

Back Creek Stream and Wetland Restoration

Project No. 17

2006 Monitoring Report: Year 1 of 5



March 2007

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EXECUTIVE SUMMARY

Executive Summary

The Back Creek Site is located in Mecklenburg County, North Carolina and is a mitigation project for the North Carolina Department of Transportation. The following goals were established for the Back Creek stream and wetland restoration project:

1. Restore approximately 3,525 linear feet of Back Creek,
2. Restore approximately 827 linear feet of secondary tributary to Back Creek,
3. Restore approximately 1.5 acres of jurisdictional wetland, enhance approximately 1.8 acres of jurisdictional wetland, and create approximately 0.5 acres of open water/freshwater marsh adjacent to on-site channels, and
4. Reforest approximately 17.5 acres of floodprone area and adjacent upland slopes with native forest species.

The project reach of Back Creek was restored by relocating approximately 1,300 linear feet of the existing channel (Restoration, Priority 1) and restoring in-place approximately 2,000 linear feet (Enhancement Level 1, Priority 2/3) where relocation was not feasible. Two unnamed tributaries to Back Creek were restored by relocating approximately 775 linear feet of their existing channels (Restoration, Priority 1) and adding stabilization structures. Back Creek's riparian areas were planted to improve habitat and stabilize stream banks. This report serves as the 1st year of the 5 year monitoring plan for the Back Creek stream restoration site.

Results from the 2006 monitoring effort indicate that Back Creek and the two unnamed tributaries are maintaining stability and holding grade. The pattern, profile, and dimension of the restored main channel and tributaries appear stable. There were a few problem areas observed that included moderate bank erosion, moderate to poor stream bank cover, and loose matting. It is recommended that the section with poor stream bank cover should be stabilized with matting and vegetation as soon as possible to prevent future problems.

Two or the four vegetation monitoring plots for planted woody vegetation have low survival rates; however, these areas are developing into wetlands. Within the plots, a heavy ground cover of emergent wetland plants has developed. Success criteria for planted woody vegetation is 320 stems per acre in years 1 through 3. Monitoring during 2006 (year 1) has determined an average of 320 stems per acre of planted species, which satisfies the vegetation success criteria for year 1.

There were no problems areas observed within the wetland restoration zones for the Back Creek restoration project. All gauges on site achieved wetland success criteria of soil saturation within the upper 12 inches for 29 consecutive days (12.5% of growing season) during the growing season.

Overall, the Back Creek restoration site appears to be stable and has met mitigation goals for monitoring year 1.

SECTION I
Project Background

SECTION I

Project Background

The background information provided in this report is referenced from the mitigation plan prepared by EcoScience, Inc.

1. Location and Setting

The Back Creek Site is a mitigation project for the North Carolina Department of Transportation (NCDOT); however, the North Carolina Ecosystem Enhancement Program (NCEEP) is overseeing monitoring of the project. The site is located approximately five miles northeast of the City of Charlotte in Mecklenburg County, North Carolina. The site is east of Back Creek Church Road and southwest of the intersection of State Route 49 and Interstate 485 (Figure I). The restoration site is located within the Piedmont eco-region and in the Yadkin-Peedee River Basin (USGS Subbasin HUC 03040105).

To access the site from Interstate 85, take Exit 48 (I-485S), follow to Exit 33 (Highway 49), and turn right onto Highway 49. Next, turn left onto Back Creek Church Road, and continue until the intersection with Back Creek. The restoration project is located downstream from Back Creek Church Road.

2. Mitigation Structure and Objectives

Historically, the site was utilized for livestock grazing and agricultural hay production. Currently, the site is dominated by fallow, successional fields and a few stands of isolated hardwood forests. Sewer line construction and past landuse are the apparent causes of stream instability due to dredging and straightening of the upstream reach. A prior stabilization attempt included using rip-rap on the channel banks. Urban development in the watershed has also contributed to the instability of Back Creek.

The following goals were established for the Back Creek stream and wetland restoration project:

1. Restore approximately 3,525 linear feet of Back Creek,
2. Restore approximately 827 linear feet of secondary tributary to Back Creek,
3. Restore approximately 1.5 acres of jurisdictional wetland, enhance approximately 1.8 acres of jurisdictional wetland, and create approximately 0.5 acres of open water/freshwater marsh adjacent to on-site channels, and
4. Reforest approximately 17.5 acres of floodprone area and adjacent upland slopes with native forest species.

The stream and its tributaries were restored by relocating the existing channel (Restoration, Priority 1) and restoring in-place (Enhancement Level 1, Priority 2/3) where relocation was not feasible. Back Creek and the tributary to the southeast in the upstream portion of the site were designed and constructed as E-channels. The incoming tributary along the north side of Back

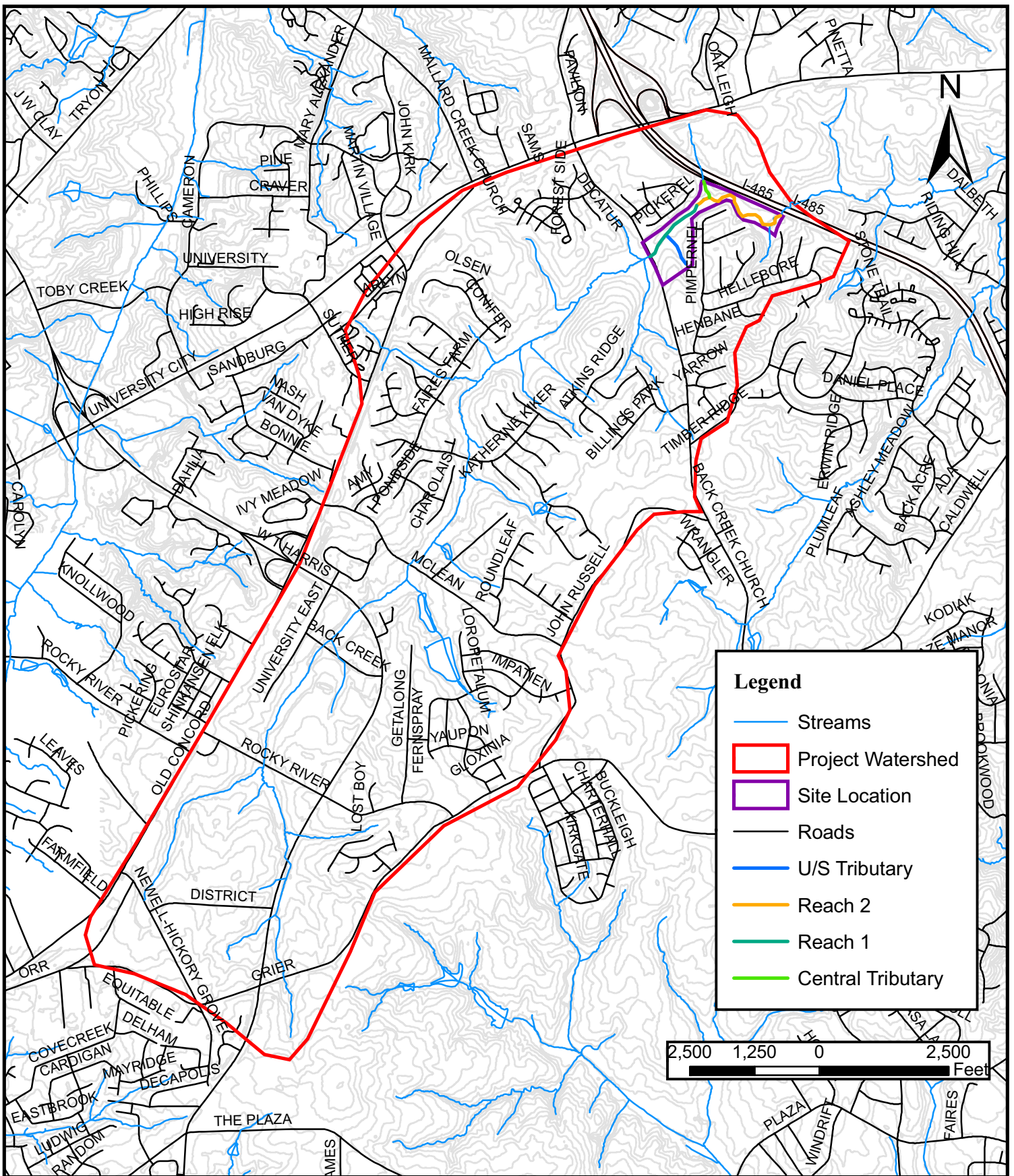


Figure I. Project Location and Watershed Map
 Back Creek Stream Restoration
 Mecklenburg County, NC
 Monitoring Report Year 1 of 5

Project # 17
 March 2007

Creek in the central portion of the site was designed and constructed as a B-channel. The project also included enhancing the associated riparian zone. According to the “Transfer of Back Creek Mitigation Site” letter from NCDOT to NCEEP dated March 15, 2006, the mitigation site consists of approximately 4,075 (proposed as 4,352) linear feet of restored stream including restoring approximately 3,300 (proposed as 3,525) linear feet of Back Creek and restoring approximately 775 (proposed as 827) linear feet of tributaries to Back Creek. Also, per the previous referenced letter, the site contains 3.5 acres (proposed as 1.8) of wetland enhancement and 0.4 acres (proposed as 2.0) of wetland restoration. Construction of the restoration project was completed in December 2005, and tree planting was completed in February 2006.

The drawings provided by NCEEP indicate that 3,300 linear feet of Back Creek restoration/enhancement was implemented by relocating 1,300 linear feet and enhancing 2,000 linear feet of Back Creek in-place within a 17.5 acre plot of the site (Table I). The relocated reaches and the restored in-place reaches were restored/enhanced using vegetation and in-stream stabilization structures, such as cross-vanes. Bankfull benches were created along each reach to assist in the stabilization process. The restoration of 775 linear feet of two tributaries was also performed. The upstream tributary was designed and constructed as an E-channel and in-stream stabilization structures were installed. The central tributary was designed and constructed as a B-channel and step-pool structures were installed. Riparian areas were planted with native bare root seedlings and herbaceous cover to enhance the riparian areas and stabilize stream banks.

Table I
Project Mitigation Structure and Objectives

Back Creek/Project No. 17					
Segment/Reach	Mitigation Type	Approach	Linear Footage or Acres	Stationing (ft)	Comments
Back Creek/Reach 1	R	P1	1,300 lf	0+00-13+00	Channel restoration, relocation with use of grade control and bank protection structures.
Back Creek/Reach 2	EI	P2/3	2,000 lf	13+00-33+00	Channel restoration, in-place with use of grade control and bank protection structures.
Upstream Tributary	R	P1	400 lf	0+00 - 4+00	Channel restoration, relocation with use of grade control and bank protection structures.
Central Tributary	R	P1	375 lf	0+00 - 3+75	Channel restoration, relocation with use of grade control and bank protection structures.
Wetland Areas	R	-	0.4 ac	-	Restoration of wetlands.
Wetland Area	E	-	3.5 ac	-	Enhancement of jurisdictional wetland.

3. Project History and Background

The stream enhancement/restoration plan was designed by EcoScience Corporation and constructed by Shamrock Environmental. Construction activities were completed in December 2005. The first annual monitoring activities were conducted in the spring of 2006. This report serves as the 1st year of the 5 year monitoring plan for the Back Creek project. Tables II and III provide detailed project activity, history and contact information for this project. Table IV provides more in-depth watershed/site background for the project.

Table II
Project Activity and Reporting History

Back Creek/Project No. 17			
Activity or Report	Scheduled Completion	Data Collection Completed	Actual Completion or Delivery
Restoration Plan	Unknown	NA	January 2003
Final Design-90%	Unknown	NA	NA
Construction	Unknown	NA	December 2005
Temporary S&E mix applied to entire project area	Unknown	NA	2005
Permanent seed mix applied to reach	Unknown	NA	NA
Containerized and B&B plantings for reach	Unknown	NA	February 2006
Mitigation Plan/ As-Built (Year 0 Monitoring)	Unknown	Unknown	Unknown
Year 1 Monitoring	December 2006	November 2006	November 2006
Year 2 Monitoring	2007	2007	2007
Year 3 Monitoring	2008	2008	2008
Year 4 Monitoring	2009	2009	2009
Year 5 Monitoring	2010	2010	2010

**Table III
Project Contacts**

Back Creek/Project No. 17	
Designer	EcoScience Corporation 1101 Haynes Street, Suite 101 Raleigh, NC 27604
Construction	Shamrock Environmental Corporation 503 Patton Avenue Greensboro, NC 27406
Planting Contractor	Henry Rosso
Seeding Contractor	Shamrock Environmental Corporation 503 Patton Avenue Greensboro, NC 27406
Monitoring Performers	Jordan, Jones, and Gouilding, Inc. 9101 Southern Pine Blvd., Suite 160 Charlotte, NC 28273
Stream Monitoring, POC	Dan Rice, 678-333-0457
Vegetation Monitoring, POC	Dan Rice, 678-333-0457

**Table IV
Project Background**

Back Creek/Project No. 17	
Main Reach	
Project County	Mecklenburg County, North Carolina
Drainage Area – Main Reach	4.1 sq. mi
Upstream Tributary	0.1 sq. mi
Central Tributary	0.04 sq. mi
Drainage impervious cover estimate	~20%
Stream Order – Main Reach	3rd
Upstream Tributary	1st
Central Tributary	1st
Physiographic Region	Piedmont
Ecoregion	Piedmont
Rosgen Classification of As-built – Main Reach	E4/5
Upstream Tributary	E4/5
Central Tributary	B
Cowardin Classification	N/A
Dominant soil types	Monacan, Enon, Wilkes
Reference site ID	UT to Crane Creek UT to Reedy Creek UT to Dutch Buffalo Creek
USGS HUC for Project and Reference – Back Creek	03040105
NCDWQ Sub-basin for Project and Reference	CTB31
NCDWQ classification for Project and Reference	WS-II, HQW,C
Any portion of any project segment 303d list?	No
Any portion of any project segment upstream of a 303d listed segment?	No
Reason for 303d listing or stressor?	N/A
% of project easement fenced?	100%

4. Monitoring Plan View

The monitoring plan view map (Figure II) illustrates the location of the longitudinal profile stations, cross-section stations, vegetation plots, and photo points. A total of seven cross-sections were established within the main reach of Back Creek, and one cross-section was established within the upstream tributary. Approximately 3,300 linear feet of longitudinal profile were monitored. Four previously established vegetative plots in the riparian zone adjacent to Back Creek were identified and monitored. Photographs were taken upstream and downstream at each cross-section and at photo points that were established during the 2006 monitoring effort. No problems occurred that inhibited accurate data assessment.



Aerial Photo Source: Mecklenburg County Land Use and Environmental Services, March 2004



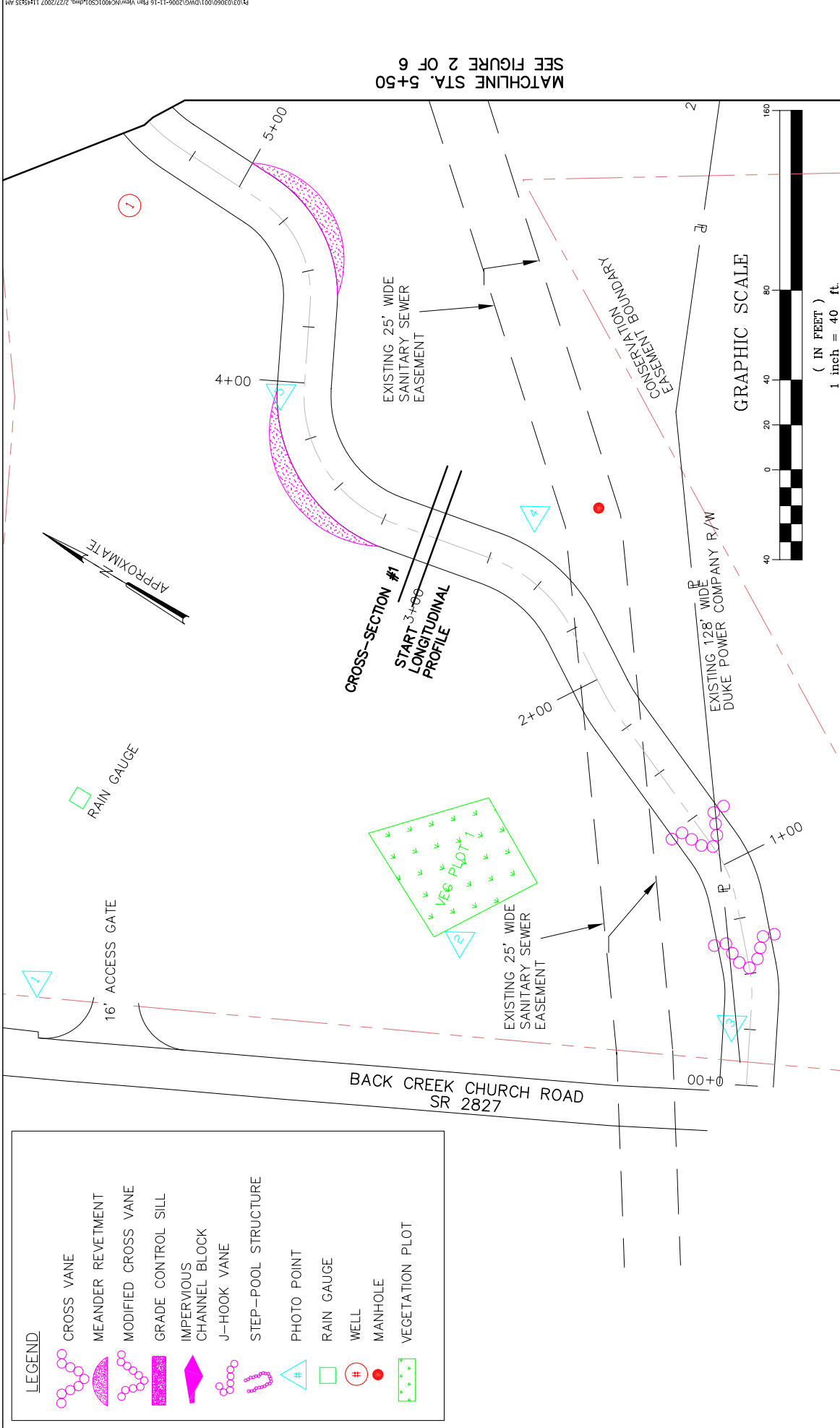
NOTES:
1. GENERAL SITE DATA PROVIDED BY NCEEP.
2. ALL LOCATIONS ARE APPROXIMATE.

