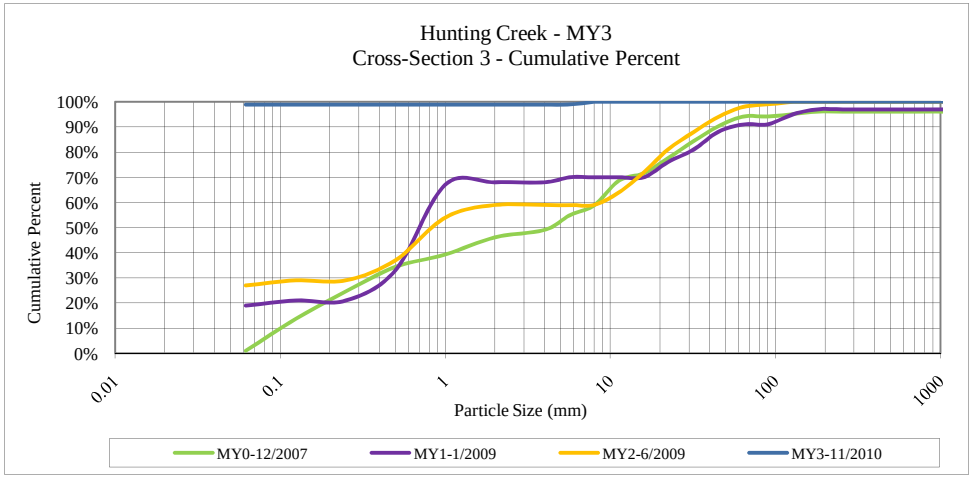



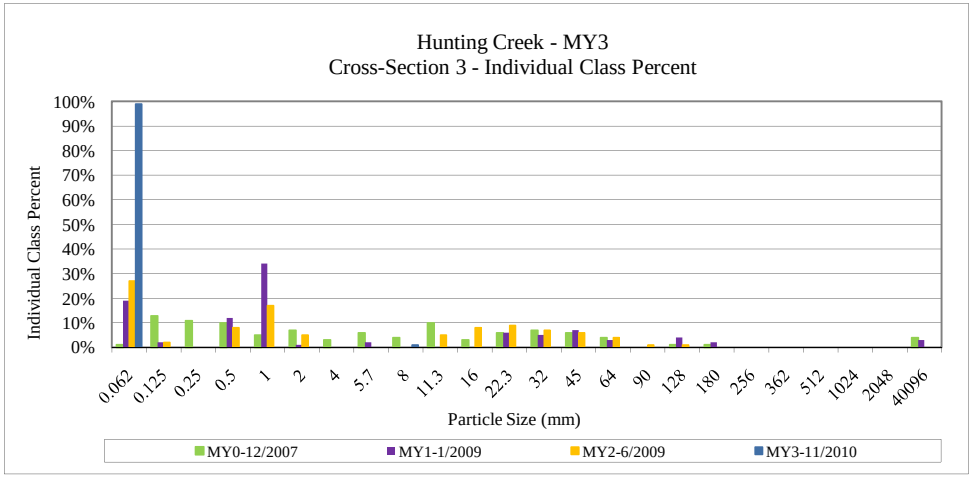
**Appendix 4.6 Pebble Count Plots and Raw Data Tables**
**UT to Little Hunting Creek (Johnson Site) Stream Restoration/EEP Project No. 197**
**Monitoring Year 3 of 5**

| | |
|---|---|
| **Project Name** | **Hunting Creek** |
| **EEP Project Number** | **197** |
| **Cross-Section ID** | **XS-3, Pool, 9+41** |
| **Survey Date** | **11/2010** |

