Dula Thoroughfare Stream and Wetland Restoration

EEP Project No. 65
2011 Monitoring Report: Year 5 of 5

Construction Completed: February 2007
Submission Date: April 2012

Submitted to: NCDENR-EEP
1652 Mail Service Center
Raleigh, NC 27699-1652

Table of Contents

SECTION 1 – EXECUTIVE SUMMARY

1.1 Goals and Objectives 1-1
1.2 Vegetation Assessment 1-2
1.3 Stream Assessment 1-3
1.4 Wetland Assessment 1-4
1.5 Annual Monitoring Summary 1-4

SECTION 2 – METHODOLOGY

2.1 Methodology 2-1

SECTION 3 – REFERENCES

SECTION 4 – APPENDICES

List of Appendices

Appendix A – Project Vicinity Map and Background Tables

Figure 1	Project Vicinity Map and Directions
Table 1	Project Restoration Components
Table 2	Project Activity and Reporting History
Table 3	Project Contacts Table
Table 4	Project Attribute Table

Appendix B – Visual Assessment Data

Figure 2	Current Condition Plan View (CPV)
Table 5	Visual Stream Morphology Stability Assessment Table
Table 6	Vegetation Condition Assessment Table
Photos	Stream Station Photos
Photos	Vegetation Plot Photos

Appendix C – Vegetation Plot Data

Table 7	Vegetation Plot Mitigation Success Summary Table
Table 8	CVS Vegetation Metadata Table
Table 9	CVS Stem Count Total and Planted by Plot and Species

Appendix D – Stream Survey Data

Figure 3a-d	Cross-sections with annual overlays
Figure 4	Longitudinal Profiles with Annual Overlays
Figure 5a-d	Pebble Count Plots with Annual Overlays
Tables 10a,b	Baseline – Stream Data Summary Tables
Table 11a	Monitoring – Cross-Section Morphology Data Table
Table 11b	Monitoring – Stream Reach Morphology Data Table

Appendix E – Hydrologic Data

Table 12	Verification of Bankfull Events
Figure 6	Monthly Rainfall Data
Figure 7a-c	Precipitation and Water Level Plots
Table 13	Wetland Hydrology Criteria Attainment

SECTION 1
EXECUTIVE SUMMARY

SECTION 1
EXECUTIVE SUMMARY

The Dula Thoroughfare Stream and Wetland Restoration Project (Site) is located in Anson County, North Carolina, north of the Town of Wadesboro within the Piedmont eco-region and in the Yadkin River Basin (USGS Subbasin HUC 03040104) (Appendix 1.1). The Site includes one of the two Ecosystem Enhancement Program (EEP) project sites located on the 200-acre Bishop Site (Dula Thoroughfare (DT) and Unnamed Tributary (UT) to Dula Thoroughfare). The Site is confined within a North Carolina Department of Transportation (NCDOT)-owned conservation easement. The stream preservation/enhancement/restoration plan was designed by EcoScience Corporation and constructed by Vaughn Construction, Inc. Construction and planting activities were completed in February 2007. As-built surveys for the Site were performed in May 2007. The first annual monitoring activities were conducted in October 2007.

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

1.1 Goals and Objectives

Prior to restoration, the Site was predominantly utilized for row cropping and recreational activities, such as hunting and wildlife viewing. Historically, drainage features and wetland areas were dredged, straightened, and filled in to provide land for agricultural purposes. These activities are thought to have inhibited stream channel stability and water quality; therefore, producing an incised, eroded stream. Primary goals for the Site were to restore stable dimension, pattern, and profile for impacted on-site stream reaches and to restore adjacent riverine wetlands. Secondary Site restoration goals included stream channel and adjacent wetland enhancement and preservation.

Restoration goals established for the Site include:

Dula Thoroughfare

- Aquatic habitat creation via excavation of vernal pools within floodplain cut areas.
- Re-establishment of the characteristic, pre-disturbance Piedmont Bottomland Forest (Schafale and Weakley 1990) community adjacent to restoration reaches using bare root seedling plantings.

UT Dula Thoroughfare

- Re-establishment of the characteristic, pre-disturbance Piedmont Bottomland Forest (Schafale and Weakley 1990) community adjacent to restoration reaches using bare root seedling plantings.

The project objectives include:

Dula Thoroughfare

- Priority II stream restoration via excavation of approximately 2,730 linear feet of a designed E-type stream of Dula Thoroughfare (including an associated tributary), including adjacent floodplain excavation to achieve and entrenchment ratio characteristic of E-type streams.
- Restoration of approximately 3.1 acres of riverine wetlands adjacent to Dula Thoroughfare via floodplain excavation in previously identified hydric soil areas, thereby re-establishing jurisdictional wetland hydrology.

UT Dula Thoroughfare

- Level I enhancement of approximately 1,871 linear feet of stream via backfill of straightened and ditched portions of the existing watercourse, thereby re-establishing characteristic stream dimension and pattern by reintroducing flow into adjacent relic channel areas.
- Level II enhancement of approximately 480 linear feet of stream via riparian plantings adjacent to the UT to Dula Thoroughfare streambanks.
- Re-vegetation of open areas adjacent to the UT to Dula Thoroughfare via plantings of characteristic, pre-disturbance community types described by Schafale and Weakley (1990) using bare root seedling plantings.

The main reach of DT was restored by relocating approximately 2,730 lf of the existing channel and its tributary. DT (Reach 1) and its tributary (Reach 2) were designed as E-type streams by creating bankfull benches to re-establish floodplain connection. The UT to DT enhancement (Level 1) along Reach 3 was established via backfill of straightened and ditched portions of the existing watercourse, thereby re-establishing characteristic stream dimension and pattern by reintroducing flow into adjacent relic channel areas. Enhancement (Level 2) along Reach 4 was established through riparian plantings adjacent to the streambanks. The Site's riparian areas were planted to improve habitat and stabilize streambanks via planting bare root seedlings to recreate pre-disturbance vegetative communities within their appropriate landscape contexts. Appendix 2 provides more detailed project activity, history, contact information, and watershed/site background information for this project.

1.2 Vegetation Assessment

JJG conducted the 2011 (year 5 of 5) vegetation assessment and vegetation plot analysis in August 2011 per the 2006 CVS-EEP Level 2 protocol (Lee et al., 2006). The eight vegetation plots previously established in the design phase were selected randomly and represent the riparian buffer zone (DT has five vegetation plots and UT to DT has three vegetation plots). Vegetation monitoring success criteria, as stated in the 2007 mitigation plan, requires an average number of planted stems per acre exceeding

320 stems/acre after the third year of monitoring and 260 stems/acre after the fifth and final year of project monitoring.

The 2011 vegetation monitoring results indicated that the main reach of DT has met the vegetation success criteria in four (Plots 8, 9, 10, and 11) of the five plots. Results for the UT to DT indicate that two (Plots 14 and 15) out of three did not meet the 2011 vegetation success criteria. Potential causes of unsuccessful establishment in Plot 12 were likely due to excessive inundation and flooding associated with the downstream beaver dam along DT. Woody vegetation growth observed in Plots 14 and 15 was limited due to competition with blackberry and other invasive species along UT to DT.

Although five of eight plots met the vegetation success threshold, the results from plots 12, 14 and 15 did not substantially decrease the overall site's average survivability estimate, having an average of 592 living woody stems per acre per plot. Monitoring data averaged from both sites recorded an average of 15 planted live stems per plot. Plots in DT and UT to DT that have met the success criteria had stem densities of approximately 802 and 364 planted stems per acre, respectively.

The mean 802 stems per acre for DT is slightly below that of MY-1's mean density of 842 stems per acre, but still vastly exceeds the required average of 260 stems per acre. The mean density of 243 stems per acre for UT to DT is considerably less than the MY-1 mean density of 310 stems per acre. UT to DT does not satisfy the requirement for a stem density of 260 stems per acre. In consideration of total mean density, both DT and UT to DT consist of elevated stem densities due to inclusion of naturally grown volunteer/recruit specimens within each plot. The difference in success between DT and UT to DT is likely due to shading and topographical differences between the planting areas. Additionally, the persistence of invasive species along UT to DT has likely contributed to lower stem densities and overall success. Please refer to Appendix 3 for more detailed information on the 2011 vegetation data.

1.3 Stream Assessment

Results from the 2011 stream monitoring effort indicate the DT and UT to DT appear stable, but are experiencing unintended flow conditions. The entire restored stream length (main channel and its tributary) of DT was assessed from the project origination at the gravel road to the downstream end of the restoration project where the preservation reach begins. The UT to DT was assessed from the beginning of the project approximately 300 feet upstream from the first cross vane triplet to the downstream end of the restoration project where the preservation reach begins.

Dula Thoroughfare-Main Channel

Overall, the present stream dimensions along DT appear stable. The average bankfull width (5.8 ft) of the surveyed cross-sections is coincides with the proposed 6.0 ft. Cross-sectional area, entrenchment ratio, and width/depth ratio remain consistent with baseline parameter ranges and amongst each year. Each cross section maintained a

bank height ratio of 1.0, indicating connection with the flood prone area and no significant incision. A new right bank pin was installed in 2009 and 2010, but could not be located during MY5 monitoring, which resulted in slightly different cross-sectional surveys depending on the angle used across the channel. The average bankfull and water surface slopes for the 2011 monitoring year were calculated as 0.0014 ft/ft and 0.0014 ft/ft, respectively. Due to the lack of well defined bed features, riffle slopes were not calculated. Several areas along the channel still continue to exhibit increasing levels of in-stream vegetation growth. The substrate along the reach was dominated by silt deposition. The silt substrate was unconsolidated, which may have contributed to variations between yearly cross-sections and profiles as a firm surface for elevation capture was not always possible. The persistence of silt laden bed material is likely due to a combination of watershed particle contribution and the beaver dam impoundment effects. The dam was breached prior to MY 2011 stream monitoring, but the dam still appears to be a bottleneck and impediment for water flow as water pools before existing the restored channel.

Dula Thoroughfare-Tributary

Based on current monitoring data and the visual inspection, the channel appears to be functioning properly and maintaining stability. No erosion failure was observed along this reach. In-stream vegetation and poor streambank vegetation cover were observed and noted in the Current Condition Plan View (CCPV, Appendix B). The substrate along the entire reach was dominated by silt deposition.

UT to Dula Thoroughfare

All cross-vanes triplets appear to be stable and are not showing any signs of erosion or piping. Cross-section results calculated during MY 2011 monitoring indicate the channel has remained relatively stable throughout the monitoring period. Only slight changes in channel morphology are evident and can be attributed to natural variations.

Both DT and UT to DT appear stable, but have experienced abnormal flow conditions over the past few monitoring years. As a result, in-stream vegetation has developed throughout the channels. Overall, the Site appears to be stable and could function as intended in normal flow conditions.

A crest gauge is located on the main channel and its tributary of the DT site. At least one bankfull or greater event occurred within the DT restoration project in monitoring year 2011. Other indicators such as old wrack lines and staining were observed at the bankfull and greater elevations within the restoration site as well.

1.4 Wetland Assessment

Three groundwater monitoring gauges were installed on the DT site by EcoScience. The monitoring gauges are programmed to download groundwater levels daily and were downloaded monthly in order to capture hydrological data during the growing season.

The target wetland hydrological success criterion is saturation or inundation for at least 12.5 percent of the growing season in the lower landscape (floodplain) positions. To achieve the above hydrologic success criterion, groundwater levels must be within 12-inches of the ground surface for 31 consecutive days, which is 12.5 percent of the March 15 to November 18 (249 days).

All gauges on Site achieved the wetland success criterion of soil saturation within the upper 12 inches for the required minimum of 31 consecutive days, which is 12.5 percent of the growing season. There were no problem areas observed within the wetland restoration zones for the DT Site. Within the wetland zones, hydrophytic vegetation and hydrology indicators have developed. The planted woody stem species throughout the wetland areas are meeting the required success criteria; however, minimal woody stems were observed within plot 14. It is suspected that the planted stem rates may have been too low in this area to achieve success criteria. With the natural recruitment of woody vegetation, the planted riparian area could improve and exceed the vegetation success criteria by year five. Please refer to Appendix E for the wetland plots and a summary of wetland criteria attainment.

1.5 Annual Monitoring Summary

Overall, the Site appears to be stable and has met stream and wetland mitigation goals for monitoring year 5. DT has met the vegetation success requirements, but UT to DT has not achieved the required mean planted stem density.

The background information provided in this report is referenced from the mitigation plan and previous monitoring reports prepared by EcoScience (2007). 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 Baseline Monitoring Report (formerly Mitigation Plan) and in the Mitigation Plan (formerly the 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

3.1 Methodology

Methods employed for this report were a combination of those established by standard regulatory guidance and procedures documents as well as previous monitoring reports completed by EcoScience. Survey data collected was performed via total station to establish the current longitudinal profile and cross-section elevations. Data recorded during this monitoring event were georeferenced using historically established positions to evaluate annual progress. Longitudinal stationing for the stream profile, cross-sectional surveys, and additional geomorphic 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). Substrate analysis and particle size distribution were established using a modified Wolman pebble count (Rosgen 1996) at each cross-section location.

Vegetation monitoring for Year 5 was performed based on the Carolina Vegetation Survey (CVS) Level 2 (Lee et al. 2006). Plot locations are consistent with previous years and plot sizes consist of eight 10m x 10m plots. The taxonomic standard for vegetation follows *Flora of the Carolinas, Virginia, Georgia, and surrounding areas* (Weakley, 2007). Precipitation data for the hydrographs was obtained from Weather Underground for the Albemarle, NC weather station (the nearest offering daily precipitation data) through the following URL (Data Period January 2011 through December 2011).
http://www.wunderground.com/history/airport/KVUJ/2008/1/1/CustomHistory.html?dayend=14&monthend=10&yearend=2008&req_city=NA&req_state=NA&req_statename=NA

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.

EcoScience Corporation. 2007. Bishop Site Stream and Wetland Restoration 2007 Annual Monitoring Report (Year 1). Raleigh, NC.

EcoScience Corporation. 2007. Mitigation Report (Bishop Site Stream and Wetland Restoration). Raleigh, NC.

EcoScience Corporation. 200. Restoration Plan Report (Bishop Site Stream and Wetland Restoration). Raleigh, NC.

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.

Lee, Michael T., Peet, Robert K., Steven D., Wentworth, Thomas R. (2006). CVS-EEP Protocol for Recording Vegetation Version 4.0. Retrieved from http://www.nceep.net/business/monitoring/veg/datasheets.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 A – Project Vicinity Map and Background Tables

Appendix B – Visual Assessment Data

Appendix C – Vegetation Plot Data

Appendix D – Stream Survey Data

Appendix E – Hydrologic Data

APPENDIX A
PROJECT VICINITY MAP AND BACKGROUND TABLES

Figure 1 **Project Vicinity Map and Directions**

Table 1 **Project Restoration Components**

Table 2 **Project Activity and Reporting History**

Table 3 **Project Contacts Table**

Table 4 **Project Attribute Table**

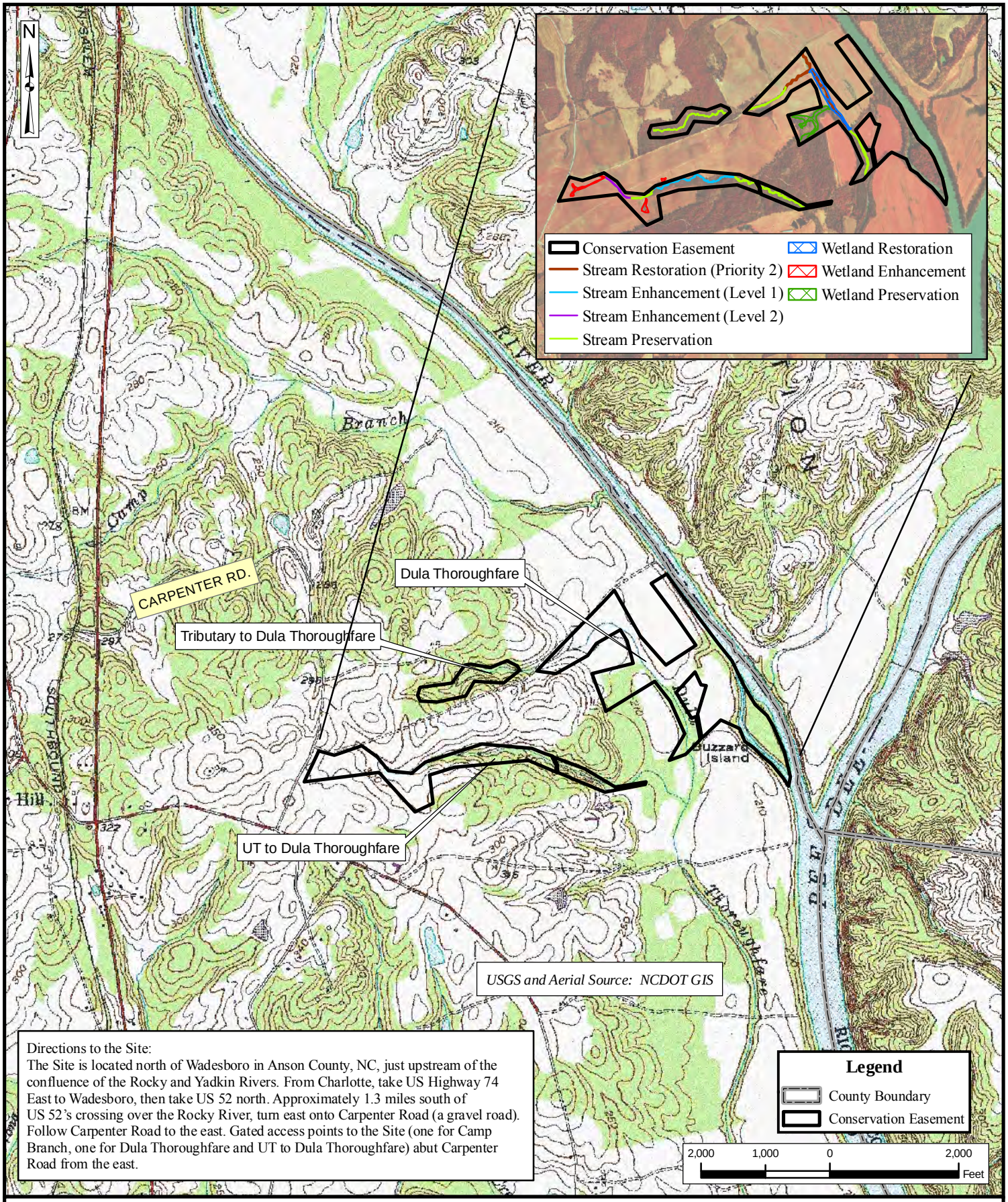


Figure 1. Vicinity Map
Dula Thoroughfare and UT to Dula Thoroughfare Stream and Wetland Restoration/EEP Project No. 65
Anson County, NC
Monitoring Year 5 of 5
Submittal Date: April 2012

Appendix A. Project Vicinity Map and Background Tables
Table 1: Project Components and Mitigation Credits
Dula Thoroughfare Stream and Wetland Restoration/EEP Project No. 65
Monitoring Year 5 of 5

Mitigation Credits						
	Stream	**Riparian Wetland**	**Non-riparian Wetland**	**Buffer**	**Nitrogen Nutrient Offset**	**Phosphorous Nutrient Offset**
Type	R, EI, EII, P	R, WE, P	N/A			
Totals	5,440.33 SMU	4.06 WMU	N/A	N/A	N/A	N/A

Project Components						
Project Component/Reach ID	**Stationing (ft)**	**Existing Footage/ Acreage**	**Approach**	**Restoration or Restoration Equivalent**	**Restoration Footage or Acres**	**Mitigation Ratio**
Reach 1-DT Main Channel	0+00 – 20+25	2,025 lf	P2	Restoration	2,025 lf	1:1
Reach 2-DT Tributary	0+00 – 7+05	705 lf	P2	Restoration	705 lf	1:1
Reach 3-UT to DT	N/A*	1,871 lf	N/A	Enhancement Level 1	1,871 lf	1.5:1
Reach 4-UT to DT	N/A*	480 lf	N/A	Enhancement Level 2	480 lf	2.5:1
Stream Preservation **	N/A	6,355 lf	N/A	Preservation	6,355 lf	5:1
Riparian Wetland Restoration	N/A	3.1 ac	N/A	Restoration	3.1 ac	1:1
Riparian Wetland Enhancement	N/A	0.9 ac	N/A	Wetland Enhancement	0.9 ac	2:1
Riparian Wetland Preservation	N/A	2.3 ac	N/A	Preservation	2.3 ac	5:1