PROJECT NO. 17
MECKLENBURG COUNTY
NORTH CAROLINA
MONITORING
YEAR 1 of 5



NC ECOSYSTEM ENHANCEMENT PROGRAM
BACK CREEK STREAM AND WETLAND RESTORATION
FIGURE II
MONITORING PLAN VIEW MAP

DATE : MARCH 2007
SCALE : 1"=200'
JOB NO.: 03060-001
FIGURE KEY



LEGEND

	CROSS VANE
	MEANDER REVETMENT
	MODIFIED CROSS VANE
	GRADE CONTROL SILL
	IMPERVIOUS CHANNEL BLOCK
	J-HOOK VANE
	STEP-POOL STRUCTURE
	PHOTO POINT
	RAIN GAUGE
	WELL
	MANHOLE
	VEGETATION PLOT

NOTES:
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PROJECT NO. 17
 MECKLENBURG COUNTY
 NORTH CAROLINA
 MONITORING
 YEAR 1 of 5

JORDAN JONES & GOULDING

NC ECOSYSTEM ENHANCEMENT PROGRAM
 BACK CREEK STREAM AND WETLAND RESTORATION

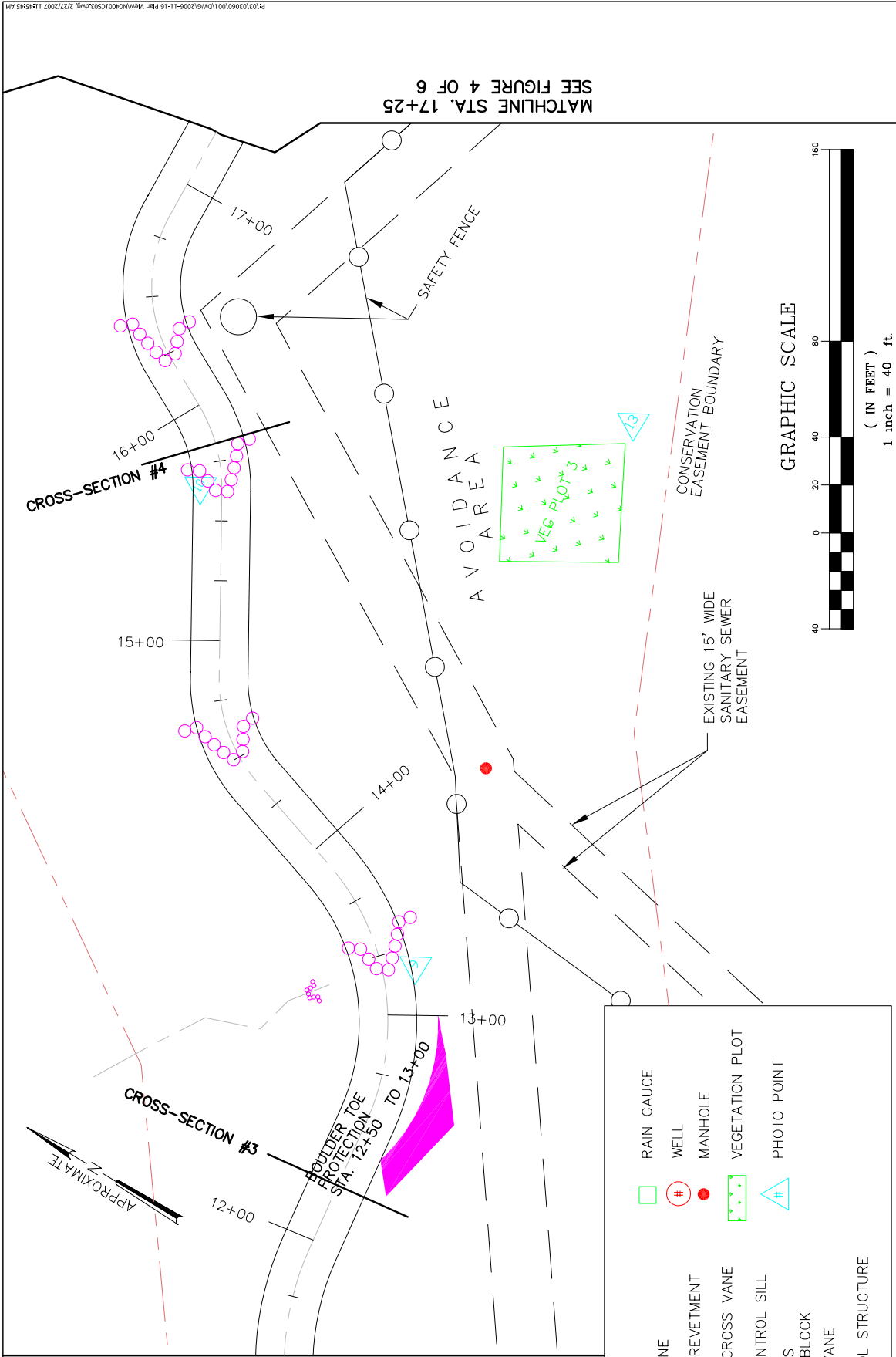
DATE : MARCH 2007
 SCALE : 1"=40'
 JOB NO.: 03060-001

MONITORING PLAN VIEW MAP
 FIGURE II

FIGURE 1 OF 6

Ecosystem Enhancement
 PROGRAM

SEE FIGURE 2 OF 6



DATE : MARCH 2007
 SCALE : 1"=40'
 JOB NO.: 03060-001

NC ECOSYSTEM ENHANCEMENT PROGRAM
 BACK CREEK STREAM AND WETLAND RESTORATION
 FIGURE II



PROJECT NO. 17
 MECKLENBURG COUNTY
 NORTH CAROLINA
 MONITORING
 YEAR 1 of 5

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



FIGURE 3 OF 6

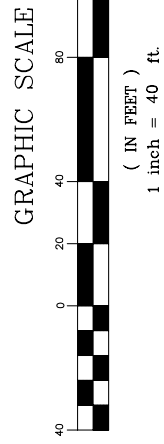
MONITORING PLAN VIEW MAP

JORDAN JONES & GOULDING

MECKLENBURG COUNTY
 NORTH CAROLINA
 MONITORING
 YEAR 1 of 5

GENERAL SITE DATA PROVIDED BY NCEEP.
 ALL LOCATIONS ARE APPROXIMATE.

Ecosystem Enhancement Program

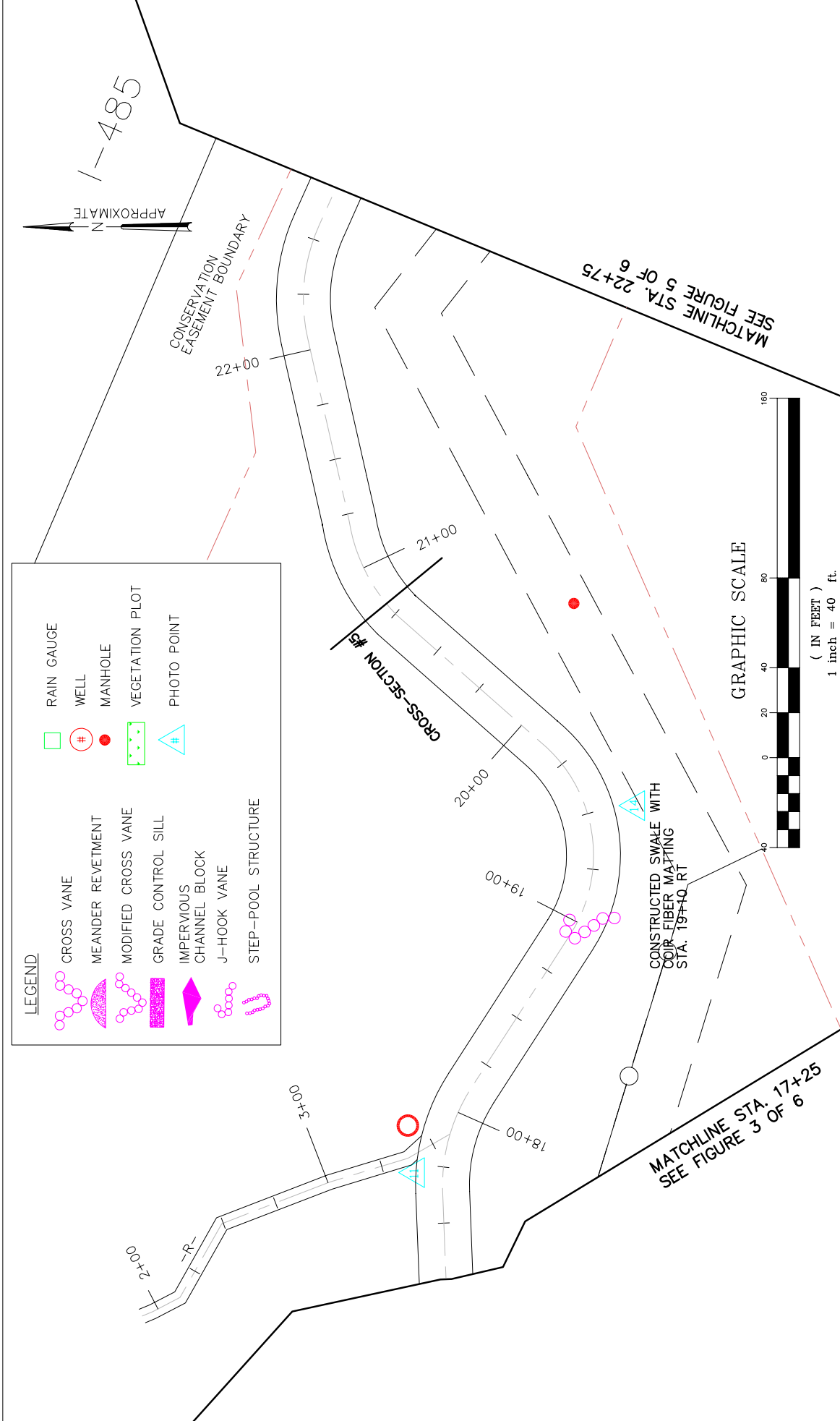


LEGEND

	CROSS VANE		RAIN GAUGE
	MEANDER REVETMENT		WELL
	MODIFIED CROSS VANE		MANHOLE
	GRADE CONTROL SILL		VEGETATION PLOT
	IMPERVIOUS CHANNEL BLOCK		PHOTO POINT
	J-HOOK VANE		
	STEP-POOL STRUCTURE		

SEE FIGURE 4 OF 6
 MATCHLINE STA. 17+25

MATCHLINE STA. 11+50
 SEE FIGURE 2 OF 6



DATE : MARCH 2007
 SCALE : 1"=40'
 JOB NO.: 03060-001
 FIGURE 4 OF 6

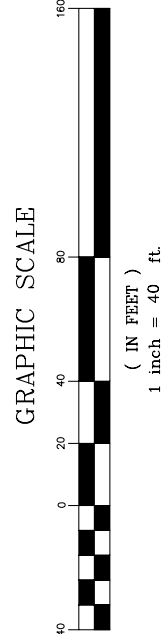
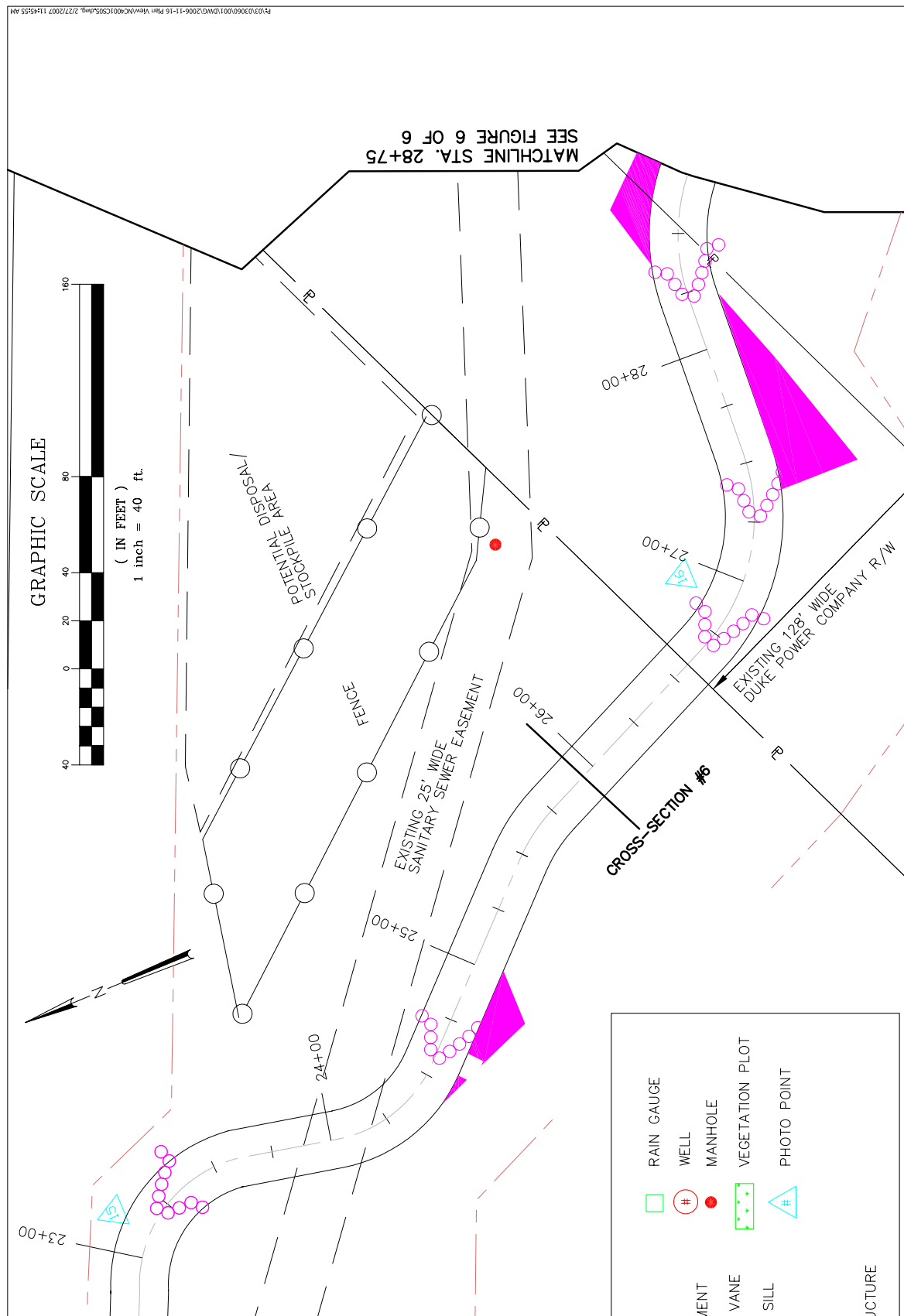
NC ECOSYSTEM ENHANCEMENT PROGRAM
 BACK CREEK STREAM AND WETLAND RESTORATION
 FIGURE II
 MONITORING PLAN VIEW MAP



PROJECT NO. 17
 MECKLENBURG COUNTY
 NORTH CAROLINA
 MONITORING
 YEAR 1 of 5

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





MATCHLINE STA. 22+75
SEE FIGURE 4 OF 6

MATCHLINE STA. 28+75
SEE FIGURE 6 OF 6

LEGEND	
	RAIN GAUGE
	WELL
	MANHOLE
	VEGETATION PLOT
	PHOTO POINT
	CROSS VANE
	MEANDER REVETMENT
	MODIFIED CROSS VANE
	GRADE CONTROL SILL
	IMPERVIOUS CHANNEL BLOCK
	J-HOOK VANE
	STEP-POOL STRUCTURE

