Dula Thoroughfare Stream and Wetland Restoration
Project No. 65
2009 Monitoring Report: Year 3 of 5

February 2010 (Revised April 2010)

Prepared for: NCDENR-EEP
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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 and 03040105) (Appendix 1.1). The Site includes two of the three separate Ecosystem Enhancement Program (EEP) project sites located on the 200-acre Bishop Site (Dula Thoroughfare (DT) and Unnamed Tributary (UT) to Dula Thoroughfare), each 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 third 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. The following restoration goals were established for the Site.

Dula Thoroughfare

1. 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.
2. 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.
3. Aquatic habitat creation via excavation of vernal pools within floodplain cut areas.
4. 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

1. 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.
2. Level II enhancement of approximately 480 linear feet of stream via riparian plantings adjacent to the UT to Dula Thoroughfare streambanks.
3. 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 Vegetative Assessment

JJG conducted the 2009 (year 3 of 5) vegetative assessment and vegetative plot analysis in July 2009 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). Vegetative 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 2009 vegetation monitoring results indicated that the main reach of DT appears to be meeting vegetation success criteria. However, the UT to DT results indicate the Site did not meet the 2009 vegetation success criteria. The DT and the UT to DT survival rate for the woody vegetation monitored for 2009 is 96% and 97%, respectively. The DT and the UT to DT site density are approximately 810 and 283 planted stems per acre, respectively. The DT exceeds the year 3 goal of 320 planted stems per acre. The UT to DT did not exceed the year 3 goal for 320 planted stems per acre, but with natural recruitment and re-planting of woody vegetation, the planted riparian area could improve and exceed the vegetation success criteria by year five.

In conclusion, the 2009 vegetation monitoring results indicated that the main reach of DT has met the year 3 vegetation success criteria. However, the UT to DT did not meet the year 3 vegetation success criteria. Although the UT to DT did not exceed the year 3 goal for 320 planted stems per acre, with natural recruitment, the planted riparian area could potentially

improve by year 5 and exceed the vegetation success criteria. Please refer to Appendix 3 for more detailed information on the 2009 vegetation data.

1.3 Stream Assessment

Results from the 2009 stream monitoring effort indicate the DT and UT DT appear stable, but are experiencing abnormal flow conditions. The entire restored stream length (main channel and its tributary) of DT was assessed from the project 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. Although the average bankfull width (6.5 ft) of the surveyed cross-sections is higher than the proposed 6.0 ft, cross-sections 1 and 3 had minor adjustments in 2009 that affected these calculations. Cross-section 1 appears to have had some minor adjustements along the left bank, which increased the bankfull width. The right pin for cross-section 3 could not be located; therefore, a new pin was established, which resulted in a different cross-sectional survey. The average bankfull and water surface slopes for the 2009 monitoring year were calculated as 0.0013 ft/ft and 0.0010 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 in-stream vegetation growth. The substrate along the reach was dominated by silt deposition.

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 1.2). The substrate along the entire reach was dominated by silt deposition.

UT to Dula Thoroughfare

During JJG's assessment, the channel had normal flow conditions with riffles, runs, and pools present. Approximately midway down the project reach (between the first and second cross-vane triplets), the water in the channel disappears and then reappears 50 ft downstream. All cross-vanes triplets appear to be stable and are not showing any signs of erosion or piping.

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. These areas will continue to be monitored closely for significant adjustments in the bed features and the channel thalweg. 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 2009. 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 31 consecutive days, which is 12.5 percent of the March 15 to November 18 (249 days) 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 5 for wetland raw data tables and plots and a summary of wetland criteria attainment.

1.5 Annual Monitoring Summary

Overall, the Site appears to be stable and has met stream, vegetation, and wetland mitigation goals for monitoring year 3, with the exception of the UT to DT vegetation, which failed to meet the year three success criteria.

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 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

3.1 Methodology

Methods employed for the DT Site were a combination of those established by standard regulatory guidance and procedures documents as well as previous monitoring reports completed by EcoScience. 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). 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. 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.
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
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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

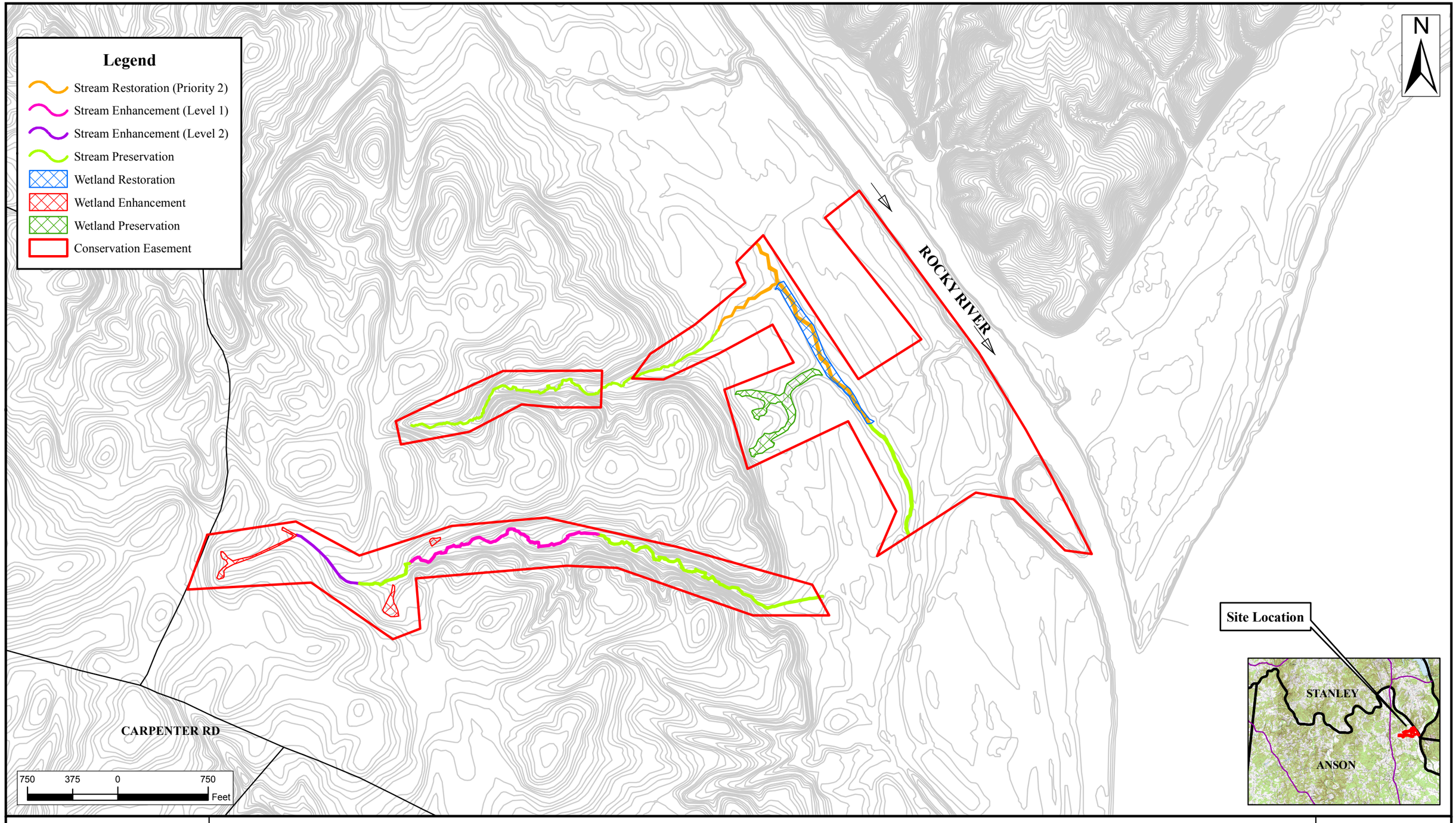
Appendix 4 – Stream Assessment Data

Appendix 5 – Wetland Assessment Data

APPENDIX 1
GENERAL FIGURES AND PLAN VIEWS

1. Vicinity Map

2. Current Condition Plan View



Appendix 1. General Figures and Plan Views
Figure 1.1a Vicinity Map
Dula Thoroughfare Stream Restoration
Anson County, NC
Year 3 of 5

Project No. 65
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Legend

- Stream Restoration (Priority 2)
- Stream Enhancement (Level 1)
- Stream Enhancement (Level 2)
- Stream Preservation
- Wetland Restoration
- Wetland Enhancement
- Wetland Preservation
- Conservation Easement

Dula Thoroughfare Project Site

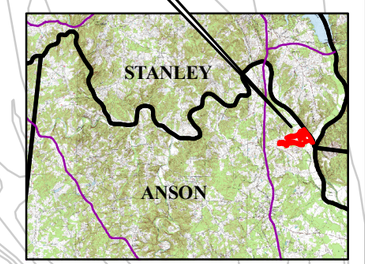
UT to Dula Thoroughfare Project Site

ROCKY RIVER

N

CARPENTER RD

Site Location



500 250 0 500
Feet

Appendix 1 General Figures and Plan Views
Figure 1.1b Vicinity Map
UT to Dula Thoroughfare Stream Restoration
Anson County, NC
Year 3 of 5

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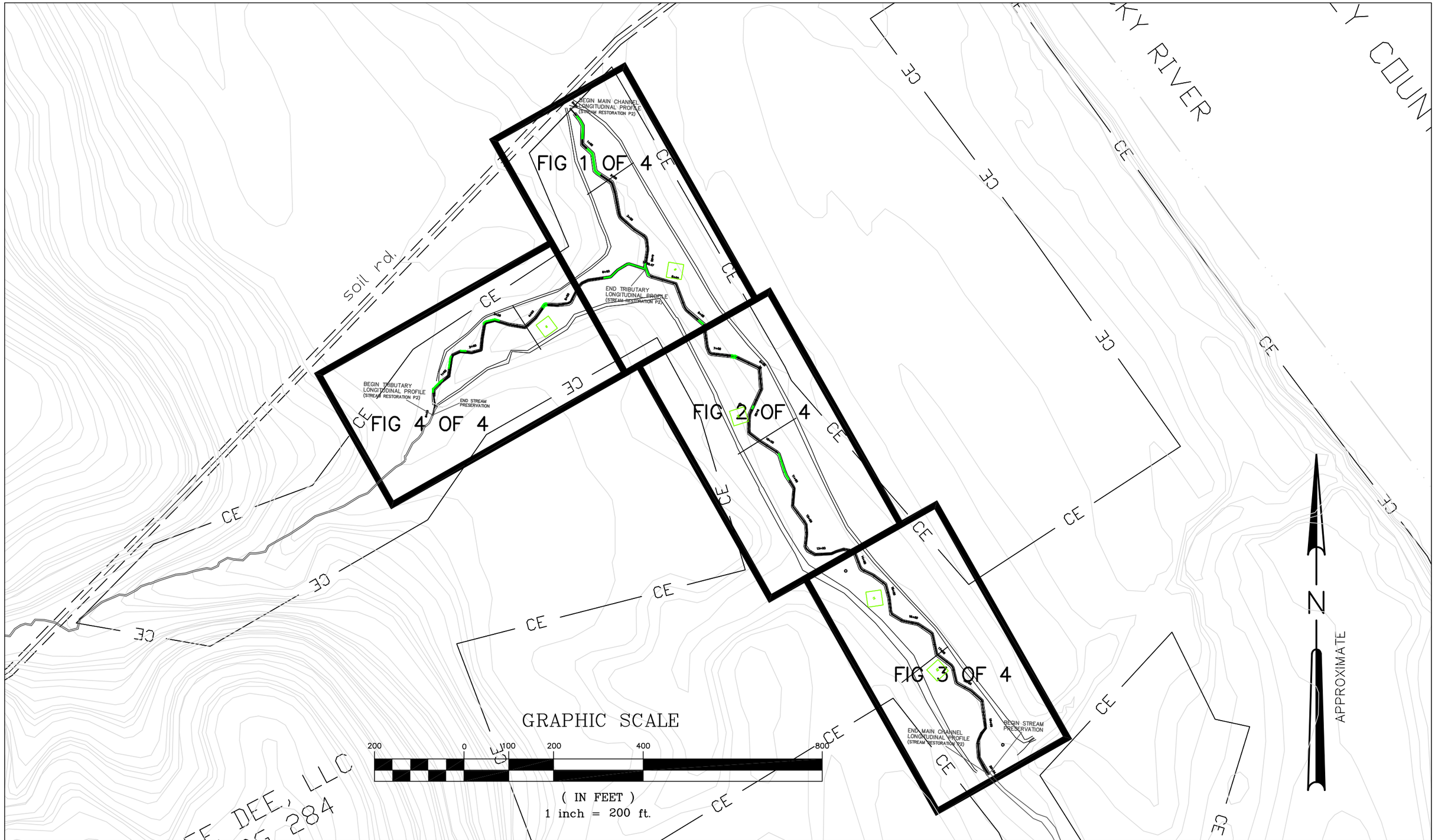
April 2010