Component Summations						
Restoration Level	**Stream (linear feet)**	**Riparian Wetland (acres)**		**Non-riparian Wetland (acres)**	**Buffer (square feet)**	**Upland (acres)**
		Riverine	**Non-Riverine**			
Restoration (R)	2,730	3.1	N/A	N/A	N/A	N/A
Enhancement (E)		0.9	N/A	N/A	N/A	N/A
Enahncement I (E)	1,871					
Enhancement II (E)	480					
Creation (C)		N/A	N/A	N/A		
Preservation (P)	6,355	2.3	N/A	N/A		N/A
HQ Preservation (P)	N/A	N/A	N/A	N/A		N/A
Totals	**11,436**	**6.3**	**N/A**	**N/A**	**N/A**	**N/A**

BMP Elements			
Element	**Location**	**Purpose/Function**	**Notes**
N/A	N/A	N/A	N/A

BMP Elements
BR = Bioretention Cell; SF = Sand Filter; SW = Stormwater Wetland; WDP = Wet Detention Pond; DDP - Dry Detention Pond; FS = Filter Strip; S = Grassed Swale; LS = Level Spreader; NI = Natural Infiltration Area; FB = Forested Buffer
SMU = Stream Mitigation Unit; WMU = Wetland Mitigation Unit

Appendix A. Project Vicinity Map and Background Tables
Table 2: Project Activity and Reporting History
Dula Thoroughfare Stream and Wetland Restoration/EEP Project No. 65
Monitoring Year 5 of 5

Elapsed Time Since Grading Complete: 5 Years 3 Months
Elapsed Time Since Planting Complete: 4 Years 11 Months
Number of Reporting Years: 5

Activity or Report	Data Collection Completed	Actual Completion or Delivery
Restoration Plan	Aug-04	Sep-04
Final Design (90%)	Mar-05	Jun-05
Construction	N/A*	Feb-07
Temporary S&E mix applied to entire project area*	N/A	Throughout construction
Permanent seed mix applied to reach/segments	N/A	Oct-06
Bare Root Seedling Installation	N/A	Feb-07
Mitigation Plan	Jun-07	Oct-07
Final Report	Jun-07	Oct-07
Year 1 Monitoring	Oct-07 /Dec-07	Oct-07 /Dec-08
Year 2 Monitoring	May-08/Sept-08	Oct-08
Year 3 Monitoring	Jul-09/Jan-10	Jan-10
Year 4 Monitoring	Jun-10/Feb-11	Feb-11
Year 5 Monitoring	Jul-11/Mar-12	Apr-12

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

Appendix A. Project Vicinity Map and Background Tables
Table 3: Project Contacts Table
Dula Thoroughfare Stream and Wetland Restoration/EEP Project No. 65
Monitoring Year 5 of 5

Designer	EcoScience Corporation 1101 Haynes Street, Suite 101 Raleigh, NC 27604 919- 828-3433
Construction Contractor	Vaughn Contruction, Inc. Tommy Vaughn and Spencer Walker (Foremen) P.O. Box 796 Wadesboro, NC 28170 704- 694-6450
Planting Contractor	Kiker Forestry and Realty P.O. Box 933 Wadesboro, NC 28170 704- 694-6436
Seeding Contractor	N/A
Monitoring Performers	
Year 1	EcoScience Corporation 1101 Haynes Street, Suite 101 Raleigh, NC 27604 919- 828-3433
Year 2-present	Jordan, Jones & Goulding 6801 Governors Lake Parkway Norcross, GA 30071
Stream Monitoring, POC	Alison Nichols, 770-455-8555
Vegetation Monitoring, POC	
Wetland Monitoring, POC	

Appendix A. Project Vicinity Map and Background Tables
Table 4 Project Baseline Information and Attributes
Dula Thoroughfare Stream and Wetland Restoration/EEP Project No. 65
Monitoring Year 5 of 5

Project Information					
Project Name	Dula Thoroughfare Stream and Wetland Restoration (Bishop site)				
Project County	Anson County, North Carolina				
Project Area (acres)	148 acres (approx)				
Project Coordinates	35º 9' 7.0" N 80º 5' 10.24" W				
Project Watershed Summary Information					
Physiographic Region	Piedmont				
River Basin	Yadkin				
USGS HUC for Project (8 digit)	03040104 and 03040105				
USGS HUC for Project (14 digit)	03040104061050 and 03040105081060				
DWQ Sub-basin	03-07-10 and 03-07-14				
Project Drainage Area (acres)	378				
Project Drainage Area Percentage of Impervious Area*	< 1%				
CGIA Land Use Classification	1.01.01.03				
Reach Summary Information					
Parameters	**Reach 1**	**Reach 2**	**Reach 3**	**Reach 4**	
Length of reach (linear feet)	2,025	705	1,871	480	
Valley classification	U	U	U	U	
Drainage area (acres)	U	U	U	U	
NCDWQ stream identification score	U	U	U	U	
NCDWQ Water Quality Classification	C	C	C	C	
Morphological Description (stream type)	Perennial	Perennial	Intermittent	Intermittent	
Evolutionaly trend	E5 to E/D5	E5 to E/D6	C5 to E5	C5 to E5	
Underlying mapped soils	Badin Channery Silt Loam (BaB, BaC) Badin-Goldston Complex (BgD) McQueen (MrB) Shellbluff (ShA) Tetotum (ToA) Chewacla (ChA)				
Drainage Class	U	U	U	U	
Soil Hydric status	N/A	N/A	N/A	N/A	
Slope	U	U	U	U	
FEMA classification	100 year floodplain	100 year floodplain	100 year floodplain	100 year floodplain	
Native vegetation community	bottomland hardwood	bottomland hardwood	bottomland hardwood	bottomland hardwood	
Percent composition of exotic invasive vegetation	U	U	U	U	

Wetland Summary Information**					
Parameters	**Wetland 1**	**Wetland 2**	**Wetland 3**	**Wetland 4**	**Wetland 5**
Size of Wetland (acres)	2.18	2.29	0.48	0.37	0.082
Wetland Type (non-riparian, riparian riverine or riparian non-riverine)	Riparian riverine	Riparian riverine	Riparian riverine	Riparian riverine	Riparian riverine
Mapped Soil Series	ShA, ToA	ToA	BaB, BaC	BaC	BaC
Drainage class	PFO1/PEM	PFO1	PFO1	PFO1	PFO1
Soil Hydric Status	None	None	None	None	None
Source of Hydrology	Slope & Overbank	Slope & Overbank	Slope & Overbank	Slope & Overbank	Slope & Overbank
Hydrologic impairment	N/A	N/A	N/A	N/A	N/A
Native vegetation community	bottomland hardwood	bottomland hardwood	bottomland hardwood	bottomland hardwood	bottomland hardwood
Percent composition of exotic invasive vegetation	U	U	U	U	U

Regulatory Considerations			
Regulation	**Applicable?**	**Resolved?**	**Supporting Documentation**
Waters of the United States - Section 404	Yes	Yes	Restoration Plan
Waters of the United States - Section 401	No	N/A	N/A
Endangered Species Act	Yes	Yes	Feasibility Study
Historic Preservation Act	Yes	Yes	Feasibility Study
Costal Zone Management Act (CZMA)/Costal Area	No	N/A	N/A
FEMA Floodplain Compliance	Yes	U	N/A
Essential Fisheries Habitat	No	N/A	N/A

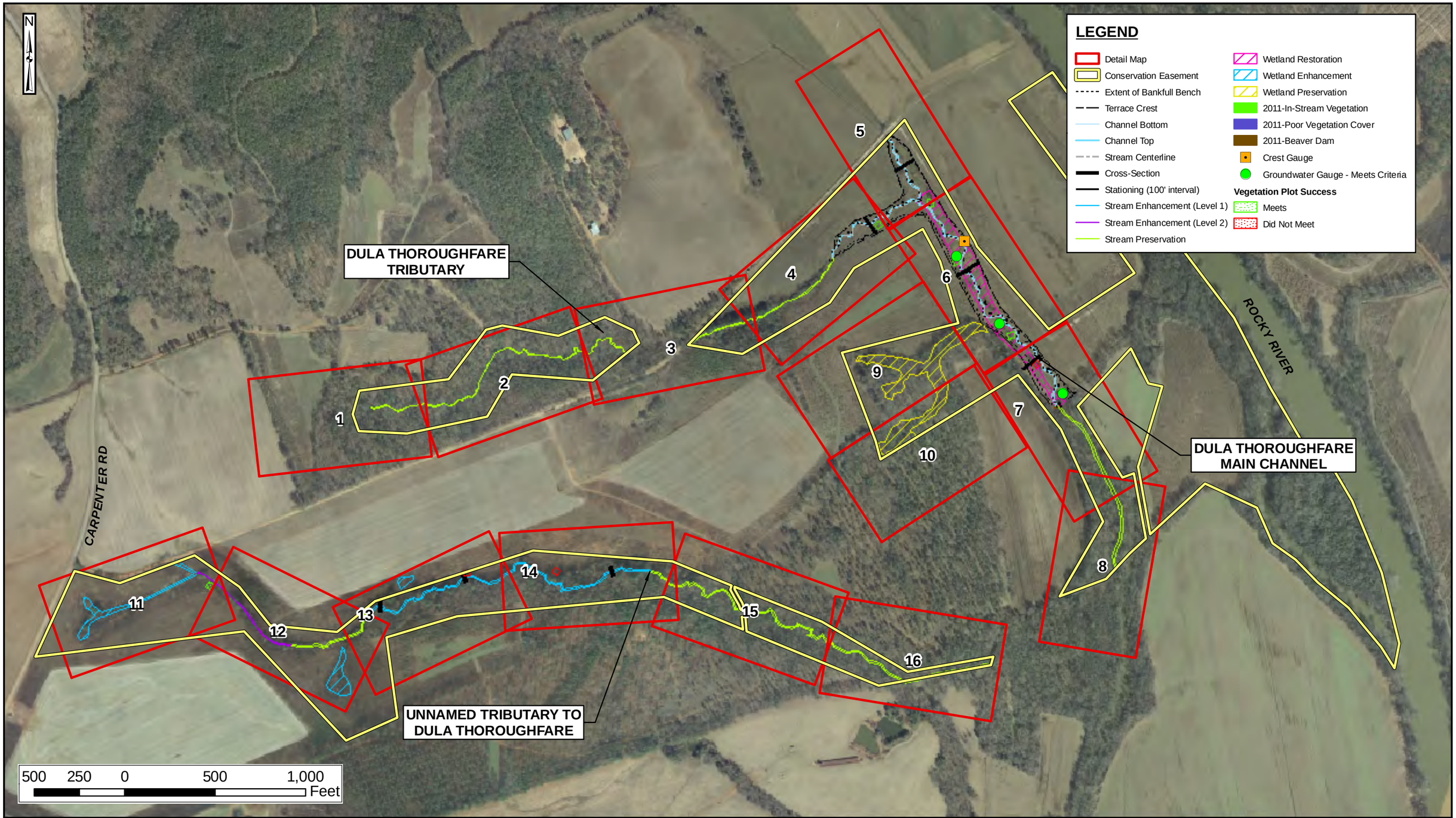
*At the time of project completion.

**Wetland mitigation was not included for this restoration project.

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

APPENDIX B
VISUAL ASSESSMENT DATA

Figure 2	**Current Condition Plan View (CCPV)**
Table 5	**Visual Stream Morphology Stability Assessment Table**
Table 6	**Vegetation Condition Assessment Table**
Photos	**Stream Station Photos**
Photos	**Vegetation Plot Photos**



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

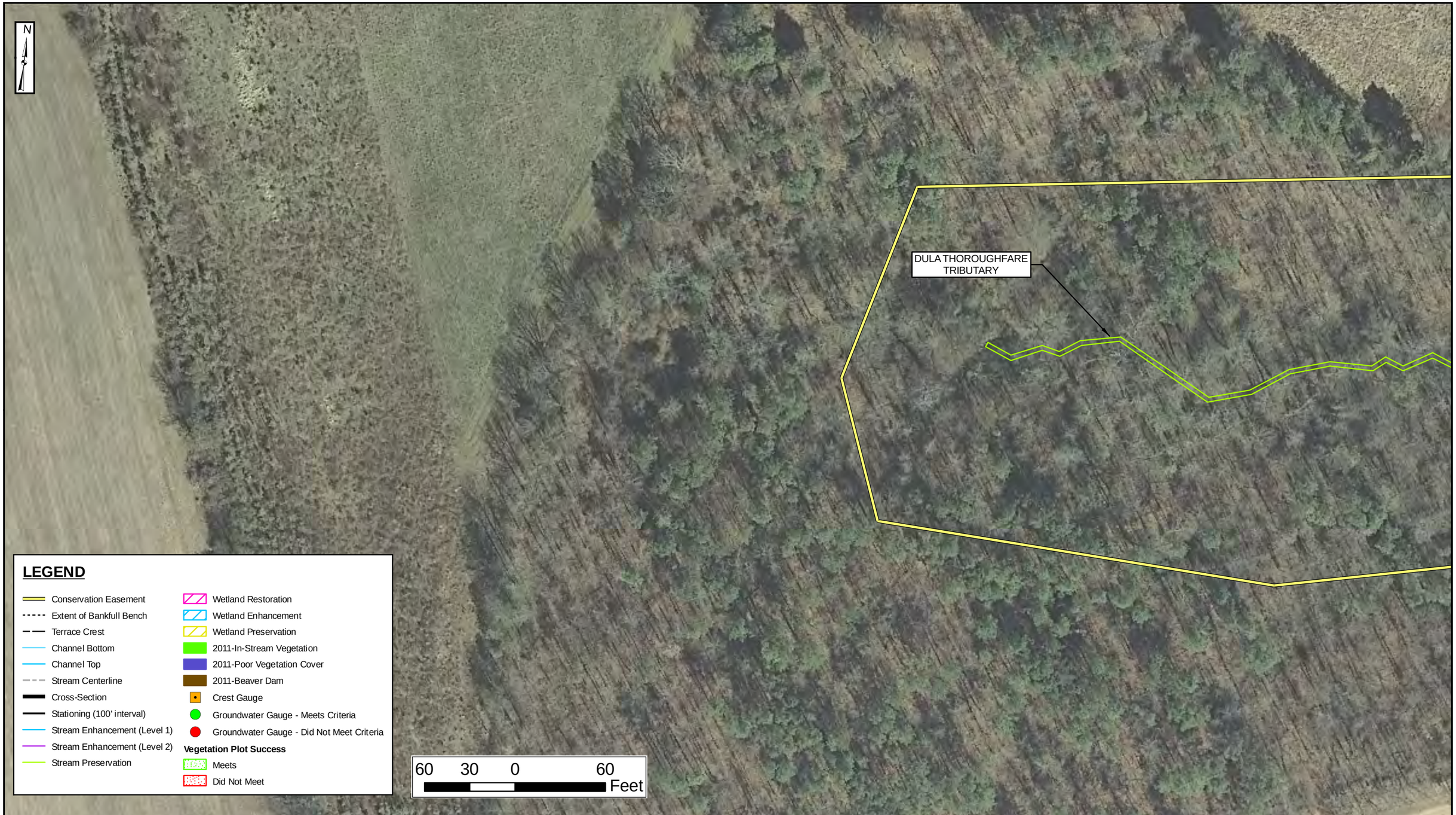
PROJECT NO. 65
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
DULA THOROUGHFARE AND UT TO DULA THOROUGHFARE STREAM AND WETLAND RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE INDEX



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

PROJECT NO. 65
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

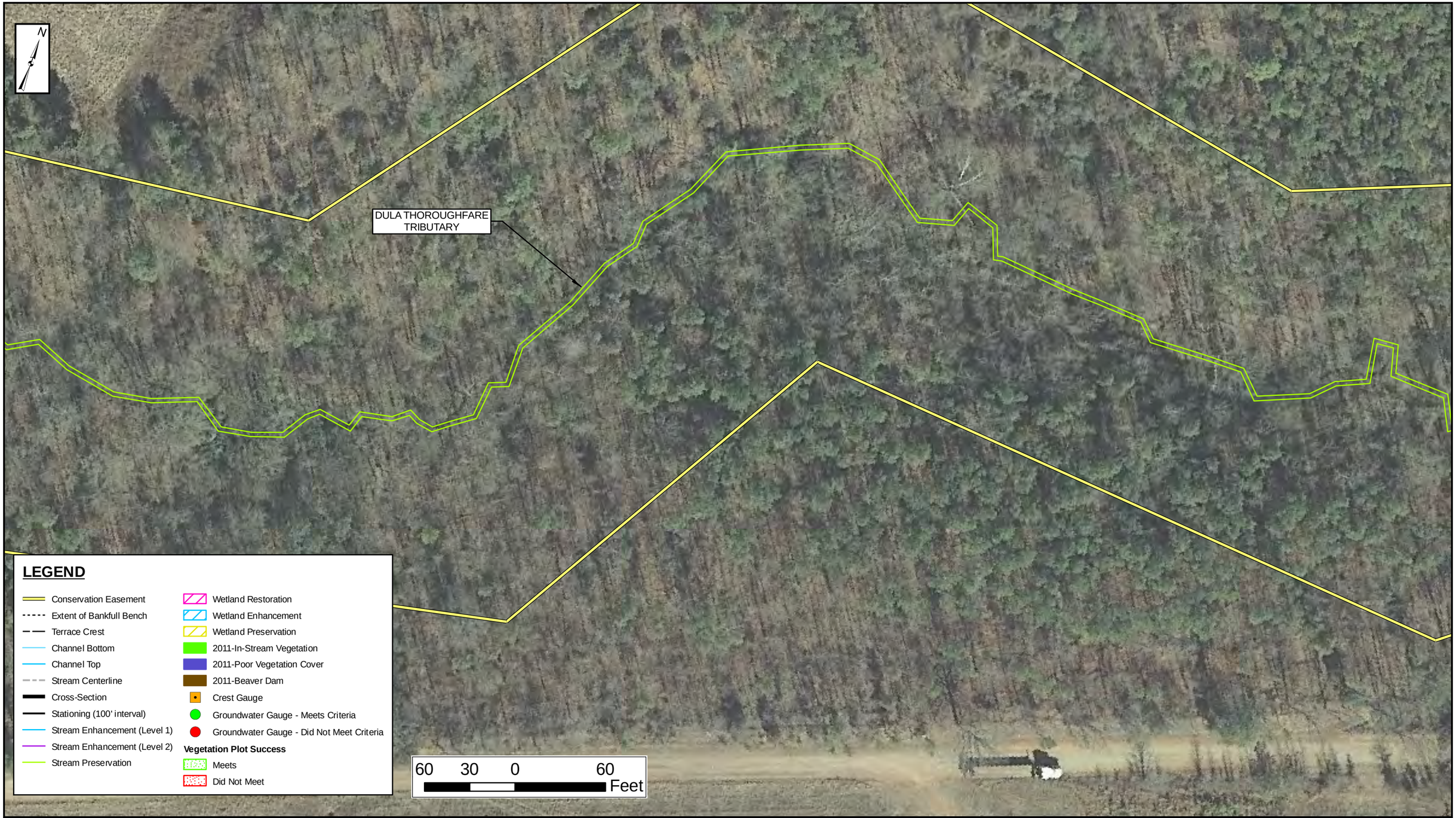
NC ECOSYSTEM ENHANCEMENT PROGRAM

DULA THOROUGHFARE AND UT TO DULA THOROUGHFARE STREAM AND WETLAND RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 2-1