NOTES:
1. GENERAL SITE DATA PROVIDED BY NCEEP.
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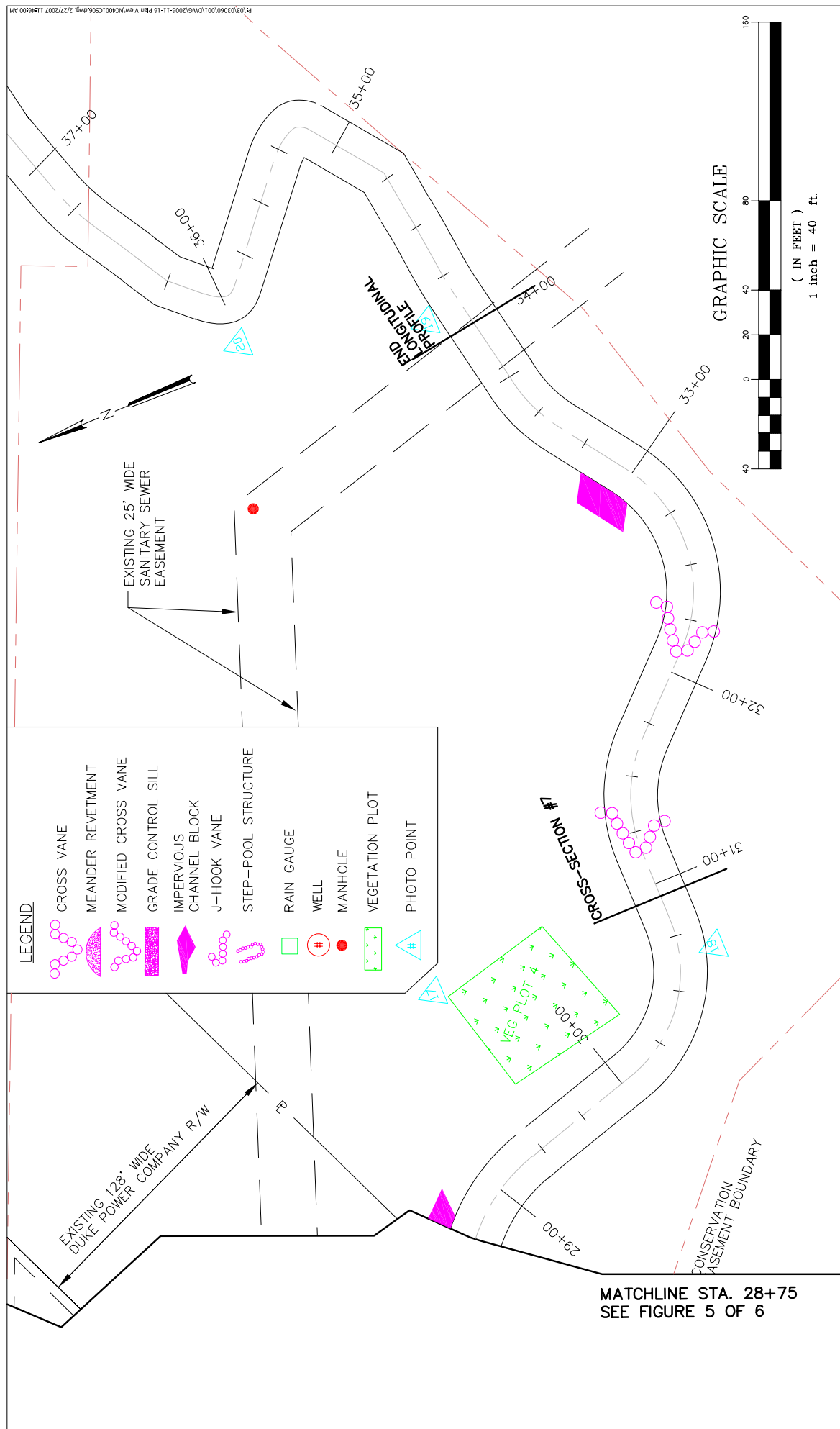


PROJECT NO. 17
MECKLENBURG COUNTY
NORTH CAROLINA
MONITORING
YEAR 1 of 5



NC ECOSYSTEM ENHANCEMENT PROGRAM
BACK CREEK STREAM AND WETLAND RESTORATION
FIGURE II
MONITORING PLAN VIEW MAP

DATE : MARCH 2007
SCALE : 1"=40'
JOB NO.: 03060-001
FIGURE 5 OF 6



MATCHLINE STA. 28+75
SEE FIGURE 5 OF 6



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PROJECT NO. 17
MECKLENBURG COUNTY
NORTH CAROLINA
MONITORING
YEAR 1 of 5



NC ECOSYSTEM ENHANCEMENT PROGRAM
BACK CREEK STREAM AND WETLAND RESTORATION
FIGURE II
MONITORING PLAN VIEW MAP

DATE : MARCH 2007
SCALE : 1"=40'
JOB NO.: 03060-001
FIGURE 6 OF 6

SECTION II
Project Condition and Monitoring Results

SECTION II

Project Condition and Monitoring Results

The following monitoring results are from the 2006 (year 1 of 5) survey conducted in May and September, 2006.

A. Vegetative Assessment

1. Soil Data

Back Creek is situated within an agricultural valley in the inner Piedmont Belt of the North Carolina Piedmont Physiographic Province. Researchable data indicates that the soils within the project area are those found in alluvial landforms in this physiographic region; however, grading and filling activities during construction likely have disturbed the parent soil material.

Review of the *Soil Survey of Mecklenburg County, North Carolina* indicates that three soil series are found within the project limits. These soil series consist of Monacan, Enon, and Wilkes (Figure III). Monacan soils are very deep, well-drained to somewhat poorly drained soils found along stream corridors. These soils are formed in recent alluvium sediments of the Piedmont and Coastal Plain. Slopes are generally less than 2 percent. Enon soils are very deep, well-drained soils on ridges and side slopes of the Piedmont uplands. The soils are formed in clayey residuum weathered from mafic or intermediate igneous and metamorphic rocks such as diorite, gabbro, gneiss, and schist of the Piedmont uplands. Slopes range from 2 to 15 percent for the Enon series. Wilkes soils are shallow, well-drained soils adjacent to drainageways. They are formed in residuum weathered from intermediate and mafic crystalline rocks on the Piedmont uplands. Slopes range from 15 to 25 percent for the Wilkes series. Please refer to Table V for descriptions of the soil series within the project area.

Table V
Preliminary Soil Data

Series	Max Depth (in)	% Clay on Surface	K Factor	T Factor	OM %
Enon	72	5-20	0.24	5	0.0 – 2.0
Monacan	80	7-27	0.43	5	0.0 – 3.0
Wilkes	48	5-20	0.24	2	0.0 – 2.0

2. Vegetative Problem Areas

During the initial vegetative survey conducted May 2006 and the follow-up assessment conducted in September 2006, it was noted that some areas of the stream banks have suffered localized loss of vegetative cover. In these areas, flood events likely caused bank erosion resulting in a loss of bank vegetation. Furthermore, the compaction of soil and nutrient poor conditions may also be contributing to the mortality of live stakes and herbaceous cover in these

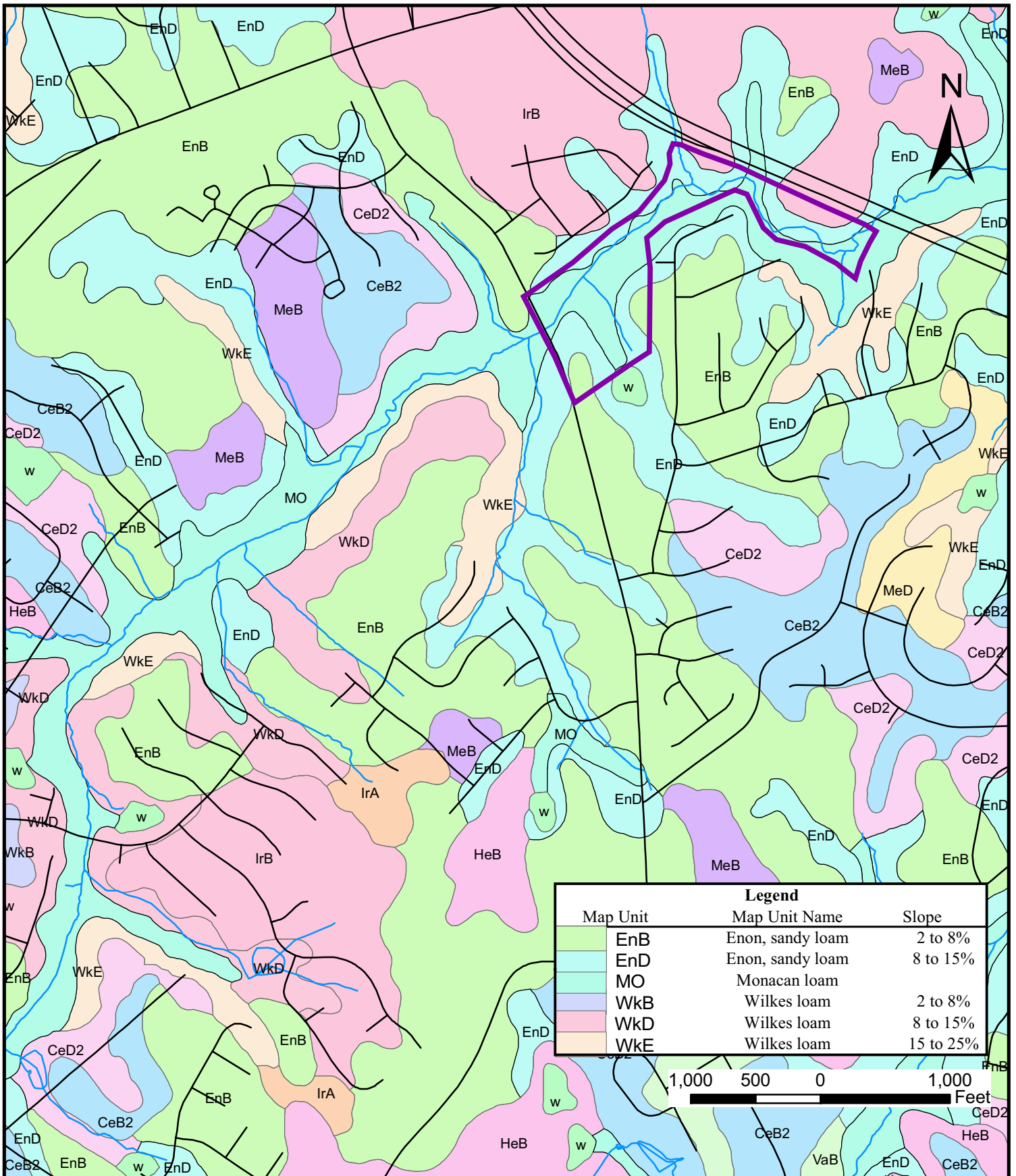


Figure III. SOIL MAP
 Back Creek Stream Restoration
 Mecklenburg County, NC
 Monitoring Report Year 1 of 5

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 March 2007

areas. Please refer to Table VI for a summary of the Vegetative Problem Areas on the Back Creek restoration site. Representative photographs of the problem areas are located in Appendix A2.

Table VI
Vegetative Problem Areas

Feature Issue	Station Numbers	Probable Cause	Photo #
Bank erosion - moderate	3+05 - 3+20	Flood event	A2 - 1
	12+60 - 12+75	Flood event	
	14+70 - 15+20	Flood event	
Loose matting	14+55	Flood event	A2 - 2
Stream bank cover - moderate	4+30 - 4+50	Flood event	A2 - 3
Stream bank cover - poor	35+00-35+50	Flood event	
Mortality rate is 46% in Vegetation Monitoring Plots	All Plots	Saplings appear to be not rooting due to shallow planting depth, soil compaction, or nutrient poor soil conditions	A2 - 4

3. Vegetative Problem Area Plan View

Please refer to Appendix B1 for locations of vegetative problems onsite.

4. Stem Counts

The vegetative assessment and vegetative plot analysis were conducted in May and September 2006. The four previously established vegetative plots within the riparian buffer zone were located and monitored. The planted vegetative community goal for these plots is to establish a Piedmont floodplain forest. Success goals for vegetation are established in the January 2003 mitigation plan prepared by EcoScience. Success criteria are:

- 320 stems per acre years 1 through 3
- 290 stems per acre year 4
- 260 stems per acre year 5

Up to 10-percent of the stems per acre can include naturally recruited “character species.” Character species are represented by those tree species that were planted on site.

Trees planted within the monitored plots include swamp chestnut oak (*Quercus michauxii*), river birch (*Betula nigra*), American sycamore (*Platanus occidentalis*), green ash (*Fraxinus pennsylvanica*), and American elm (*Ulmus americana*). In addition, natural recruitment vegetation was also monitored within these plots. Naturally recruited species encountered were sweet gum (*Liquidambar styraciflua*) and red maple (*Acer rubrum*).

The survival rate for the planted woody vegetation monitored for 2006 is 54%. The monitoring data indicates an average of 16 stems per plot. Using an average of 16 stems per plot and a plot

Project Conditioning and Monitoring Results

size of 0.05 acre, the average stem density for the site is 320 stems per acre. The monitoring data indicates an average of 3 volunteer stems per plot; however, none of the documented natural recruits were character species. Raw vegetation monitoring data is shown in Appendix A1.

Per the success criterion for year 1, the site has met the goal number of stems per acre.

Table VII
Stem Counts for Planted Species Arranged by Plot
Year 1 of 5 (2006)

Planted Stems					
Species	Plot 1	Plot 2	Plot 3	Plot 4	Year 1 Totals
<i>Quercus michauxii</i>	3	3			6
<i>Fraxinus pennsylvanica</i>	4	8	11	5	28
<i>Platanus occidentalis</i>	2	5	8	1	16
<i>Betula nigra</i>	1	2	6	5	14
<i>Ulmus americana</i>	1				1
Unknown Dead	19	12	5	19	55
Total Live	11	18	25	11	65
Total Monitored	30	30	30	30	120
Percent of Planted Stems Alive	37%	60%	83%	37%	54%
Volunteer Stems					
Species	Plot 1	Plot 2	Plot 3	Plot 4	Year 1 Totals
<i>Liquidambar styraciflua</i>		9	3		12
<i>Acer rubrum</i>			2		2
Total Monitored	0	9	5	0	14

5. Vegetation Plot Photos

Please refer to Appendix A3 for photographs of the monitoring plots.

B. Stream Assessment

Stream dimension, pattern, profile and substrate were evaluated within 3,300 linear feet of the Back Creek stream restoration site. The two tributaries were also evaluated through visual assessment, and a cross-section was surveyed in the upstream tributary. Please refer to Table VIII for a summary of problem areas, Table IX for a summary of the visual assessment, Table X for hydrologic criteria, Table XI for the as-built morphology and hydraulic summary, Table XII for monitoring year 2006 morphology and hydraulic summary, and Appendix B for the problem area plan view map, stability assessment, stream photographs and raw data.

Project Conditioning and Monitoring Results

1. Problem Areas Plan View (Stream)

Please refer to Appendix B1 for problem areas plan view map.

2. Problem Areas Table Summary

Table VIII below provides categorical feature issues by station, the suspected cause and denotes a representative photo of the condition, which is located in Appendix B2.

**Table VIII
Stream Problem Areas
(Please refer to Appendix B2 for photos)**

Back Creek/Project No.17				
Feature Issue	Reach	Station Numbers	Suspected Cause	Photo ID
Bank erosion - moderate	Main	3+05 - 3+20	Eroding under matting - LB	1
	Main	12+60 - 12+75	Toe protection slightly undermined - TOB/RB	
	Main	14+70 - 15+20	Eroding under matting - LB	
Down Tree	Main	17+85	Down tree from stream bank - potential for debris jam	2
Lateral bar	Main	20+20 - 20+60	Overwidened channel - lateral bar forming - LB	3
Loose matting	Main	14+55	Stakes protruding causing loose matting	4
Stream bank cover - moderate	Main	4+30 - 4+50	Stream bank near waters edge needs matting/staking - RB	5
Stream bank cover - poor	Main	35+00 - 35+50	Bare bank needs coverage - RB	
Mortality rate approx. 50% in Vegetation Plots	Main	NA	Saplings appear to be not rooting due to shallow planting depth	N/A

TOB - top of bank LB - Left Bank facing downstream RB - right bank facing downstream

3. Numbered Issues Photo Section

Please refer to Appendix B2 for problem area photos.

4. Fixed Photo Station Photos

Please refer to Appendix B3 for stream photo station photos.

5. Stability Assessment

Drawings provided by NCEEP in preparation for the monitoring effort show cross-sections every 100 feet, but these appear to be design cross-sections rather than detailed as-built cross-sections. Where possible, monitoring survey data was compared to the design; however, as-built information was not available for comparison.

Back Creek - The majority of current project conditions reflect information in the provided drawings and mitigation plan. The pattern, profile, and dimension of the restored main channel appear stable. There were a few problem areas noted. Please refer to Table VIII above, Appendix B, and below for more detailed information.