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

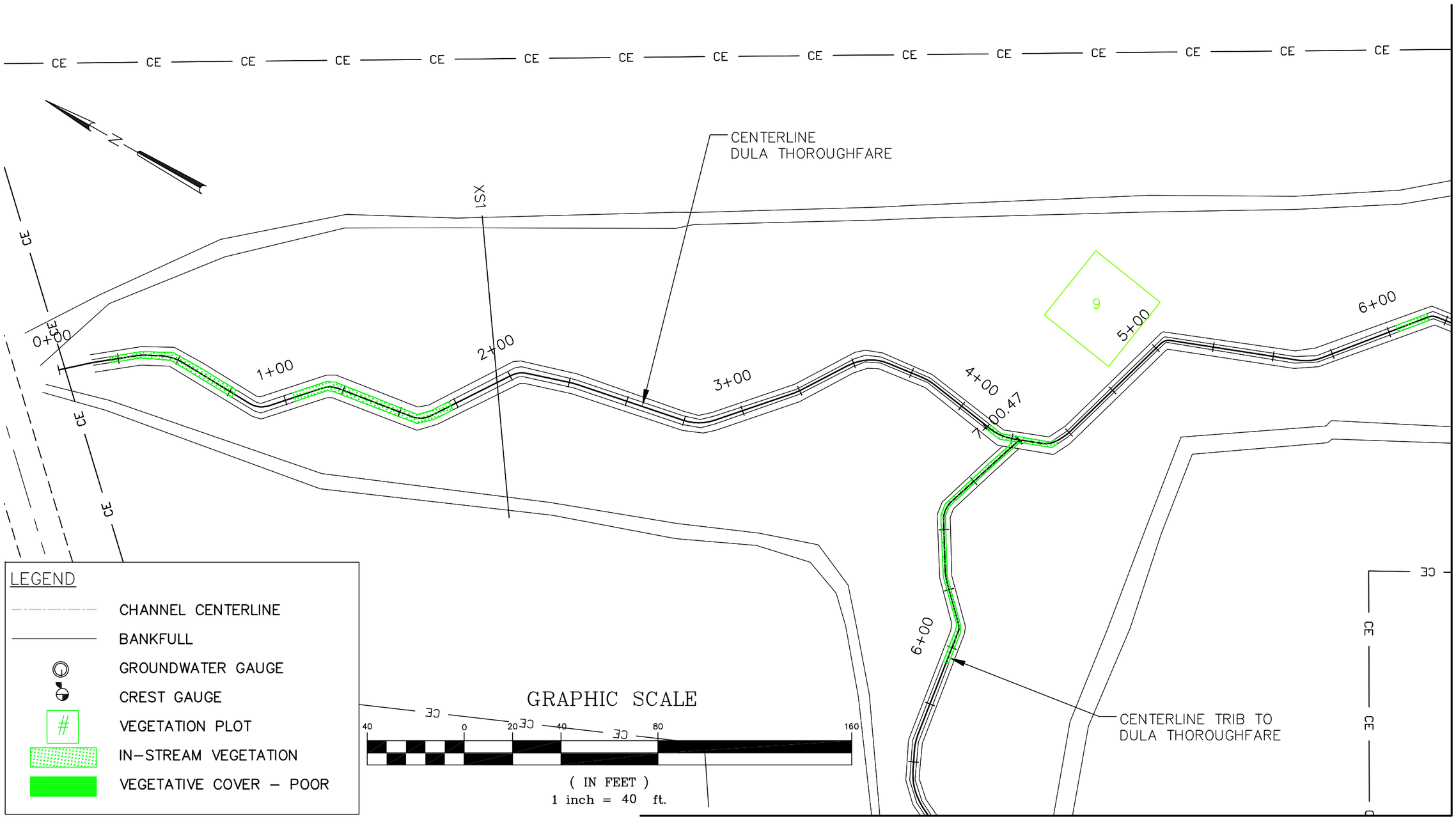
PROJECT NO. 65
ANSON COUNTY
NORTH CAROLINA
MONITORING
YEAR 3 of 5

NC ECOSYSTEM ENHANCEMENT PROGRAM
DULA THOROUGHFARE STREAM AND WETLAND RESTORATION

FIGURE 1.2a
CURRENT CONDITION PLAN VIEW

DATE : FEBRUARY 2010
SCALE : 1"=200'
JOB NO.: 03060005

FIGURE KEY



Ecosystem Enhancement PROGRAM

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

PROJECT NO. 65
ANSON COUNTY
NORTH CAROLINA
MONITORING
YEAR 3 of 5

JJG

NC ECOSYSTEM ENHANCEMENT PROGRAM
DULA THOROUGHFARE STREAM AND WETLAND RESTORATION

FIGURE 1.2a
CURRENT CONDITION PLAN VIEW

DATE : FEBRUARY 2010
SCALE : 1"=40'
JOB NO.: 03060005

FIGURE 1 OF 4

MATCHLINE SEE FIGURE 1 OF 4

MATCHLINE SEE FIGURE 3 OF 4

CE CE CE CE CE CE CE CE CE CE CE

N

CENTERLINE
DULA THOROUGHFARE

8+00

7+00

9+00

10+00

11+00

12+00

13+00

GAUGE 3

10

XS2

LEGEND

- CHANNEL CENTERLINE
- BANKFULL
- GROUNDWATER GAUGE
- CREST GAUGE
- # VEGETATION PLOT
- IN-STREAM VEGETATION
- VEGETATIVE COVER – POOR

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.

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ANSON COUNTY
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NC ECOSYSTEM ENHANCEMENT PROGRAM
DULA THOROUGHFARE STREAM AND WETLAND RESTORATION

FIGURE 1.2a
CURRENT CONDITION PLAN VIEW

DATE : FEBRUARY 2010
SCALE : 1"=40'
JOB NO.: 03060005

MATCHLINE SEE FIGURE 1 OF 4

CE CE CE CE CE

CENTERLINE
DULA THOROUGHFARE

N

GAUGE 1

GAUGE 2

14+00

15+00

16+00

17+00

18+00

19+00

20+24.48

11

12

XS3

CE CE CE CE

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

LEGEND

- CHANNEL CENTERLINE
- BANKFULL
- GROUNDWATER GAUGE
- CREST GAUGE
- # VEGETATION PLOT
- IN-STREAM VEGETATION
- VEGETATIVE COVER - POOR

Ecosystem Enhancement PROGRAM

NOTES:
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2. ALL LOCATIONS ARE APPROXIMATE.

PROJECT NO. 65
ANSON COUNTY
NORTH CAROLINA
MONITORING
YEAR 3 of 5

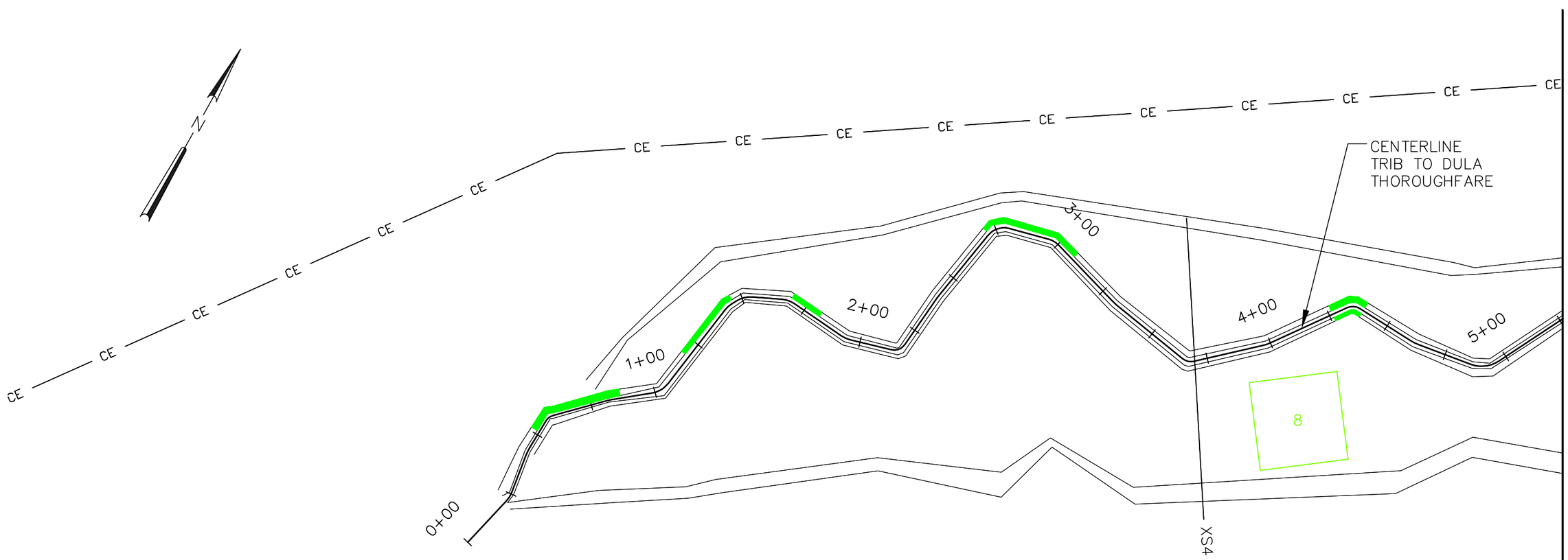
JJG

NC ECOSYSTEM ENHANCEMENT PROGRAM
DULA THOROUGHFARE STREAM AND WETLAND RESTORATION

FIGURE 1.2a
CURRENT CONDITION PLAN VIEW

DATE : FEBRUARY 2010
SCALE : 1"=40'
JOB NO.: 03060005

FIGURE 3 OF 4



LEGEND

- CHANNEL CENTERLINE
- BANKFULL
- GROUNDWATER GAUGE
- CREST GAUGE
- # VEGETATION PLOT
- IN-STREAM VEGETATION
- VEGETATIVE COVER - POOR

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.

PROJECT NO. 65
ANSON COUNTY
NORTH CAROLINA
MONITORING
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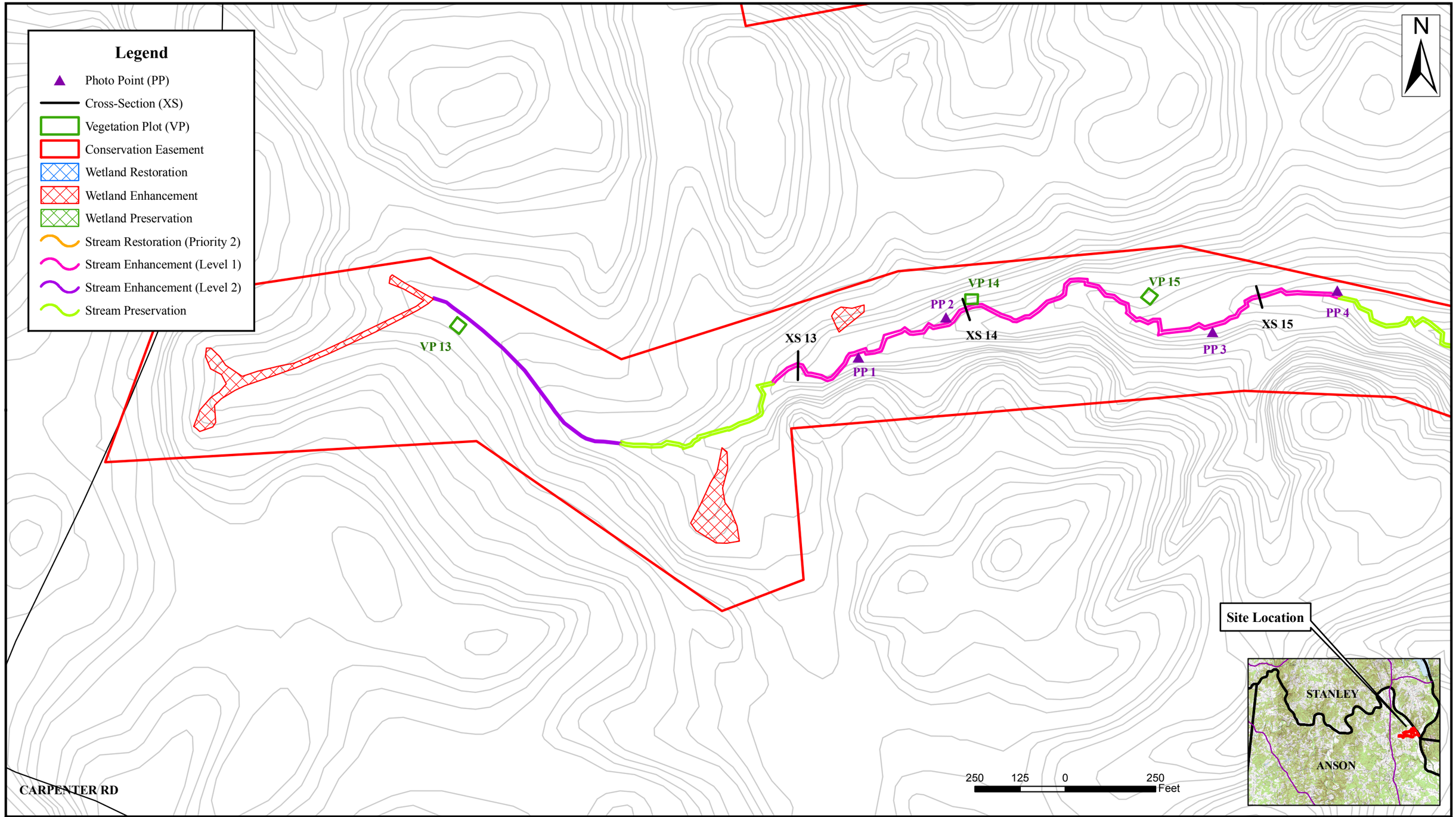
NC ECOSYSTEM ENHANCEMENT PROGRAM
DULA THOROUGHFARE STREAM AND WETLAND RESTORATION

FIGURE 1.2a
CURRENT CONDITION PLAN VIEW

DATE : FEBRUARY 2010
SCALE : 1"=40'
JOB NO.: 03060005

FIGURE 4 OF 4



Appendix 1. General Figures and Plan Views
Figure 1.2b. Current Condition Plan View Map
UT to Dula Thoroughfare Stream Restoration
Anson County, NC
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April 2010

APPENDIX 2
GENERAL PROJECT TABLES

1. **Project Mitigation Structure and Objectives**
2. **Project Activity and Reporting History**
3. **Project Contacts**
4. **Project Background**

Segment/Reach	Mitigation Type	Approach	Linear Footage or Acres	Stationing (ft)	Comments
Reach 1-DT Main Channel	R	P2	2,025 lf	0+00 – 20+25	
Reach 2-DT Tributary	R	P2	705 lf	0+00 – 7+05	
Reach 3-UT to DT	E1	N/A	1,871 lf	N/A*	Enhancement reaches not stationed
Reach 4-UT to DT	E2	N/A	480 lf	N/A*	Enhancement reaches not stationed
Stream Preservation **	P	N/A	6,355 lf	N/A	
Riparian Wetland Restoration	R	N/A	3.1 ac	N/A	
Riparian Wetland Enhancement	WE	N/A	1.0 ac	N/A	
Riparian Wetland Preservation	P	N/A	2.3 ac	N/A	

Component Summations

Restoration Level	Stream (lf)	Wetland (ac)		Upland (ac)	Buffer (ac)	BMP
		Riparian	Non-Riparian			
Restoration (R)	2,730	3.1	N/A	N/A	N/A	N/A
Enhancement (E)	N/A	1	N/A	N/A	N/A	N/A
Enahncement I (E)	1,871	N/A	N/A	N/A	N/A	N/A
Enhancement II (E)	480	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)	6,355	2.3	N/A	N/A	N/A	N/A
HQ Preservation (P)	N/A	N/A	N/A	N/A	N/A	N/A
Totals	**11,436**	**6.4**	**N/A**	**N/A**	**N/A**	**N/A**

*Stationing was not provided for the enhancement and preservation reach.