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

PROJECT NO. 65
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

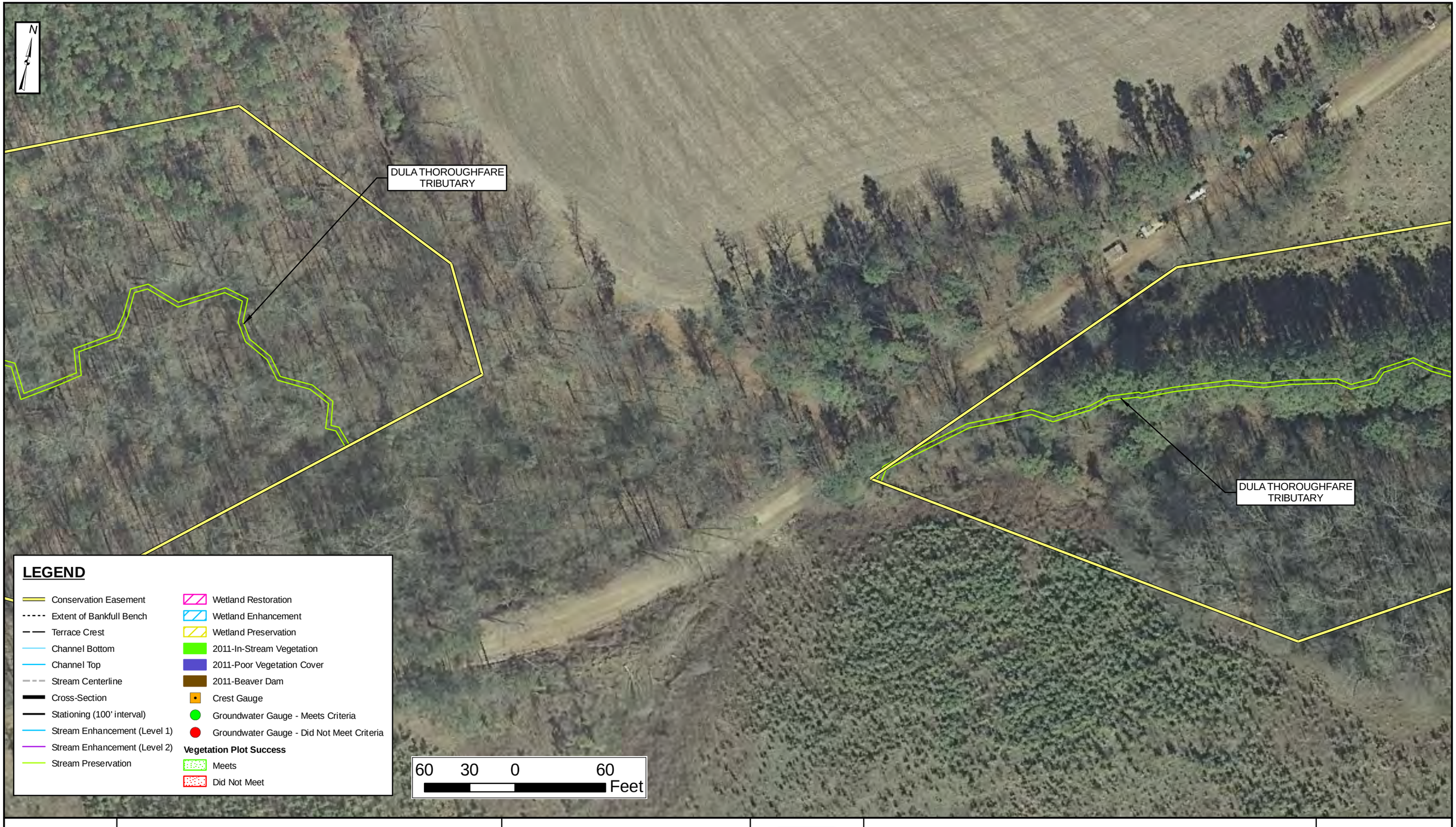
NC ECOSYSTEM ENHANCEMENT PROGRAM

DULA THOROUGHFARE AND UT TO DULA THOROUGHFARE STREAM AND WETLAND RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 2-2



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

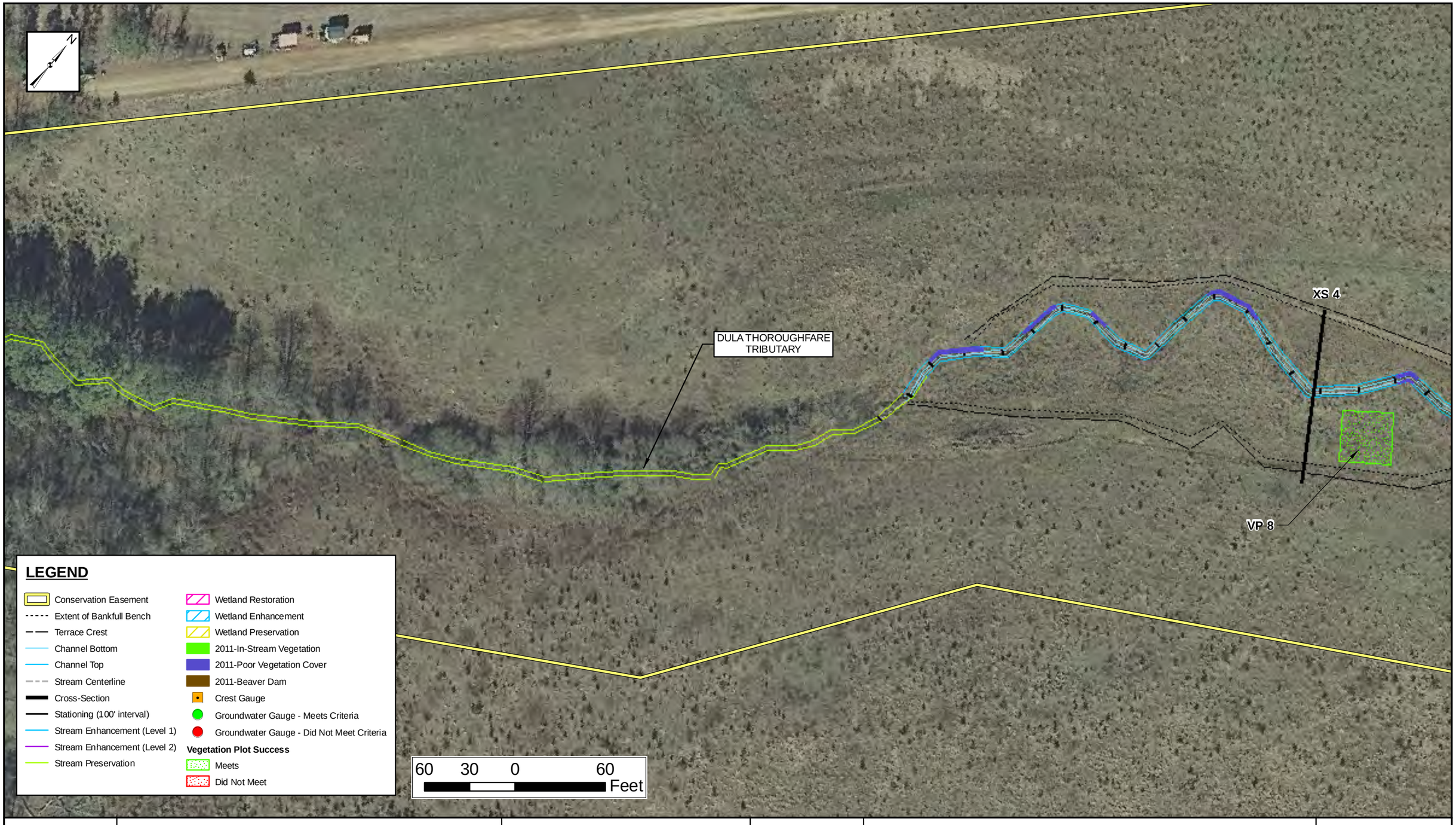
PROJECT NO. 65
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
DULA THOROUGHFARE AND UT TO DULA THOROUGHFARE STREAM AND WETLAND RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 2-3



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

PROJECT NO. 65
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

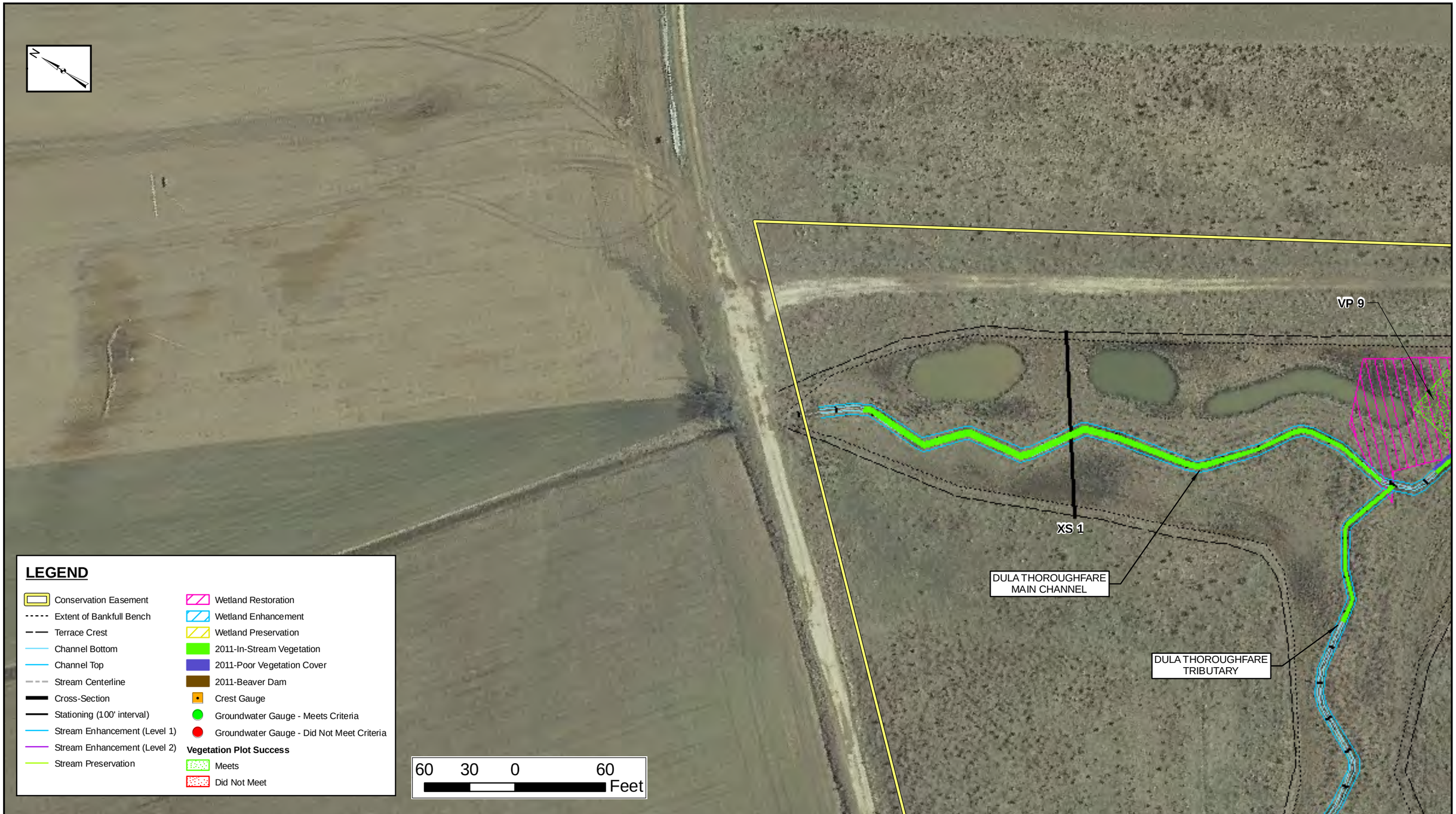
NC ECOSYSTEM ENHANCEMENT PROGRAM

DULA THOROUGHFARE AND UT TO DULA THOROUGHFARE STREAM AND WETLAND RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 2-4



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

PROJECT NO. 65
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

NC ECOSYSTEM ENHANCEMENT PROGRAM

DULA THOROUGHFARE AND UT TO DULA THOROUGHFARE STREAM AND WETLAND RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 2-5

DULA THOROUGHFARE
MAIN CHANNEL

VP 9

GWG 3

GWG 2

XS 2

VP 10

VP 11

LEGEND

- Conservation Easement
- Extent of Bankfull Bench
- Terrace Crest
- Channel Bottom
- Channel Top
- Stream Centerline
- Cross-Section
- Stationing (100' interval)
- Stream Enhancement (Level 1)
- Stream Enhancement (Level 2)
- Stream Preservation
- Wetland Restoration
- Wetland Enhancement
- Wetland Preservation
- 2011-In-Stream Vegetation
- 2011-Poor Vegetation Cover
- 2011-Beaver Dam
- Crest Gauge
- Groundwater Gauge - Meets Criteria
- Groundwater Gauge - Did Not Meet Criteria

Vegetation Plot Success

- Meets
- Did Not Meet

60 30 0 60 Feet

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

PROJECT NO. 65
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

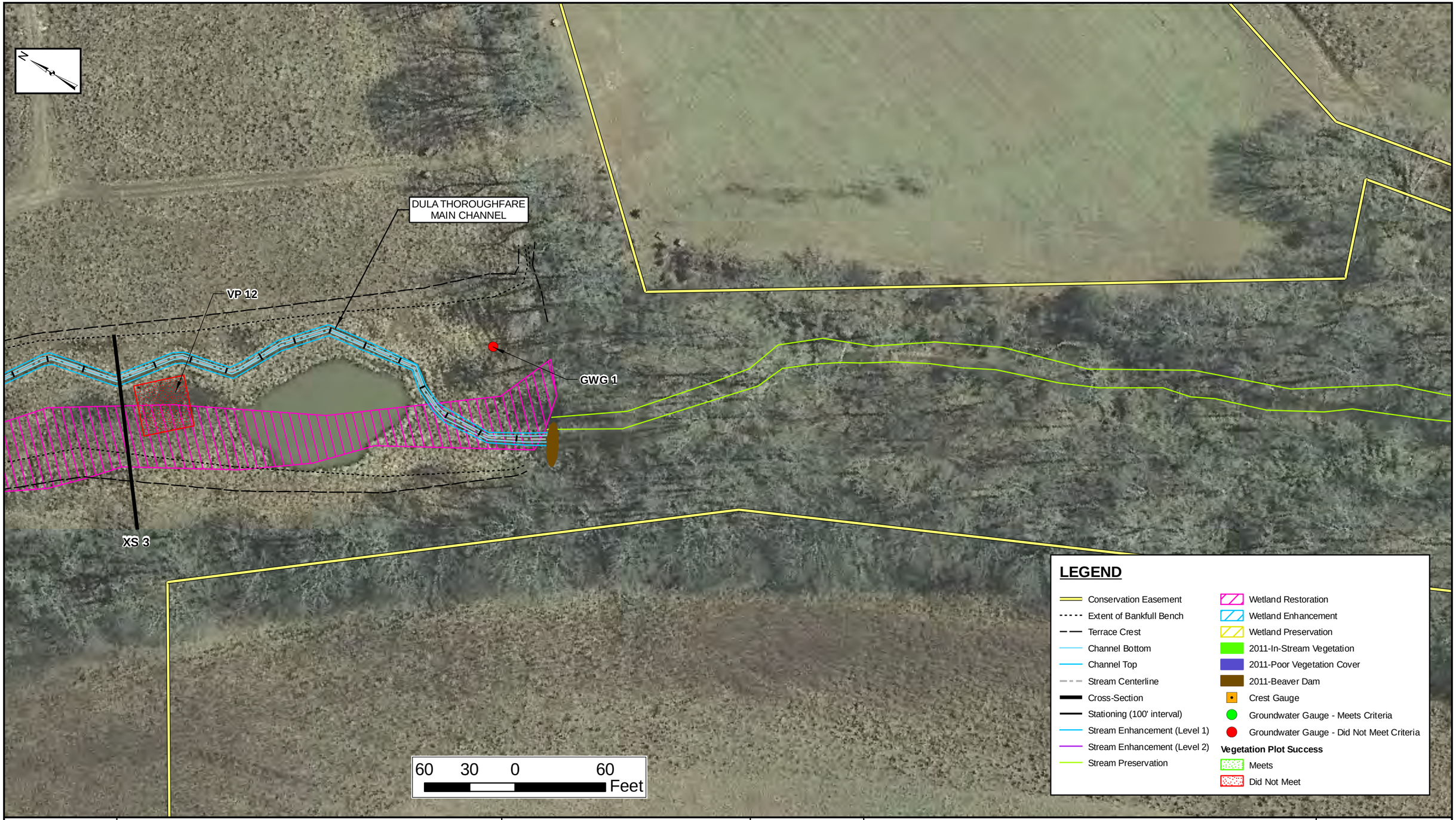
NC ECOSYSTEM ENHANCEMENT PROGRAM

DULA THOROUGHFARE AND UT TO DULA THOROUGHFARE STREAM AND WETLAND RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 2-6



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

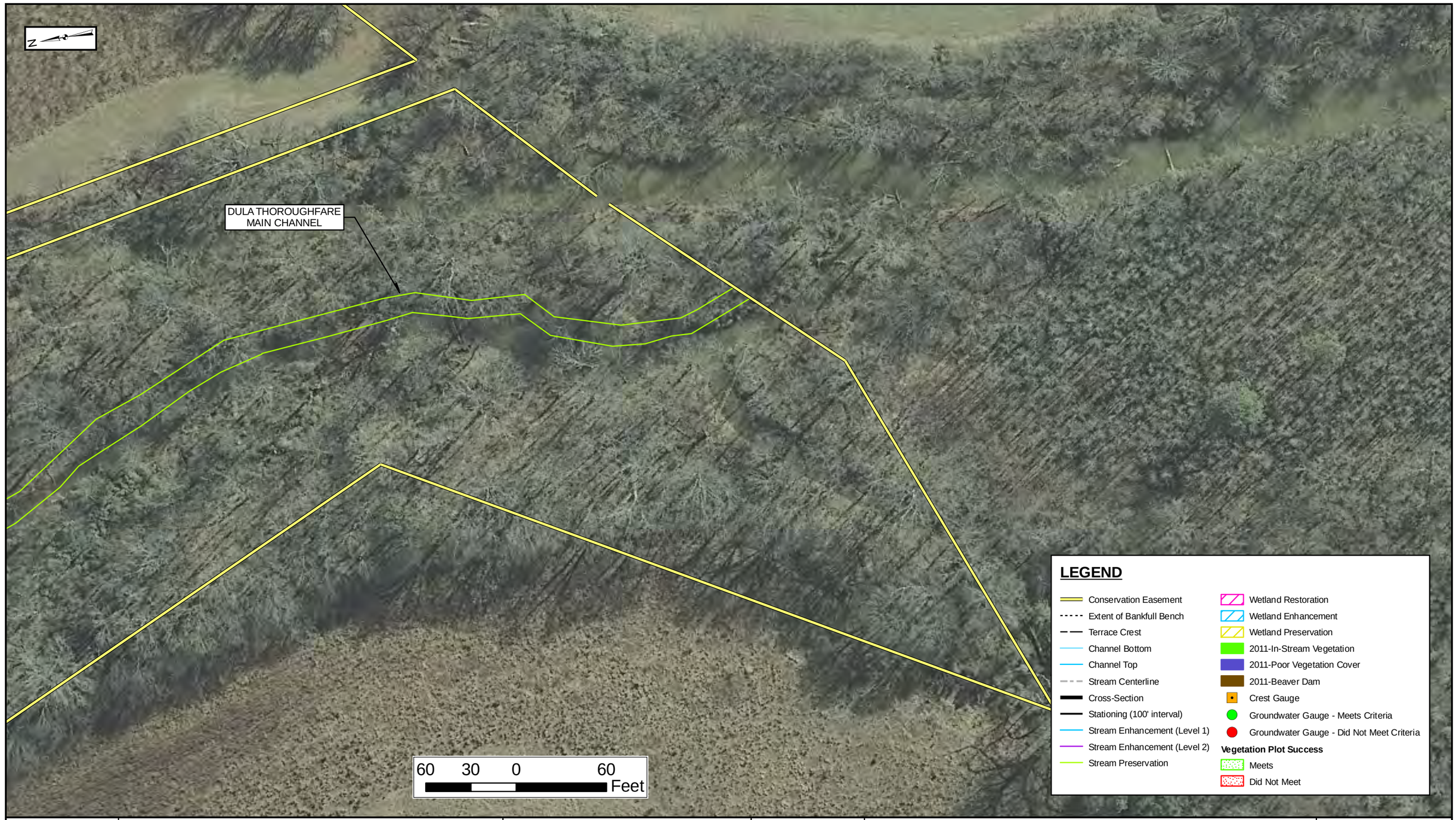
PROJECT NO. 65
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
DULA THOROUGHFARE AND UT TO DULA THOROUGHFARE STREAM AND WETLAND RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 2-7