| Description | Material | Size (mm) | Total # | Item % | Cum % |
|---|---|---|---|---|---|
| **Silt/Clay** | silt/clay | 0.062 | 99 | 99% | 99% |
| **Sand** | very fine sand | 0.125 | 0 | 0% | 0% |
| | fine sand | 0.250 | 0 | 0% | 0% |
| | medium sand | 0.50 | 0 | 0% | 0% |
| | coarse sand | 1.00 | 0 | 0% | 0% |
| | very coarse sand | 2.0 | 0 | 0% | 0% |
| **Gravel** | very fine gravel | 4.0 | 0 | 0% | 0% |
| | fine gravel | 5.7 | 0 | 0% | 0% |
| | fine gravel | 8.0 | 1 | 1% | 1% |
| | medium gravel | 11.3 | 0 | 0% | 0% |
| | medium gravel | 16.0 | 0 | 0% | 0% |
| | course gravel | 22.3 | 0 | 0% | 0% |
| | course gravel | 32.0 | 0 | 0% | 0% |
| | very coarse gravel | 45 | 0 | 0% | 0% |
| | very coarse gravel | 64 | 0 | 0% | 0% |
| **Cobble** | small cobble | 90 | 0 | 0% | 0% |
| | medium cobble | 128 | 0 | 0% | 0% |
| | large cobble | 180 | 0 | 0% | 0% |
| | very large cobble | 256 | 0 | 0% | 0% |
| **Boulder** | small boulder | 362 | 0 | 0% | 0% |
| | small boulder | 512 | 0 | 0% | 0% |
| | medium boulder | 1024 | 0 | 0% | 0% |
| | large boulder | 2048 | 0 | 0% | 0% |
| **Bedrock** | bedrock | 40096 | 0 | 0% | 0% |
| **TOTAL % of whole count** | | | 100 | 100% | 100% |

| Summary Data | |
|---|---|
| D50 | 0.03 |
| D84 | 0.05 |
| D95 | 0.06 |



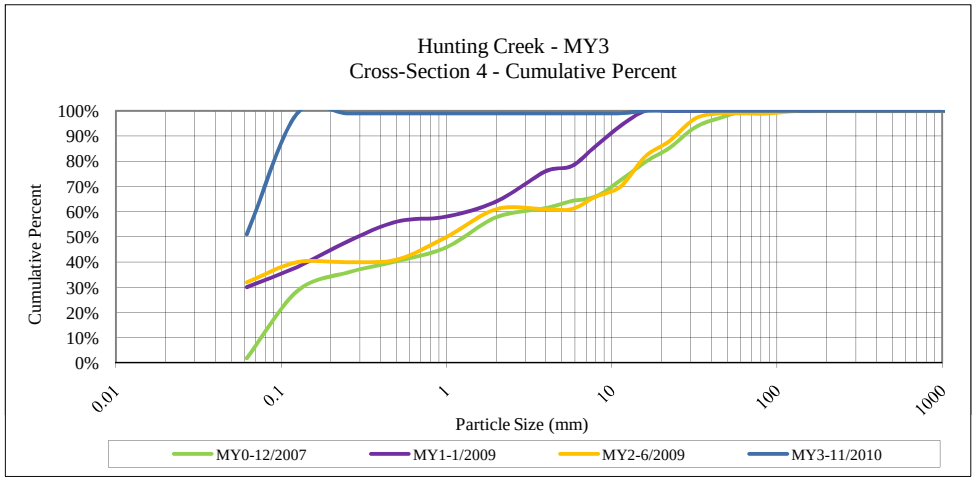



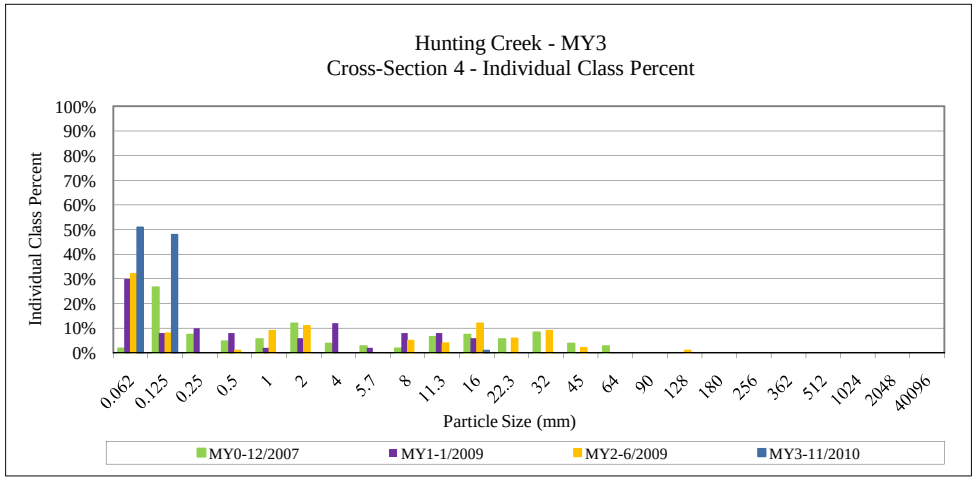
**Appendix 4.6 Pebble Count Plots and Raw Data Tables**
**UT to Little Hunting Creek (Johnson Site) Stream Restoration/EEP Project No. 197**
**Monitoring Year 3 of 5**