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	TBD	TBD
Year 5 Monitoring	TBD	TBD

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

Designer	EcoScience Corporation 1101 Haynes Street, Suite 101 Raleigh, NC 27604 919- 828-3433
Construction	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 9101 Southern Pine Blvd., Suite 160 Charlotte, NC 28273
Stream Monitoring, POC	Kirsten Young, 704-527-4106 ext.246
Vegetation Monitoring, POC	

Project County	Anson County, North Carolina
Drainage Areas:	
DT	0.36 square miles
UT to DT	0.23 square miles
Impervious cover estimate (%)	<1 percent for all streams
Stream Orders (per USGS)	1st
DT and UT to DT	
Physiographic Region	Piedmont
Ecoregion (Griffith and Omernik)	Triassic Basins
Rosgen Classifications of As-built:	E5
Dula Thoroughfare	E/D5
UT to Dula Thoroughfare	
Cowardin Classification	Streams: R2UB12/R4SB23
	Wetlands: PFO1
Dominant soil types	Badin Channery Silt Loam (BaB, BaC) Badin-Goldston Complex (BgD) McQueen (MrB) Shellbluff (ShA) Tetotum (ToA) Chewacla (ChA)
Reference Site ID	N/A* (reference areas established on-Site)
USGS HUCs for Project and Reference	03040104 and 03040105
NCDWQ Sub-basins for Project and Reference	03-07-10
NCDWQ classification for Project and Reference	C
Any portion of any project segment 303d listed?	No
Any portion of any project segment upstream of a 303d listed segment?	No
Reasons for 303d listing or stressor	N/A
Percent of project easement fenced	No fencing along easement

APPENDIX 3
VEGETATION ASSESSMENT DATA

1. **Vegetation Plot Mitigation Success**

2. **Vegetation Monitoring Plot Photos**

3. **Vegetation Plot Summary Data Table**

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

Monitoring Plot 8 (7/2009)
Dula Thoroughfare

Monitoring Plot 9 (7/2009)
Dula Thoroughfare

Monitoring Plot 10 (7/2009)
Dula Thoroughfare

Monitoring Plot 11 (7/2009)
Dula Thoroughfare

Prepared For: Ecosystem Enhancement Program	Dula Thoroughfare Stream Restoration Year 3 of 5	Date: February 2010 Project No.: 65
	Appendix 3.2 Vegetation Monitoring Plot Photos	JJG

Monitoring Plot 12 (7/2009)
Dula Thoroughfare

Monitoring Plot 13 (7/2009)
UT Dula Thoroughfare

Monitoring Plot 14 (7/2009)
UT Dula Thoroughfare

Monitoring Plot 15 (7/2009)
UT Dula Thoroughfare

Vegetation Metadata
Dula Thoroughfare

Report Prepared By	Kirsten Young
Date Prepared	7/29/2009 16:35
database name	cvs-eep-entrytool-v2.2.7.mdb
database location	P:\03\03060\005\M6-Field Monitoring Data\MY-2009\Vegetation\Bishop Site
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
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.
Stem Count 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	Dula Thoroughfare and UT Dula Thoroughfare (Bishop Site)
Description	Stream and wetland restoration/enhancement in Anson County
length(ft)	
stream-to-edge width (ft)	
area (sq m)	100
Required Plots (calculated)	5
Sampled Plots	5

Dula Thoroughfare
Stem Counts for Planted Species

			Current Data (MY3-2009)										Annual Means					
			Plot 8		Plot 9		Plot 10		Plot 11		Plot 12		Current Mean		MY1 - 2007		MY2 - 2008	
Species	**Common Name**	**Type**	P	T	P	T	P	T	P	T	P	T	**P**	**T**	**P**	**T**	**P**	**T**
Acer negundo	boxelder	T											**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**1**
Betula nigra	river birch	T	1	1	17	17	13	13	2	2	3	3	**7**	**7**	**7**	**7**	**7**	**9**
Carya ovata	shagbark hickory	T							1	1			**1**	**1**	**1**	**1**	**1**	**1**
Celtis laevigata	sugarberry	T					1	1					**1**	**1**	**1**	**1**	**1**	**1**
Cephalanthus occidentalis	common buttonbush	T	1	1	5	5	3	3			3	3	**3**	**3**	**3**	**3**	**3**	**3**
Cornus amomum	silky dogwood	T	3	3	9	9	3	3			1	1	**4**	**4**	**4**	**4**	**4**	**5**
Fraxinus pennsylvanica	green ash	T	3	4			4	4					**4**	**4**	**3**	**3**	**4**	**3**
Liquidambar styraciflua	sweet gum	T											**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**1**
Nyssa biflora	swamp tupelo	T	1	1	1	1							**1**	**1**	**1**	**1**	**1**	**1**
Platanus occidentalis	American sycamore	T			1	1			4	4			**3**	**3**	**3**	**3**	**3**	**3**
Quercus michauxii	swamp chestnut oak	T	2	2			1	1	1	1			**1**	**1**	**1**	**1**	**1**	**1**
Quercus pagoda	cherrybark oak	T	2	2	1	1	1	1			1	1	**1**	**1**	**1**	**1**	**1**	**1**
Quercus phellos	willow oak	T	2	2	2	2	1	1	1	1			**2**	**2**	**2**	**2**	**2**	**2**
Quercus sp.	oak species	T											**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**3**
Ulmus americana	American elm	T			3	3	1	1	1	1			**2**	**2**	**2**	**2**	**2**	**3**
	Plot Area (acres)		**0.0247**															
	Species Count		**8**	**8**	**8**	**8**	**9**	**9**	**6**	**6**	**4**	**4**	**12**	**12**	**7**	**7**	**7**	**8**
	Stem Count		**15**	**16**	**39**	**39**	**28**	**28**	**10**	**10**	**8**	**8**	**29**	**29**	**21**	**21**	**20**	**24**
	Stems per Acre		**607**	**648**	**1579**	**1579**	**1134**	**1134**	**405**	**405**	**324**	**324**	**810**	**818**	**842**	**842**	**802**	**980**

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

Vegetation Metadata
UT to Dula Thoroughfare

Report Prepared By	Kirsten Young
Date Prepared	7/29/2009 16:46
database name	cvs-eep-entrytool-v2.2.7.mdb
database location	P:\03\03060\005\M6-Field Monitoring Data\MY-2009\Vegetation\Bishop Site
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
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.
Stem Count 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	UT to Dula Thoroughfare (Bishop Site)
Description	Stream and wetland restoration/enhancement in Anson County
length(ft)	
stream-to-edge width (ft)	
area (sq m)	100
Required Plots (calculated)	3
Sampled Plots	3

UT to Dula Thoroughfare
Stem Counts for Planted Species

			Current Data (MY3-2009)						Annual Means					
			Plot 13		Plot 14		Plot 15		Current Mean		MY1 - 2007		MY2 - 2008	
Species	Common Name	Type	P	T	P	T	P	T	P	T	P	T	P	T
Celtis laevigata	sugarberry	T	3	3					**3**	**3**	**4**	**4**	**2**	**3**
Cornus amomum	silky dogwood	S												**2**
Cornus florida	flowering dogwood	T			1	1	1	1	**1**	**1**	**1**	**1**	**1**	**1**
Fagus grandifolia	American beech	T	1	1			1	1	**1**	**1**	**1**	**1**	**1**	**1**
Liquidambar styraciflua	sweet gum	T												**1**
Nyssa biflora	swamp tupelo	T					1	1	**1**	**1**	**1**	**1**	**1**	**1**
Quercus falcata	southern red oak	T	2	2	2	2	1	1	**2**	**2**	**2**	**2**	**1**	**1**
Quercus phellos	willow oak	T					1	1	**1**	**1**	**1**	**1**	**1**	**2**
Quercus rubra	northern red oak	T	5	5			2	2	**4**	**4**	**4**	**4**	**4**	**4**
		Plot Area (acres)	**0.0247**											
		Species Count	**4**	**4**	**2**	**2**	**6**	**6**	**6**	**6**	**4**	**4**	**4**	**4**
		Stem Count	**11**	**11**	**3**	**3**	**7**	**7**	**9**	**9**	**8**	**8**	**6**	**6**
		Stems per Acre	**445**	**445**	**121**	**121**	**283**	**283**	**283**	**283**	**310**	**310**	**243**	**256**

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

APPENDIX 4
STREAM ASSESSMENT DATA

1. **Stream Station Photos**
2. **Stream Cross-Section Photos**
3. **Qualitative Visual Stability Assessment**
4. **Verification of Bankfull Events**
5. **Cross-Section Plots and Raw Data Tables***
6. **Longitudinal Plots and Raw Data Tables***
7. **Pebble Count Plots and Raw Data Tables***

*Raw data tables have been provided electronically.

Photo Point 1-Upstream (7/2009)

Photo Point 1-Downstream (7/2009)

Photo Point 2-Upstreamv(7/2009)

Photo Point 2-Downstream (7/2009)

Prepared For:	Dula Thoroughfare Stream and Wetland Restoration Year 3 of 5	Date: February 2010 Project No.: 65
	Appendix 4.1 Stream Station Photos	

Photo Point 3-Upstream (7/2009)

Photo Point 3-Downstream (7/2009)

Photo Point 4-Upstream (7/2009)

Photo Point 4-Downstream (7/2009)

Cross-Section 1-Upstream
Dula Thoroughfare (1/2010)

Cross-Section 1-Downstream
Dula Thoroughfare (1/2010)

Cross-Section 2-Upstream
Dula Thoroughfare (1/2010)

Cross-Section 2-Downstream
Dula Thoroughfare (1/2010)

Prepared For: Ecosystem Enhancement Program	Dula Thoroughfare Stream Restoration Year 3 of 5	Date: February 2010 Project No.: 65
	Appendix 4.2 Stream Cross-Section Photos	JJG

Cross-Section 4-Upstream
Dula Thoroughfare (1/2010)

Cross-Section 4-Downstream
Dula Thoroughfare (1/2010)

Prepared For:	Dula Thoroughfare Stream Restoration Year 3 of 5	Date: February 2010 Project No.: 65
	Appendix 4.2 Stream Cross-Section Photos	

Cross-Section 5-Upstream
UT Dula Thoroughfare (7/2009)

Cross-Section 5-Downstream
UT Dula Thoroughfare (7/2009)

Cross-Section 6-Upstream
UT Dula Thoroughfare (7/2009)

Cross-Section 6-Downstream
UT Dula Thoroughfare (7/2009)

Cross-Section 7-Upstream
UT Dula Thoroughfare (7/2009)

Cross-Section 7-Downstream
UT Dula Thoroughfare (7/2009)

Dula Thoroughfare-Main Channel (2,025 linear feet)

Feature Category		(# Stable) Number Performing as Intended	Total Number assessed per As-Built survey	Total Number/ feet in unstable state	% Perform in Stable Condition	Feature Perform Mean or Total
A. Riffles	1. Present?	N/A*				
	2. Armor Stable?					
	3. Facet grade appears stable?					
	4. Minimal evidence of embedding/fining?					
	5. Length appropriate?					
B. Pools	1. Present?	8	30	N/A	27%	**27%**
	2. Sufficiently deep?	**			**	
	3. Length Appropriate?	8			27%	
C. Thalweg	1. Upstream of meander bend centering?	30	30	N/A	100%	**100%**
	2. Downstream of meander centering?	30			100%	
D. Meanders	1. Outer bend in state of limited/controlled erosion?	N/A			100%	**100%**
	2. Of those eroding, # w/concomitant point bar formation?				100%	
	3. Apparent Rc within spec?				100%	
	4. Sufficient floodplain access and relief?				100%	
E. Bed General	1. General channel bed aggradation areas (bar formation)?	N/A		***	80%	**90%**
	2. Channel bed degradation - areas of increasing down-cutting or head cutting?			0	100%	
F. Bank	1. Actively eroding, wasting, or slumping bank	N/A		0	100%	**100%**
G. Vanes	1. Free of back or arm scour?	N/A				
	2. Height appropriate?					
	3. Angle and geometry appear appropriate?					
	4. Free of piping or other structural failures?					
H. Wads/ Boulders	1. Free of scour?	N/A				
	2. Footing stable?					

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

**Flow appears to be impacted by the PeeDee Dam and was higher than normal baseflows.

***Approximate percentage of channel impacted by in-stream vegetation

Dula Thoroughfare-Tributary (705 linear feet)

Feature Category		(# Stable) Number Performing as Intended	Total Number assessed per As-Built survey	Total Number/ feet in unstable state	% Perform in Stable Condition	Feature Perform Mean or Total
A. Riffles	1. Present?	*				
	2. Armor Stable?					
	3. Facet grade appears stable?					
	4. Minimal evidence of embedding/fining?					
	5. Length appropriate?					
B. Pools	1. Present?	0	11	N/A	0	**0%**
	2. Sufficiently deep?	N/A			N/A	
	3. Length Appropriate?	0			0	
C. Thalweg	1. Upstream of meander bend centering?	11	11	N/A	100%	**100%**
	2. Downstream of meander centering?	11			100%	
D. Meanders	1. Outer bend in state of limited/controlled erosion?	N/A			100%	**100%**
	2. Of those eroding, # w/concomitant point bar formation?				100%	
	3. Apparent Rc within spec?				100%	
	4. Sufficient floodplain access and relief?				100%	
E. Bed General	1. General channel bed aggradation areas (bar formation)?	N/A		0	100%	**100%**
	2. Channel bed degradation - areas of increasing down-cutting or head cutting?			0	100%	
F. Bank	1. Actively eroding, wasting, or slumping bank	N/A		0	100%	**100%**
G. Vanes	1. Free of back or arm scour?	N/A				
	2. Height appropriate?					
	3. Angle and geometry appear appropriate?					
	4. Free of piping or other structural failures?					
H. Wads/ Boulders	1. Free of scour?	N/A				
	2. Footing stable?					