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

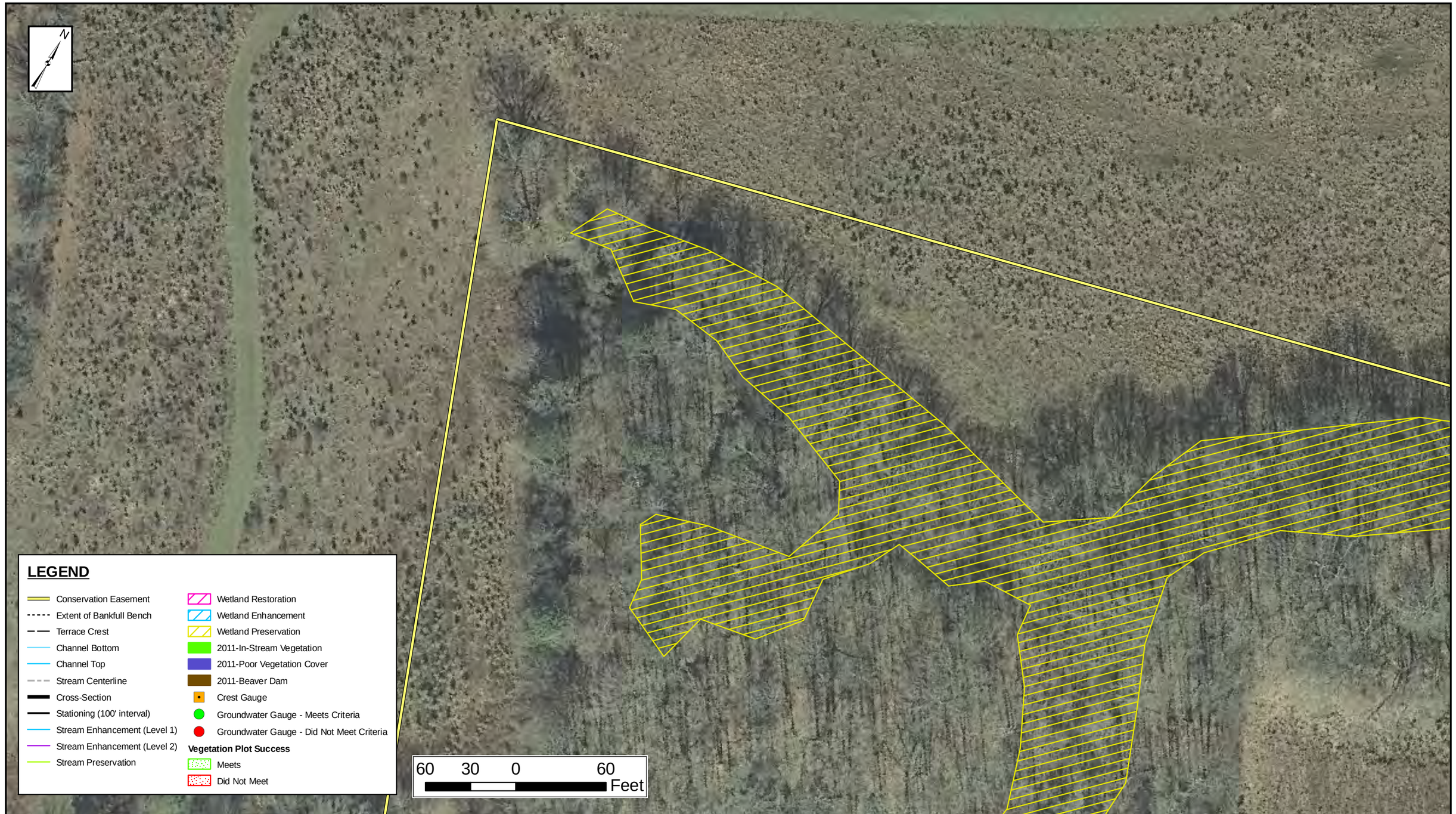
PROJECT NO. 65
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
DULA THOROUGHFARE AND UT TO DULA THOROUGHFARE STREAM AND WETLAND RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 2-8



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

PROJECT NO. 65
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

NC ECOSYSTEM ENHANCEMENT PROGRAM

DULA THOROUGHFARE AND UT TO DULA THOROUGHFARE STREAM AND WETLAND RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 2-9

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

PROJECT NO. 65
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

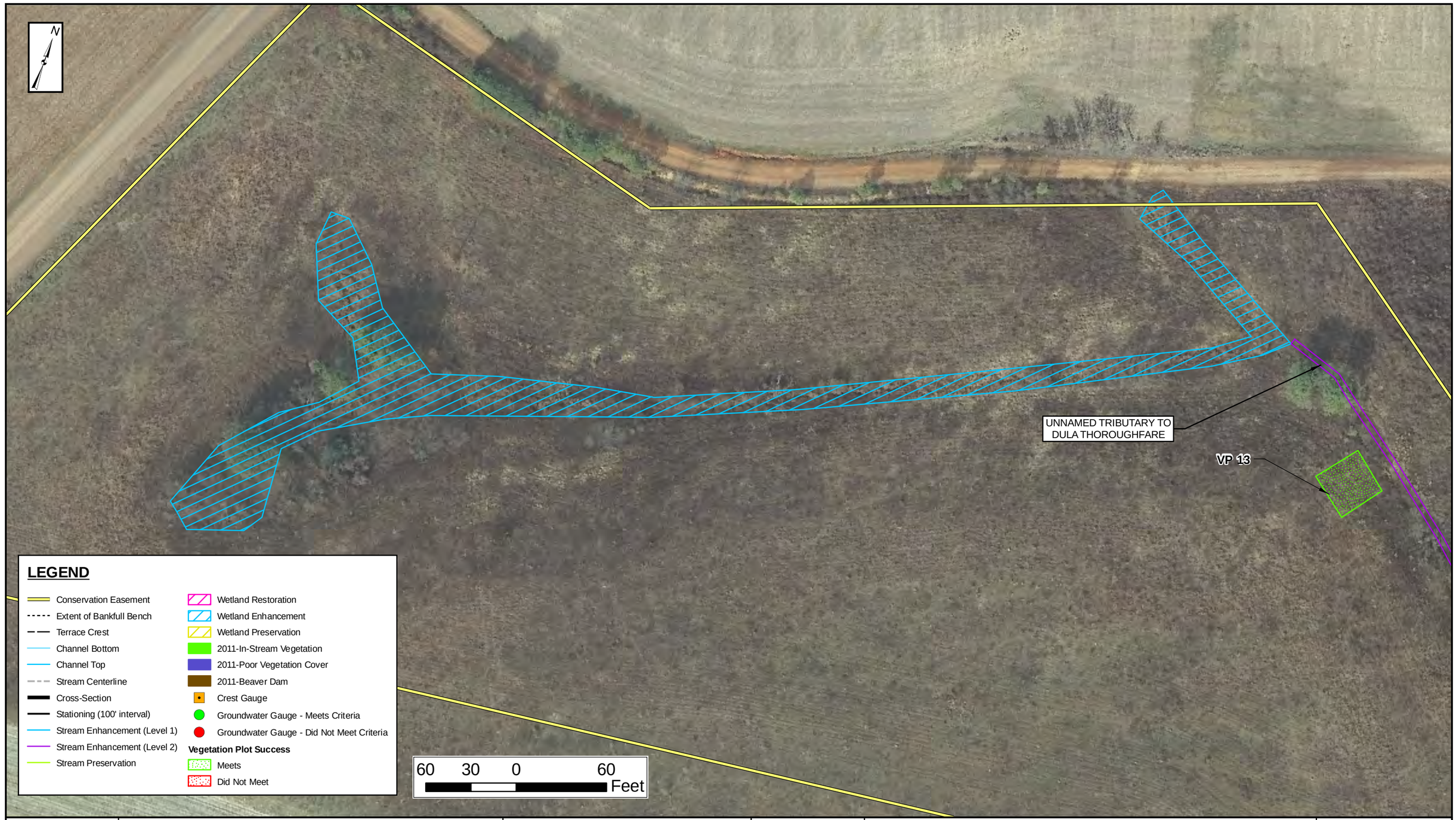
NC ECOSYSTEM ENHANCEMENT PROGRAM

DULA THOROUGHFARE AND UT TO DULA THOROUGHFARE STREAM AND WETLAND RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 2-10



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

PROJECT NO. 65
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

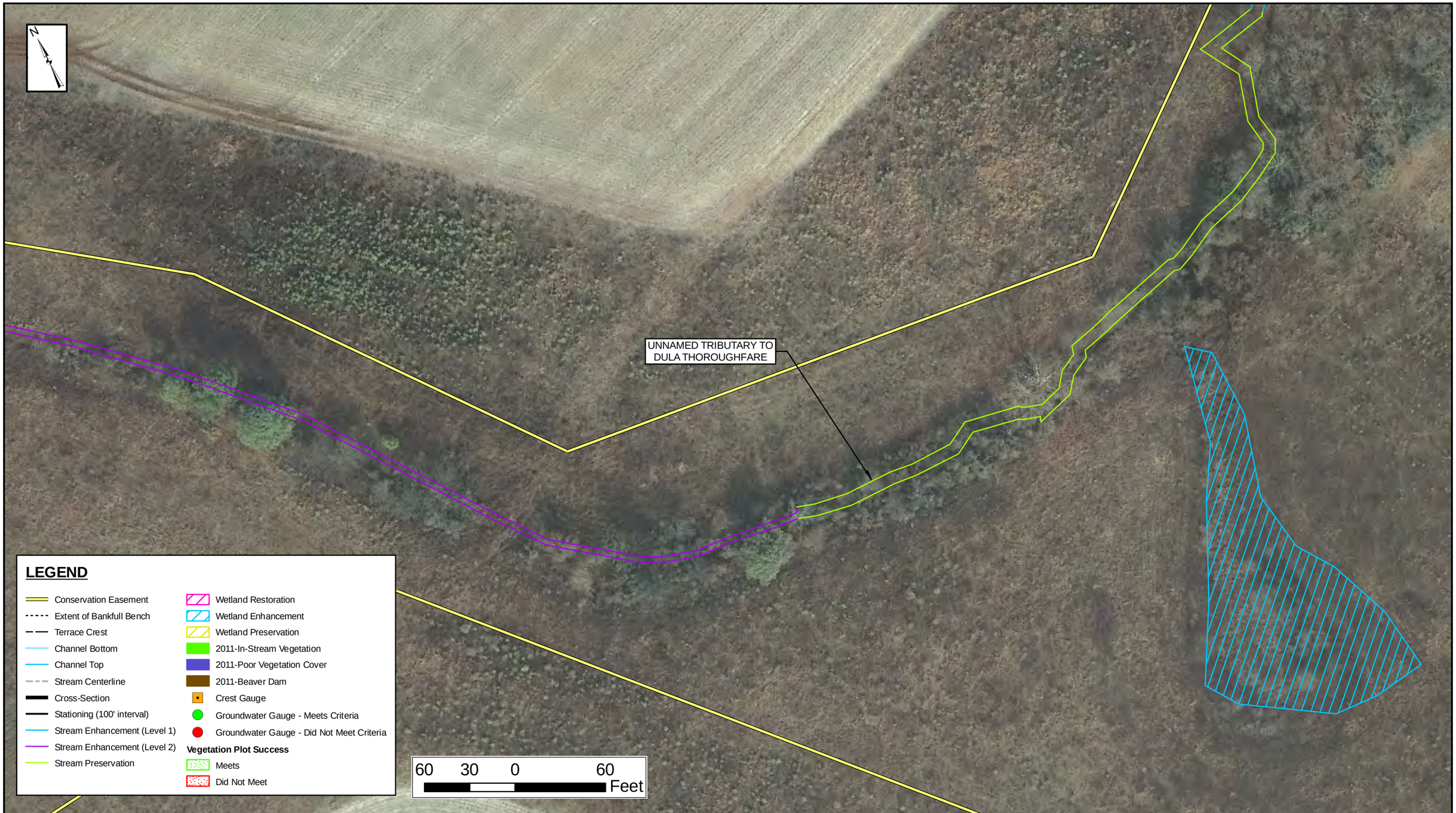
NC ECOSYSTEM ENHANCEMENT PROGRAM

DULA THOROUGHFARE AND UT TO DULA THOROUGHFARE STREAM AND WETLAND RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 2-11



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

PROJECT NO. 65
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

NC ECOSYSTEM ENHANCEMENT PROGRAM

DULA THOROUGHFARE AND UT TO DULA THOROUGHFARE STREAM AND WETLAND RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 2-12

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

PROJECT NO. 65
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

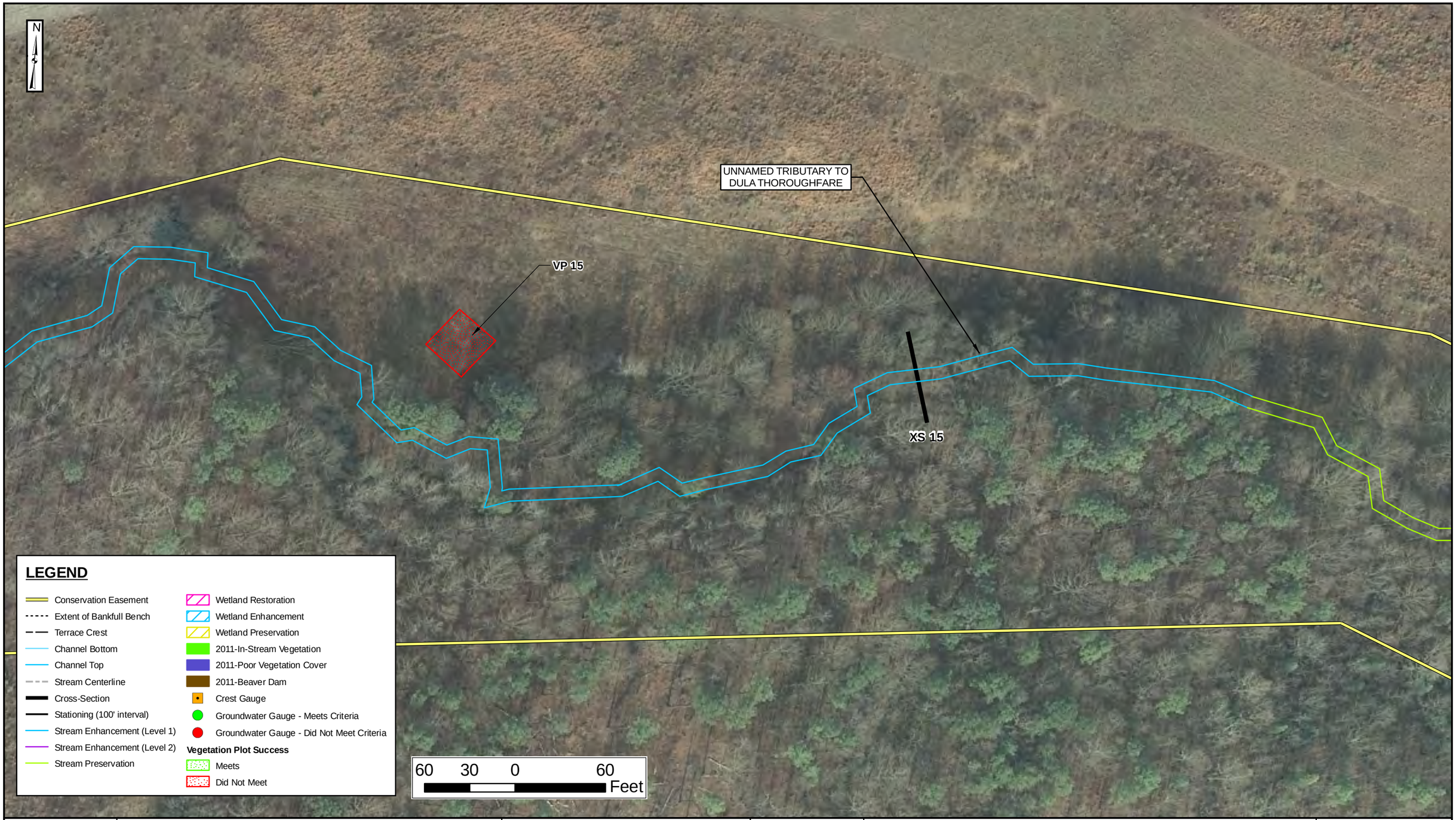
NC ECOSYSTEM ENHANCEMENT PROGRAM

DULA THOROUGHFARE AND UT TO DULA THOROUGHFARE STREAM AND WETLAND RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 2-13



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

PROJECT NO. 65
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

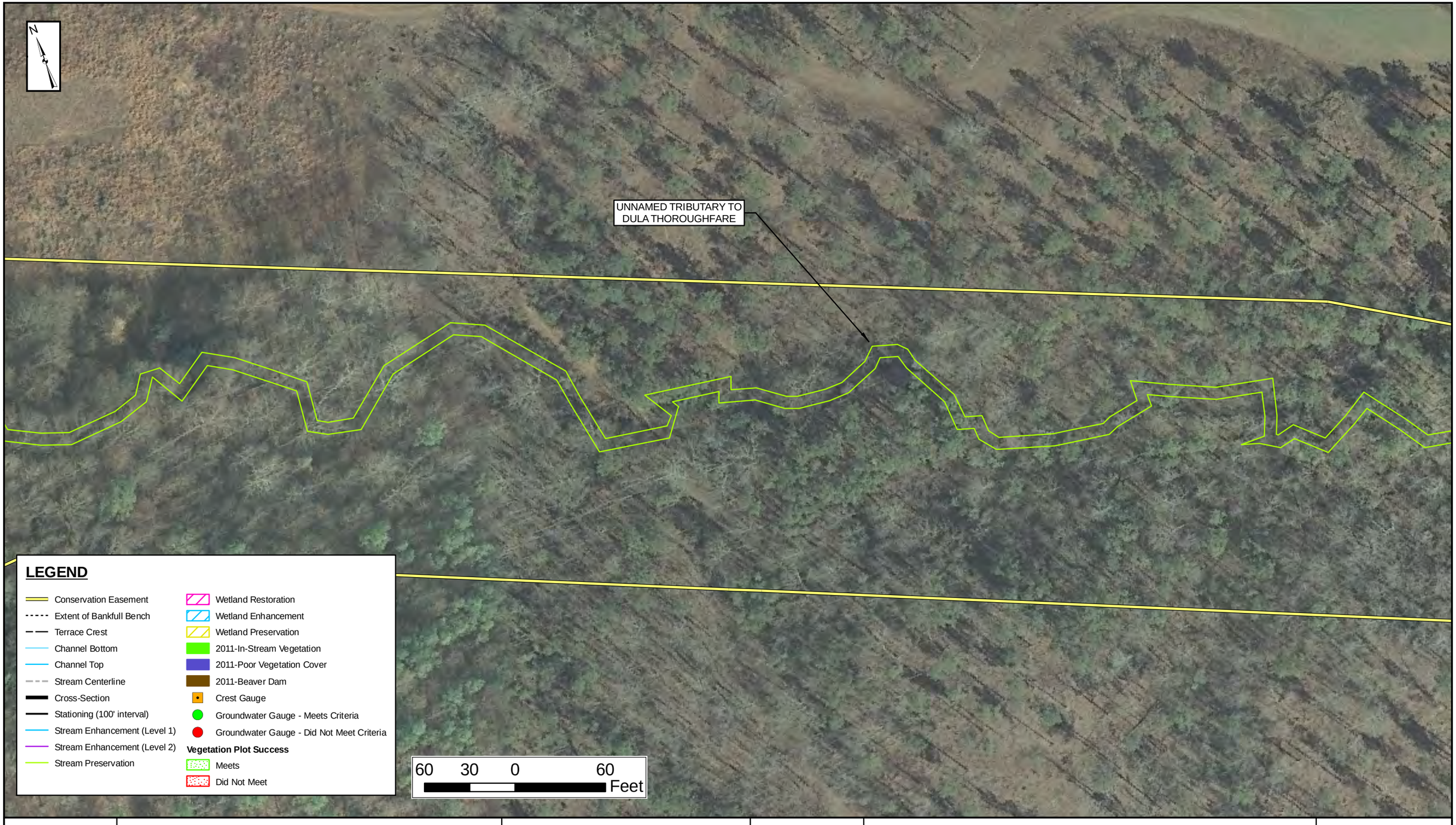
NC ECOSYSTEM ENHANCEMENT PROGRAM

DULA THOROUGHFARE AND UT TO DULA THOROUGHFARE STREAM AND WETLAND RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 2-14