- There are a few areas of moderate erosion under the stream bank matting. However, once vegetation is established, these areas may be less noticeable and will likely not result in instability. If possible, these areas should be stabilized with riparian vegetation.
- Since completion of construction, one medium-sized cedar tree has fallen into the stream below the convergence of the tributary that was restored as a B-channel. Over time, this tree will likely catch debris.
- One area of bare bank was observed at the downstream end of the project. Access may have prevented completion of matting in this area.

Seven cross-sections (4 riffle and 3 pool) were surveyed within the main reach of Back Creek. Since this was the initial year in the monitoring effort for the Back Creek site and pre-existing cross-sections were not previously established, JJG identified and recommended permanent cross-section locations for NCEEP review. Following NCEEP approval, the permanent cross-sections were established.

Several trends appear to be evident when comparing the design parameters with JJG's surveyed numbers. The average bankfull width (34.7 ft) of the surveyed cross-sections is higher than the proposed 22.4 ft, and the average surveyed mean bankfull depth is 1.9 ft compared to the proposed 2.5 ft. There could be several explanations for these differences; however, since a detailed as-built survey was not provided for comparison, sufficient data is not available at this time to explain the differences. The surveyed bankfull widths and depths lead to an average Width/Depth ratio of 18.7 which typifies a Rosgen C-type stream and not the proposed E-channel. The present stream dimension conditions in Back Creek appear to be stable.

JJG conducted a longitudinal profile along 3,100 linear feet of Back Creek. The thalweg profile appears to be stable, and was characterized by well-defined riffle and pool features. The average water surface slope and the average bankfull slope were very similar for the surveyed stretch, 0.0042 and 0.0043 respectively. The surveyed water surface slope was slightly steeper than the proposed 0.0034. As-built longitudinal profile data was not available, so there was no baseline information for JJG to compare against current data.

The reach appears to be maintaining stability with stable structures and minimal bank erosion. Please refer to Table VIII, IX, X, XI, XII and Appendix B for detailed stream assessment problem area results.

Project Conditioning and Monitoring Results

Upstream Tributary – Based on current monitoring data and the visual inspection, the channel seems to be functioning properly and maintaining stability. As stated in the discussion above, as-built survey information was not available to compare the current data with. There doesn't appear to be any erosion or structure failure occurring along this reach.

Central Tributary - A visual assessment of stability was performed for the central tributary. The tributary appears to be maintaining its proposed function as a B-type storm drain channel with no signs of active erosion or instability.

Table IX
Categorical Stream Feature Visual Stability Assessment
(Cells noted with a (-), data was not provided)

Back Creek/Project No. 17		
Main Reach		
Feature	As-Built (2005)	MY1 (2006)
A. Riffles	-	100%
B. Pools	-	99%
C. Thalweg	-	100%
D. Meanders	-	91%
E. Bed General	-	99%
F. Vanes/J Hooks, etc	-	100%
G. Wads and Boulders	-	N/A
H. Bank Performance	-	98%

6. Quantitative Measures Tables

Tables X and XI display morphological summary data for baseline conditions and from the monitoring year. Survey data can be found in Appendix B.

7. Hydrologic Criteria

The Back Creek project site did not have a crest gauge located on it; therefore visual assessments were used for bankfull verification. A bankfull event was verified by visual observation on September 13, 2006. Stream flow was observed to be out of the stream banks beyond the bankfull elevation. This flow event corresponds with a peak rainfall event of 1.6 inches.

Table X. Verification of Bankfull Events

Back Creek Stream Restoration Project/Project No. 17			
Date of Collection	Date of Occurrence	Method	Photo # (if available)
Summer/Fall 2006	September 13, 2006	Visual Assessment	N/A

Project Conditioning and Monitoring Results

Table XI

Baseline Morphology and Hydraulic Summary
Back Creek/Project No. 17

(USGS Gage Data and Regional Curve Intervals were not provided)

	Upstream Straightened						Existing Channel						Reference Stream						Design						As-Built*					
	Upstream Straightened			Downstream Sinuous C			Downstream Sinuous E			UT to Crane Creek			Back Creek			Back Creek			Back Creek			Back Creek			Back Creek					
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean						
Bankfull Width (ft)	16.7	21.9	19.0	29.5	36.0	32.2	114.0	293.0	179.0	227.7	227.0	232.0	345.0	237.0	230.0	21.2	23.7	22.4	114.0	297.0	230.0	114.0	297.0	230.0						
Floodprone Width (ft)	235.0	290.0	253.0	114.0	293.0	179.0	-	-	-	227.7	227.0	232.0	345.0	237.0	230.0	21.2	23.7	22.4	114.0	297.0	230.0	114.0	297.0	230.0						
Bankfull Cross-sectional Area	54.0			56.2			55.7			20.5			20.5			56.0			56.0			56.0			56.0					
Bankfull Mean Depth	2.2	3.4	2.9	1.6	1.9	1.8	-	-	-	2.5	2.5	1.9	2.1	2.0	2.0	2.4	2.6	2.5	2.4	2.6	2.5	2.4	2.6	2.5						
Bankfull Max Depth	4.0	4.7	4.4	3.0	3.6	3.3	-	-	-	3.8	3.8	2.5	2.9	2.6	2.6	2.8	3.8	3.3	2.8	3.8	3.3	2.8	3.8	3.3						
Bank Height Ratio	1.0	1.0	1.0	1.1	1.5	1.2	1.4	1.4	1.4	1.4	1.4	1.1	1.2	1.2	1.2	1.0	1.2	1.0	1.0	1.2	1.0	1.0	1.2	1.0						
Width/Depth Ratio	5.0	10.0	7.0	16.0	23.0	19.0	-	-	-	9.0	9.0	5.0	6.0	5.0	5.0	8.0	10.0	9.0	8.0	10.0	9.0	8.0	10.0	9.0						
Entrenchment Ratio	13.0	14.0	13.3	4.0	10.0	6.0	-	-	-	13.0	13.0	20.0	34.5	25.0	25.0	5.1	13.3	10.3	5.1	13.3	10.3	5.1	13.3	10.3						
Wetted Perimeter (ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
Hydraulic Radius (ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
PATTERN																														
Channel Belwidth (ft)	41.0			199.0			41.0			199.0			74.3			101.3			86.1			25.0			140.0			57.0		
Radius of Curvature (ft)	23.0			135.0			23.0			135.0			18.6			30.4			25.3			43.0			100.0			58.0		
Meander Wave Length (ft)	129.0			608.0			129.0			608.0			61.0			115.0			73.0			166.0			347.0			220.0		
Meander Width Ratio	1.3			6.2			1.8			8.8			7.4			10.0			8.5			1.1			6.3			2.5		
PROFILE																														
Rifle Length (ft)																														
Rifle Slope (ft/ft)																														
Pool Length (ft)																														
Pool to Pool Spacing (ft)																														
SUBSTRATE																														
D50 (mm)	0.7			0.6			19.8			19.8			1.9			2.0			2.0			2.0			2.0			2.0		
D84 (mm)	10.0			32.0			55.0			55.0			12.0			34.0			34.0			34.0			34.0			34.0		
ADDITIONAL REACH PARAMETERS																														
Valley Length (ft)																														
Channel Length (ft)																														
Sinuosity																														
Water Surface Slope (ft/ft)																														
Bankfull Slope (ft/ft)																														
Rosen Classification																														
	E5			C5			E4			E4			E4/5			E4/5			E4/5			E4/5			E4/5			E4/5		

*To JJC's knowledge, a post construction as-built survey was not performed for Back Creek, therefore the as-built dimensions were assumed to be the same as the proposed dimensions from Ecoscience Inc.'s subgation plan.

Project Conditioning and Monitoring Results

Table XII
Morphology and Hydraulic Monitoring Summary
Back Creek/Project No. 17
Main Reach

DIMENSION	Cross-Section #1-Riffle	Cross-Section #2-Pool	Cross-Section #3-Riffle	Cross-Section #4-Pool	Cross-Section #5-Riffle	Cross-Section #6-Pool	Cross-Section #7-Riffle	Cross-Section #8-Riffle
	2006	2006	2006	2006	2006	2006	2006	2006
Bankfull Width (ft)	42.92	33.11	43.00	32.70	29.15	29.33	32.66	12.70
Floodprone Width (ft)	>100	N/A	>100	N/A	>100	N/A	>100	>100
Bankfull Cross-sectional Area	51.79	84.07	52.99	59.47	48.27	70.51	70.59	8.65
Bankfull Mean Depth	1.21	2.54	1.23	1.82	1.66	2.40	2.16	0.68
Bankfull Max Depth	3.00	5.31	3.03	3.15	2.94	5.01	3.36	1.33
Bank Height Ratio	1.00	1.19	1.00	1.00	1.00	1.00	1.16	1.26
Width/Depth Ratio	35.47	13.04	34.96	17.97	17.56	12.22	15.12	18.68
Entrenchment Ratio	>2.20	N/A	>2.20	N/A	>2.20	N/A	>2.20	>2.20
Wetted Perimeter (ft)	43.95	35.33	44.01	33.55	30.70	32.64	33.72	13.03
Hydraulic Radius (ft)	1.18	2.38	1.20	1.77	1.57	2.16	2.09	0.66
SUBSTRATE								
D50 (mm)	12.47	0.42	67.06	0.46	10.20	29.99	5.27	-
D84 (mm)	53.96	5.42	100.13	5.53	41.10	69.20	45.00	-
PATTERN								
	Min	Max	Med					
Channel Beltwidth (ft)	45	117	78					
Radius of Curvature (ft)	67	107	80					
Meander Wave Length (ft)	165	370	260					
Meander Width Ratio	1.30	3.37	2.25					
PROFILE								
Riffle Length (ft)	24	77	56					
Riffle Slope (ft/ft)	0.0001	0.0173	0.0063					
Pool Length (ft)	19	161	55					
Pool to Pool Spacing (ft)	21	208	122.5					
ADDITIONAL REACH								
PARAMETERS								
Valley Length (ft)	2,200							
Channel Length (ft)	3,300							
Sinuosity	1.5							
Water Surface Slope (ft/ft)	0.0042							
Bankfull Slope (ft/ft)	0.0043							
Rosgen Classification	C4							

C. Wetland Assessment

Three groundwater monitoring gauges and one rain gauge were installed during the construction phase of the Back Creek Restoration project. Two of these ground water gauges were installed in close proximity to Vegetation Plot 2. One gauge is located within an emergent wetland area adjacent to the stream. The monitoring gauges were downloaded monthly from March to November in order to capture hydrological data during the 2006 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.

The gauges are programmed to download ground water levels daily. In order to attain hydrologic success, ground water levels must be within 12-inches of the ground surface for 29 consecutive days, which is 12.5% of the March 22 to November 11 (235 days) growing season.

1. Problem Areas Plan View (Wetland)

There were no problems areas observed within the wetland restoration zones for the Back Creek restoration project. Within the wetland zones, hydrophytic vegetation and hydrology indicators have developed. In some areas, the appropriate soil chroma has also been met. It is suspected that these areas may have already presented hydric conditions. Hyrdophytic vegetation consists of a thick herbaceous layer of sedge species (*Carex* spp.), rush species (*Juncus* spp.), bulrush species (*Scirpus* spp.), spotted touch-me-not (*Impatiens capensis*), and smart weed species (*Polygonum* spp.). The planted woody stem species throughout the wetland areas are meeting the required success criteria; however, mortality of woody stems was observed. It is suspected that the mortality of planted stems may be subject to the planting technique or the soil conditions prior to planting. The general success of hydrology within the wetland restoration zones is adequate to meet success requirements. Surface inundation to ground saturation was observed throughout the site; therefore, an appropriate hydrological condition for the wetland zones appears to be present.

2. Wetland Criteria Attainment

All gauges on site achieved the wetland success criterion of soil saturation within the upper 12 inches for 29 consecutive days during the growing season. Please refer to Appendix C for the data tables and charts created from the ground water gauges and Table XIII for a summary of wetland hydrology success.

Project Conditioning and Monitoring Results

Table XIII
Wetland Criteria Attainment

GAUGE ID	GAUGE HYDROLOGY MET (Y/N)	VEGETATION PLOT ID	VEGETATION SURVIVAL THRESHOLD MET (Y/N)
BC-1 (000009BE9013)	Y	Plot 1	N
BC-2 (000009DE6C7E)	Y	Plot 2	Y
BC-3 (000009BEA425)	Y	Plot 3	Y
		Plot 4	N

SECTION III
Methodology

SECTION III

Methodology

Methods employed for the Back Creek Stream Restoration Project were a combination of those established in the post-construction monitoring plan from the EcoScience mitigation plan and standard regulatory guidance and procedures documents prepared by NCEEP.

APPENDIX A

Vegetation Raw Data*

- 1. Vegetation Survey Data Tables**
- 2. Vegetation Problem Area Photos**
- 3. Problem Monitoring Plot Photos**

*Raw data tables have been provided electronically.

Back Creek Vegetation Assessment, May 2006

Planted Stems					
Species	Plot 1	Plot 2	Plot 3	Plot 4	Totals
QM	3	3			6
FP	4	8	11	5	28
PO	2	5	8	1	16
BN	1	2	6	5	14
UA	1				1
Unknown Dead	19	12	5	19	55
Total	30	30	30	30	120
Percent Alive	37%	60%	83%	37%	54%
Volunteer Stems					
Species	Plot 1	Plot 2	Plot 3	Plot 4	Totals
LS		9	3		12
AR			2		2
Total		9	5	0	14

Prepared For:



Back Creek Stream Restoration
Year 1 of 5

Date: March 2007

Project No.: 17



Appendix A1. Vegetation Survey Data Tables



1. Bank Erosion: Moderate – Flood Event



2. Loose matting – Flood Event



2. Bank Erosion: Moderate



4. Plot Mortality – Soil Conditions

Photos taken during the initial site assessment conducted in March 2006

Prepared For:



Back Creek Restoration
Year 1 of 5

Date: March 2007
Project No.: 17

Appendix A2. Vegetation Problem Area Photos





Monitoring Plot 1



Monitoring Plot 2



Monitoring Plot 3



Monitoring Plot 4

Photos taken during the vegetation monitoring conducted in May 2006

Prepared For:



Back Creek Stream Restoration
Year 1 of 5

Date: March 2007
Project No.: 17

Appendix A3. Vegetation Monitoring Plot Photos

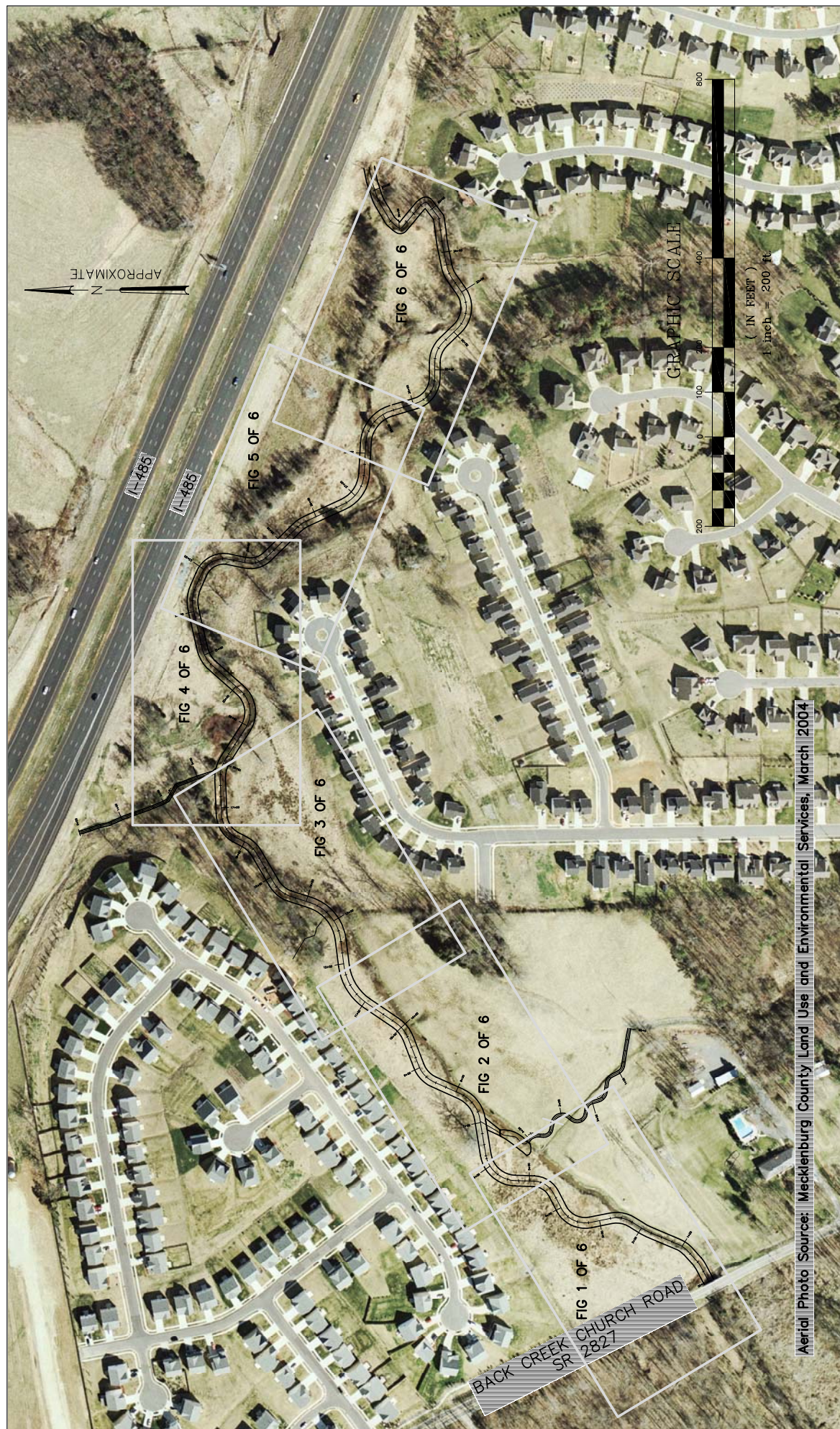


APPENDIX B

Geomorphic and Stream Stability Data*

1. Problem Area Plan View
2. Representative Stream Problem Area Photos
3. Stream Photo Station Photos
4. Qualitative Visual Stability Assessment
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.