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

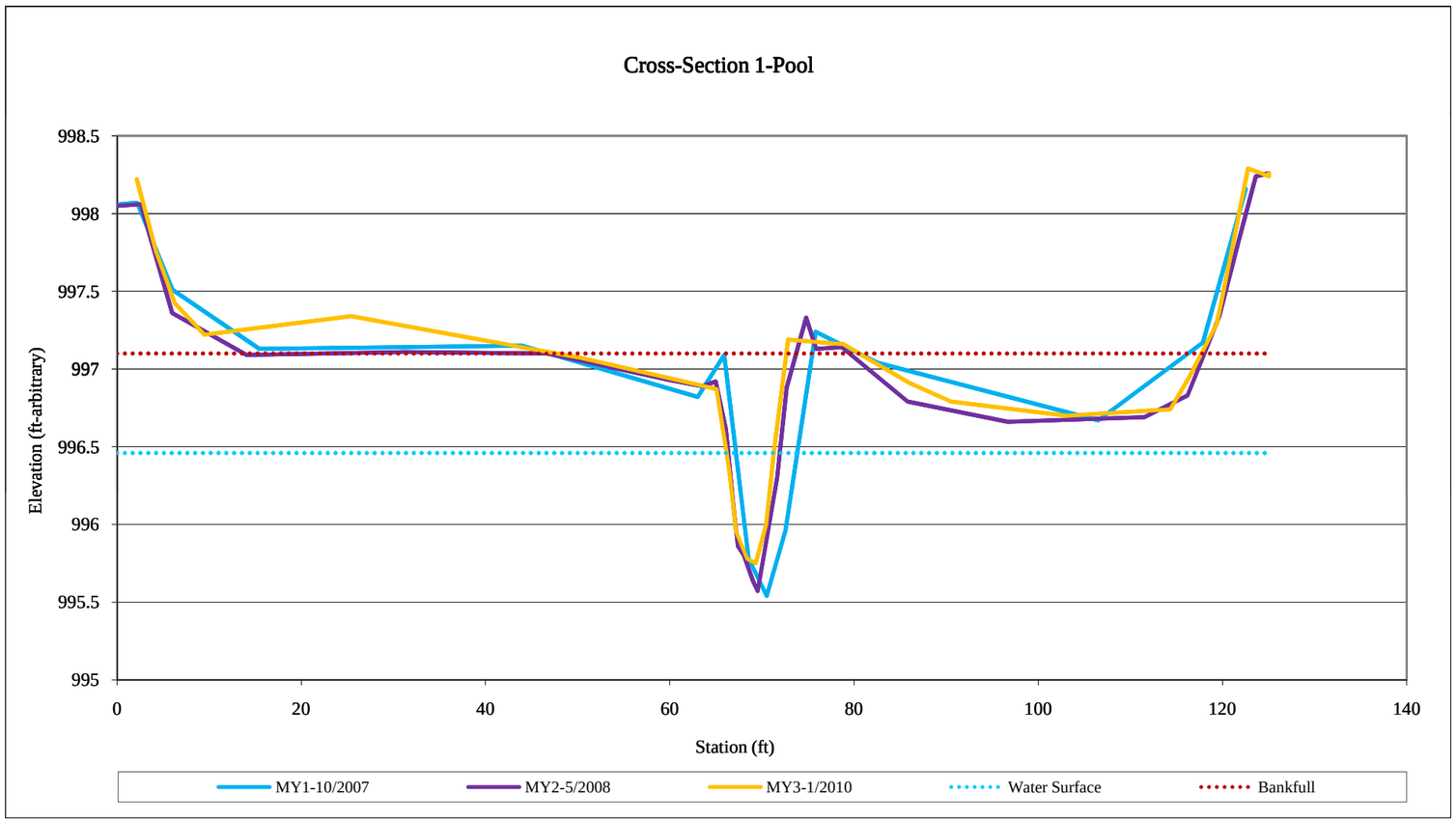
UT to Dula Thoroughfare-Main Channel (2,351 linear feet)

Feature Category		(# Stable) Number Performing as Intended	Total Number assessed per As-Built survey	Total Number/ feet in unstable state	% Perform in Stable Condition	Feature Perform Mean or Total
A. Riffles	1. Present?	N/A				
	2. Armor Stable?					
	3. Facet grade appears stable?					
	4. Minimal evidence of embedding/fining?					
	5. Length appropriate?					
B. Pools	1. Present?	N/A				
	2. Sufficiently deep?					
	3. Length Appropriate?					
C. Thalweg	1. Upstream of meander bend centering?	N/A			100%	**100%**
	2. Downstream of meander centering?				100%	
D. Meanders	1. Outer bend in state of limited/controlled erosion?	N/A			100%	**100%**
	2. Of those eroding, # w/concomitant point bar formation?				100%	
	3. Apparent Rc within spec?				100%	
	4. Sufficient floodplain access and relief?				100%	
E. Bed General	1. General channel bed aggradation areas (bar formation)?	N/A			100%	**100%**
	2. Channel bed degradation - areas of increasing down-cutting or head cutting?				100%	
F. Bank	1. Actively eroding, wasting, or slumping bank	N/A		0	100%	**100%**
G. Vanes	1. Free of back or arm scour?	N/A				
	2. Height appropriate?					
	3. Angle and geometry appear appropriate?					
	4. Free of piping or other structural failures?					
H. Wads/ Boulders	1. Free of scour?	N/A				
	2. Footing stable?					

Date of Collection	Date of Occurrence	Method	Photo # (if available)
12/2007	N/A*	Crest Gauge (Main Channel and Tributary)	N/A
9/30/2008	Unknown	Crest Gauge (Main Channel and Tributary)	N/A
6/2009	Unknown	Crest Gauge (Main Channel and Tributary)	N/A

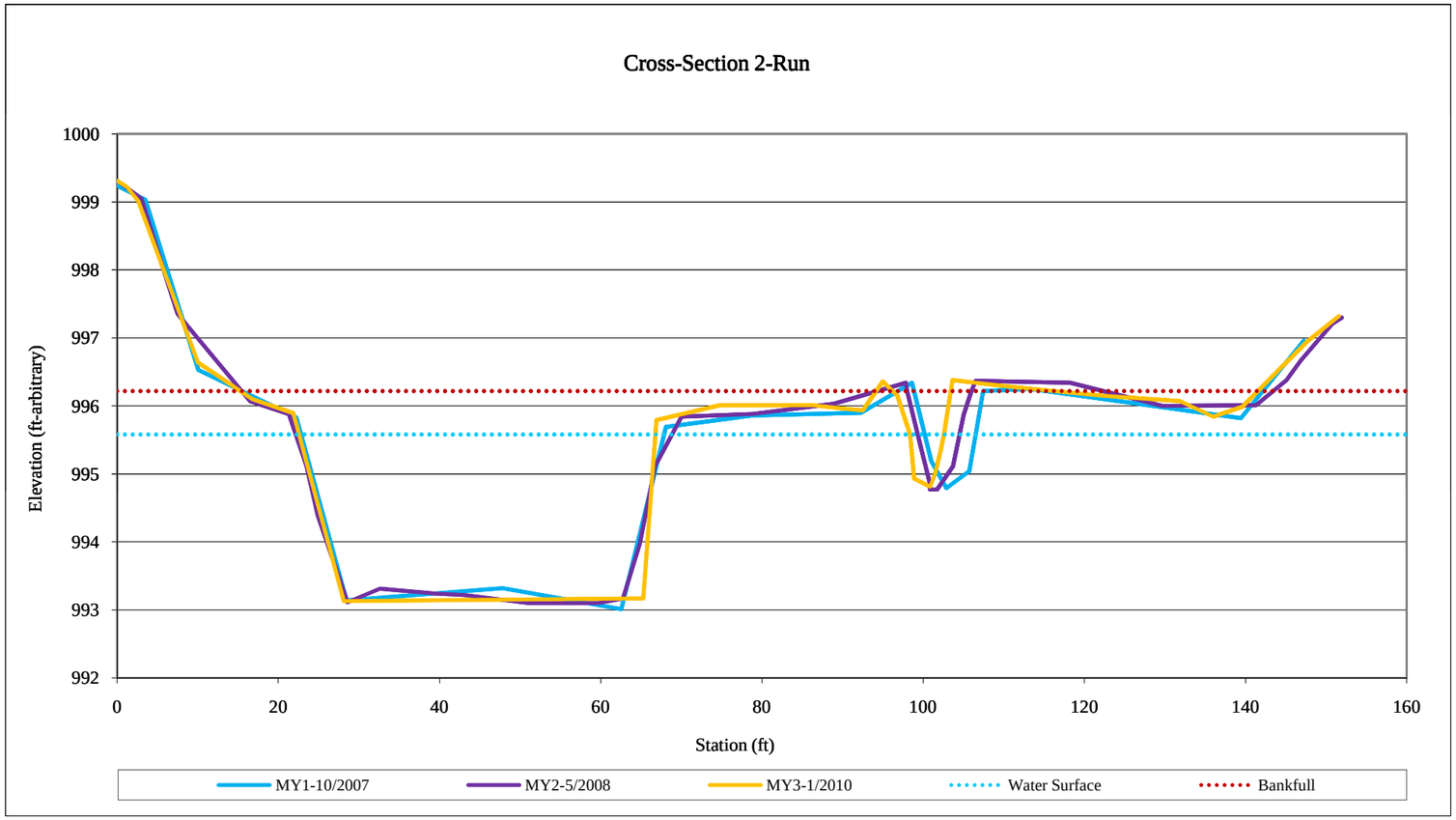
Project Name: Dula Thoroughfare Main Channel		
Cross-Section: 1		
Feature: Pool		
1/2010		
Station	**Elevation**	**Notes**
2.13	998.22	x1
4.19	997.76	x1
6.3	997.42	x1
9.47	997.22	x1
25.41	997.34	x1
50.47	997.07	x1
65.09	996.87	x1
66.17	996.46	x1-lew
66.51	996.32	x1
67.21	995.95	x1
68.4	995.78	x1
69.32	995.75	x1
70.46	996	x1
71.27	996.46	x1-rew
72.83	997.19	x1
78.85	997.16	x1
86.03	996.91	x1
90.53	996.79	x1
103.03	996.7	x1
114.31	996.74	x1
116.41	996.95	x1
119.37	997.29	x1
119.9	997.44	x1
122.77	998.29	x1
125.04	998.24	x1
125.02	998.26	x1-rpt

Summary Data	
Bankfull Cross-sectional Area (ft^2)	8.71
Bankfull Width (ft)	21.71
Bankfull Mean Depth (ft)	0.40
Bankfull Max Depth (ft)	1.36
Width/Depth Ratio	54.28
Entrenchment Ratio	5.66



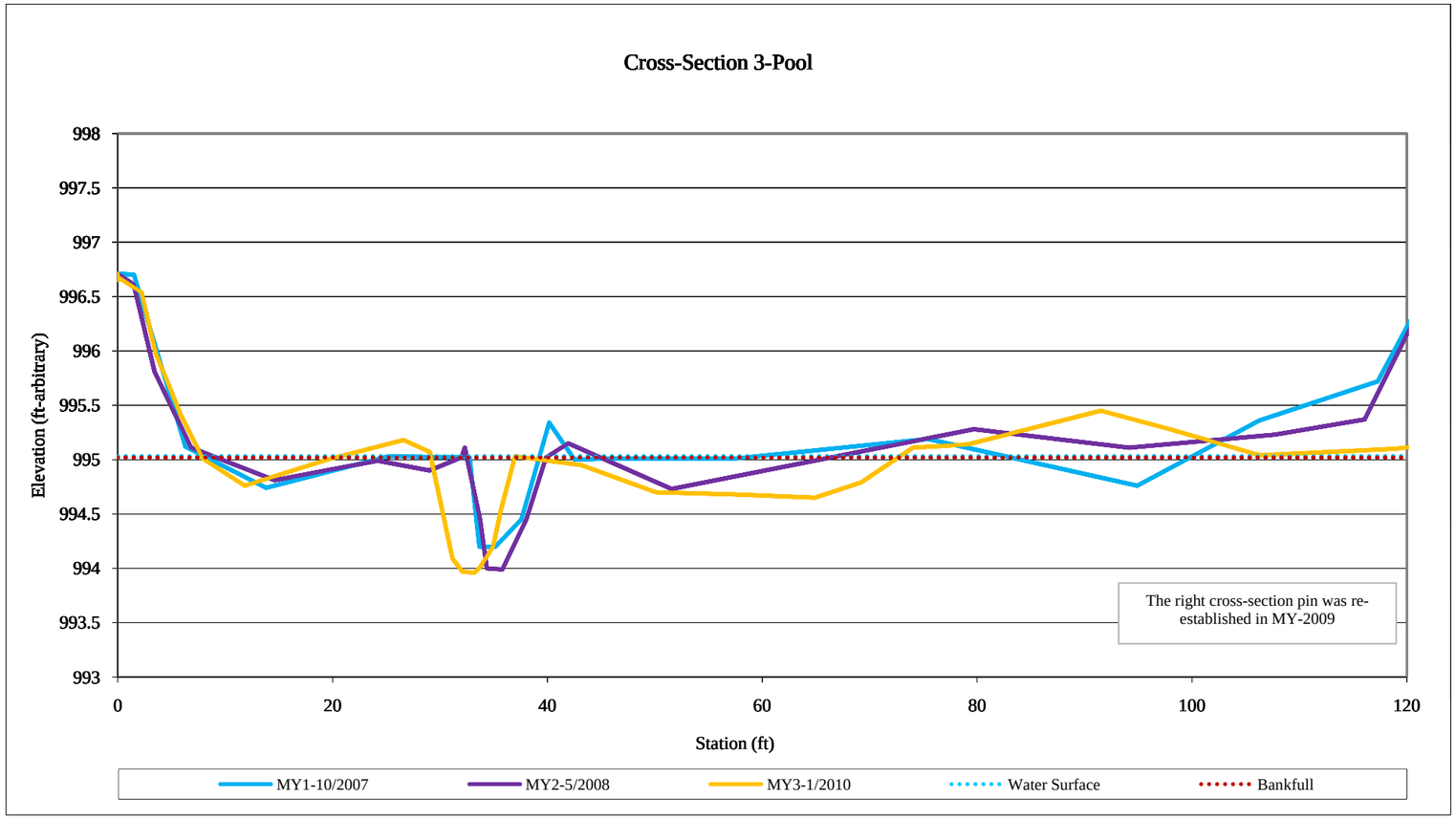
Project Name: Dula Thoroughfare Main Channel		
Cross-Section: 2		
Feature: Run		
1/2010		
Station	**Elevation**	**Notes**
0	999.31	x2-lpt
1.19	999.22	x2
2.64	999.01	x2
10.01	996.64	x2
16.79	996.1	x2
21.87	995.89	x2
28.14	993.13	x2
65.28	993.17	x2
66.91	995.79	x2-ew
74.8	996.01	x2
86.3	996.01	x2
92.49	995.93	x2
94.99	996.36	x2
96.79	996.15	x2
98.36	995.58	x2-ew
98.87	994.93	x2
100.85	994.81	x2
101.47	994.99	x2
102.19	995.35	x2
102.58	995.58	x2-ew
103.64	996.38	x2
111.87	996.27	x2
122.17	996.15	x2
131.83	996.07	x2
136.00	995.84	x2
139.61	995.99	x2
147.55	996.94	x2
151.57	997.32	x2-rpt