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

PROJECT NO. 65
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

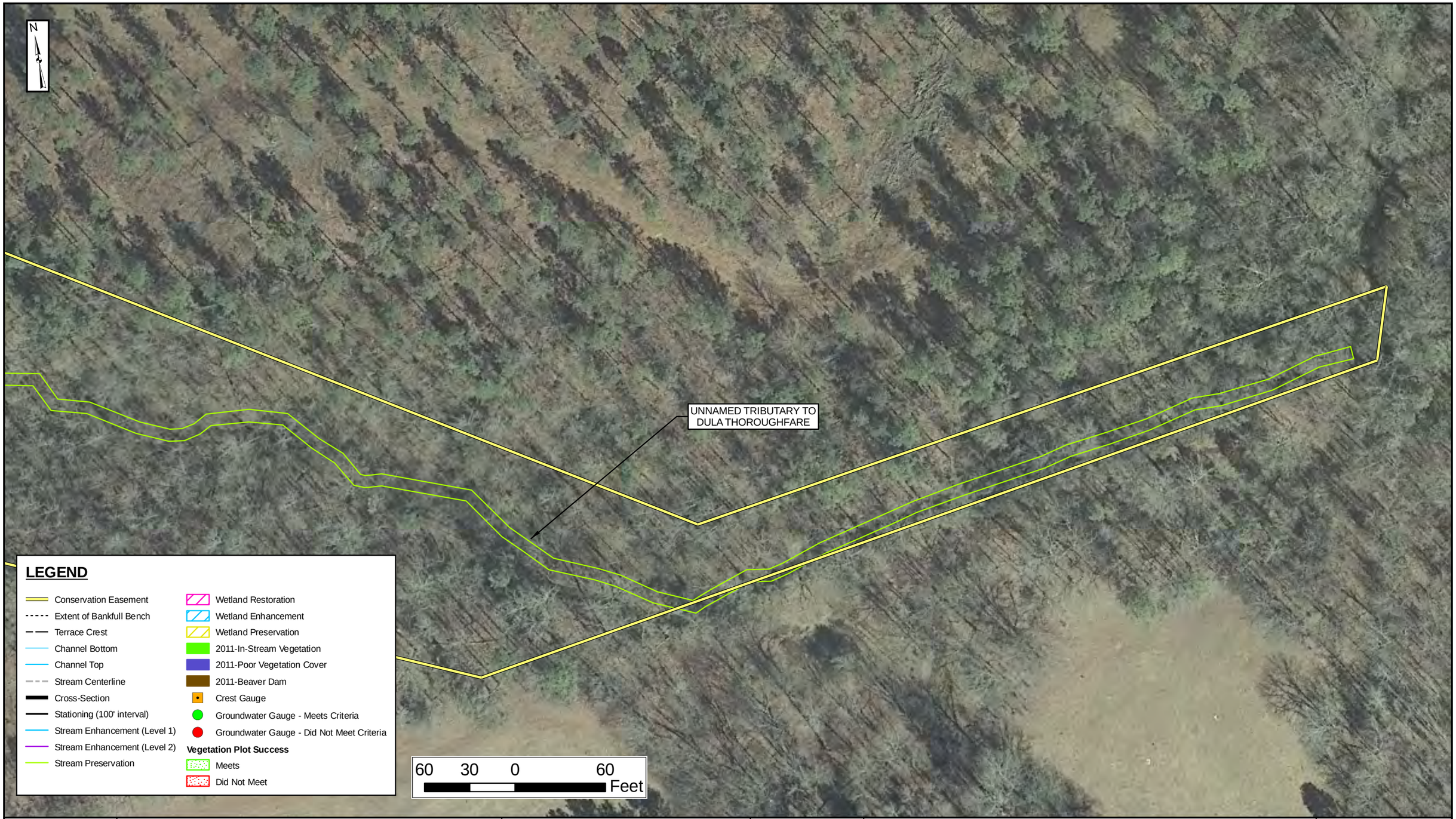
NC ECOSYSTEM ENHANCEMENT PROGRAM

DULA THOROUGHFARE AND UT TO DULA THOROUGHFARE STREAM AND WETLAND RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 2-15



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

PROJECT NO. 65
ANSON COUNTY
NORTH CAROLINA
MONITORING YEAR 5 OF 5

NC ECOSYSTEM ENHANCEMENT PROGRAM

DULA THOROUGHFARE AND UT TO DULA THOROUGHFARE STREAM AND WETLAND RESTORATION

CURRENT CONDITION PLAN VIEW

DATE: JANUARY 2012
SCALE: 1" = 60'
JOB NO.: JJX31100

FIGURE 2-16

Appendix B. Visual Assessment Data
Table 5. Visual Stream Morphology Stability Assessment Table
Dula Thoroughfare - Main Channel (2,025 lf)
Dula Thoroughfare Stream and Wetland Restoration/EEP Project No. 65
Monitoring Year 5 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			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition*	Texture/Substrate	N/A*	N/A*			N/A			
	3. Meander Pool Condition	Depth Sufficient	8	30			27%			
		Length Appropriate	8	30			27%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	30	30			100%			
		Thalweg centering at downstream of meander bend (Glide)	30	30			100%			
2. Bank	**1. Scoured/Eroded**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			2	167	92%	0	0	92%
	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	167	92%	0	0	92%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	N/A	0			N/A			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	N/A	0			N/A			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	N/A	0			N/A			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	N/A	0			N/A			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	N/A	0			N/A			

*As in previous years, the stream bed features consist of runs and small pools and lack well-defined riffle features.

Appendix B. Visual Assessment Data
Table 5. Visual Stream Morphology Stability Assessment Table
Dula Thoroughfare - Tributary (705 lf)
Dula Thoroughfare Stream and Wetland Restoration/EEP Project No. 65
Monitoring Year 5 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			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition*	Texture/Substrate	N/A	0			N/A			
	3. Meander Pool Condition	Depth Sufficient	N/A	11			N/A			
		Length Appropriate	0	11			0%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	11	11			100%			
		Thalweg centering at downstream of meander bend (Glide)	11	11			100%			
2. Bank	**1. Scoured/Eroded**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			5	122	83%	0	0	83%
	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	5	122	83%	0	0	83%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	N/A	0			N/A			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	N/A	0			N/A			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	N/A	0			N/A			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	N/A	0			N/A			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	N/A	0			N/A			

*The stream bed features consist mainly of runs and small pools.

Appendix B. Visual Assessment Data
Table 5. Visual Stream Morphology Stability Assessment Table
UT to Dula Thoroughfare (2,351 lf)
Dula Thoroughfare Stream and Wetland Restoration/EEP Project No. 65
Monitoring Year 5 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			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	N/A	0			N/A			
	3. Meander Pool Condition	Depth Sufficient	N/A	0			N/A			
		Length Appropriate	N/A	0			N/A			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	N/A	0			N/A			
		Thalweg centering at downstream of meander bend (Glide)	N/A	0			N/A			
2. Bank	**1. Scoured/Eroded**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	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	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	3	3			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	N/A	N/A			N/A			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	3	3			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	N/A	N/A			N/A			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	N/A	N/A			N/A			

Appendix B
Table 6a: Vegetation Condition Assessment Table
Dula Thoroughfare and Trib to Dula Thoroughfare/EEP Project No. 65
Monitoring Year 5 of 5

Planted Acreage* **9**

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	0	0	0.00%
Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1	0	0	0%
		Total	**0**	**0**	**0.00%**
Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0	0	0	0.00%

Easement Acreage* **71**

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 B
Table 6: Vegetation Condition Assessment Table
UT to Dula Thoroughfare/EEP Project No. 65
Monitoring Year 5 of 5

Planted Acreage **17**

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	0	0	0.00%
Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1	0	0	0.00%
		Total	**0**	**0**	**0.00%**
Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.05	1	0.05	0.29%

Easement Acreage **31**

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%

Vegetation Plot 8
(MY 1 - 4/2006)

Vegetation Plot 8
(MY 5 - 8/2011)

Vegetation Plot 8
(MY 5 - 8/2011)

Prepared For:	Appendix B – Visual Assessment Data Vegetation Plot Photos Dula Thoroughfare Stream and Wetland Restoration Project EEP Project No. 65 Monitoring Year 5 of 5 April 2012	Prepared By:

Vegetation Plot 9
(MY 1 - 4/2006)

Vegetation Plot 9
(MY 5 - 8/2011)

Vegetation Plot 9
(MY 2 - 8/2011)

Prepared For:	Appendix B – Visual Assessment Data Vegetation Plot Photos Dula Thoroughfare Stream and Wetland Restoration Project EEP Project No. 65 Monitoring Year 5 of 5 April 2012	Prepared By:

Vegetation Plot 10
(MY 1 - 4/2006)

Vegetation Plot 10
(MY 2 - 8/2011)

Vegetation Plot 10
(MY 2 - 8/2011)

Prepared For:	Appendix B – Visual Assessment Data Vegetation Plot Photos Dula Thoroughfare Stream and Wetland Restoration Project EEP Project No. 65 Monitoring Year 5 of 5 April 2012	Prepared By:

Vegetation Plot 11
(MY 1 - 4/2006)

Vegetation Plot 11
(MY 5 - 8/2011)

Vegetation Plot 11
(MY 5 - 8/2011)

Vegetation Plot 12
(MY 1 - 4/2006)

Vegetation Plot 12
(MY 5 - 8/2011)

Vegetation Plot 12
(MY 5 - 8/2011)

Vegetation Plot 13
(MY 1 - 4/2006)

Vegetation Plot 13
(MY 5 - 8/2011)

Vegetation Plot 13
(MY 5 - 8/2011)

Prepared For:	Appendix B – Visual Assessment Data Vegetation Plot Photos Dula Thoroughfare Stream and Wetland Restoration Project EEP Project No. 65 Monitoring Year 5 of 5 April 2012	Prepared By:

Vegetation Plot 14
(MY 3 - 6/2009)

Vegetation Plot 14
(MY 5 - 8/2011)

Vegetation Plot 14
(MY 5 - 8/2011)

Prepared For:	Appendix B – Visual Assessment Data Vegetation Plot Photos Dula Thoroughfare Stream and Wetland Restoration Project EEP Project No. 65 Monitoring Year 5 of 5 April 2012	Prepared By:

Vegetation Plot 15
(MY 1 - 4/2006)

Vegetation Plot 15
(MY 5 - 8/2011)

Vegetation Plot 15
(MY 5 - 8/2011)

Cross Section 1: View Upstream
(MY 1 - 10/2006)

Cross Section 1: View Upstream
(MY 5 - 7/2011)

Cross Section 1: View Upstream
(MY 1 - 10/2006)

Cross Section 2: View Downstream
(MY 5 - 7/2011)

Cross Section 2: View Upstream
(MY 1 - 10/2006)

Cross Section 2: View Upstream
(MY 5 - 7/2011)

Cross Section 2: View Upstream
(MY 1 - 10/2006)

Cross Section 2: View Downstream
(MY 5 - 7/2011)

Prepared For:	Appendix B – Visual Assessment Data Stream Station & Cross Section Photos Dula Thoroughfare Stream and Wetland Restoration Project EEP Project No. 65 Monitoring Year 5 of 5 April 2012	Prepared By:

Cross Section 3: View Upstream
(MY 1 - 10/2006)

Cross Section 3: View Upstream
(MY 5 - 7/2011)

Cross Section 3: View Upstream
(MY 1 - 10/2006)

Cross Section 3: View Downstream
(MY 5 - 7/2011)

Prepared For:	Appendix B – Visual Assessment Data Stream Station & Cross Section Photos Dula Thoroughfare Stream and Wetland Restoration Project EEP Project No. 65 Monitoring Year 5 of 5 April 2012	Prepared By:

Cross Section 4: View Upstream
(MY 1 - 10/2006)

Cross Section 4: View Upstream
(MY 5 - 7/2011)

Cross Section 4: View Upstream
(MY 1 - 10/2006)

Cross Section 4: View Downstream
(MY 5 - 7/2011)

Cross Section 13: View Upstream
(MY 1 - 10/2006)

Cross Section 13: View Upstream
(MY 5 - 7/2011)

Cross Section 13: View Upstream
(MY 1 - 10/2006)

Cross Section 13: View Downstream
(MY 5 - 7/2011)

Cross Section 14: View Upstream
(MY 1 - 10/2006)

Cross Section 14: View Upstream
(MY 5 - 7/2011)

Cross Section 14: View Upstream
(MY 1 - 10/2006)

Cross Section 14: View Downstream
(MY 5 - 7/2011)

)

Cross Section 15: View Upstream
(MY 1 - 10/2006)

Cross Section 15: View Upstream
(MY 5 - 7/2011)

Cross Section 15: View Upstream
(MY 1 - 10/2006)

Cross Section 15: View Downstream
(MY 5 - 7/2011)

Photo Point 1: View Upstream
(MY 1 - 7/2006)

Photo Point 1: View Upstream
(MY 5 - 7/2011)

Photo Point 1: View Downstream
(MY 1 - 7/2006)

Photo Point 1: View Downstream
(MY 5 - 7/2011)

Photo Point 2: View Upstream
(MY 1 - 7/2006)

Photo Point 2: View Upstream
(MY 5 - 7/2011)

Photo Point 2: View Downstream
(MY 1 - 7/2006)

Photo Point 2: View Downstream
(MY 5 - 7/2011)

Photo Point 3: View Upstream
(MY 1 - 7/2006)

Photo Point 3: View Upstream
(MY 5 - 7/2011)

Photo Point 3: View Downstream
(MY 1 - 7/2006)

Photo Point 3: View Downstream
(MY 5 - 7/2011)

Photo Point 4: View Upstream
(MY 1 - 7/2006)

Photo Point 4: View Upstream
(MY 5 - 7/2011)

Photo Point 4: View Downstream
(MY 1 - 7/2006)

Photo Point 4: View Downstream
(MY 5 - 7/2011)

APPENDIX C
VEGETATION PLOT DATA

Table 7 **Vegetation Plot Mitigation Success Summary Table**

Table 8 **CVS Vegetation Metadata Table**

Table 9 **CVS Stem Count Total and Planted by Plat and Species**

Appendix C
Table 7 Vegetation Plot Mitigation Success
Dula Thoroughfare Stream and Wetland Restoration/EEP Project 65
Dula Thoroughfare and UT Dula Thoroughfare
Monitoring Year 5 of 5

Vegetation Plot ID	Vegetation Survival Threshold Met (Y/N)
Plot 8	Y
Plot 9	Y
Plot 10	Y
Plot 11	Y
Plot 12	N
Plot 13	Y
Plot 14	N
Plot 15	N

Appendix C
Table 8: CVS Vegetation Metadata Table
Dula Thoroughfare Stream and Wetland Restoration/EEP Project 65
Dula Thoroughfare and UT Dula Thoroughfare
Monitoring Year 5 of 5

Report Prepared By	Heath Caldwell	
Date Prepared	9/7/2011 15:20	
database name	Database1.mdb	
database location	J:\JJX31100\M5-Field Monitoring Data\MY 2011\VEGETATION\Bishop Sites	
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	D05010S	
project Name	Bishop Site Stream and Wetland Restoration	
Description	Stream and wetland restoration/enhancement in Anson County	
length(ft)		
stream-to-edge width (ft)		
area (sq m)		
Required Plots (calculated)	8	
Sampled Plots	8	

Appendix C
Table 9: CVS Stem Count Total and Planted by Plot and Species
Dula Thoroughfare/EEP Project No. 65
Monitoring Year 5 of 5

			Current Data (MY5-2011)										Annual Means									
			Plot 8		Plot 9		Plot 10		Plot 11		Plot 12		Current Mean		MY1 - 2007		MY2 - 2008		MY3 - 2009		MY4 - 2010	
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	T		3									N/A	1	N/A	N/A	N/A	1	N/A	N/A	N/A	1
Acer rubrum	red maple	T											N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
Baccharis hamilifolia	groundsel tree	S											N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
Betula nigra	river birch	T	1	1	17	17	14	14	2	79	2	2	7	23	7	7	7	9	7	7	7	7
Carya glabra	pignut hickory	T											N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Carya ovata	shagbark hickory	T											N/A	N/A	1	1	1	1	1	1	1	1
Celtis laevigata	sugarberry	T					1	1					1	1	1	1	1	1	1	1	1	1
Cephalanthus occidentalis	common buttonbush	T	1	1	5	5	3	3			3	3	2	2	3	3	3	3	3	3	3	4
Cornus amomum	silky dogwood	T	3	3	9	14	3	3					3	4	4	4	4	5	4	4	4	5
Cornus florida	flowering dogwood	S											N/A	N/A	1	1	1	1	1	1	N/A	N/A
Diospyros virginiana	common persimmon	T											N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fagus grandifolia	American beech	T											N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fraxinus pennsylvanica	green ash	T	3	5			4	4				1	1	2	3	3	4	3	4	4	4	4
Liquidambar styraciflua	sweet gum	T								3			N/A	1	N/A	N/A	N/A	1	N/A	N/A	N/A	3
Nyssa biflora	swamp tupelo	T	1	1	1	1							1	1	1	1	1	1	1	1	1	1
Pinus taeda	loblolly pine	T											N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
Platanus occidentalis	American sycamore	T			1	1			5	5			1	1	3	3	3	3	3	3	3	3
Quercus michauxii	swamp chestnut oak	T	2	2			1	1	1	1			1	1	1	1	1	1	1	1	1	1
Quercus pagoda	cherrybark oak	T	2	4	1	3	1	1			1	1	1	2	1	1	1	1	1	1	1	2
Quercus phellos	willow oak	T	2	4	2	2	2	2	1	1			2	2	2	2	2	2	2	2	2	2
Quercus rubra	Northern red oak	T											N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
Quercus sp.	oak species	T											N/A	N/A	N/A	N/A	N/A	3	N/A	N/A	N/A	N/A
Ulmus alata	winged elm	T										48	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	58
Ulmus americana	American elm	T			3	4	1	1		1			1	1	2	2	2	3	2	2	2	8
	Plot Area (acres)		0.0247																			
	Species Count		8	9	8	8	9	9	4	6	3	5	11	13	7	7	7	8	12	12	12	12
	Stem Count		15	24	39	47	30	30	9	90	6	55	22	51	21	21	20	24	29	29	29	29
	Stems per Acre		607	972	1579	1903	1215	1215	364	3644	243	2227	802	1992	842	842	802	980	810	818	810	818

Type=**S**hrub or **T**ree
P = Planted
T = Total

Appendix C
Table 9: CVS Stem Count Total and Planted by Plot and Species
UT to Dula Thoroughfare/EEP Project No. 65
Monitoring Year 5 of 5

			Current Data (MY5-2011)						Annual Means									
			Plot 13		Plot 14		Plot 15		Current Mean		MY1 - 2007		MY2 - 2008		MY2 - 2008		MY4 - 2010	
Species	Common Name	Type	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T
Acer rubrum	red maple	T						2	N/A	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	17
Carya glabra	pignut hickory	T							N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
Celtis laevigata	sugarberry	T	2	2					1	1	4	4	2	3	3	3	2	2
Cornus amomum	silky dogwood	T							N/A	N/A	N/A	N/A	N/A	2	N/A	N/A	N/A	N/A
Cornus florida	flowering dogwood	S			1	1	1	1	1	1	1	1	1	1	1	1	1	1
Diospyros virginiana	common persimmon	T							N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4
Fagus grandifolia	American beech	T	1	1	1	3	2	4	1	3	1	1	1	1	1	1	1	2
Liquidambar styraciflua	sweet gum	T				1		2	N/A	1	N/A	N/A	N/A	1	N/A	N/A	N/A	5
Nyssa biflora	swamp tupelo	T							N/A	N/A	1	1	1	1	1	1	N/A	N/A
Pinus taeda	loblolly pine	T		22		3		11	N/A	12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11
Quercus falcata	southern red oak	T	4	4	2	3	1	3	2	3	2	2	1	1	2	2	2	2
Quercus phellos	willow oak	T					1	1	1	1	1	1	1	2	1	1	1	1
Quercus rubra	northern red oak	T	2	2					1	1	4	4	4	4	4	4	4	4
Rhus glabra	smooth sumac	S		7					N/A	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3
Taxodium distichum	bald cypress	T							N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
	Plot Area (acres)		**0.0247**															
	Species Count		**4**	**6**	**3**	**5**	**4**	**7**	**4**	**7**	**4**	**4**	**4**	**4**	**6**	**6**	**4**	**8**
	Stem Count		**9**	**38**	**4**	**11**	**5**	**24**	**6**	**23**	**8**	**8**	**6**	**6**	**9**	**9**	**7**	**27**
	Stems per Acre		**364**	**1538**	**162**	**445**	**202**	**972**	**243**	**985**	**310**	**310**	**243**	**256**	**283**	**283**	**243**	**1039**

Type=**S**hrub or **T**ree
P = Planted
T = Total

APPENDIX D
STREAM SURVEY DATA

Figures 3a-3d	**Cross-sections with Annual Overlays**
Figure 4	**Longitudinal Profiles with Annual Overlays**
Figures 5a-5d	**Pebble Count Plots with Annual Overlays**
Tables 10a,b	**Baseline – Stream Data Summary Tables**
Table 11a	**Monitoring – Cross-Section Morphology Data Table**
Table 11b	**Monitoring – Stream Reach Morphology Data Table**

Appendix D. Stream Survey Data
Figure 3a: Cross-Section Plots and Raw Data Tables
Dula Thoroughfare Stream and Wetland Restoration/EEP Project No. 65
Dula Thoroughfare Main Channel
Monitoring Year 5 of 5