NC ECOSYSTEM ENHANCEMENT PROGRAM
 BACK CREEK STREAM AND WETLAND RESTORATION
 DATE : MARCH 2007
 SCALE : 1"=200'
 JOB NO.: 03060-001

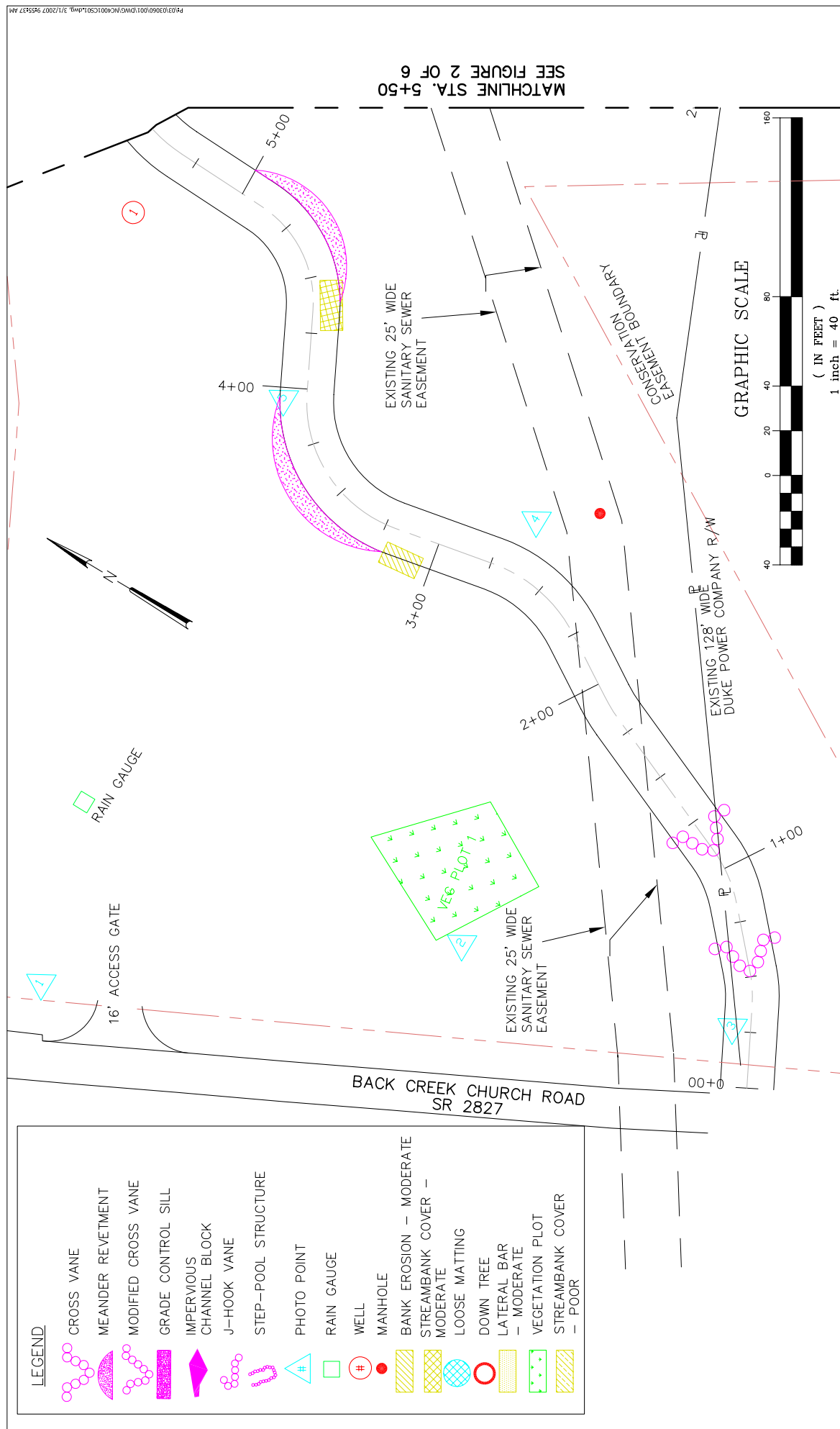
PROJECT NO. 17
 MECKLENBURG COUNTY
 NORTH CAROLINA
 MONITORING
 YEAR 1 of 5

JORDAN JONES & GOULDING

PROBLEM AREAS PLAN VIEW

FIGURE KEY

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



LEGEND

	CROSS VANE
	MEANDER REVETMENT
	MODIFIED CROSS VANE
	GRADE CONTROL SILL
	IMPERVIOUS CHANNEL BLOCK
	J-HOOK VANE
	STEP-POOL STRUCTURE
	PHOTO POINT
	RAIN GAUGE
	WELL
	MANHOLE
	BANK EROSION - MODERATE
	STREAMBANK COVER - MODERATE
	LOOSE MATTING
	DOWN TREE
	LATERAL BAR - MODERATE
	VEGETATION PLOT
	STREAMBANK COVER - POOR

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



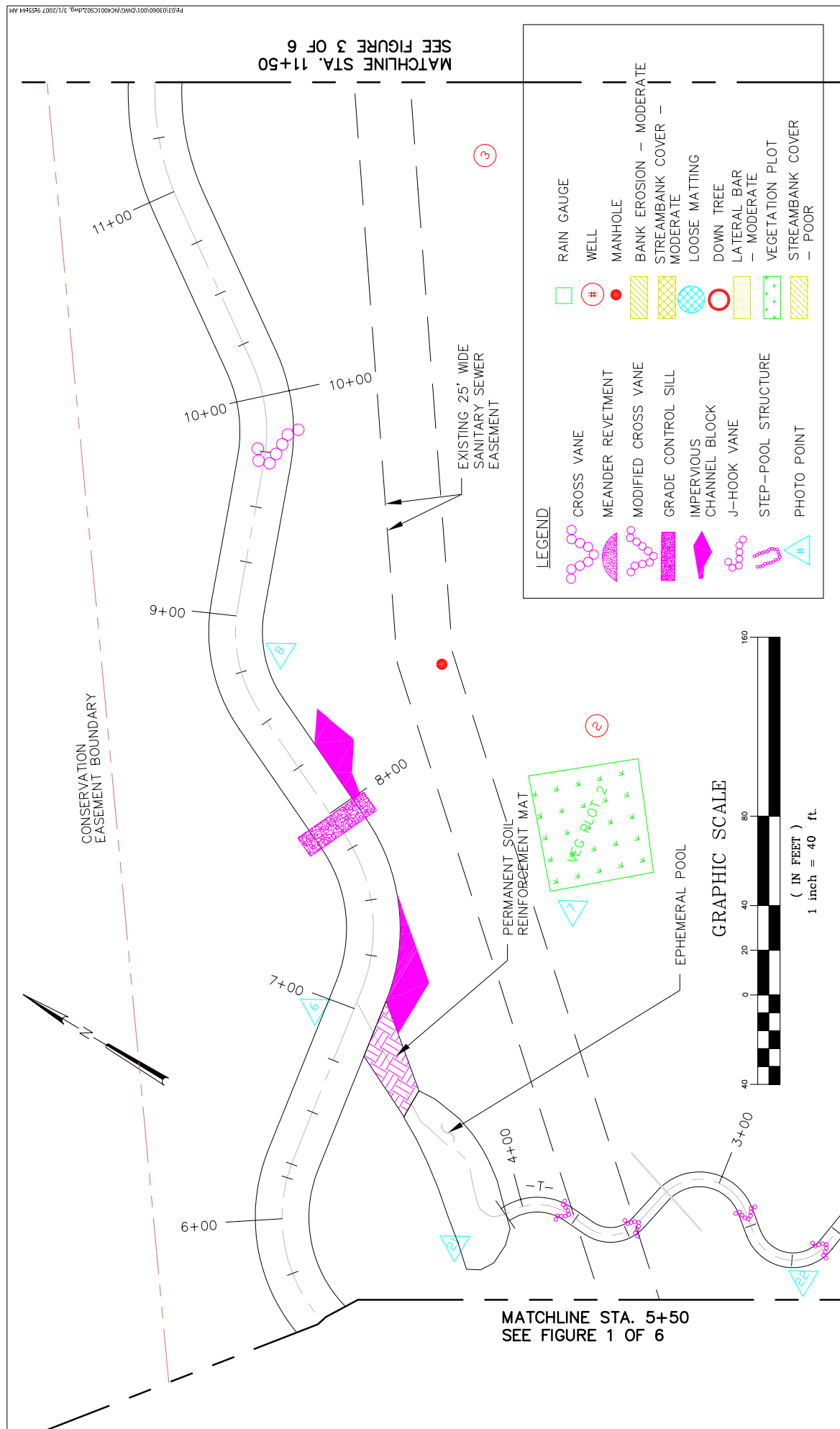
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SCALE : 1"=40'
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APPENDIX B1
PROBLEM AREAS PLAN VIEW
FIGURE 1 OF 6

MATCHLINE STA. 5+50
SEE FIGURE 2 OF 6

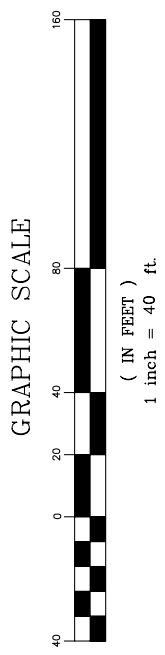


MATCHLINE STA. 11+50
SEE FIGURE 3 OF 6

MATCHLINE STA. 5+50
SEE FIGURE 1 OF 6

LEGEND

	CROSS VANE		RAIN GAUGE
	MEANDER REVETMENT		WELL
	MODIFIED CROSS VANE		MANHOLE
	GRADE CONTROL SILL		BANK EROSION - MODERATE
	IMPERVIOUS CHANNEL BLOCK		STREAMBANK COVER - MODERATE
	J-HOOK VANE		LOOSE MATTING
	STEP-POOL STRUCTURE		DOWN TREE
	PHOTO POINT		LATERAL BAR - MODERATE
			VEGETATION PLOT
			STREAMBANK COVER - POOR



NC ECOSYSTEM ENHANCEMENT PROGRAM
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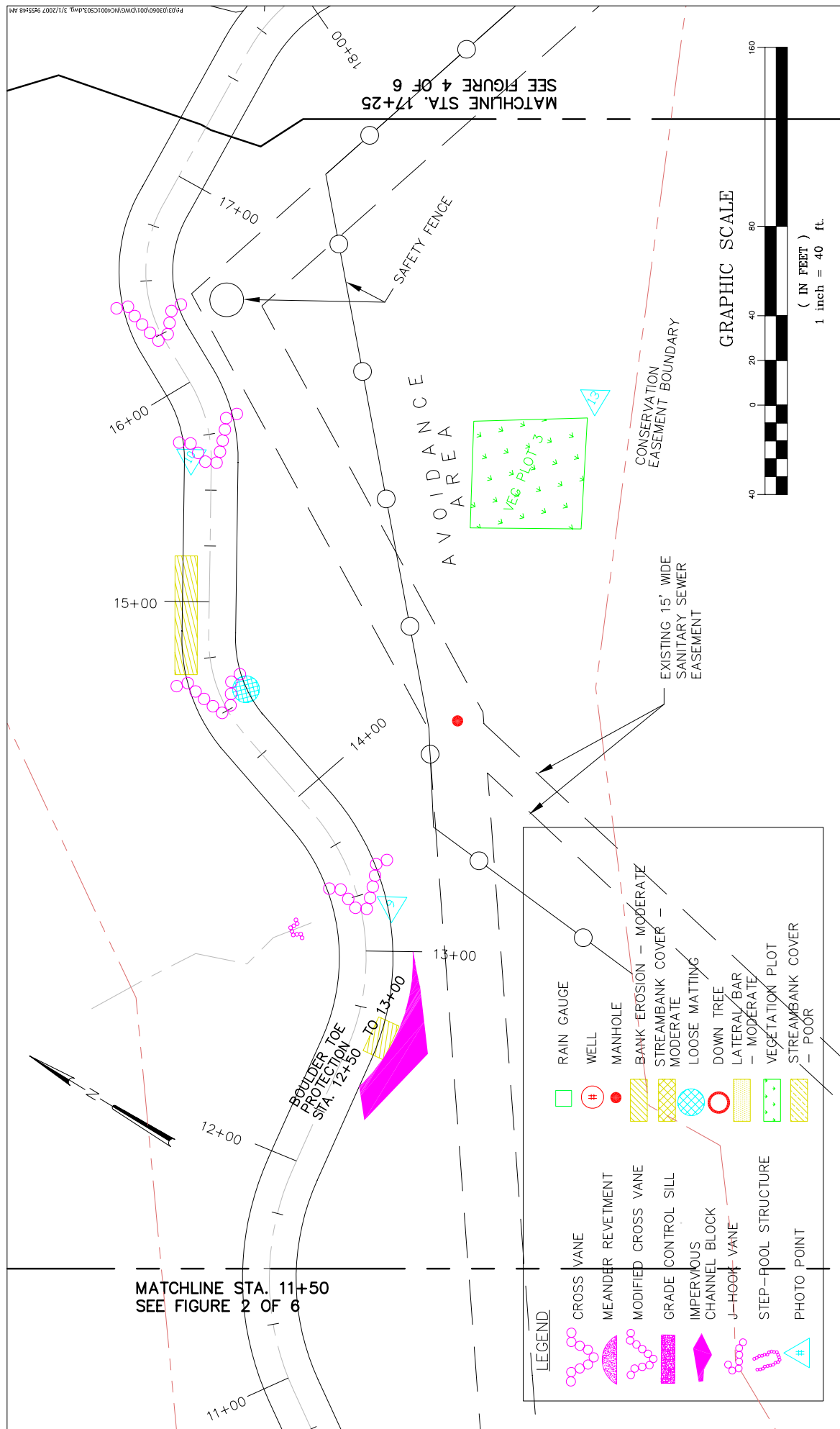


APPENDIX B1
PROBLEM AREAS PLAN VIEW

FIGURE 2 OF 6



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



LEGEND

	CROSS VANE		RAIN GAUGE
	MEANDER REVETMENT		WELL
	MODIFIED CROSS VANE		MANHOLE
	GRADE CONTROL SILL		BANK-EROSION - MODERATE
	IMPERVIOUS CHANNEL BLOCK		STREAMBANK COVER - MODERATE
	J-HOOK VANE		STREAMBANK COVER - POOR
	STEP-POOL STRUCTURE		LOOSE MATTING
	PHOTO POINT		DOWN TREE
			LATERAL BAR - MODERATE
			VEGETATION PLOT

NOTES:

- GENERAL SITE DATA PROVIDED BY NCEEP.
- ALL LOCATIONS ARE APPROXIMATE.