Summary Data	
Bankfull Cross-sectional Area (ft^2)	5.90
Bankfull Width (ft)	7.29
Bankfull Mean Depth (ft)	0.81
Bankfull Max Depth (ft)	3.09
Width/Depth Ratio	9.00
Entrenchment Ratio	20.79



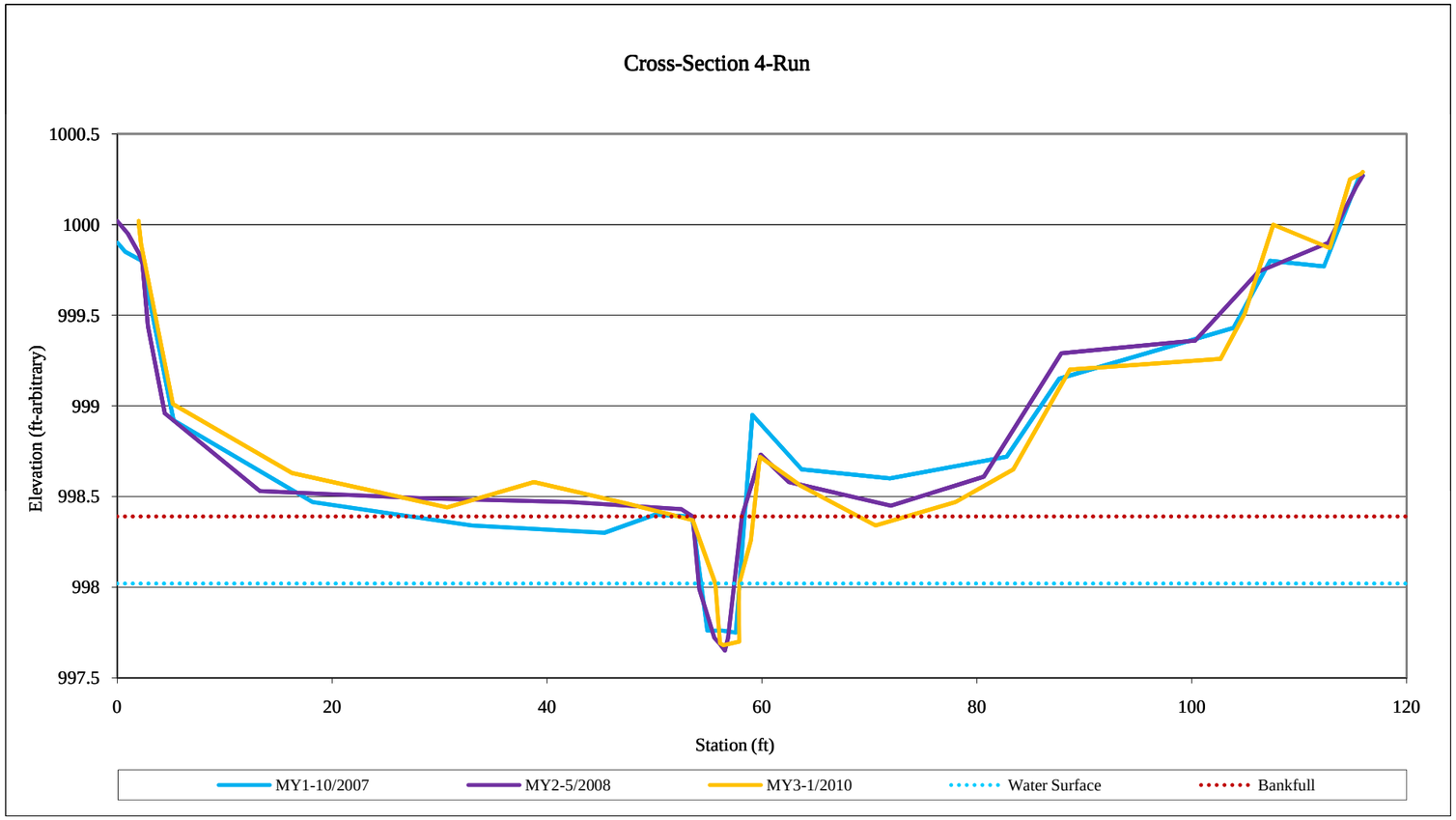
Project Name: Dula Thoroughfare-Main Channel					
Cross-Section: 3					
Feature: Pool					
1/2010					
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
0	996.71	X3-lpt	69.2	994.79	x3
0	996.65	x3	74.02	995.11	x3
0.18	996.67	X3	79.15	995.14	x3
2.21	996.54	x3	91.53	995.45	x3
3.54	995.98	x3	97.95	995.28	x3
5.88	995.41	x3	106.31	995.04	x3
7.91	995.01	x3	118.97	995.1	x3
11.82	994.76	x3	126.52	995.19	x3
19.51	995	x3	131.64	996.11	x3
26.61	995.18	x3	136.25	996.96	x3
29.05	995.07	x3	138.37	997.09	x3
31.16	994.09	x3	138.87	997.1	x3
32.08	993.97	x3	139.07	997.2	x3-rpt
33.21	993.96	x3			
33.72	994.01	x3			
34.94	994.2	x3			
35.68	994.54	x3			
36.98	995.03	x3-rew			
43.14	994.95	x3			
50.09	994.7	x3			
57.31	994.68	x3			
64.91	994.65	x3			

Summary Data	
Bankfull Cross-sectional Area (ft^2)	5.54
Bankfull Width (ft)	7.84
Bankfull Mean Depth (ft)	0.71
Bankfull Max Depth (ft)	1.07
Width/Depth Ratio	11.04
Entrenchment Ratio	16.36



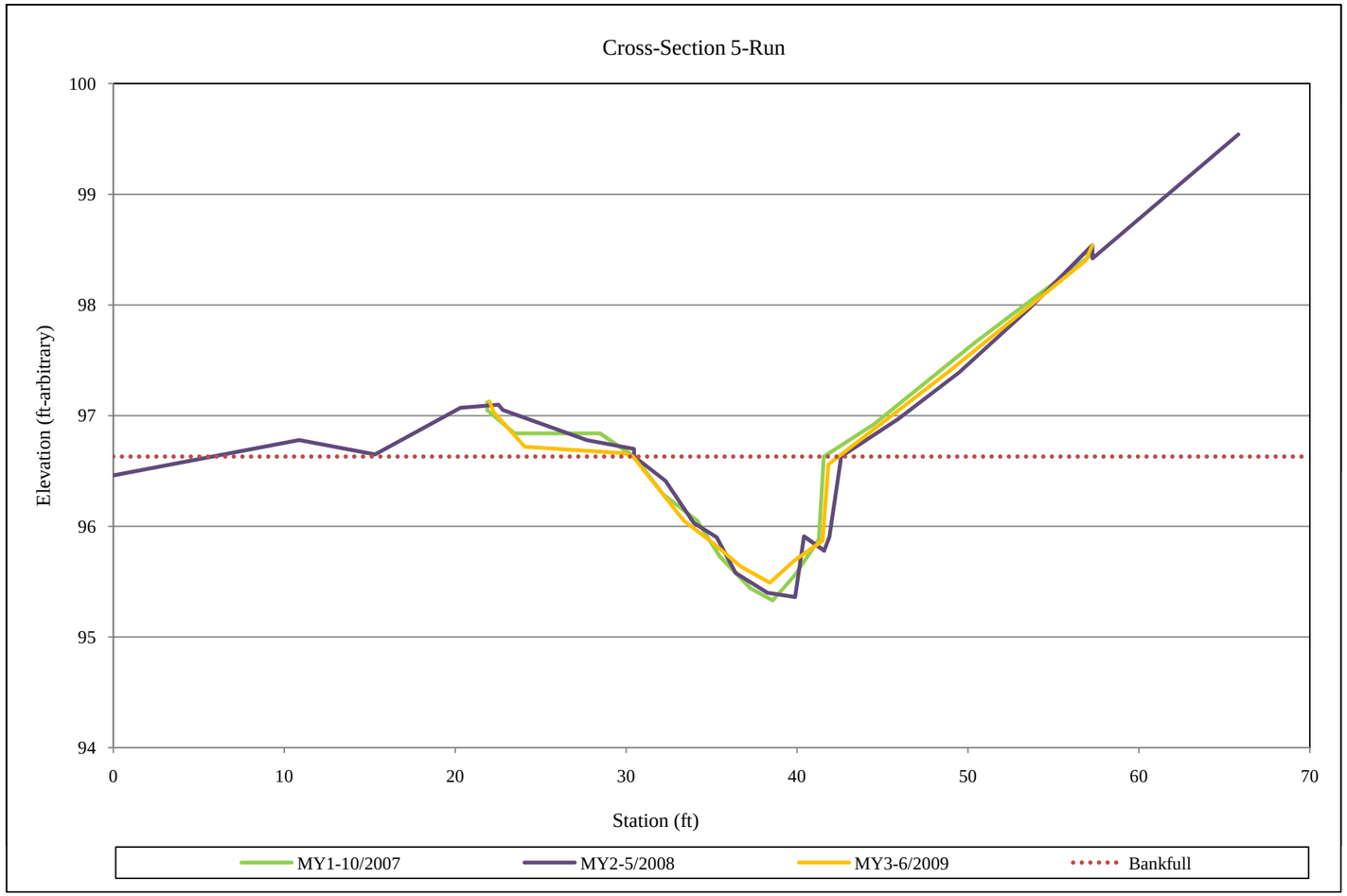
Project Name: Dula Thoroughfare Tributary		
Cross-Section: 4		
Feature: Run		
1/2010		
Station	**Elevation**	**Notes**
2	1000.02	x4-lpt
2	1000.01	x4-lpg
2.21	999.89	x4
5.17	999.01	x4
16.27	998.63	x4
30.7	998.44	x4
38.77	998.58	x4
47.52	998.46	x4
53.55	998.37	x4
55.67	998.02	x4-lew
56.1	997.69	x4
56.4	997.68	x4
57.89	997.7	x4
57.84	997.92	x4
57.89	998.02	x4-rew
58.97	998.26	x4
59.78	998.72	x4
63.57	998.56	x4
70.56	998.34	x4
78.01	998.47	x4
83.39	998.65	x4
88.66	999.2	x4
102.69	999.26	x4
104.92	999.51	x4
107.59	1000.00	x4
112.85	999.87	x4
114.74	1000.25	x4
115.74	1000.28	x4
115.92	1000.29	x4-rpt

Summary Data	
Bankfull Cross-sectional Area (ft^2)	2.06
Bankfull Width (ft)	5.61
Bankfull Mean Depth (ft)	0.37
Bankfull Max Depth (ft)	0.69
Width/Depth Ratio	15.16
Entrenchment Ratio	14.66



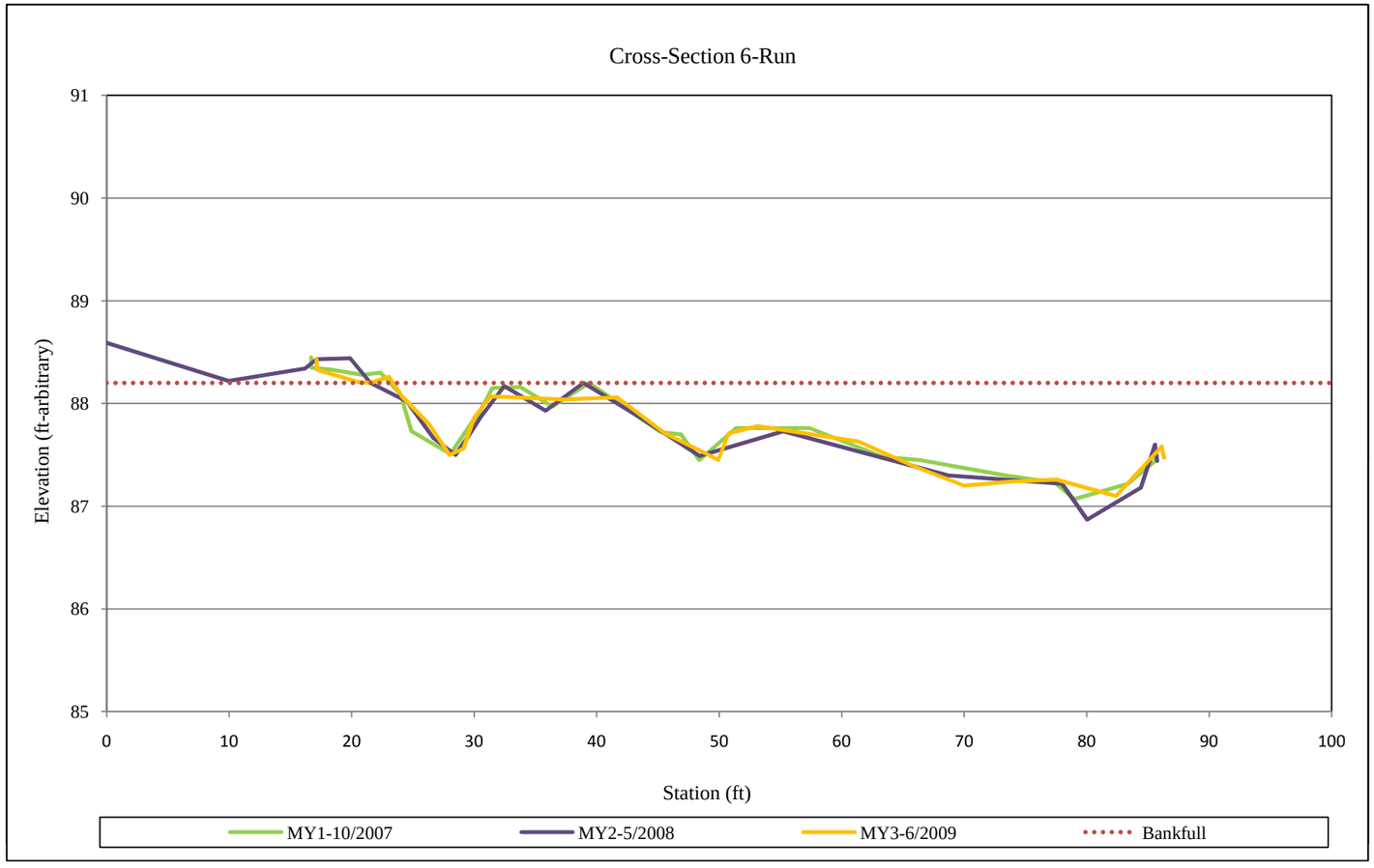
Project Name: UT to Dula Thoroughfare		
Cross-Section: 5		
Feature: Run		
1/2010		
Station	**Elevation**	**Notes**
22	97.13	x1-lpt
22.26	97.03	x1
24.07	96.72	x1
29.87	96.66	x1
30.4	96.63	x1-b
33.38	96.05	x1
35.15	95.84	x1
36.68	95.64	x1
38.4	95.49	x1
39.83	95.69	x1
41.49	95.87	x1
41.83	96.56	x1
48.88	97.4	x1
56.88	98.4	x1
57.27	98.54	xs1rpt