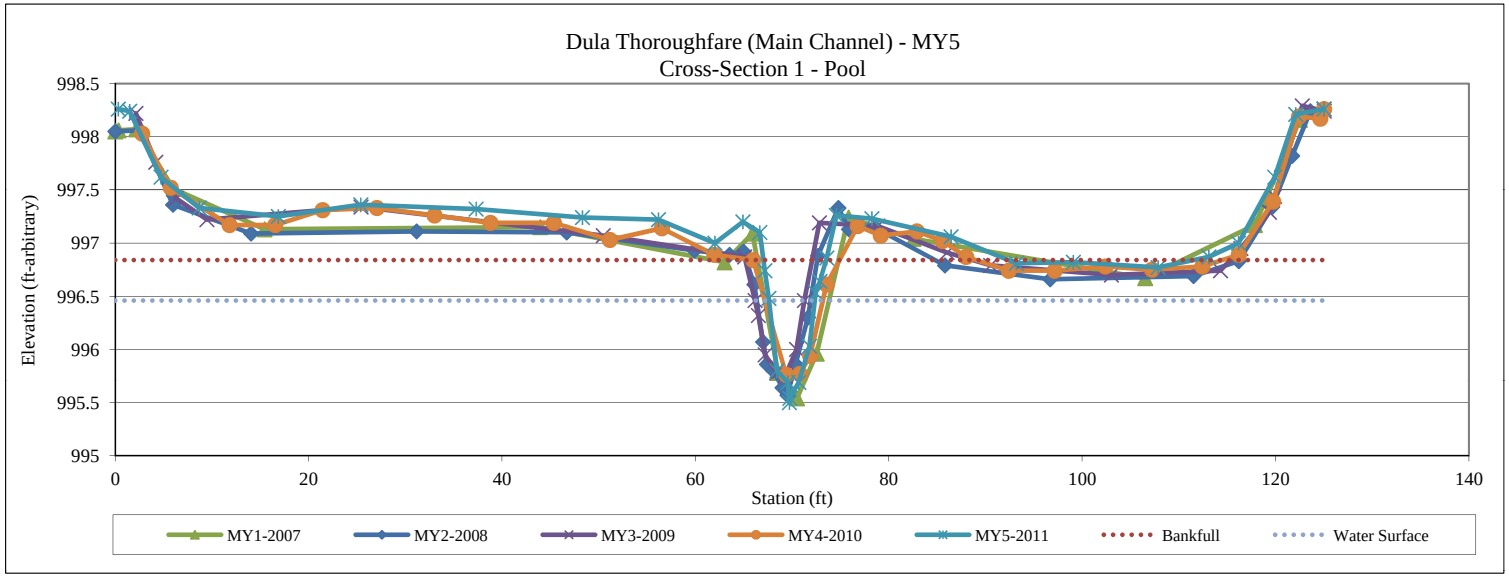
Project Name	**Dula Thoroughfare**
EEP Project Number	**65**
Cross-Section ID	**XS-1, Riffle, 1+93**
Survey Date	**3/2012**

SUMMARY DATA	
Bankfull Elevation (ft)	996.84
Bankfull Cross-Sectional Area (ft^2)	4.94
Bankfull Width (ft)	6.49
Flood Prone Area Elevation (ft)	998.18
Flood Prone Width (ft)	120.18
Bankfull Mean Depth (ft)	0.76
Bankfull Max Depth (ft)	1.34
W/D Ratio	8.54
Entrenchment Ratio	18.52
Bank Height Ratio	1.00

XS-1: View Upstream

XS-1: View Downstream

Station	Elevation	Notes
0.31	998.26	xs1
1.49	998.24	xs1
4.73	997.62	xs1
8.68	997.33	xs1
16.86	997.25	xs1
25.39	997.36	xs1
37.32	997.32	xs1
48.32	997.24	xs1
56.18	997.22	xs1
62.02	997	xs1
64.91	997.2	xs1
66.66	997.1	xs1
67.18	996.74	xs1
67.6	996.48	xs1
68.42	995.8	xs1
69.57	995.69	xs1
69.72	995.5	xs1
69.77	995.54	xs1
70.69	995.69	xs1
71.79	996.03	xs1
72.44	996.53	xs1
72.88	996.64	xs1
73.59	996.86	xs1
74.58	997.26	xs1
78.25	997.23	xs1
86.44	997.06	xs1
93.19	996.81	xs1
99.09	996.82	xs1
107.85	996.77	xs1



Station	Elevation	Notes
113.1	996.87	xs1
116.17	997	xs1
119.91	997.62	xs1
122.09	998.21	xs1
125.02	998.26	xs1-rpb

Appendix D. Stream Survey Data
Figure 3b: Cross-Section Plots and Raw Data Tables
Dula Thoroughfare Stream and Wetland Restoration/EEP Project No. 65
Dula Thoroughfare Main Channel
Monitoring Year 5 of 5

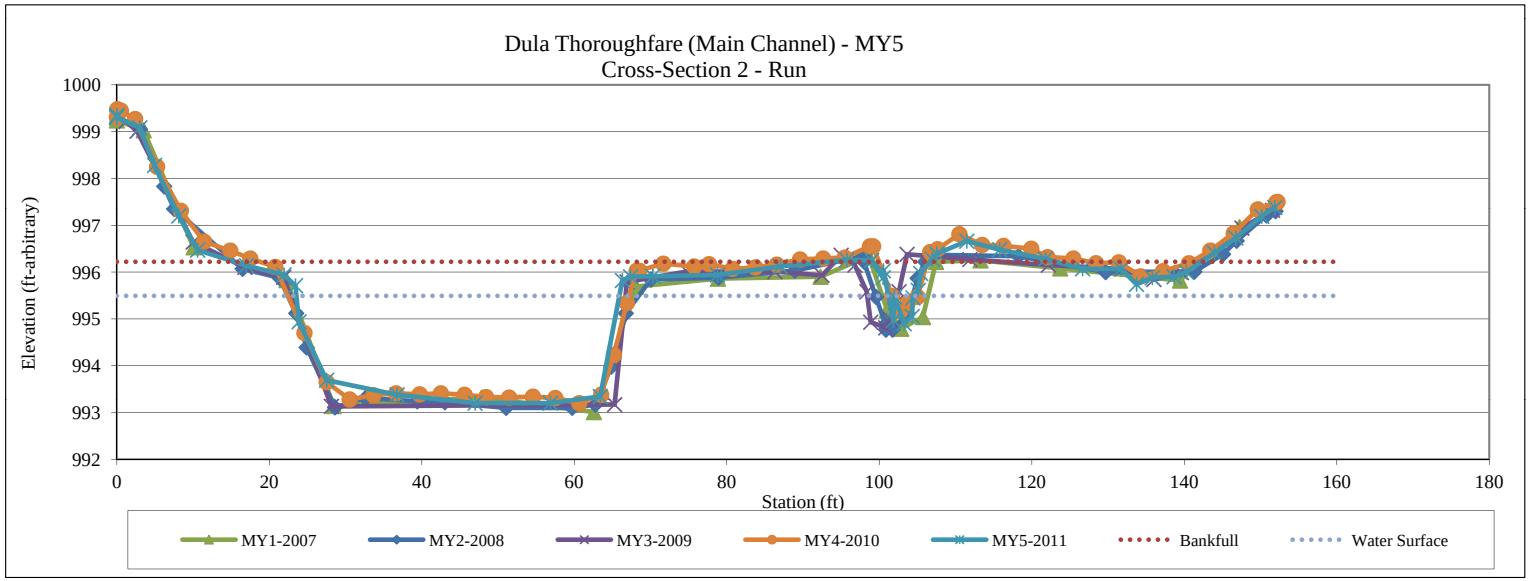
Project Name	**Dula Thoroughfare**
EEP Project Number	**65**
Cross-Section ID	**XS-2, Run, 10+21**
Survey Date	**3/2012**

SUMMARY DATA	
Bankfull Elevation (ft)	996.22
Bankfull Cross-Sectional Area (ft^2)	4.81
Bankfull Width (ft)	7.44
Flood Prone Area Elevation (ft)	999.24
Flood Prone Width (ft)	150.94
Bankfull Mean Depth (ft)	0.65
Bankfull Max Depth (ft)	3.02
W/D Ratio	11.45
Entrenchment Ratio	20.29
Bank Height Ratio	1.00

XS-2: View Upstream

XS-2: View Downstream

Station	**Elevation**	**Notes**
0	999.35	xs2-lpt
0	999.31	xs2-lpb
3.02	999.08	xs2
4.94	998.28	xs2
8.12	997.2	xs2
10.59	996.47	xs2
16.99	996.14	xs2
21.92	995.94	xs2
23.43	995.71	xs2
23.89	994.94	xs2
27.51	993.69	xs2
36.75	993.38	xs2
46.98	993.2	xs2
56.86	993.2	xs2
63.4	993.34	xs2
66.3	995.82	xs2
67.37	995.9	xs2
70.3	995.91	xs2
78.75	995.94	xs2
87.02	996.12	xs2
95.73	996.26	xs2
98.99	996.25	xs2
100.5	995.88	xs2
100.53	996.03	xs2
101.84	994.97	xs2
101.99	995.47	xs2
103.26	994.9	xs2
104.3	995.05	xs2
104.4	995.45	xs2



Station	**Elevation**	**Notes**
105.1	995.61	xs2
105.42	995.97	xs2
106.92	996.28	xs2
107.53	996.39	xs2
111.47	996.66	xs2
115.79	996.48	xs2
121.79	996.28	xs2

Station	**Elevation**	**Notes**
126.65	996.07	xs2
131.72	996.07	xs2
133.73	995.74	xs2
135.8	995.88	xs2
138.66	995.9	xs2
140.28	996	xs2
143.95	996.41	xs2

Station	**Elevation**	**Notes**
146.75	996.73	xs2
150.14	997.19	xs2
151.86	997.38	xs2-rpb

ppendix D. Stream Survey Data
gure 3c: Cross-Section Plots and Raw Data Tables
la Thoroughfare Stream and Wetland Restoration/EEP Project No. 65
la Thoroughfare Main Channel
onitoring Year 5 of 5

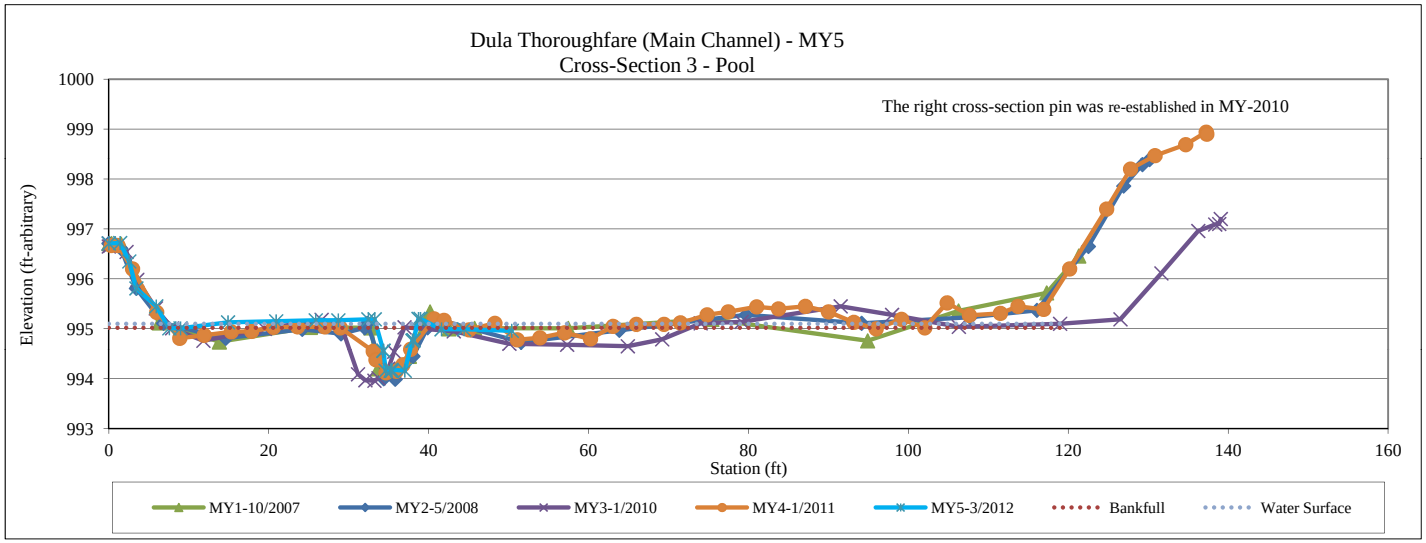
Project Name	**Dula Thoroughfare**
EEP Project Number	**65**
Cross-Section ID	**XS-3, Pool, 16+99**
Survey Date	**3/2012**

SUMMARY DATA	
Bankfull Elevation (ft)	995.02
Bankfull Cross-Sectional Area (ft^2)	3.02
Bankfull Width (ft)	4.92
Flood Prone Area Elevation (ft)	995.88
Flood Prone Width (ft)	47.07
Bankfull Mean Depth (ft)	0.61
Bankfull Max Depth (ft)	0.86
W/D Ratio	8.07
Entrenchment Ratio	9.57
Bank Height Ratio	1.00

XS-3: View Upstream

XS-3: View Downstream

Station	Elevation	Notes
0	996.71	xs3-lpb
1.41	996.72	xs3
2.55	996.35	xs3
3.44	995.81	xs3
5.92	995.45	xs3
7.56	995.01	xs3
8.96	995.01	xs3
14.9	995.13	xs3
20.92	995.15	xs3
25.88	995.17	xs3
28.7	995.17	xs3
32.45	995.19	xs3
33.25	995.19	xs3
34.35	994.82	xs3
34.34	994.56	xs3
34.62	994.16	xs3
35.24	994.77	xs3
35.39	994.16	xs3
35.33	994.18	xs3
37.01	994.16	xs3
37.96	994.76	xs3
38.08	994.77	xs3
38.11	994.77	xs3
38.72	995.2	xs3
38.97	995.2	xs3
41.6	994.99	xs3
44.43	994.99	xs3
50.39	994.96	xs3-rpb



Appendix D. Stream Survey Data
Figure 3d: Cross-Section Plots and Raw Data Tables
Dula Thoroughfare Stream and Wetland Restoration/EEP Project No. 65
Dula Thoroughfare Tributary
Monitoring Year 5 of 5

Project Name	**Dula Thoroughfare**
EEP Project Number	**65**
Cross-Section ID	**XS-4, Run**
Survey Date	**3/2012**

SUMMARY DATA	
Bankfull Elevation (ft)	998.39
Bankfull Cross-Sectional Area (ft^2)	1.50
Bankfull Width (ft)	4.47
Flood Prone Area Elevation (ft)	999.19
Flood Prone Width (ft)	90.60
Bankfull Mean Depth (ft)	0.33
Bankfull Max Depth (ft)	0.80
W/D Ratio	13.55
Entrenchment Ratio	20.27
Bank Height Ratio	1.00

XS-4: View Upstream

XS-4: View Downstream

Station	Elevation	Notes
0.03	1000.16	xs4-lpt
0	1000.07	xs4-lpb
1.08	1000.13	xs4
3.64	999.93	xs4
5.55	999.31	xs4
8.38	998.82	xs4
14.65	998.54	xs4
21.59	998.77	xs4
29.71	998.56	xs4
41.31	998.62	xs4
50.56	998.43	xs4
53.47	998.48	xs4
54.02	998.41	xs4
54.51	998.11	xs4
54.67	998.01	xs4
55.49	997.59	xs4
55.6	997.8	xs4
55.85	997.7	xs4
55.94	997.74	xs4
57.66	998.47	xs4
58.92	998.2	xs4
59.45	998.81	xs4
67.43	998.44	xs4
79.3	998.57	xs4
101.37	999.35	xs4
111.98	999.98	xs4

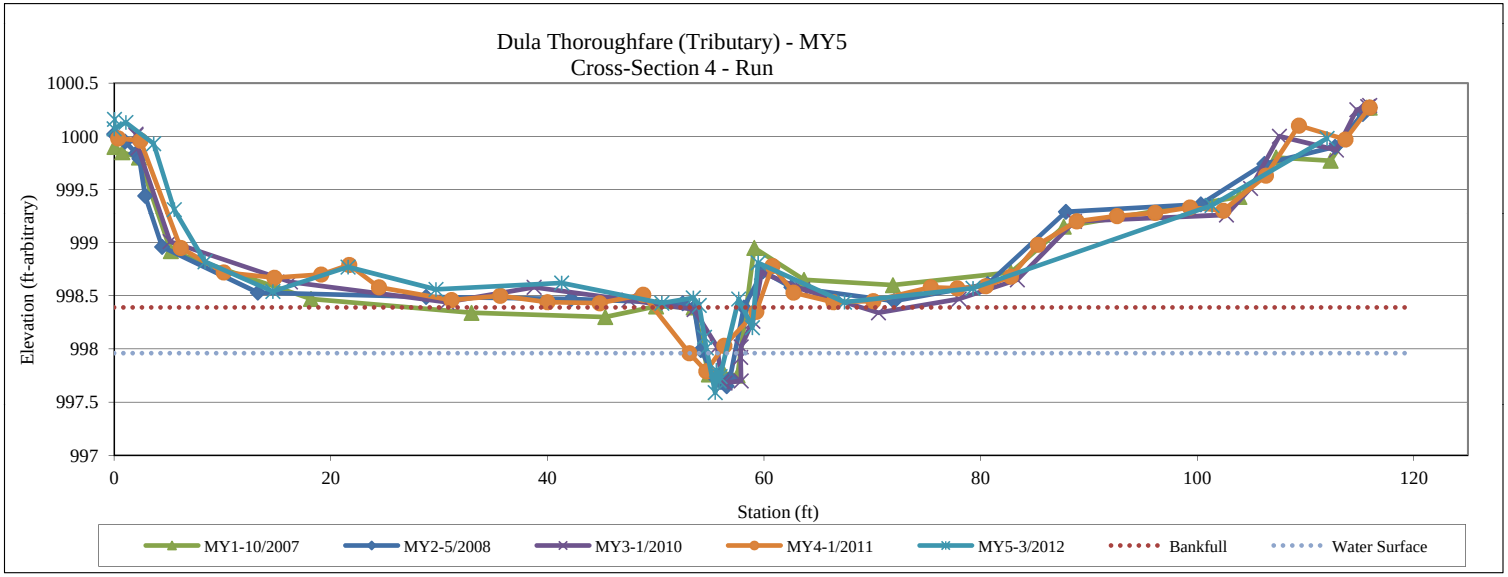


Figure 4 - Longitudinal Plot
Dula Thoroughfare Stream and Wetland Restoration/EEP Project No. 65-Main Channel
2011 Monitoring Year
MY 5 of 5