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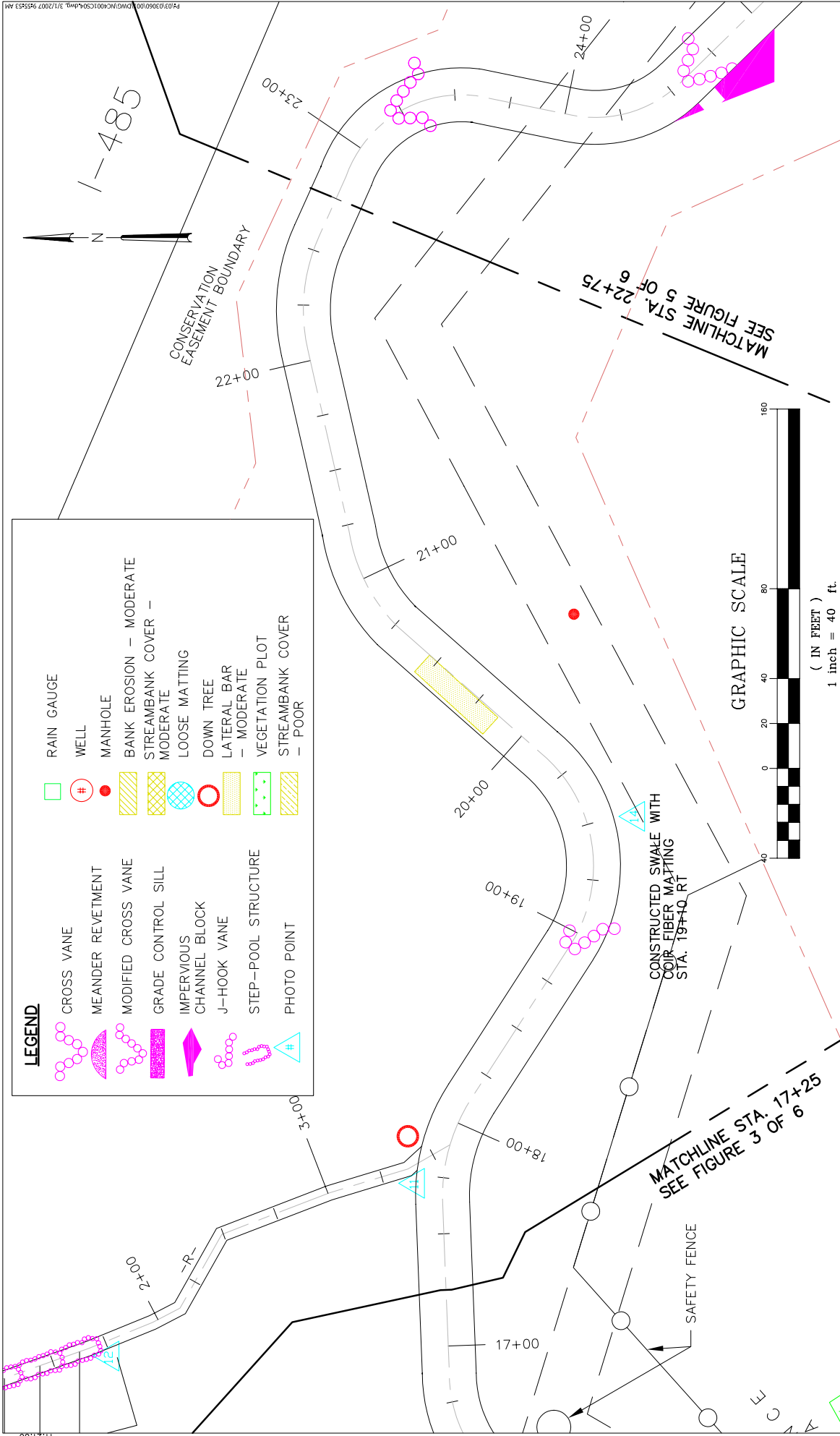
NC ECOSYSTEM ENHANCEMENT PROGRAM
BACK CREEK STREAM AND WETLAND RESTORATION

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SCALE : 1"=40'
JOB NO.: 03060-001

APPENDIX B1
PROBLEM AREAS PLAN VIEW

FIGURE 3 OF 6

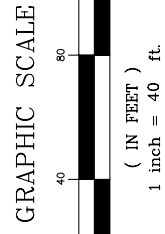
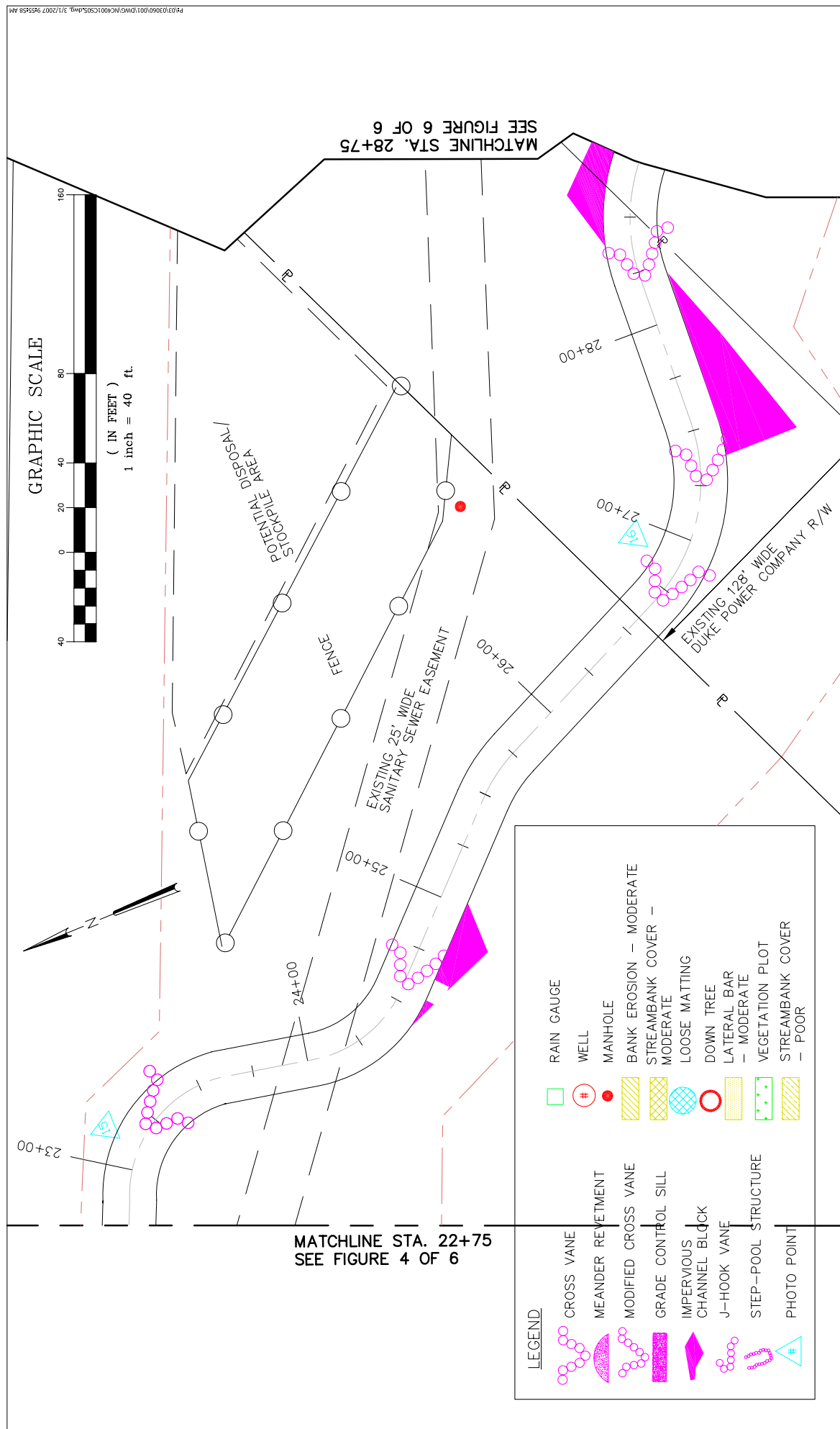




LEGEND

	CROSS VANE		RAIN GAUGE
	MEANDER REVETMENT		WELL
	MODIFIED CROSS VANE		MANHOLE
	GRADE CONTROL SILL		BANK EROSION - MODERATE
	IMPERVIOUS CHANNEL BLOCK		STREAMBANK COVER - MODERATE
	J-HOOK VANE		LOOSE MATTING
	STEP-POOL STRUCTURE		DOWN TREE
	PHOTO POINT		LATERAL BAR - MODERATE
			VEGETATION PLOT
			STREAMBANK COVER - POOR

	NOTES: 1. GENERAL SITE DATA PROVIDED BY NCEEP. 2. ALL LOCATIONS ARE APPROXIMATE.	PROJECT NO. 17 MECKLENBURG COUNTY NORTH CAROLINA MONITORING YEAR 1 of 5		NC ECOSYSTEM ENHANCEMENT PROGRAM BACK CREEK STREAM AND WETLAND RESTORATION	DATE : MARCH 2007 SCALE : 1"=40' JOB NO.: 03060-001
	APPENDIX B1 PROBLEM AREAS PLAN VIEW			FIGURE 4 OF 6	



MATCHLINE STA. 22+75
SEE FIGURE 4 OF 6

MATCHLINE STA. 28+75
SEE FIGURE 6 OF 6

LEGEND	
	CROSS VANE
	MEANDER REVETMENT
	MODIFIED CROSS VANE
	GRADE CONTROL SILL
	IMPERVIOUS CHANNEL BLOCK
	J-HOOK VANE
	STEP-POOL STRUCTURE
	PHOTO POINT
	RAIN GAUGE
	WELL
	MANHOLE
	BANK EROSION - MODERATE
	STREAMBANK COVER - MODERATE
	LOOSE MATTING
	DOWN TREE
	LATERAL BAR - MODERATE
	VEGETATION PLOT
	STREAMBANK COVER - POOR

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



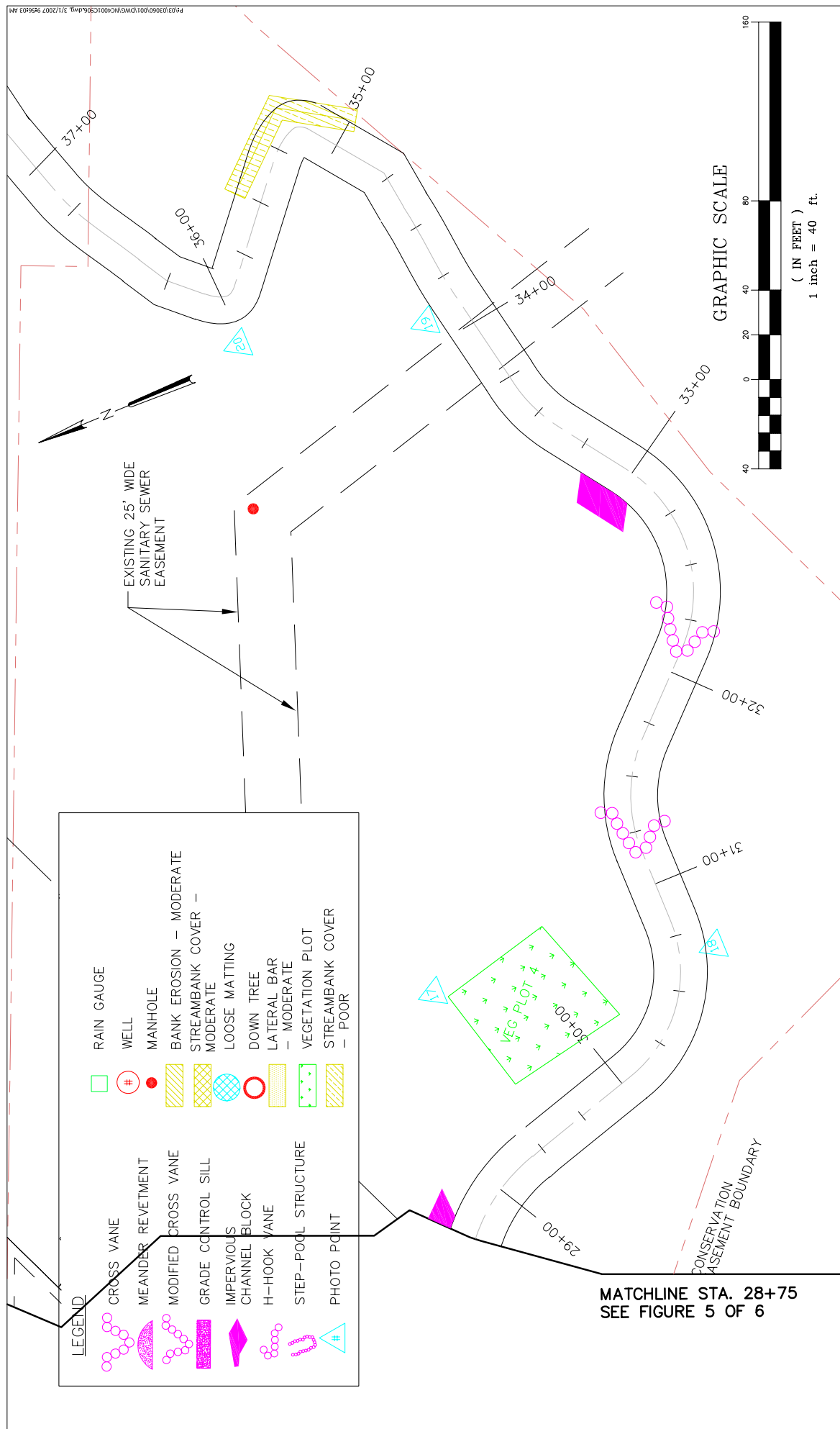
PROJECT NO. 17
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NC ECOSYSTEM ENHANCEMENT PROGRAM
BACK CREEK STREAM AND WETLAND RESTORATION

DATE : MARCH 2007
SCALE : 1"=40'
JOB NO.: 03060-001
FIGURE 5 OF 6

APPENDIX B1
PROBLEM AREAS PLAN VIEW



LEGEND	
	CROSS VANE
	MEANDER REVETMENT
	MODIFIED CROSS VANE
	GRADE CONTROL SILL
	IMPERVIOUS CHANNEL BLOCK
	H-HOOK VANE
	STEP-POOL STRUCTURE
	PHOTO POINT
	RAIN GAUGE
	WELL
	MANHOLE
	BANK EROSION - MODERATE
	STREAMBANK COVER - MODERATE
	LOOSE MATTING
	DOWN TREE
	LATERAL BAR - MODERATE
	VEGETATION PLOT
	STREAMBANK COVER - POOR

MATCHLINE STA. 28+75
SEE FIGURE 5 OF 6

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

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NC ECOSYSTEM ENHANCEMENT PROGRAM
BACK CREEK STREAM AND WETLAND RESTORATION

DATE : MARCH 2007
SCALE : 1"=40'
JOB NO.: 03060-001
APPENDIX B1
PROBLEM AREAS PLAN VIEW
FIGURE 6 OF 6





1. Bank Erosion - Moderate

Photos taken during the initial assessment conducted in March 2006



2. Down Tree

Prepared For:



Back Creek Stream and Wetland Restoration Project
Year 1 of 5 Monitoring

Date: March 2007
Project No.: 17



Appendix B2. Stream Problem Area Photos



3. Lateral Bar

Photos taken during the initial assessment conducted in March 2006



4. Loose Matting

Prepared For:



Back Creek Stream and Wetland Restoration Project
Year 1 of 5 Monitoring

Date: March 2007
Project No.: 17



Jordan
Jones &
Goulding
INCORPORATED

Appendix B2. Stream Problem Area Photos



5. Stream Bank Cover – Moderate/Poor

Photos taken during the initial assessment conducted in March 2006

Prepared For:



Back Creek Stream and Wetland Restoration Project
Year 1 of 5 Monitoring

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Appendix B2. Stream Problem Area Photos



Photo Point 1: Facing Southeast



Photo Point 1: Facing West



Photo Point 2: Facing South

Photos taken during the stream assessment conducted in September 2006

Prepared For:



Back Creek Stream and Wetland Restoration Project
Year 1 of 5 Monitoring

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Appendix B3. Stream Photo Point Photos



Photo Point 3: Upstream



Photo Point 3: Downstream



Photo Point 4: Upstream



Photo Point 4: Downstream

Photos taken during the stream assessment conducted in September 2006

**Back Creek Stream and Wetland Restoration Project
Year 1 of 5 Monitoring**

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Prepared For:



Appendix B3. Stream Photo Point Photos





Photo Point 5: Upstream



Photo Point 5: Downstream



Photo Point 6: Upstream



Photo Point 6: Downstream

Photos taken during the stream assessment conducted in September 2006

**Back Creek Stream and Wetland Restoration Project
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Prepared For:



Appendix B3. Stream Photo Point Photos





Photo Point 7: Facing Southwest



Photo Point 8: Upstream



Photo Point 8: Downstream

Photos taken during the stream assessment conducted in September 2006

Back Creek Stream and Wetland Restoration Project
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Project No.: 17

Prepared For:



Jordan
Jones &
Goulding
INCORPORATED

Appendix B3. Stream Photo Point Photos



Photo Point 9: Upstream



Photo Point 9: Downstream



Photo Point 10: Upstream



Photo Point 10: Downstream

Photos taken during the stream assessment conducted in September 2006

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Project No.: 17

Prepared For:



Appendix B3. Stream Photo Point Photos





Photo Point 11: Upstream



Photo Point 11: Downstream



Photo Point 12: Upstream



Photo Point 12: Downstream

Photos taken during the stream assessment conducted in September 2006

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Prepared For:



Appendix B3. Stream Photo Point Photos





Photo Point 13: Facing Northwest



Photo Point 13: Facing Northwest



Photo Point 14: Upstream



Photo Point 14: Downstream

Photos taken during the stream assessment conducted in September 2006

Back Creek Stream and Wetland Restoration Project
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Prepared For:



Appendix B3. Stream Photo Point Photos





Photo Point 15: Upstream



Photo Point 15: Downstream



Photo Point 16: Upstream



Photo Point 16: Downstream

Photos taken during the stream assessment conducted in September 2006

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Prepared For:



Appendix B3. Stream Photo Point Photos





Photo Point 17: Veg Plot 4



Photo Point 18: Upstream



Photo Point 18: Downstream

Photos taken during the stream assessment conducted in September 2006

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Date: March 2007
Project No.: 17

Prepared For:

**Ecosystem
Enhancement
PROGRAM**

Appendix B3. Stream Photo Point Photos


**Jordan
Jones &
Goulding**
INCORPORATED



Photo Point 19: Upstream



Photo Point 19: Downstream



Photo Point 20: Upstream



Photo Point 20: Downstream

Photos taken during the stream assessment conducted in September 2006

**Back Creek Stream and Wetland Restoration Project
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Project No.: 17

Prepared For:



Appendix B3. Stream Photo Point Photos





Photo Point 21: Upstream



Photo Point 21: Downstream

Photos taken during the stream assessment conducted in September 2006

Prepared For:



Back Creek Stream and Wetland Restoration Project
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Appendix B3. Stream Photo Point Photos

Feature Category		(# Stable) Number Performing as Intended	Total Number assessed per 2006 survey	Total Number/feet in unstable state	% Perform in Stable Condition	Feature Perform Mean or Total
A. Riffles	1. Present?	27			100%	100%
	2. Armor Stable?	27			100%	
	3. Facet grade appears stable?	27	27	N/A	100%	
	4. Minimal evidence of embedding/fining?	27			100%	
	5. Length appropriate?	27			100%	
B. Pools	1. Present?	27	27		100%	99%
	2. Sufficiently deep?	26			96%	
	3. Length Appropriate?	27			100%	
C. Thalweg	1. Upstream of meander bend centering?	13	13	N/A	100%	100%
	2. Downstream of meander centering?	13			100%	
D. Meanders	1. Outer bend in state of limited/controlled erosion?	22			81%	91%
	2. Of those eroding, # w/concomitant point bar formation?	N/A	27	N/A	N/A	
	3. Apparent Rc within spec?	25			92%	
	4. Sufficient floodplain access and relief?	27			100%	
E. Bed General	1. General channel bed aggradation areas (bar formation)?	N/A		1/40 ft	99%	99%
	2. Channel bed degradation - areas of increasing down-cutting or head cutting?			1/14 ft	99%	
F. Vanes	1. Free of back or arm scour?	16	16		100%	100%
	2. Height appropriate?	16			100%	
	3. Angle and geometry appear appropriate?	16			100%	
G. Wads/Boulders	4. Free of piping or other structural failures?	16	16		100%	100%
	1. Free of scour?			N/A		
H. Bank Performance	2. Footing stable?	N/A	N/A	80/3300 ft	98%	98%
	1. Actively eroding, wasting, or slumping bank					



Prepared For:

Back Creek Stream and Wetland Restoration Project
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Appendix B4. Qualitative Visual Stability Assessment

Project Name: Back Creek
 Cross-Section: 1
 Feature: Riffle

Design 2005		2006	
Station	Elevation	Station	Elevation
0.0	96.69	0.0	96.46
27.8	96.19	0.0	96.63
36.0	96.19	2.0	96.57
42.1	93.19	4.0	96.68
54.1	93.19	8.0	96.51
60.0	96.19	12.0	96.38
67.8	96.19	16.0	96.46
81.0	96.19	20.0	96.31
		23.0	96.17
		26.0	95.99
		29.0	96.19
		32.0	96.3
		35.0	96.28
		36.0	96.22
		37.0	95.86
		38.0	95.58
		39.0	95.15
		40.0	94.73
		41.0	94.58
		42.0	94.35
		43.0	93.7
		45.0	93.55
		45.5	93.4
		46.6	93.33
		49.0	93.19
		50	93.23
		51	93.23
		53	93.38
		54	93.8
		55	94.17
		56	94.55
		56.25	94.73
		57	95.1
		58	95.48
		59	95.66
		61	95.63
		64	95.82
		67	95.9
		71	95.97
		74	95.98
		77	96.05
		79	96.16
		80.5	96.63
		82	96.9
		84	97.03
		86	97.01
		87.2	97.06
		87.2	97.2

2006 Summary Data	
Bankfull Cross Sectional Area	51.79
Bankfull Width	42.92
Bankfull Mean Depth	1.21
Bankfull Max Depth	3.00
Bank Height Ratio	1.00
Width/Depth Ratio	35.47
Entrenchment Ratio	>2.2

Prepared For:



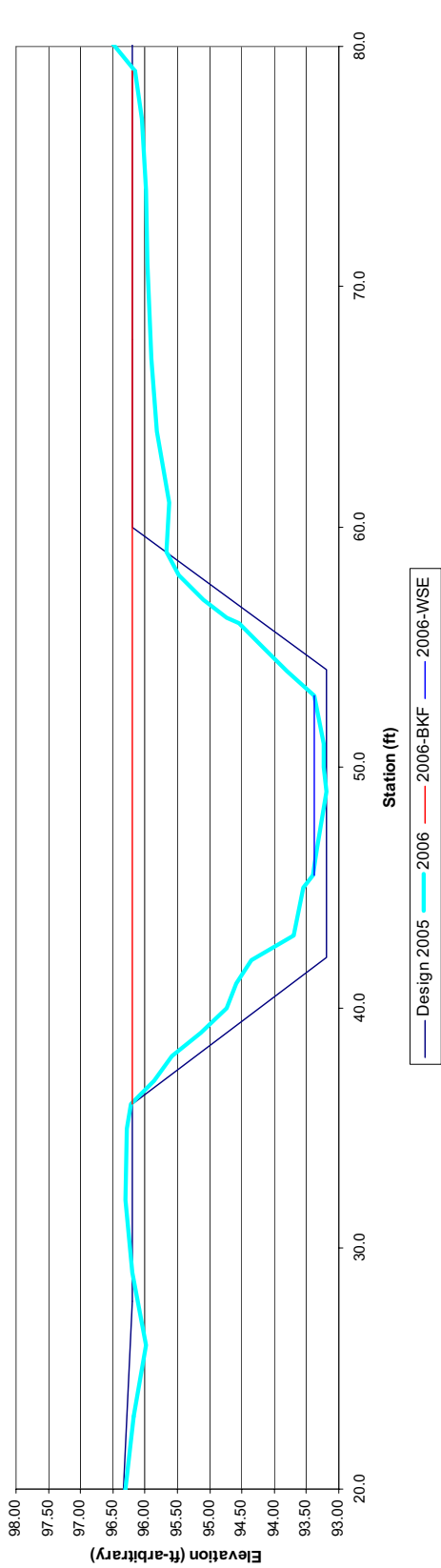
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Appendix B5. Cross-Section Plots and Raw Data Tables

**Cross-Section #1-Riffle
Back Creek**



Cross-Section #1 Riffle: Upstream



Cross-Section #1 Riffle: Downstream

Photos taken during the stream assessment conducted in September 2006

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Appendix B5. Cross-Section Plots and Raw Data Tables



Project Name: Back Creek		
Cross-Section: 2		
Feature: Pool		
2006		
Station	Elevation	Notes
0.0	95.46	lpin ground
0.0	95.7	lpin top
6.0	95.39	
12.0	95.44	
21.0	94.87	
24.7	94.59	BKF
27.0	94.06	
29.2	93.56	
32.3	92.77	
35.8	92.29	
36.6	91.8	LEW
36.6	91.66	
38.0	90.72	
40.5	89.92	
43.3	89.34	
44.0	89.33	TW
45.0	89.57	
47.0	90.22	
48.6	91.1	
49.1	91.8	REW
50.0	92.18	
52.5	93.02	
55.0	93.91	
58.0	94.69	BKF
59.7	95.12	
60.7	95.66	terrace
66	95.76	
75	95.64	
78	95.81	
80.6	95.66	rpin grd
80.6	95.38	rpin top

2006 Summary Data	
Bankfull Cross Sectional Area	84.07
Bankfull Width	33.11
Bankfull Mean Depth	2.54
Bankfull Max Depth	5.31
Bank Height Ratio	1.19
Width/Depth Ratio	13.04
Entrenchment Ratio	N/A

Date: March 2007
Project No.: 17

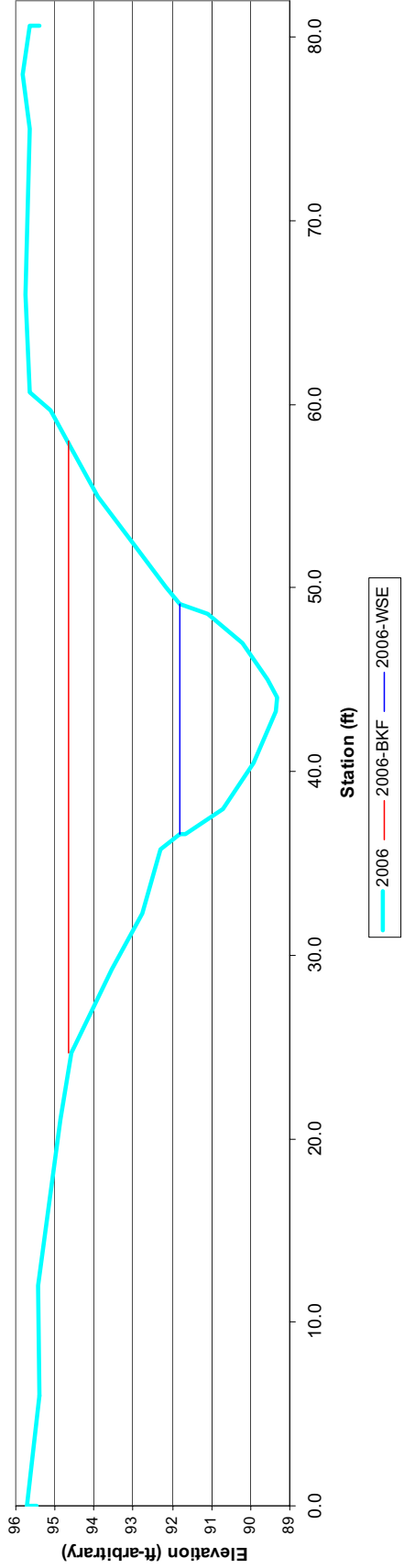


Back Creek Stream and Wetland Restoration Project
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Appendix B5. Cross-Section Plots and Raw Data Tables

**Cross-Section #2-Pool
Back Creek**



Cross-Section #2 Pool: Upstream



Cross-Section #2 Pool: Downstream

Photos taken during the stream assessment conducted in September 2006

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Appendix B5. Cross-Section Plots and Raw Data Tables



Project Name: Back Creek
 Cross-Section: 3
 Feature: Riffle

Design 2005*		2006	
Station	Elevation	Station	Elevation
0.0	101.18	0.0	94.89
20.0	99.18	2.0	94.06
29.0	97.18	4.0	94.17
34.0	95.18	8.0	94
43.0	90.68	12.0	93.87
53.0	90.68	16.0	93.95
60.0	94.18	20.0	93.8
76.0	95.18	23.0	93.66
90.0	95.18	26.0	93.48
		29.0	93.68
		32.0	93.79
		35.0	93.77
		36.0	93.71
		37.0	93.35
		38.0	93.07
		39.0	92.64
		40.0	92.22
		41.0	92.07
		42.0	91.84
		43.0	91.19
		45.0	91.04
		45.5	90.89
		46.6	90.82
		49.0	90.68
		50.0	90.72
		51	90.72
		53	90.89
		54	91.29
		55	91.66
		56	92.04
		56.23	92.22
		57	92.59
		58	92.97
		59	93.15
		61	93.12
		64	93.31
		67	93.39
		71	93.46
		74	93.47
		77	93.54
		79	93.71
		80.5	94.12
		82	94.39
		84	94.52
		86	94.5
		87.2	94.55
		89.2	93.71
		89.2	93.95

*Design XCS #12 from mitigation plan

2006 Summary Data

Bankfull Cross Sectional Area	52.99
Bankfull Width	43.00
Bankfull Mean Depth	1.23
Bankfull Max Depth	3.03
Bank Height Ratio	1.00
Width/Depth Ratio	34.96
Entrenchment Ratio	>2.2

Prepared For:



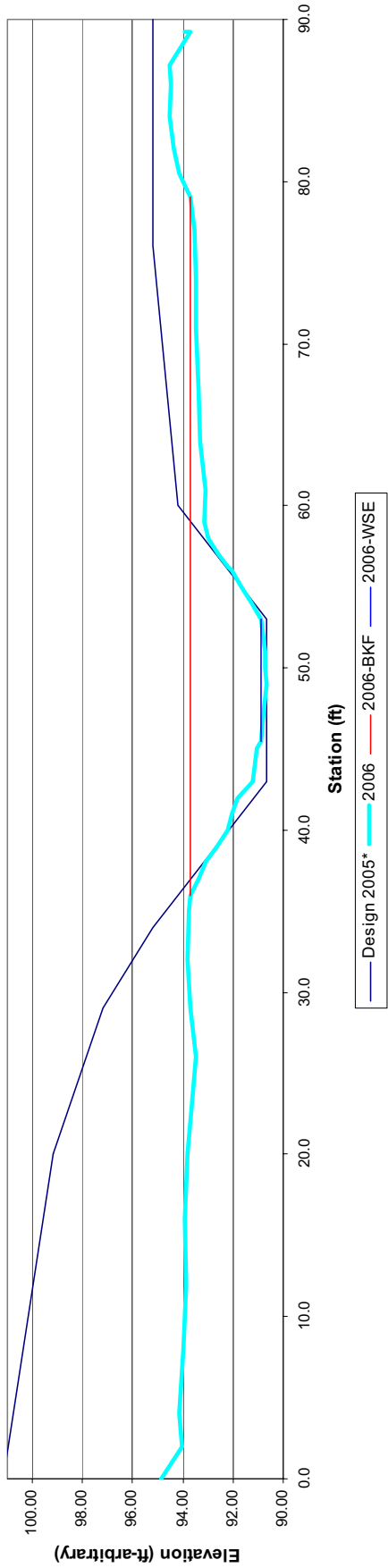
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Appendix B5. Cross-Section Plots and Raw Data Tables

**Cross-Section #3-Riffle
Back Creek**



Cross-Section #3 Riffle: Upstream

Cross-Section #3 Riffle: Downstream

Photos taken during the stream assessment conducted in September 2006

Prepared For:



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Appendix B5. Cross-Section Plots and Raw Data Tables



Project Name: Back Creek		
Cross-Section: 4		
Feature: Pool		
2006		
Station	Elevation	Notes
0.0	92.98	1 pin top
8.5	93.25	
16.4	92.6	
25.0	92.1	
28.3	92.11	BKF
31.8	91.35	
34.5	90.81	
36.3	90.25	
38.8	89.48	
40.6	89.11	LEW
42.4	89.03	
43.0	89.05	
45.0	89.01	
46.9	88.96	tw
49.2	89.04	
49.8	89.11	REW
50.7	89.33	
52.6	90.22	
56.0	91.35	
59.5	91.89	
61.0	92.11	BKF
75.0	92.58	
88.0	92.2	
94.0	91.83	rpin top

2006 Summary Data	
Bankfull Cross Sectional Area	59.47
Bankfull Width	32.7
Bankfull Mean Depth	1.82
Bankfull Max Depth	3.15
Bank Height Ratio	1.00
Width/Depth Ratio	17.97
Entrenchment Ratio	N/A

Prepared For:



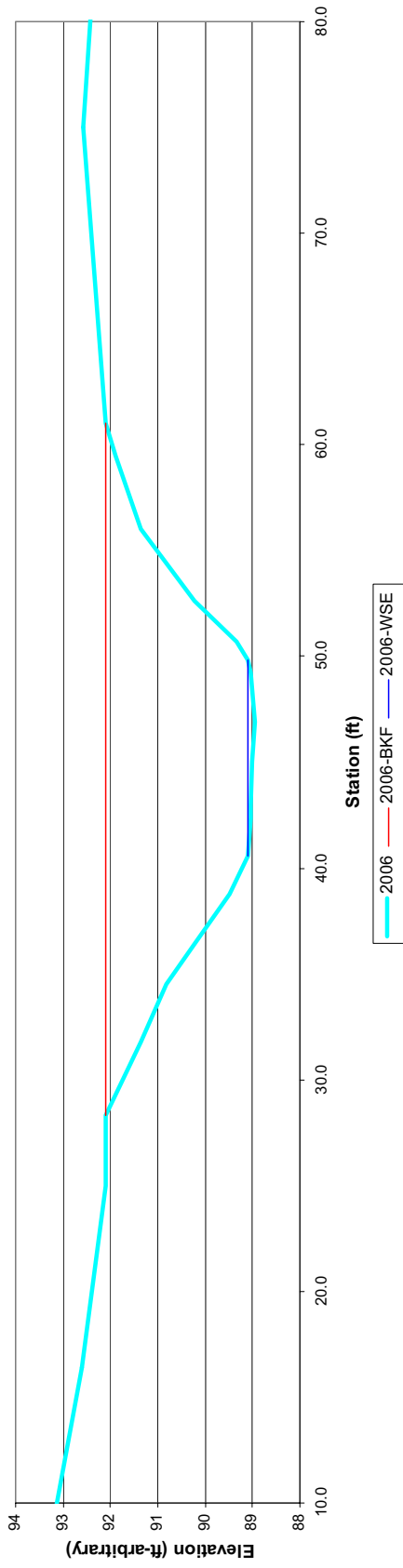
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Appendix B5. Cross-Section Plots and Raw Data Tables

**Cross-Section #4-Pool
Back Creek**



Cross-Section #4 Pool: Upstream



Cross-Section #4 Pool: Downstream

Photos taken during the stream assessment conducted in September 2006

Prepared For:



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Appendix B5. Cross-Section Plots and Raw Data Tables



Project Name: Back Creek
 Cross-Section: 5
 Feature: Riffle

Design 2005		2006	
Station	Elevation	Station	Elevation
0.0	95.47	0.0	95.42
15.0	95.47	0.5	95.59
24.0	90.87	1.2	95.45
32.0	90.87	6.9	93.95
45.0	94.47	11.2	93.94
72.0	94.47	13.6	93.81
		13.6	93.32
		17.3	92.89
		19.1	92.48
		21.2	92.26
		23.1	92.2
		25.0	91.41
		26.5	91.26
		27.0	91.2
		29.0	91.16
		30.3	91.25
		32.0	91
		32.6	90.87
		33.3	91.2
		34.4	91.45
		35.7	91.88
		38.0	91.58
		40.0	93.7
		43.0	93.8
		45.0	94.37
		48	94.52
		51	94.69
		55	94.77
		57	95.12
		58	95.5
		59	95.68
		59.6	95.07
		59.6	95.29
		61	95.65
		64	95.84
		67	95.92
		71	95.99
		74	96
		77	96.07
		79	96.18
		79.2	96.24
		80.5	96.65
		82	96.92
		84	97.05
		86	97.03
		87.2	97.08

Design XS #21 from mitigation plan.