Summary Data	
Bankfull Cross-sectional Area (ft^2)	8.33
Bankfull Width (ft)	12.02
Bankfull Mean Depth (ft)	0.69
Bankfull Max Depth (ft)	1.14
Width/Depth Ratio	17.42
Entrenchment Ratio	2.48



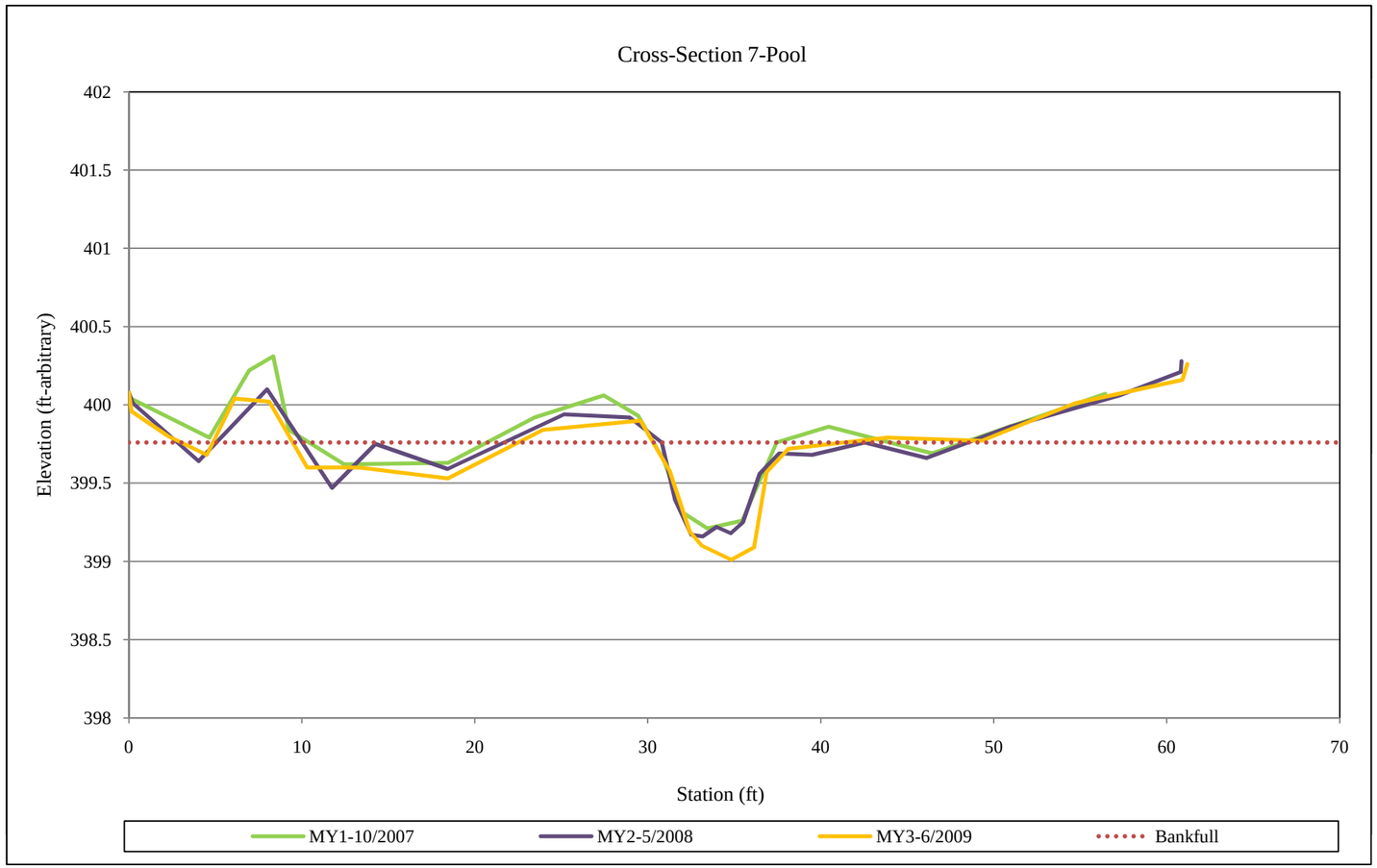
Project Name: UT to Dula Thoroughfare		
Cross-Section: 6		
Feature: Run		
Station	**Elevation**	**Notes**
17.12	88.43	x2-lpt
17.19	88.33	x2
20.49	88.21	x2
21.54	88.2	x2-b
23.05	88.26	x2
24.11	88.07	x2
26.32	87.8	x2
28	87.5	x2
29.12	87.56	x2
29.99	87.86	x2
31.35	88.07	x2
33.33	88.06	x2
37.3	88.04	x2
41.66	88.06	x2
45.55	87.71	x2
49	87.51	x2
49.92	87.45	x2
50.78	87.71	x2
53.14	87.78	x2
61.38	87.63	x2
65.89	87.39	x2
70.02	87.2	x2
73.8	87.24	x2
77.52	87.26	x2
82.39	87.1	x2
86.11	87.58	x2-rpt
86.31	87.47	x2

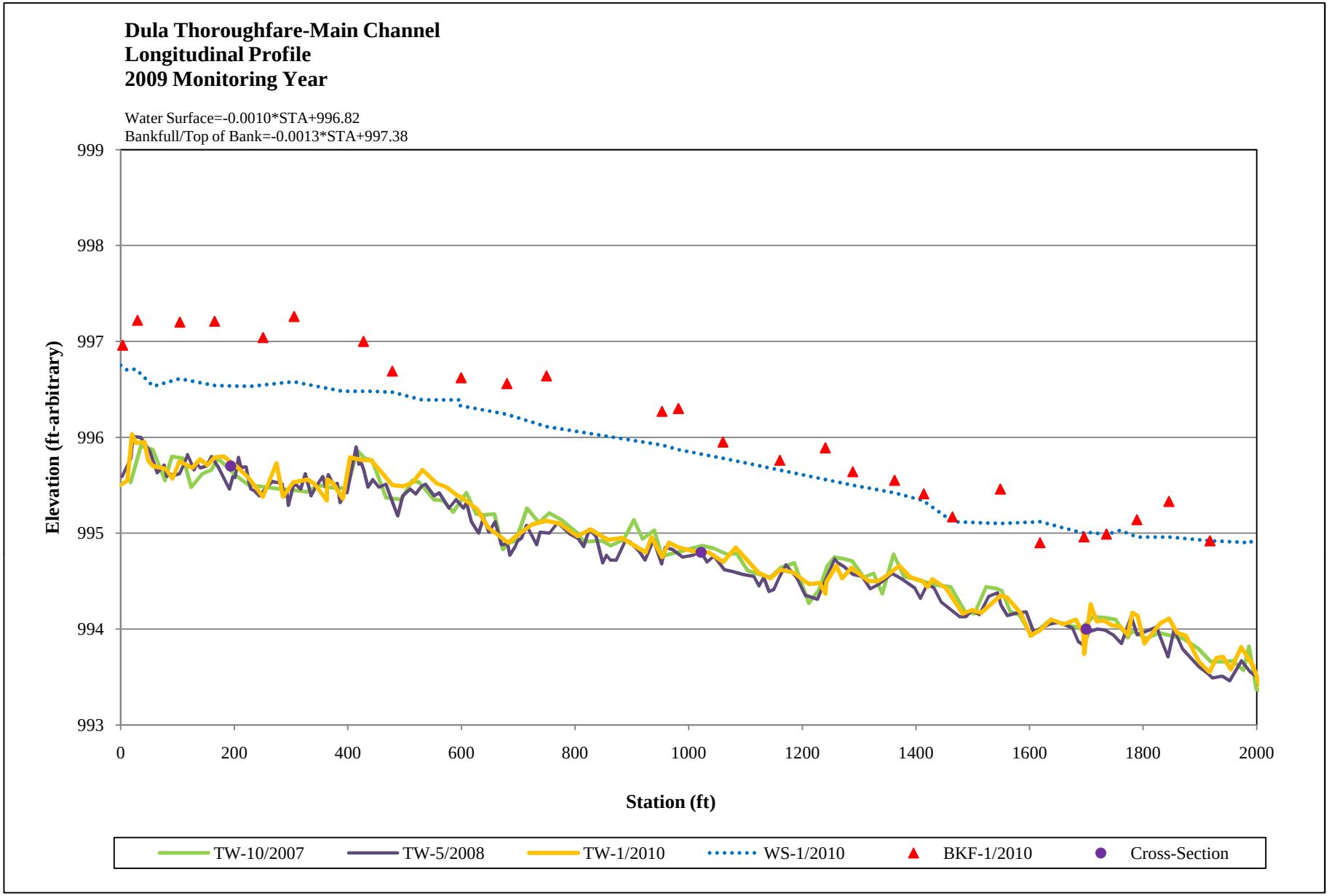
Summary Data	
Bankfull Cross-sectional Area (ft^2)	4.17
Bankfull Width (ft)	15.56
Bankfull Mean Depth (ft)	0.27
Bankfull Max Depth (ft)	1.10
Width/Depth Ratio	57.63
Entrenchment Ratio	5.50

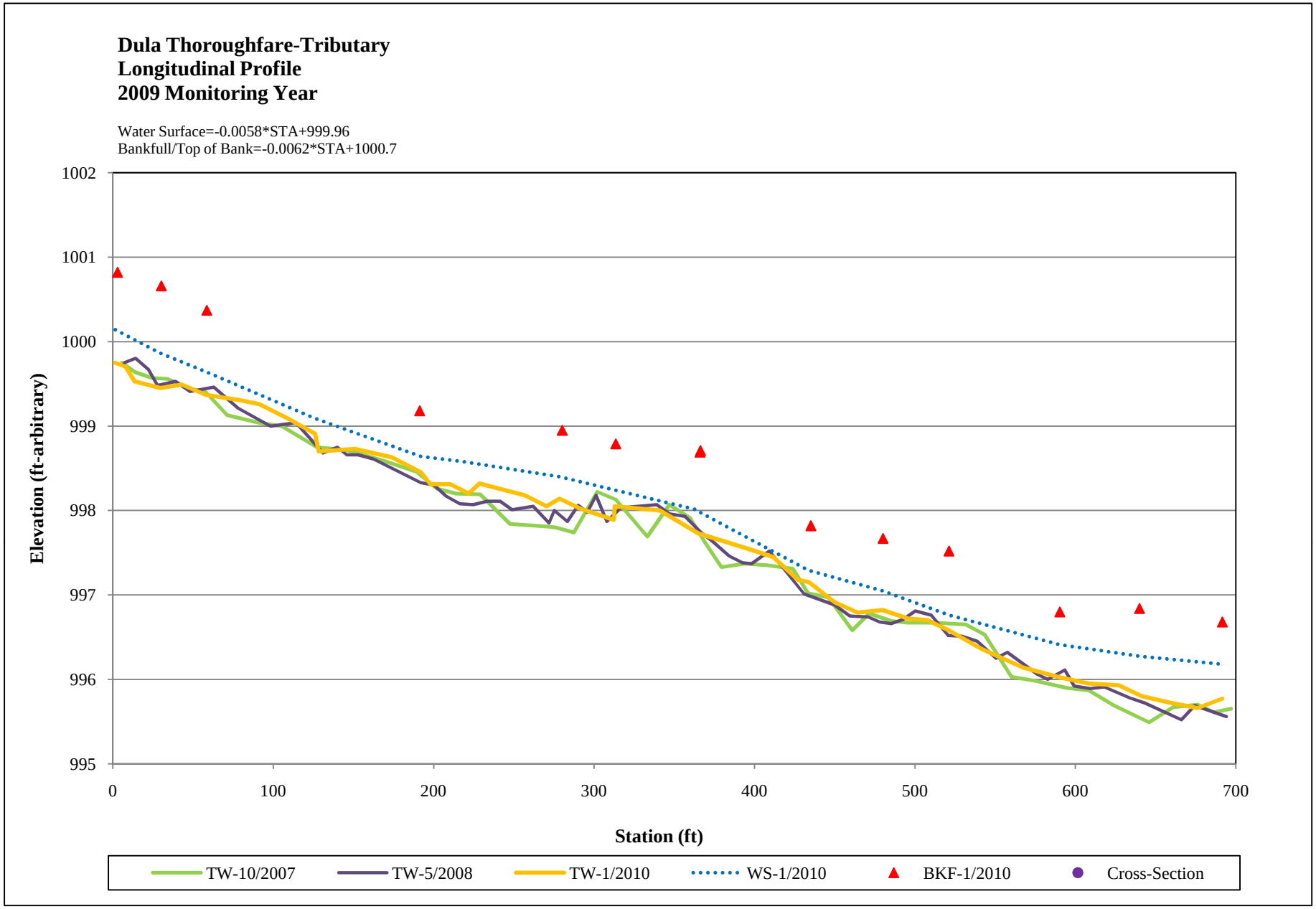


Project Name: UT to Dula Thoroughfare		
Cross-Section: 7		
Feature: Pool		
Station	**Elevation**	**Notes**
0	400.08	x3-lpt
0.15	399.96	x3
2.28	399.8	x3
4.52	399.68	x3
6.12	400.04	x3
8.12	400.02	x3
10.31	399.6	x3
13.31	399.6	x3
18.44	399.53	x3
23.95	399.84	x3
29.58	399.9	x3
31.26	399.58	x3
32.42	399.19	x3
33.13	399.1	x3
34.83	399.01	x3
36.15	399.09	x3
36.87	399.57	x3
38.14	399.72	x3-b
43.84	399.79	x3
49.3	399.77	x3
54.68	400.01	x3
60.91	400.16	x3
61.19	400.26	x3rpt

Summary Data	
Bankfull Cross-sectional Area (ft^2)	3.24
Bankfull Width (ft)	7.62
Bankfull Mean Depth (ft)	0.43
Bankfull Max Depth (ft)	0.71
Width/Depth Ratio	17.72
Entrenchment Ratio	8.00