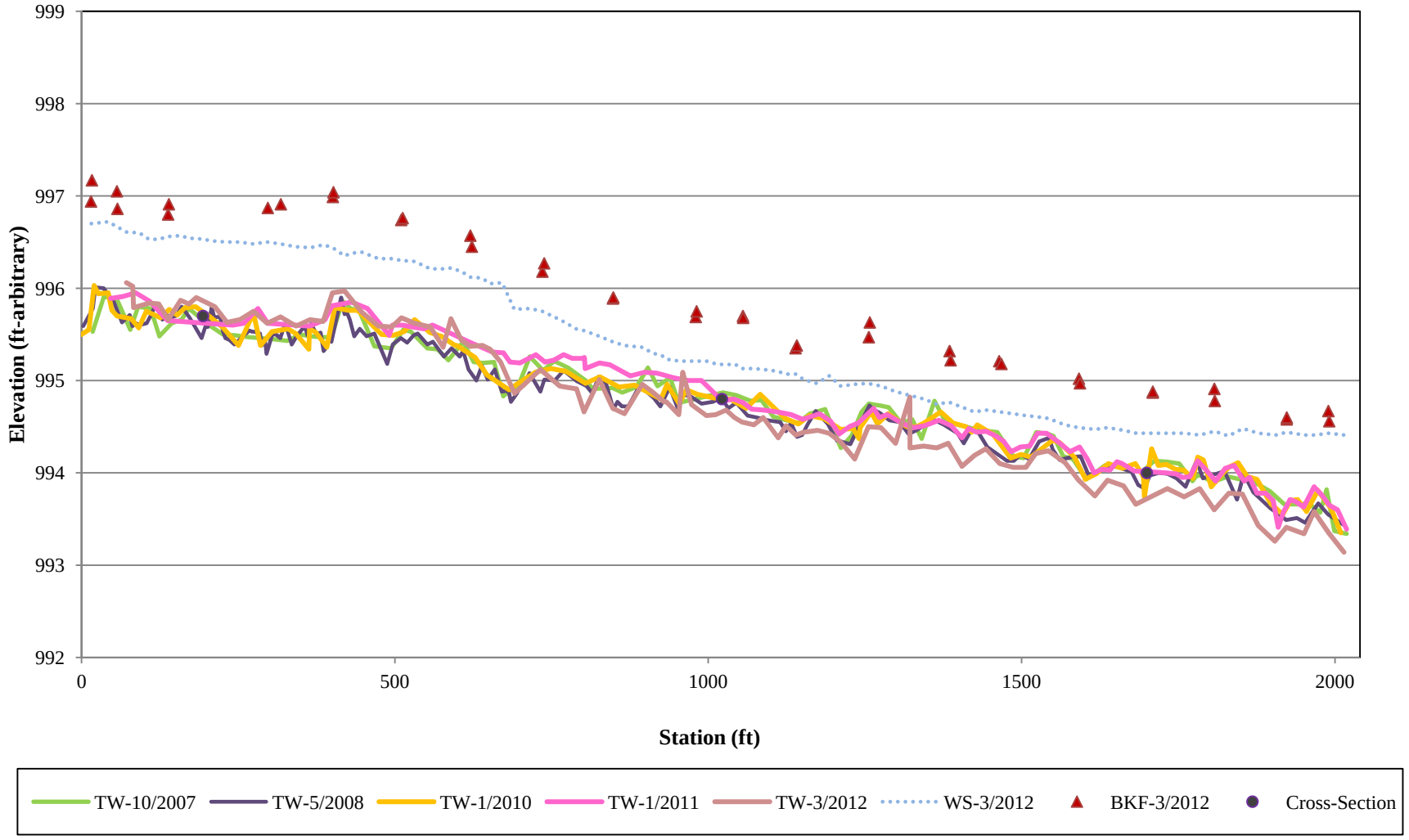
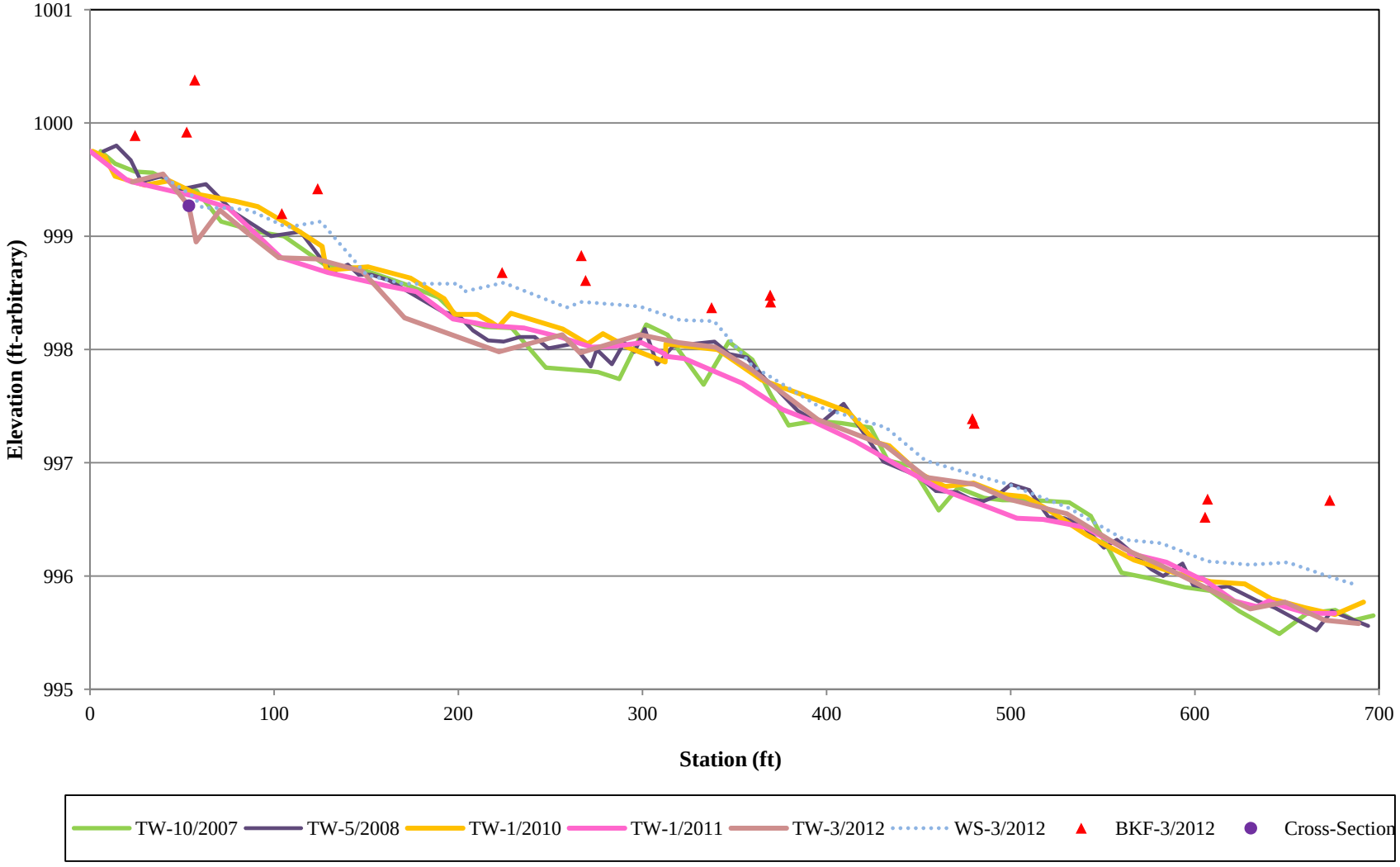


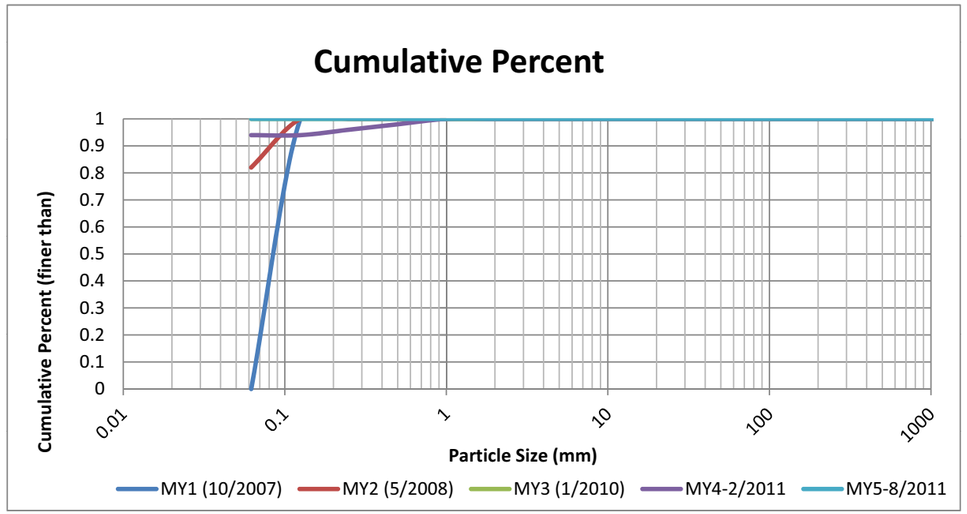
Figure 4 - Longitudinal Plot
Dula Thoroughfare Stream and Wetland Restoration/EEP Project No. 65-Tributary
2011 Monitoring Year
MY 5 of 5

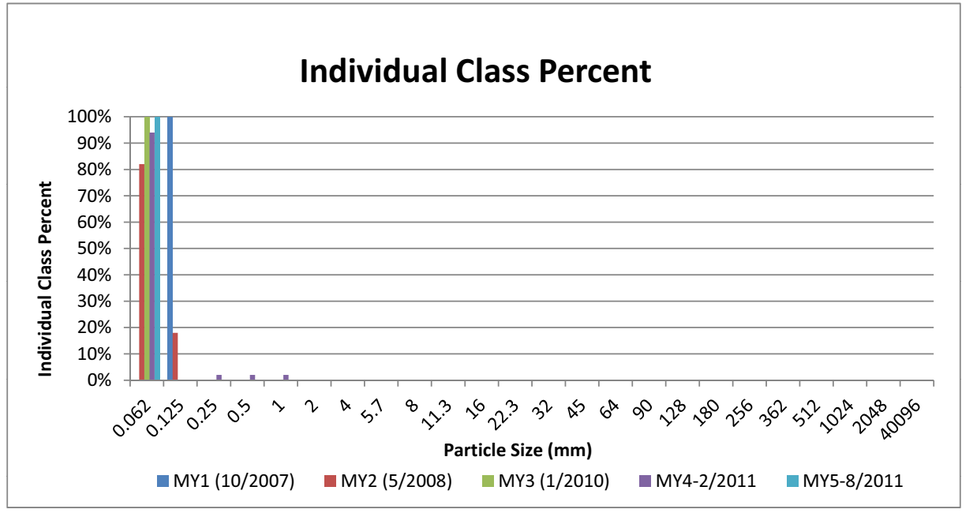


Appendix D. Stream Survey Data
Figure 5a: Pebble Count Plots with Annual Overlays
Dula Thoroughfare Stream and Wetland Restoration/EEP Project No. 65
Dula Thoroughfare Main Channel
Monitoring Year 5 of 5

Project Name: Dula Thoroughfare-Main Channel					
Cross-Section: 1					
Feature: Pool					
			MY5-8/2011		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	100	100%	100%
Sand	very fine sand	0.125	0	0%	100%
	fine sand	0.250	0	0%	100%
	medium sand	0.50	0	0%	100%
	coarse sand	1.00	0	0%	100%
	very coarse sand	2.0	0	0%	100%
Gravel	very fine gravel	4.0	0	0%	100%
	fine gravel	5.7	0	0%	100%
	fine gravel	8.0	0	0%	100%
	medium gravel	11.3	0	0%	100%
	medium gravel	16.0	0	0%	100%
	course gravel	22.3	0	0%	100%
	course gravel	32.0	0	0%	100%
	very coarse gravel	45	0	0%	100%
	very coarse gravel	64	0	0%	100%
Cobble	small cobble	90	0	0%	100%
	medium cobble	128	0	0%	100%
	large cobble	180	0	0%	100%
	very large cobble	256	0	0%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			100	100%	100%

Summary Data	
D50	0.03
D84	0.05
D95	0.060

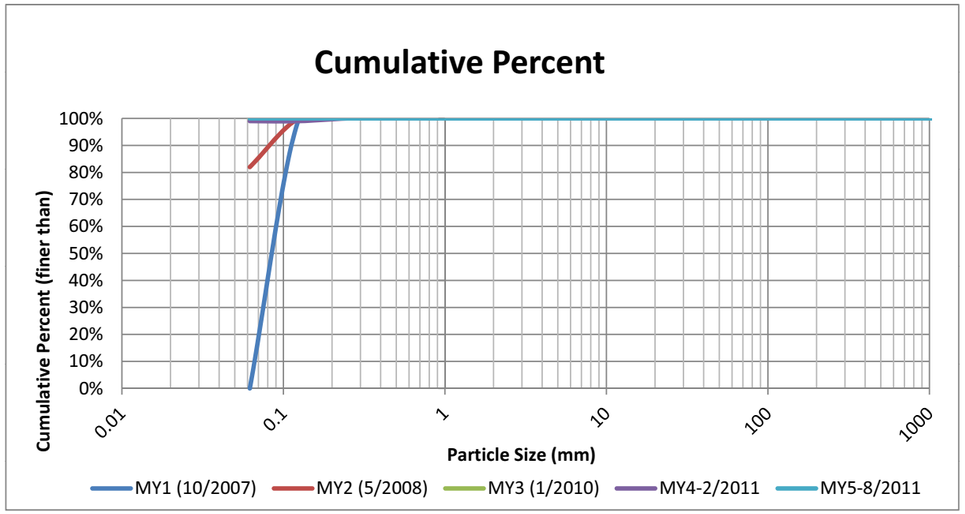


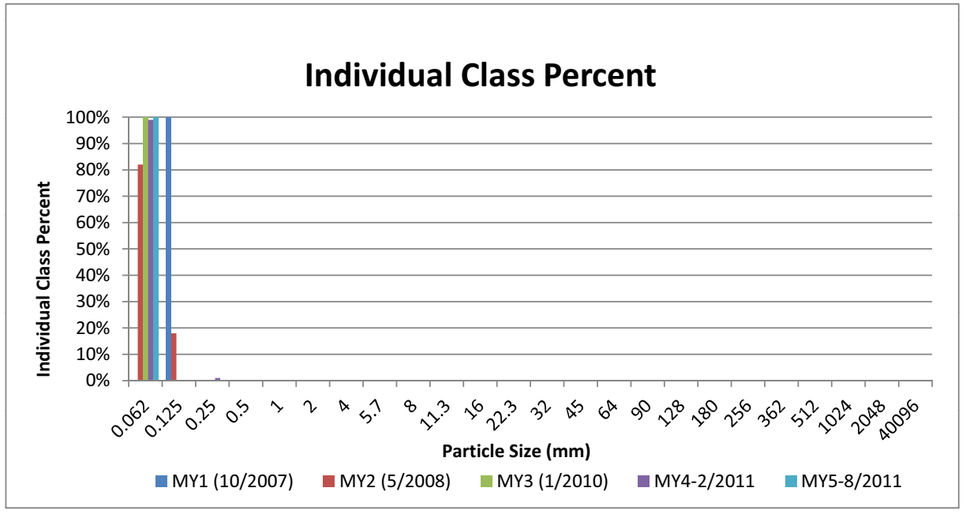


Appendix D. Stream Survey Data
Figure 5b: Pebble Count Plots with Annual Overlays
Dula Thoroughfare Stream and Wetland Restoration/EEP Project No. 65
Dula Thoroughfare Main Channel
Monitoring Year 5 of 5

Project Name: Dula Thoroughfare-Main Channel					
Cross-Section: 2					
Feature: Run					
			MY5-8/2011		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	100	100%	100%
Sand	very fine sand	0.125	0	0%	100%
	fine sand	0.250	0	0%	100%
	medium sand	0.50	0	0%	100%
	coarse sand	1.00	0	0%	100%
	very coarse sand	2.0	0	0%	100%
Gravel	very fine gravel	4.0	0	0%	100%
	fine gravel	5.7	0	0%	100%
	fine gravel	8.0	0	0%	100%
	medium gravel	11.3	0	0%	100%
	medium gravel	16.0	0	0%	100%
	course gravel	22.3	0	0%	100%
	course gravel	32.0	0	0%	100%
	very coarse gravel	45	0	0%	100%
	very coarse gravel	64	0	0%	100%
Cobble	small cobble	90	0	0%	100%
	medium cobble	128	0	0%	100%
	large cobble	180	0	0%	100%
	very large cobble	256	0	0%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			100	100%	100%

Summary Data	
D50	0.03
D84	0.05
D95	0.06

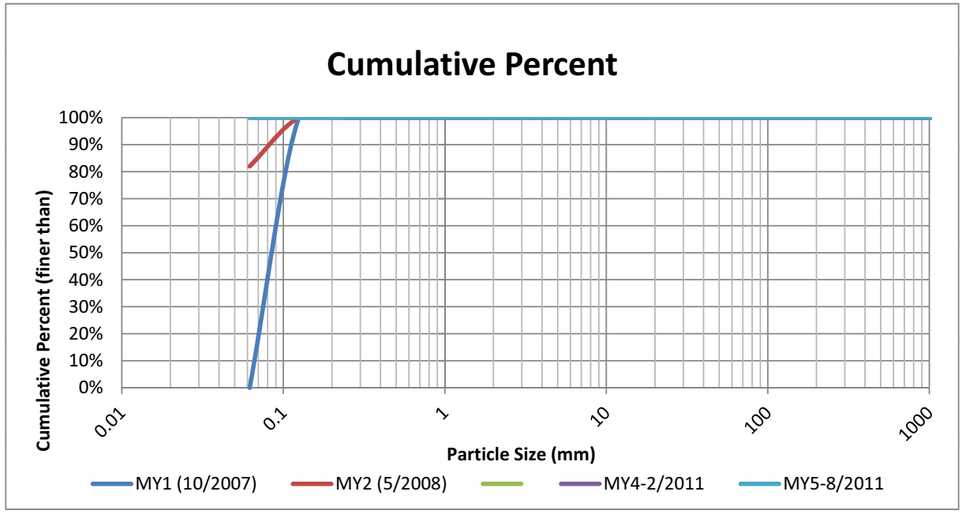


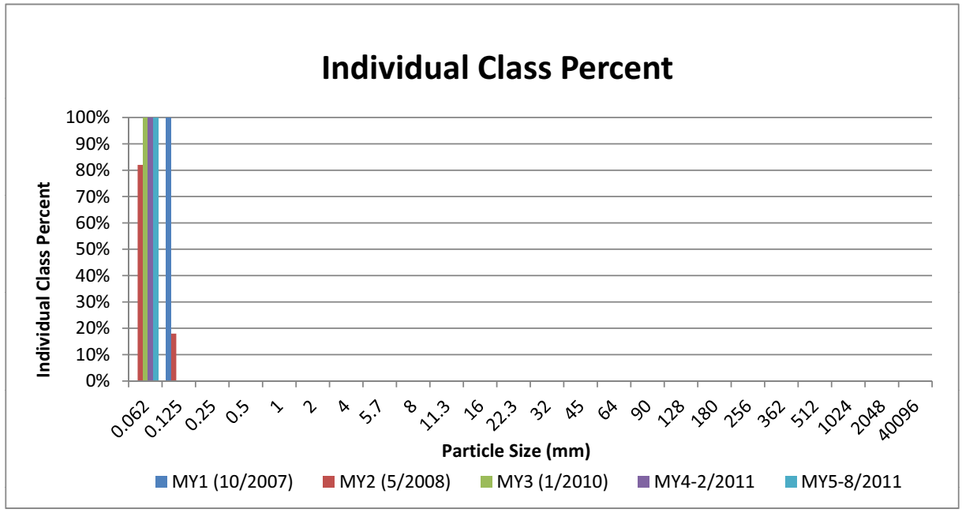


Appendix D. Stream Survey Data
Figure 5c: Pebble Count Plots with Annual Overlays
Dula Thoroughfare Stream and Wetland Restoration/EEP Project No. 65
Dula Thoroughfare Main Channel
Monitoring Year 5 of 5

Project Name: Dula Thoroughfare-Main Channel					
Cross-Section: 3					
Feature: Pool					
			MY5-8/2011		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	100	100%	100%
Sand	very fine sand	0.125	0	0%	100%
	fine sand	0.250	0	0%	100%
	medium sand	0.50	0	0%	100%
	coarse sand	1.00	0	0%	100%
	very coarse sand	2.0	0	0%	100%
Gravel	very fine gravel	4.0	0	0%	100%
	fine gravel	5.7	0	0%	100%
	fine gravel	8.0	0	0%	100%
	medium gravel	11.3	0	0%	100%
	medium gravel	16.0	0	0%	100%
	course gravel	22.3	0	0%	100%
	course gravel	32.0	0	0%	100%
	very coarse gravel	45	0	0%	100%
	very coarse gravel	64	0	0%	100%
Cobble	small cobble	90	0	0%	100%
	medium cobble	128	0	0%	100%
	large cobble	180	0	0%	100%
	very large cobble	256	0	0%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			100	100%	100%

Summary Data	
D50	0.03
D84	0.05
D95	0.06



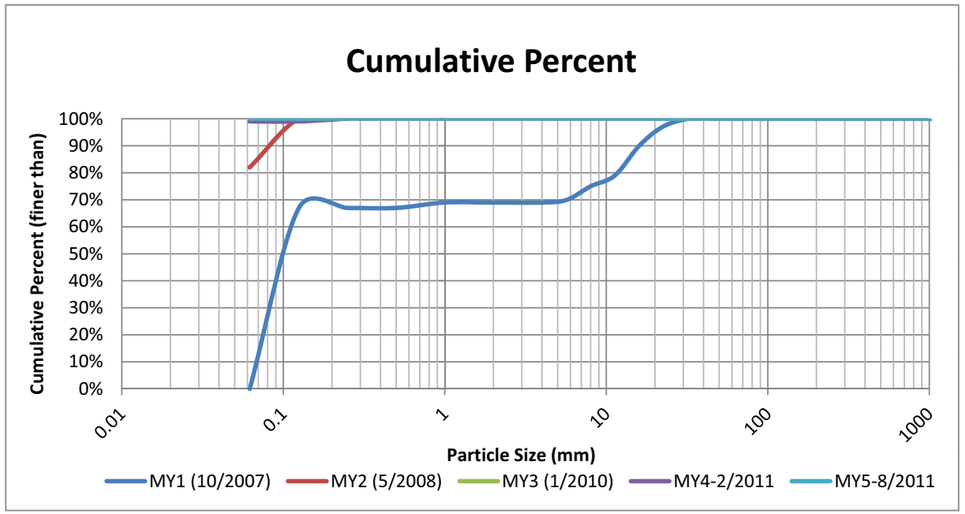


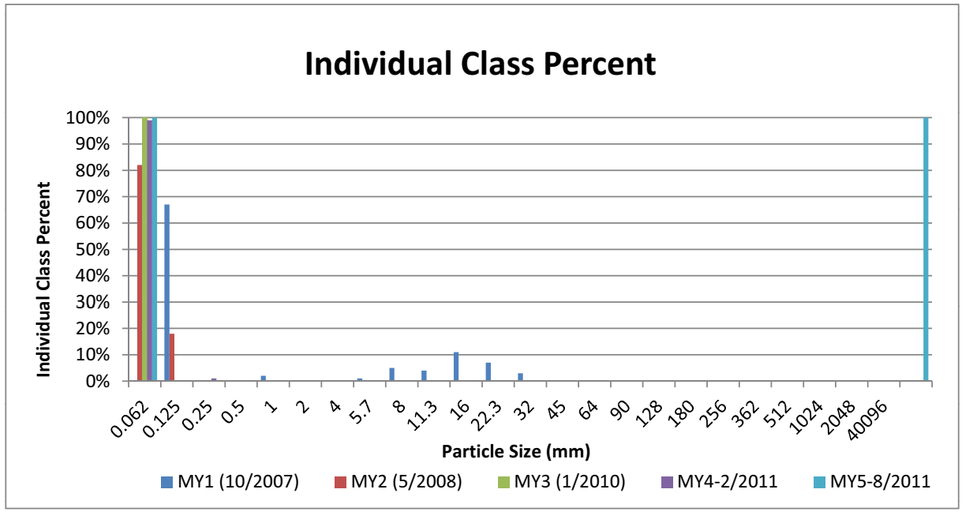
Appendix D. Stream Survey Data
Figure 5d: Pebble Count Plots with Annual Overlays
Dula Thoroughfare Stream and Wetland Restoration/EEP Project No. 65
Dula Thoroughfare Main Channel
Monitoring Year 5 of 5

Project Name: Dula Thoroughfare-Tributary					
Cross-Section: 4					
Feature: Run					
			MY5-8/2011		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	100	100%	100%
Sand	very fine sand	0.125	0	0%	100%
	fine sand	0.250	0	0%	100%
	medium sand	0.50	0	0%	100%
	coarse sand	1.00	0	0%	100%
	very coarse sand	2.0	0	0%	100%
Gravel	very fine gravel	4.0	0	0%	100%
	fine gravel	5.7	0	0%	100%
	fine gravel	8.0	0	0%	100%
	medium gravel	11.3	0	0%	100%
	medium gravel	16.0	0	0%	100%
	course gravel	22.3	0	0%	100%
	course gravel	32.0	0	0%	100%
	very coarse gravel	45	0	0%	100%
	very coarse gravel	64	0	0%	100%
Cobble	small cobble	90	0	0%	100%
	medium cobble	128	0	0%	100%
	large cobble	180	0	0%	100%
	very large cobble	256	0	0%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			100	100%	100%

Summary Data	
D50	0.03
D84	0.05
D95	0.1

D50 was not calculated due to particle size.