| | |
|---|---|
| **Project Name** | **Hunting Creek** |
| **EEP Project Number** | **197** |
| **Cross-Section ID** | **XS-4, Riffle, 14+72** |
| **Survey Date** | **11/2010** |

| Description | Material | Size (mm) | Total # | Item % | Cum % |
|---|---|---|---|---|---|
| **Silt/Clay** | silt/clay | 0.062 | 51 | 51% | 51% |
| **Sand** | very fine sand | 0.125 | 48 | 48% | 48% |
| | fine sand | 0.250 | 0 | 0% | 0% |
| | medium sand | 0.50 | 0 | 0% | 0% |
| | coarse sand | 1.00 | 0 | 0% | 0% |
| | very coarse sand | 2.0 | 0 | 0% | 0% |
| **Gravel** | very fine gravel | 4.0 | 0 | 0% | 0% |
| | fine gravel | 5.7 | 0 | 0% | 0% |
| | fine gravel | 8.0 | 0 | 0% | 0% |
| | medium gravel | 11.3 | 0 | 0% | 0% |
| | medium gravel | 16.0 | 1 | 1% | 1% |
| | course gravel | 22.3 | 0 | 0% | 0% |
| | course gravel | 32.0 | 0 | 0% | 0% |
| | very coarse gravel | 45 | 0 | 0% | 0% |
| | very coarse gravel | 64 | 0 | 0% | 0% |
| **Cobble** | small cobble | 90 | 0 | 0% | 0% |
| | medium cobble | 128 | 0 | 0% | 0% |
| | large cobble | 180 | 0 | 0% | 0% |
| | very large cobble | 256 | 0 | 0% | 0% |
| **Boulder** | small boulder | 362 | 0 | 0% | 0% |
| | small boulder | 512 | 0 | 0% | 0% |
| | medium boulder | 1024 | 0 | 0% | 0% |
| | large boulder | 2048 | 0 | 0% | 0% |
| **Bedrock** | bedrock | 40096 | 0 | 0% | 0% |
| **TOTAL % of whole count** | | | 100 | 100% | 100% |

| Summary Data | |
|---|---|
| D50 | 0.06 |
| D84 | 0.11 |
| D95 | 0.12 |



**Appendix 4.6 Pebble Count Plots and Raw Data Tables**
**UT to Little Hunting Creek (Johnson Site) Stream Restoration/EEP Project No. 197**
**Monitoring Year 3 of 5**

| | |
|---|---|
| **Project Name** | **Hunting Creek** |
| **EEP Project Number** | **197** |
| **Cross-Section ID** | **XS-5, Riffle, 17+10** |
| **Survey Date** | **11/2010** |

| Description | Material | Size (mm) | Total # | Item % | Cum % |
|---|---|---|---|---|---|
| **Silt/Clay** | silt/clay | 0.062 | 5 | 5% | 5% |
| **Sand** | very fine sand | 0.125 | 5 | 5% | 5% |
| | fine sand | 0.250 | 7 | 7% | 7% |
| | medium sand | 0.50 | 8 | 8% | 8% |
| | coarse sand | 1.00 | 8 | 8% | 8% |
| | very coarse sand | 2.0 | 8 | 8% | 8% |
| **Gravel** | very fine gravel | 4.0 | 22 | 22% | 22% |
| | fine gravel | 5.7 | 11 | 11% | 11% |
| | fine gravel | 8.0 | 9 | 9% | 9% |
| | medium gravel | 11.3 | 6 | 6% | 6% |
| | medium gravel | 16.0 | 6 | 6% | 6% |
| | course gravel | 22.3 | 5 | 5% | 5% |
| | course gravel | 32.0 | 0 | 0% | 0% |
| | very coarse gravel | 45 | 0 | 0% | 0% |
| | very coarse gravel | 64 | 0 | 0% | 0% |
| **Cobble** | small cobble | 90 | 0 | 0% | 0% |
| | medium cobble | 128 | 0 | 0% | 0% |
| | large cobble | 180 | 0 | 0% | 0% |
| | very large cobble | 256 | 0 | 0% | 0% |
| **Boulder** | small boulder | 362 | 0 | 0% | 0% |
| | small boulder | 512 | 0 | 0% | 0% |
| | medium boulder | 1024 | 0 | 0% | 0% |
| | large boulder | 2048 | 0 | 0% | 0% |
| **Bedrock** | bedrock | 40096 | 0 | 0% | 0% |
| **TOTAL % of whole count** | | | 100 | 100% | 100% |

| Summary Data | |
|---|---|
| D50 | 2.82 |
| D84 | 8.55 |
| D95 | 16 |