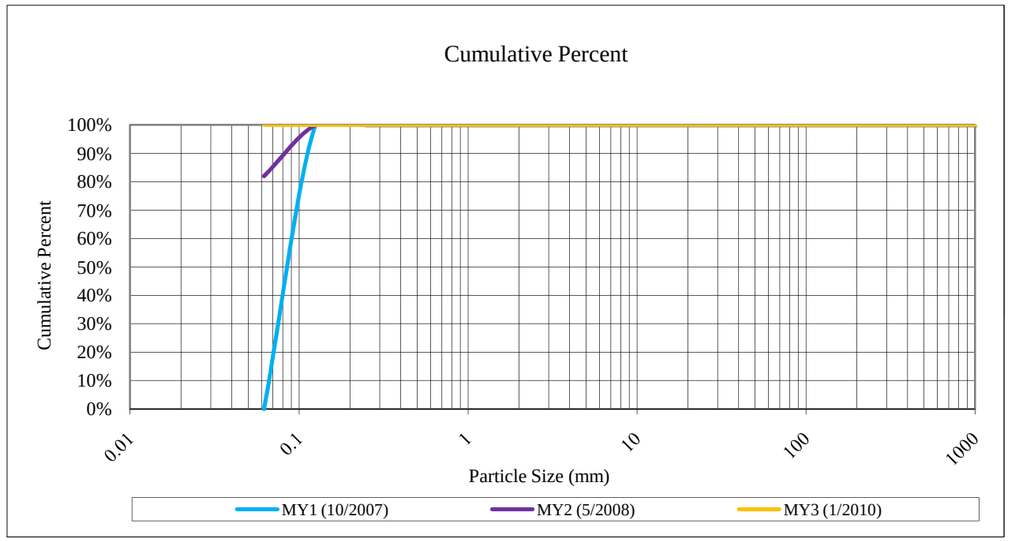


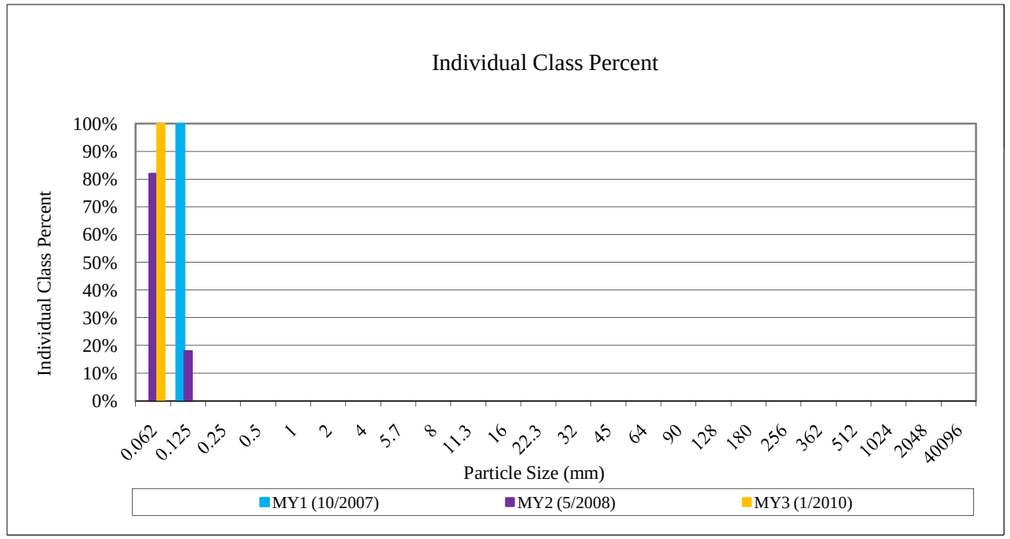

Dula Thoroughfare-Main Channel
Longitudinal Profile
2009 Monitoring Year
Water Surface=-0.0010*STA+996.82
Bankfull/Top of Bank=-0.0013*STA+997.38
Elevation (ft-arbitrary)
999
998
997
996
995
994
993
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Station (ft)
TW-10/2007
TW-5/2008
TW-1/2010
WS-1/2010
BKF-1/2010
Cross-Section


Dula Thoroughfare-Tributary
Longitudinal Profile
2009 Monitoring Year
Water Surface=-0.0058*STA+999.96
Bankfull/Top of Bank=-0.0062*STA+1000.7
Elevation (ft-arbitrary)
1002
1001
1000
999
998
997
996
995
0
100
200
300
400
500
600
700
Station (ft)
TW-10/2007
TW-5/2008
TW-1/2010
WS-1/2010
BKF-1/2010
Cross-Section

Project Name: Dula Thoroughfare-Main Channel					
Cross-Section: 1					
Feature: Pool					
			MY3-1/2010		
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%

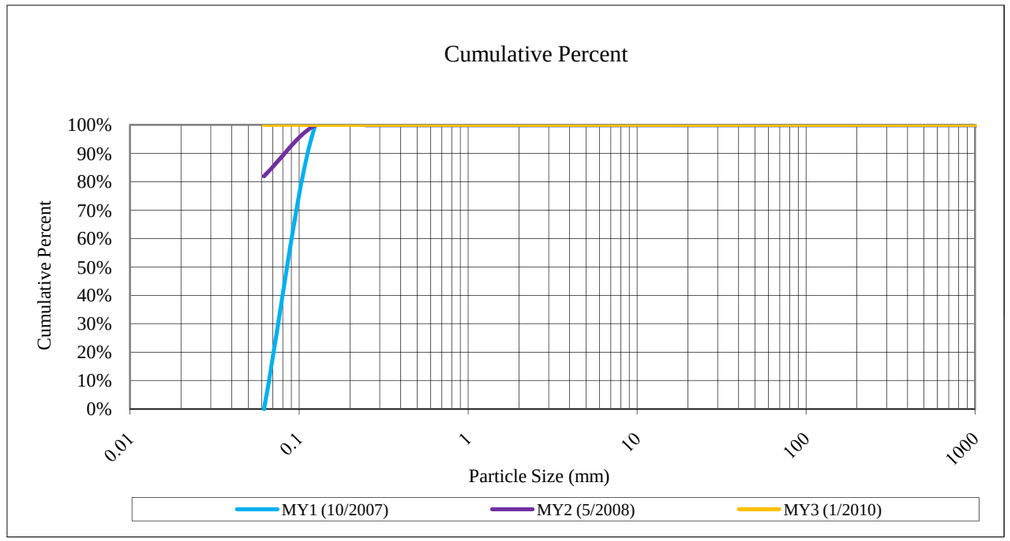
Summary Data	
D50	0.03
D84	0.05
D95	0.06

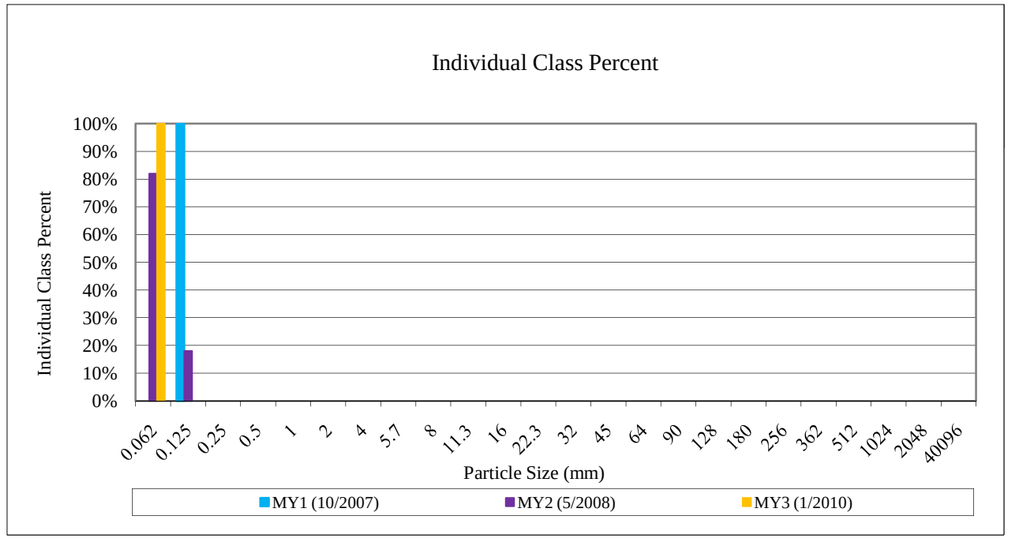




Project Name: Dula Thoroughfare-Main Channel					
Cross-Section: 2					
Feature: Run					
			MY3-1/2010		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	100	100%	100%
Sand	very fine sand	0.125	0	0%	0%
	fine sand	0.250	0	0%	0%
	medium sand	0.50	0	0%	0%
	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%

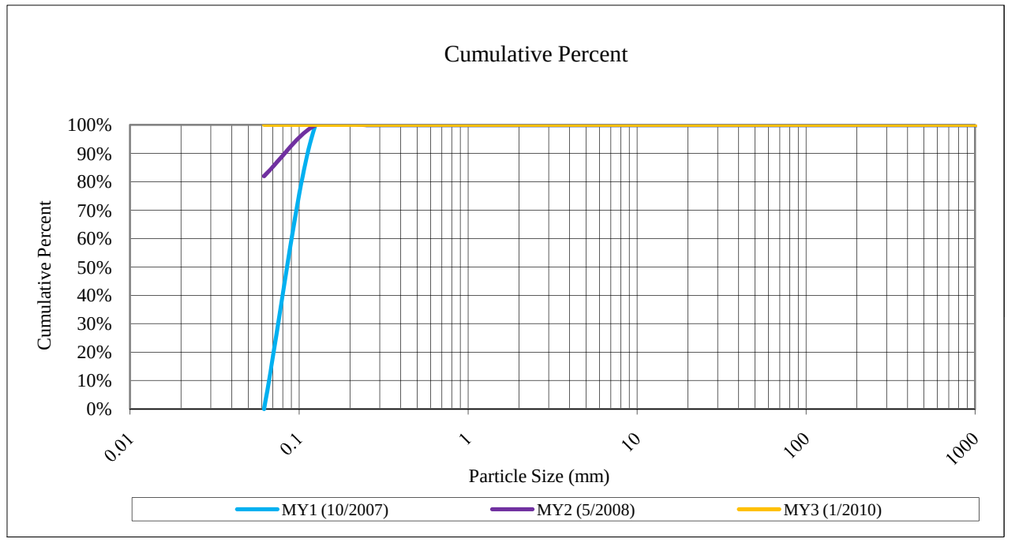
Summary Data	
D50	0.03
D84	0.05
D95	0.06

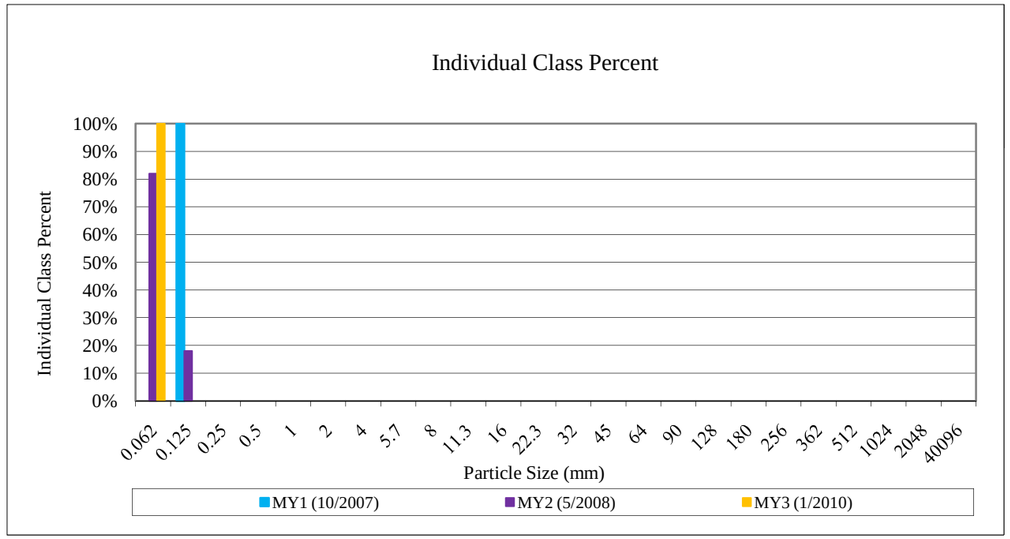




Project Name: Dula Thoroughfare-Main Channel					
Cross-Section: 3					
Feature: Pool					
			MY3-1/2010		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	100	100%	100%
Sand	very fine sand	0.125	0	0%	0%
	fine sand	0.250	0	0%	0%
	medium sand	0.50	0	0%	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%

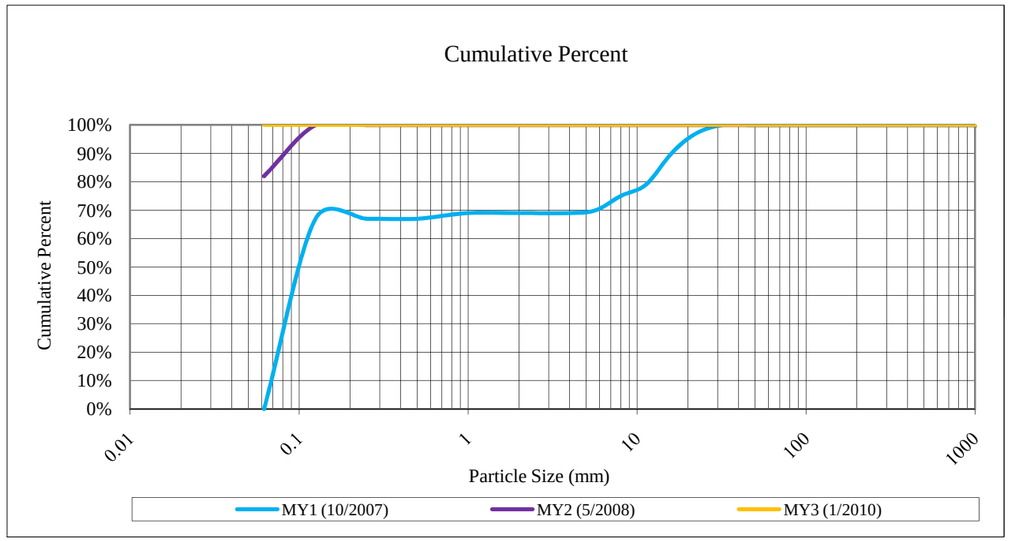
Summary Data	
D50	0.03
D84	0.05
D95	0.06