APPENDIX E
HYDROLOGIC DATA

Table 12 **Verification of Bankfull Events**

Figure 6 **Monthly Rainfall Data**

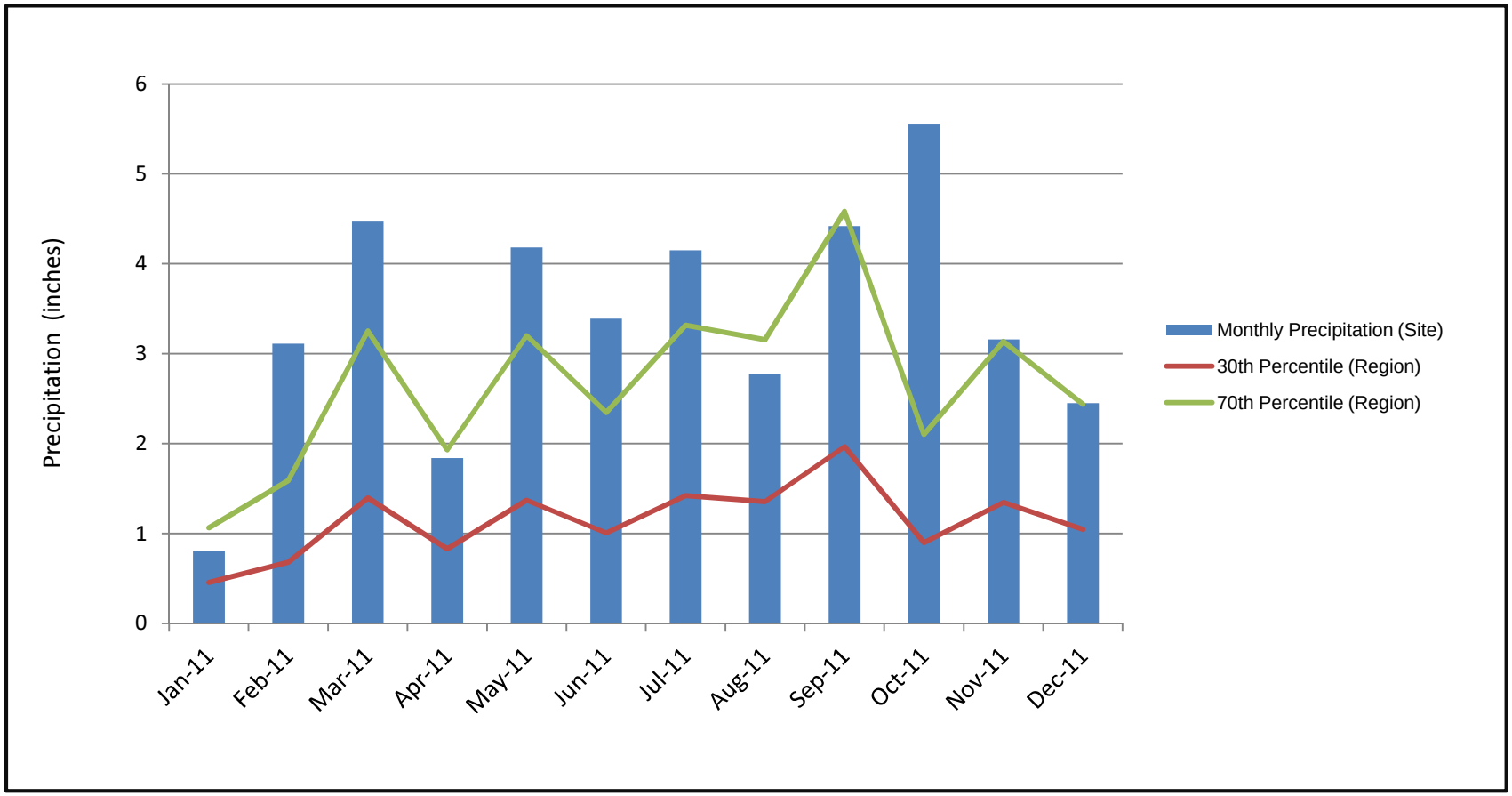
Figure 7a-c **Precipitation and Water Level Plots**

Table 13 **Wetland Hydrology Criteria Attainment**

Appendix E. Hydrologic Data
Table 12. Verification of Bankfull Events
Dula Thoroughfare Stream and Wetland Restoration/EEP Project No. 65
Monitoring Year 5 of 5

Date of Collection	Date of Occurrence	Method	Photo # (if available)
12/2007	Unknown	Crest Gauge (Main Channel and Tributary)	N/A
9/2007	Unknown	Crest Gauge (Main Channel and Tributary)	N/A
6/2009	Unknown	Crest Gauge (Main Channel and Tributary)	N/A
1/2011	Unknown	Visual Observation (Main Channel and Tributary)	N/A
4/19/2011	Unknown	Crest Gauge (Main Channel and Tributary)	N/A
5/19/2011	Unknown	Crest Gauge (Main Channel and Tributary)	N/A
7/22/2011	Unknown	Crest Gauge (Main Channel and Tributary)	N/A
7/22/2011	Unknown	Visual Observation (Main Channel and Tributary)	N/A
3/22/2012	Unknown	Crest Gauge (Main Channel and Tributary)	N/A
3/22/2012	Unknown	Visual Observation (Main Channel and Tributary)	N/A

Appendix E. Hydrologic Data
Figure 6: Monthly Rainfall Data
Dula Thoroughfare/EEP Project No.65
Monitoring Year 5 of 5



*Regional rainfall data referenced from NC Cronos Database Divisonal Data for the Southern Piedmont of North Carolina - Data Period January 2011 through December 2011.
Monthly precipitation referenced from the USGS 351218080331345 CRN-29 rain gage Real-Time daily data, January 2011 through December 2011.

Figure 7a: Precipitation and Water Level Plots for Gauges
Dula Thoroughfare Stream and Wetland Restoration/EEP Project No. 65
Monitoring Year 5 of 5

Growing Season: (March 15 - November 18)

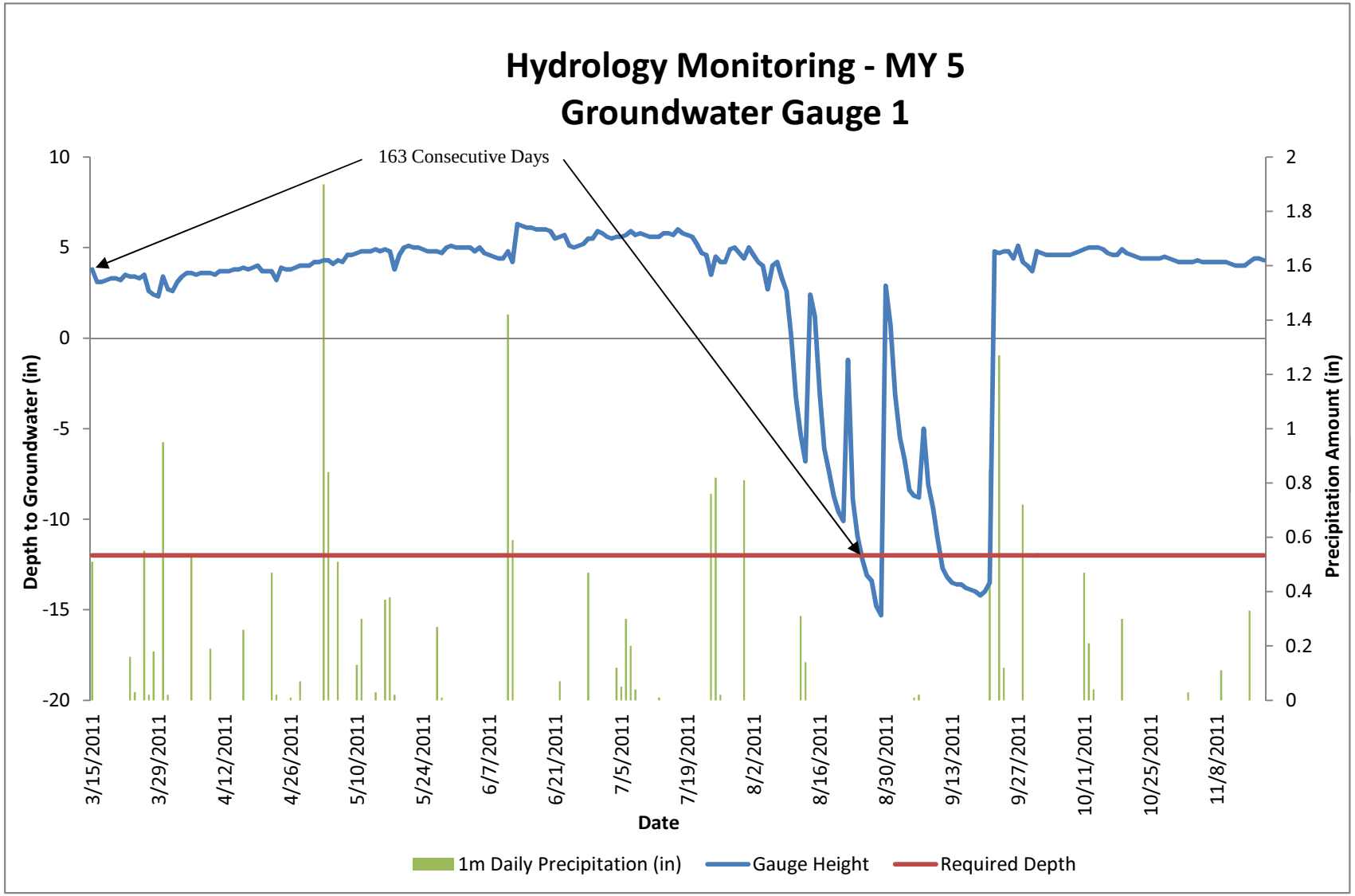


Figure 7b: Precipitation and Water Level Plots for Gauges
Dula Thoroughfare Stream and Wetland Restoration/EEP Project No. 65
Monitoring Year 5 of 5

Growing Season: (March 15 - November 18)

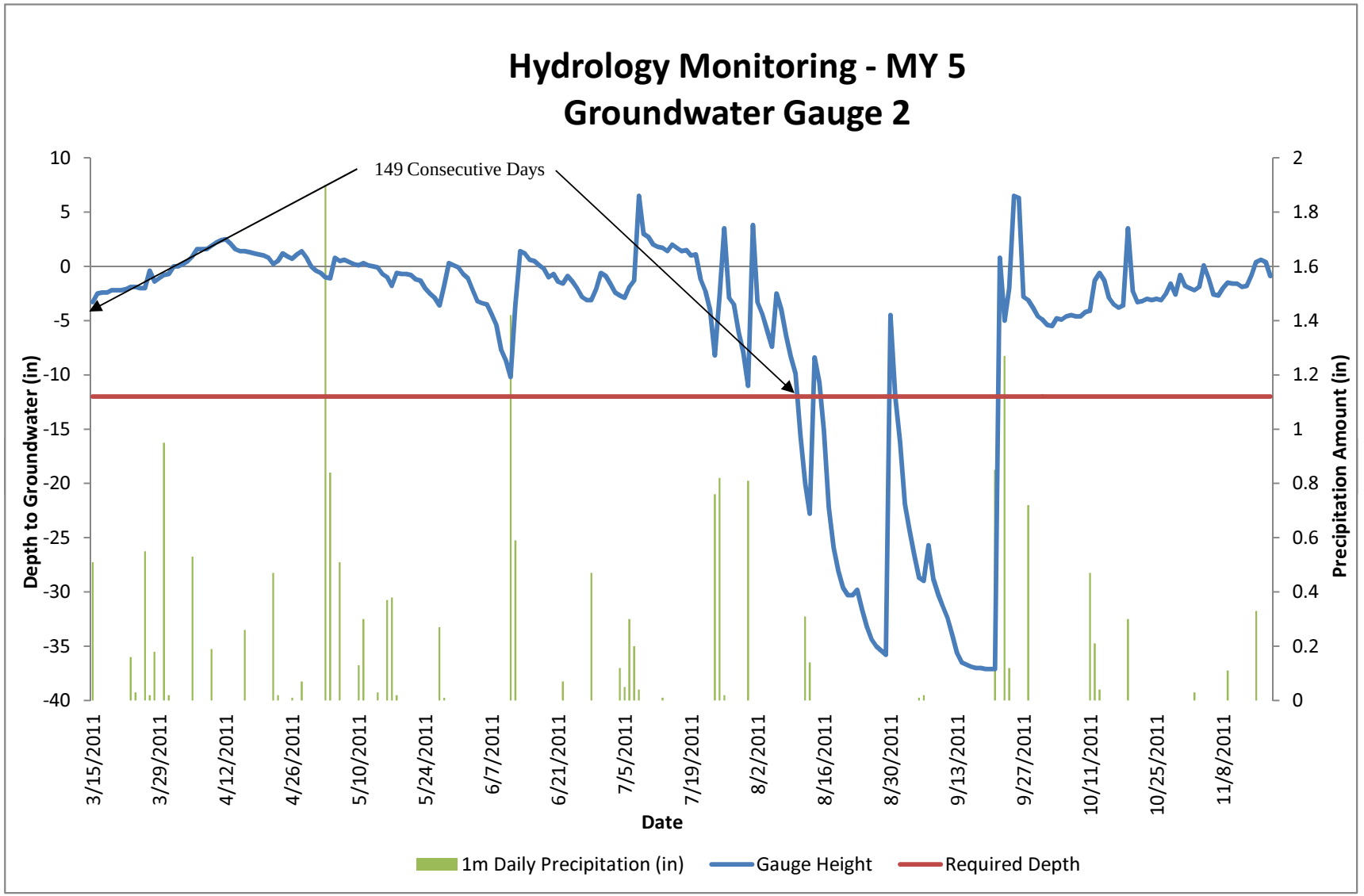
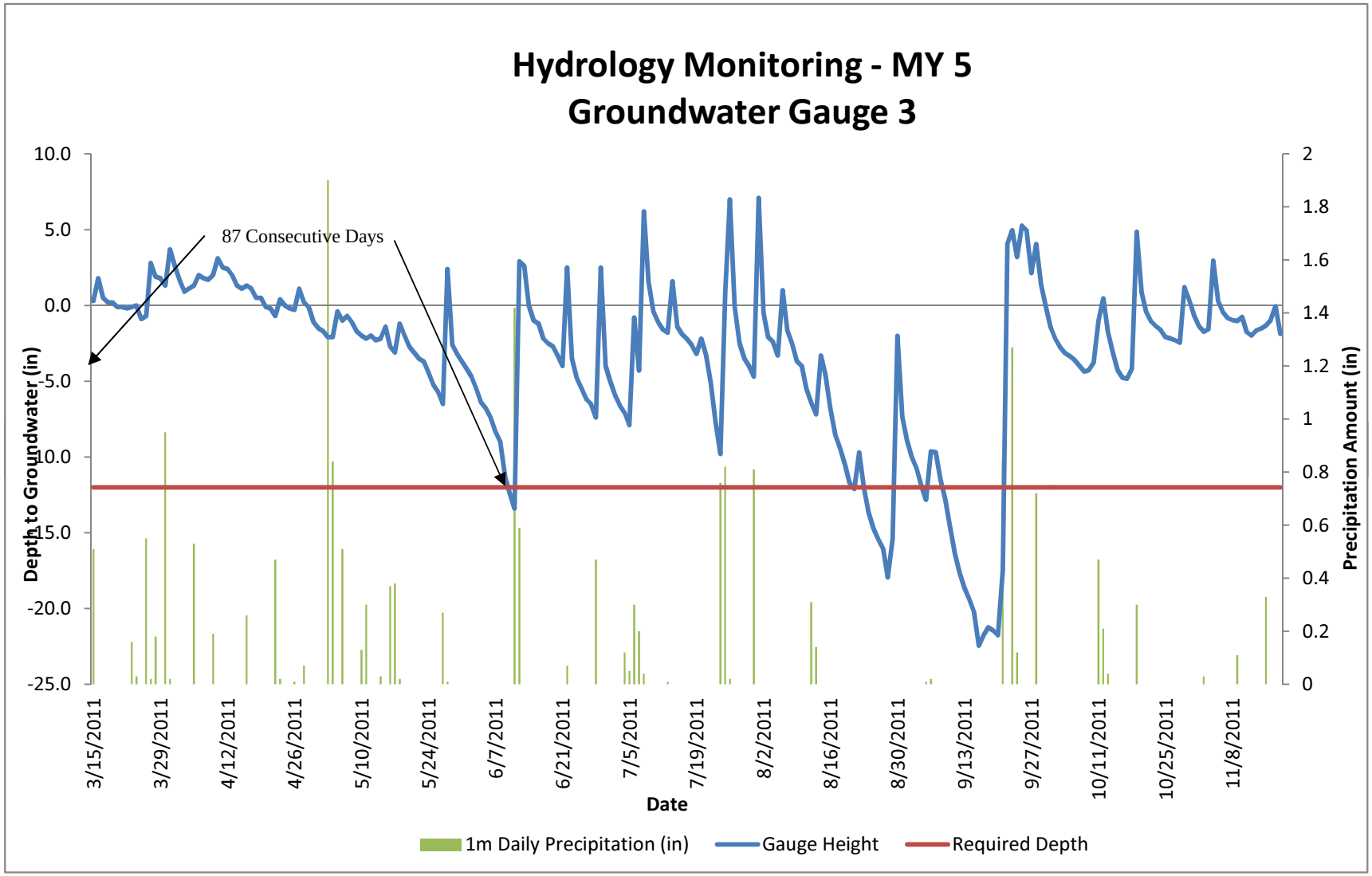


Figure 7c: Precipitation and Water Level Plots for Gauges
Dula Thoroughfare Stream and Wetland Restoration/EEP Project No. 65
Monitoring Year 5 of 5

Growing Season: (March 15 - November 18)



Appendix E. Hydrologic Data
Table 13: Wetland Hydrology Criteria Attainment
Dula Thoroughfare/EEP Project No. 65
Monitoring Year 5 of 5

Summary of Groundwater Gauge Results for Years 1 through 5					
Gauge	**Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)**				
	Year 1 (2007)	**Year 2 (2008)**	**Year 3 (2009)**	**Year 4 (2010)**	**Year 5 (2011)**
GW1	N/A*	Yes/81 Days (33%)	Yes/117 Days (47%)^	No/19 Days (8%)	Yes/163 Days (65%)
GW2	Yes/41 Days (16%)**	Yes/69 Days (28%)	Yes/99 Days (40%)	Yes/54 Days (22%)^^	Yes/149 Days (60%)
GW3	Yes/42 Days (17%)**	Yes/80 Days (32%)	Yes/96 Days (39%)	Yes/53 Days (21%)	Yes/87 Days (35%)

*Gauge was not installed until 7/11/2007
**Percentages based off of number reported in EcoScience report, raw data was unavailable
^Groundwater data is only reported through 9/28/2009
^^Groundwater data is only reported through 7/27/2010