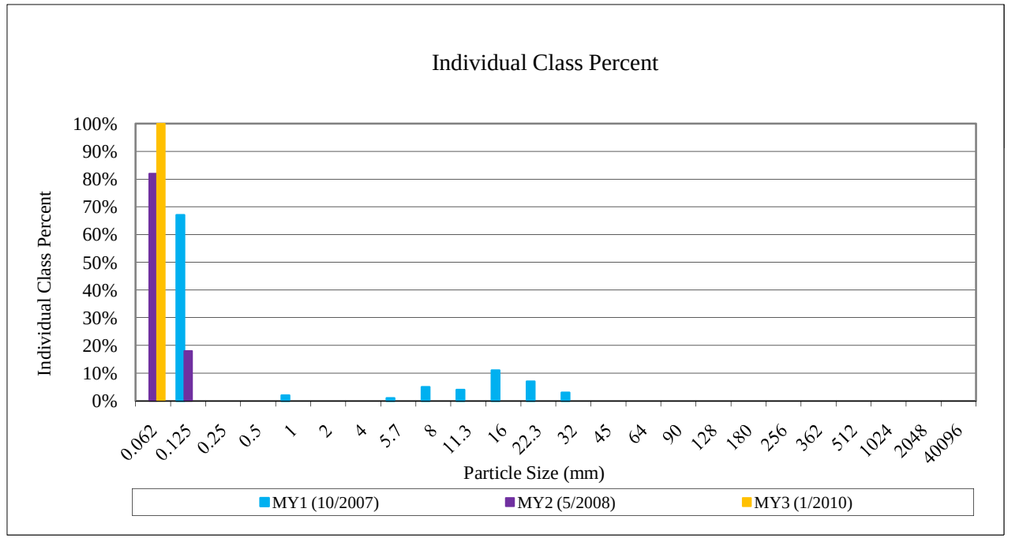




Project Name: Dula Thoroughfare-Tributary					
Cross-Section: 4					
Feature: Run					
			MY3-1/2010		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	100	100%	100%
Sand	very fine sand	0.125	0	0%	0%
	fine sand	0.250	0	0%	0%
	medium sand	0.50	0	0%	0%
	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



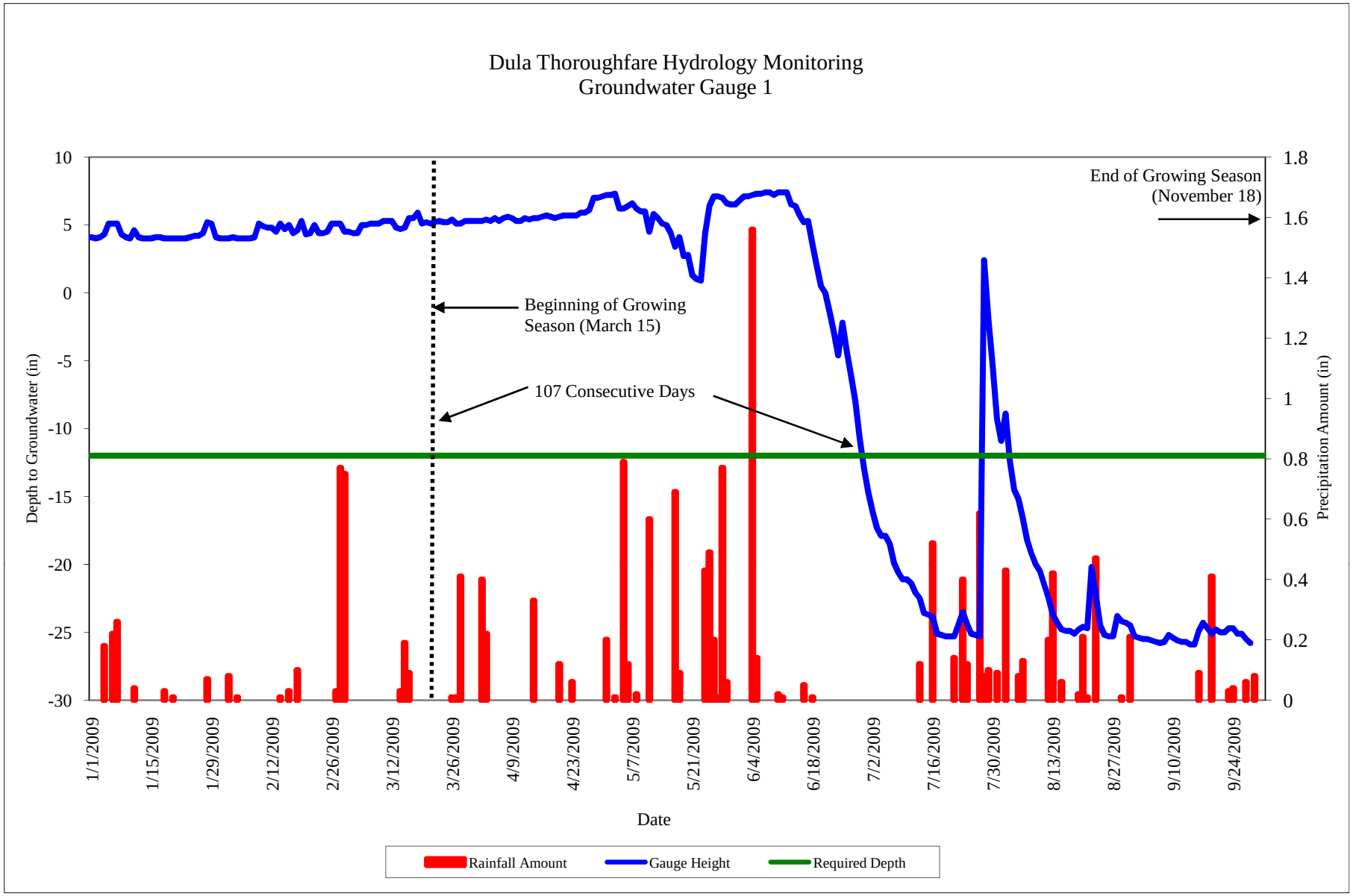


APPENDIX 5
WETLAND DATA ASSESSMENT

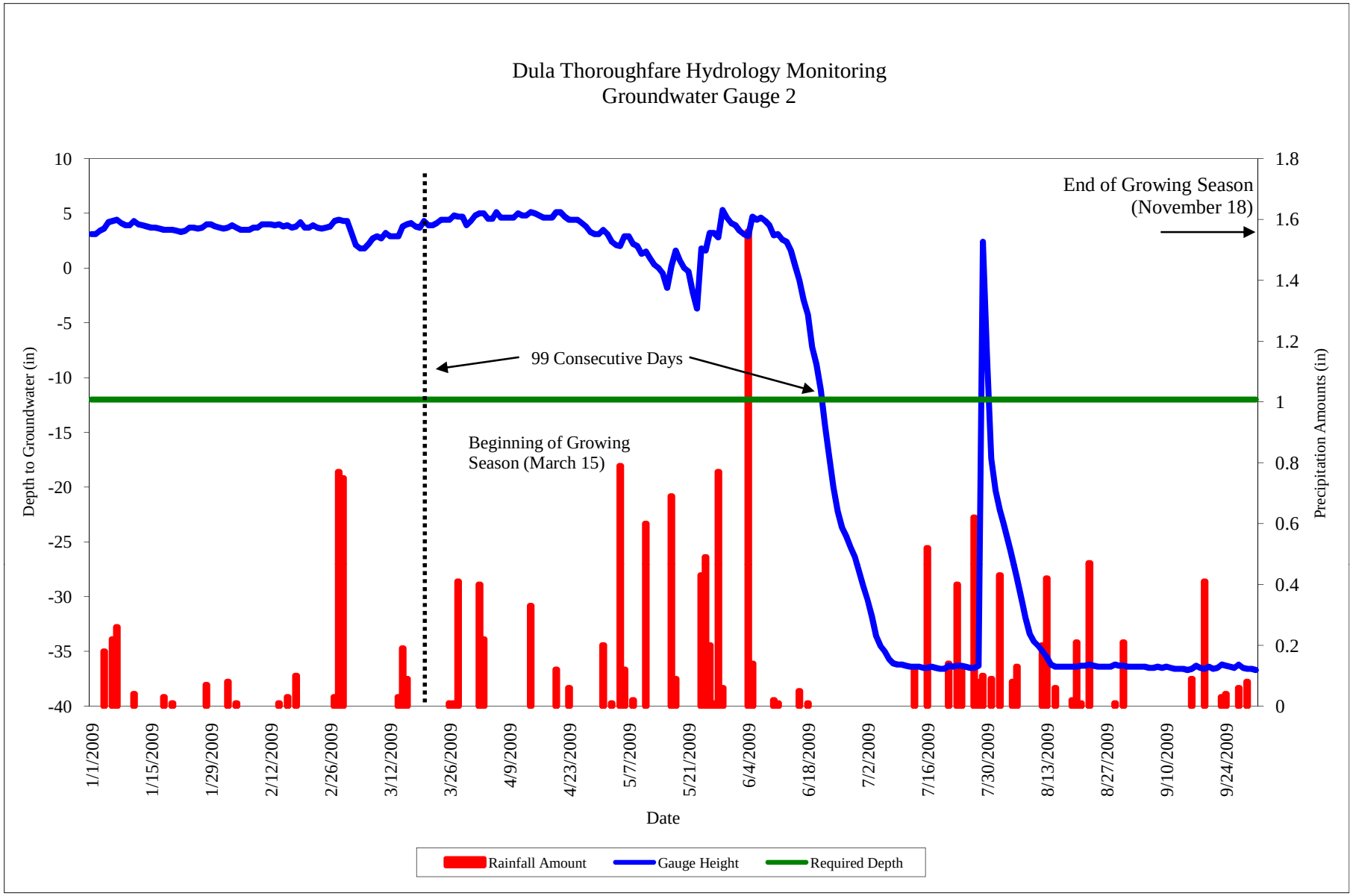
1. Precipitation – Water Level Plots for Gauges*

2. Wetland Criteria Attainment

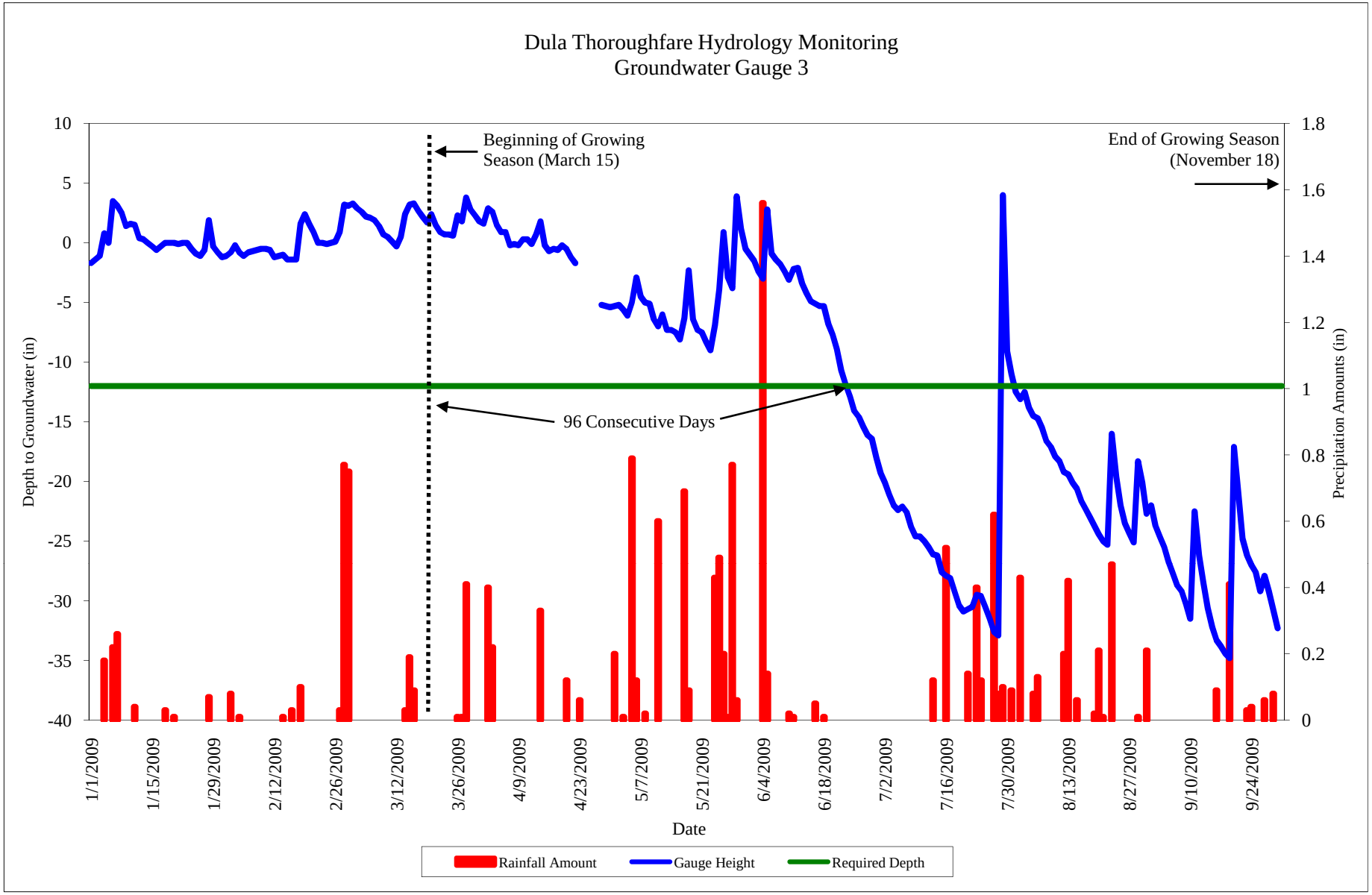
*Raw data tables have been provided electronically.



Appendix 5.1 Precipitation - Water Level Plots for Gauges
Dula Thoroughfare Stream and Wetland Restoration
Year 3 of 5



Appendix 5.1 Precipitation - Water Level Plots for Gauges
Dula Thoroughfare Stream and Wetland Restoration
Year 3 of 5



Appendix 5.1 Precipitation - Water Level Plots for Gauges
Dula Thoroughfare Stream and Wetland Restoration
Year 3 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 (76%)	Yes/117 Days (57%)^		
GW2	Yes/41 Days (16%)**	Yes/69 Days (49%)	Yes/99 Days (44%)		
GW3	Yes/42 Days (17%)**	Yes/80 Days (70%)	Yes/96 Days (43%)		

*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