2006 Summary Data	
Bankfull Cross Sectional Area	48.27
Bankfull Width	29.15
Bankfull Mean Depth	1.66
Bankfull Max Depth	2.94
Bank Height Ratio	1.00
Width/Depth Ratio	17.56
Entrenchment Ratio	>2.2

Prepared For:



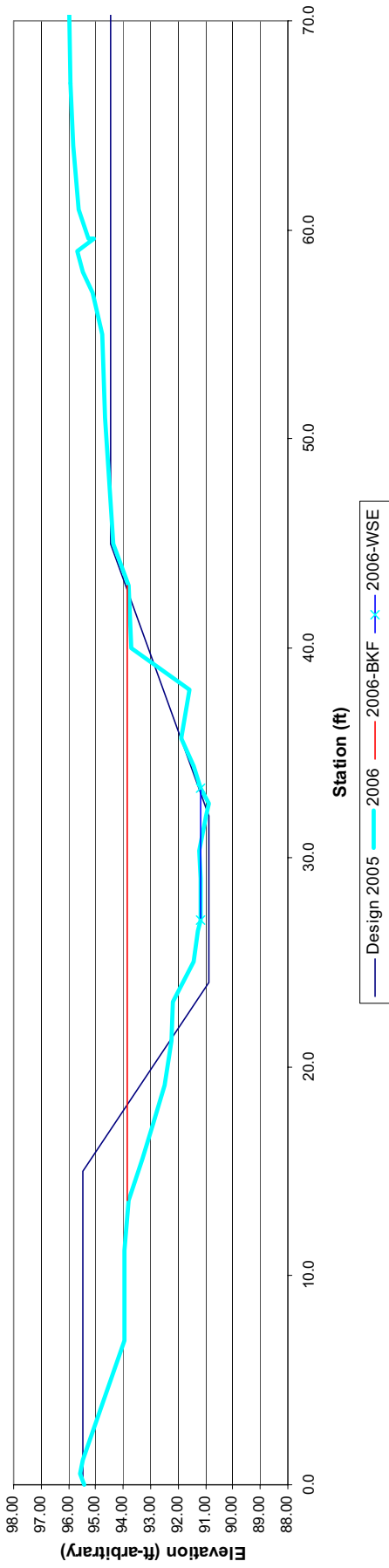
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Appendix B5. Cross-Section Plots and Raw Data Tables

**Cross-Section #5-Riffle
Back Creek**



Cross-Section #5 Riffle: Upstream



Cross-Section #5 Riffle: Downstream

Photos taken during the stream assessment conducted in September 2006

Prepared For:



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Appendix B5. Cross-Section Plots and Raw Data Tables

Project Name: Back Creek		
Cross-Section: 6		
Feature: Pool		
2006		
Station	Elevation	Notes
0.0	87.46	lpin-grd
0.0	87.91	lpin-top
2.0	87.46	
5.0	87.39	
8.0	87.31	
12.0	87.33	
12.6	87.31	BKF
13.0	87.01	
16.0	86.71	
18.0	86.37	
19.5	85.78	
21.0	85.39	
22.0	84.46	lew-ws
22.0	84.25	
23.6	83.26	
25.5	82.85	
27.7	82.29	
29.6	82.25	
31.0	82.69	
33.0	83.51	
34.9	83.68	rew
34.9	84.48	ws
36.0	86.09	
38.0	86.38	
40.0	86.93	
42	87.21	BKF
45	87.27	
48	87.55	
50.7	87.71	rp-in-grd
50.7	87.99	

2006 Summary Data	
Bankfull Cross Sectional Area	70.51
Bankfull Width	29.33
Bankfull Mean Depth	2.4
Bankfull Max Depth	5.01
Bank Height Ratio	1.00
Width/Depth Ratio	12.22
Entrenchment Ratio	N/A

Date: March 2007
Project No.: 17



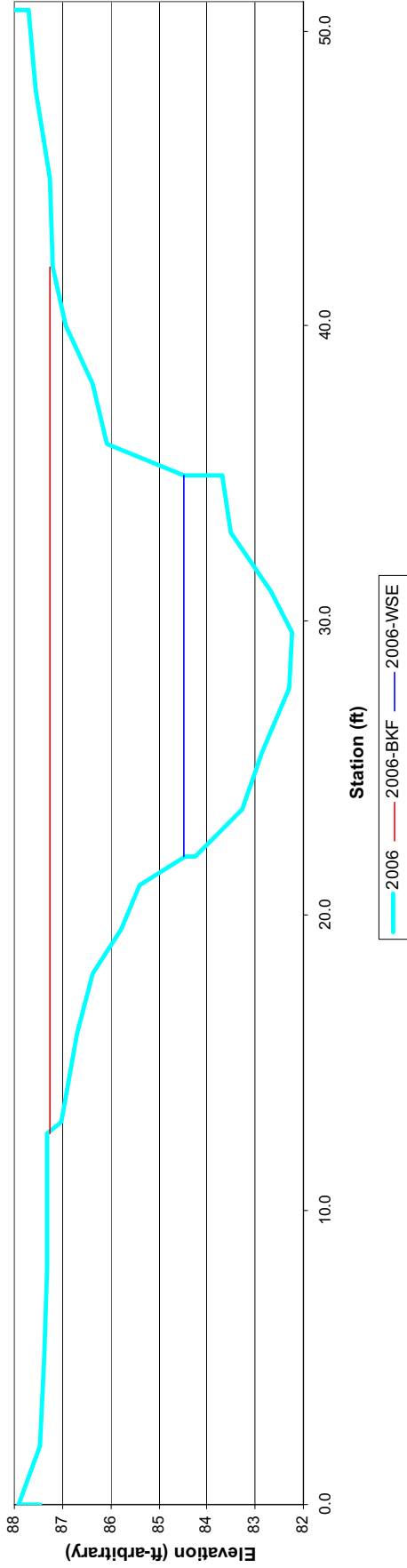
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Appendix B5. Cross-Section Plots and Raw Data Tables

Prepared For:



**Cross-Section #6-Pool
Back Creek**



Cross-Section #6 Pool: Upstream

Cross-Section #6 Pool: Downstream

Photos taken during the stream assessment conducted in September 2006

Prepared For:



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Appendix B5. Cross-Section Plots and Raw Data Tables



Project Name: Back Creek
 Cross-Section: 7
 Feature: Riffle

Design 2005			2006		
Station	Elevation	Notes	Station	Elevation	Notes
0.0	82.60		0.0	83.31	rpim/g
21.0	82.60		0.0	83.49	rpim/top
27.0	79.60		3.5	83.39	
38.2	79.60		9.0	83.39	
45.0	82.60		12.0	83.39	
62.0	82.60		15.0	83.46	
			17.0	82.92	BKF
			18.0	82.65	
			19.5	81.97	
			21.1	81.39	
			23.0	80.92	
			25.6	80.12	
			29.7	79.98	lew/wrs
			30.7	79.91	
			32.5	79.82	
			34.0	79.77	
			36.5	79.81	
			37.8	79.57	
			39.0	79.76	
			39.2	79.98	rew/wrs
			41.0	80.51	
			43.6	80.96	
			46.3	81.82	
			47.7	82.46	
			49.7	82.94	BKF
			52.4	83.19	
			56.4	83.51	
			59	83.79	
			61.7	83.59	rpim/gr
			61.7	83.69	

Design XS # 31 from mitigation plan

2006 Summary Data

Bankfull Cross Sectional Area	70.59
Bankfull Width	32.66
Bankfull Mean Depth	2.16
Bankfull Max Depth	3.36
Bank Height Ratio	1.16
Width/Depth Ratio	15.12
Entrenchment Ratio	>2.2

Prepared For:



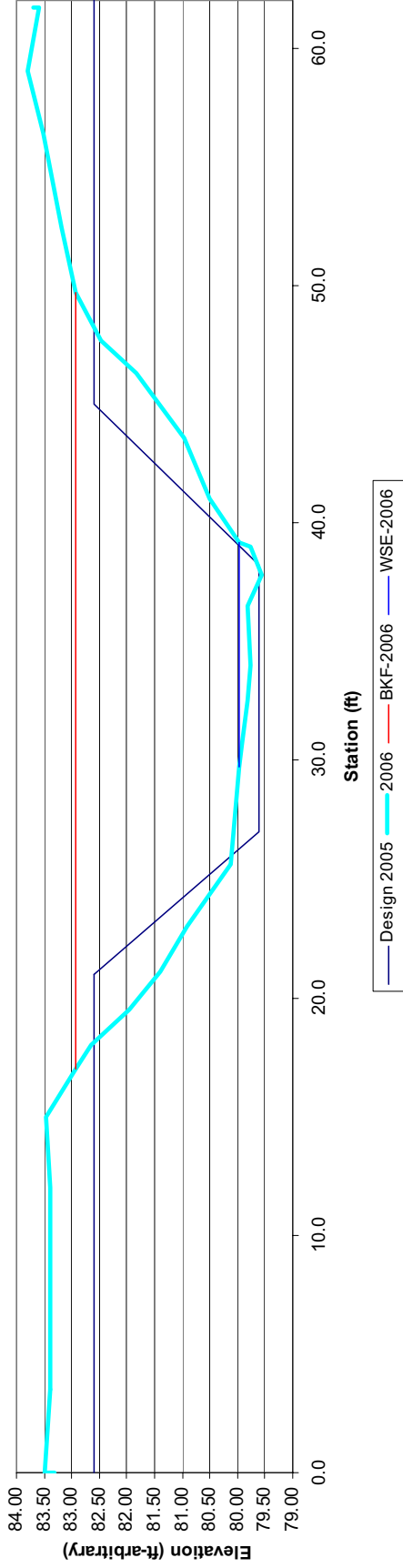
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Appendix B5. Cross-Section Plots and Raw Data Tables

**Cross-Section #7-Riffle
Back Creek**



Cross-Section #7 Riffle: Upstream



Cross-Section #7 Riffle: Downstream

Photos taken during the stream assessment conducted in September 2006

Prepared For:



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Appendix B5. Cross-Section Plots and Raw Data Tables



Project Name: Back Creek				
Cross-Section: 8				
Feature: Riffle				
Design 2005		2006		
Station	Elevation	Notes	Station	Elevation
0.0	93.50		0.0	93.69
16.0	93.50		0.0	93.92
16.0	92.00		3.0	93.9
23.0	92.00		7.0	93.74
23.0	93.50		11.0	93.65
34.0	93.50		12.0	93.63
			14.0	93.26
			16.0	92.54
			18.0	92.21
			19.0	91.95
			21.0	92.24
			23.0	92.7
			25.0	93.11
			27.0	93.31
			28.0	93.28
			30.0	93.11
			32.0	93.1
			34.3	93.16
			34.3	93.36
Design XS # M3 from mitigation plan				

2006 Summary Data	
Bankfull Cross Sectional Area	8.65
Bankfull Width	12.7
Bankfull Mean Depth	0.68
Bankfull Max Depth	1.33
Bank Height Ratio	1.26
Width/Depth Ratio	18.68
Entrenchment Ratio	> 2.2

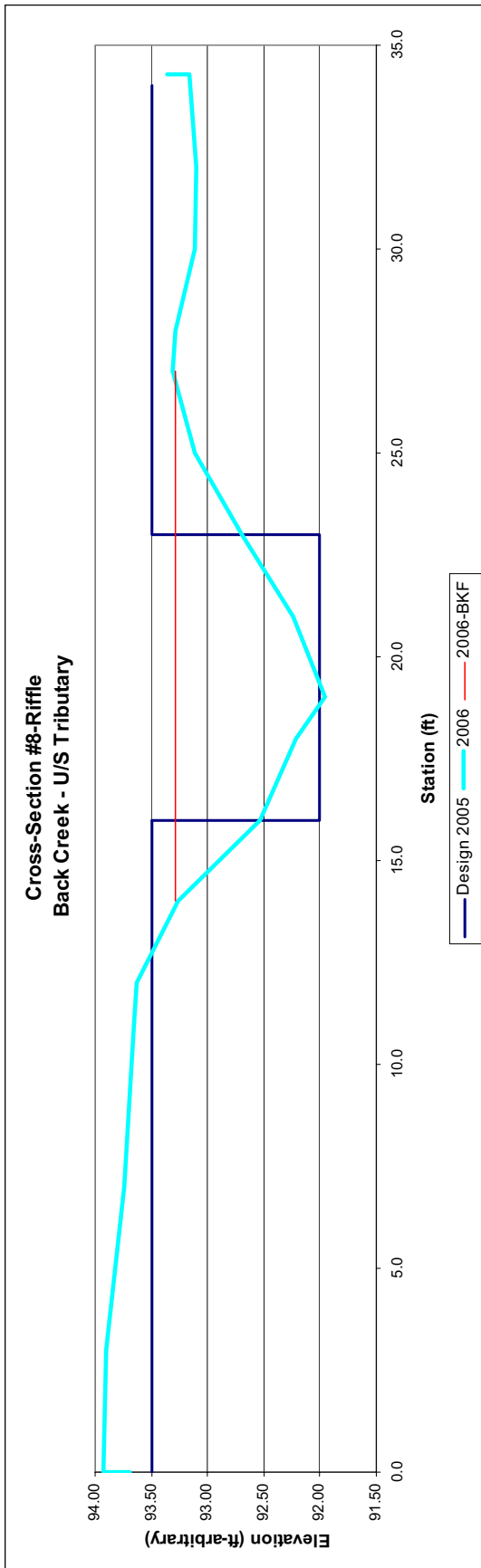


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 Back Creek Stream and Wetland Restoration Project
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Appendix B5. Cross-Section Plots and Raw Data Tables



Cross-Section #8 Riffle: Upstream



Cross-Section #8 Riffle: Downstream

Photos taken during the stream assessment conducted in September 2006

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Appendix B5. Cross-Section Plots and Raw Data Tables



2006

STA	TW-2006	WS-2006	BKF-2006	NOTES	STA	TW-2006	WS-2006	BKF-2006	NOTES
0	93.34	93.53	96.26	Head of Riffle	721	90.4	91.19		Glide
33	92.84	93.17	95.73	Head of Run	726	90.74	91.18		Head of Riffle
42	91.52	93.17		Head of Pool	802	90.18	91.17		Head of Pool
65	91.21	93.17			816	89	91.17	94.42	
85.3	90.88	93.12		Max Pool	849	88.72	91.17		Max Pool
94	92.38	93.12			894	90.09	91.15		
100	92.96	93.12	95.43	Head of Riffle	897	90.71	90.96	94.14	Glide
119	92.67	93.12		Max Pool	921	90.77	90.89		Run
155	92.36	93.1	94.99	Head of Pool	948	90.02	90.23		Head of Pool
168	90.79	93.1	95.6	Max Pool	987	88.64	90.22	93.59	Max Pool
195	90.92	93.09			1022.6	88.66	90.22		
210	92.19	93.09			1046	89.49	90.21		Glide
215	92.85	93.09	95.56	Head of Riffle	1050	90.16	90.17		Invert Cross-Vane
251	92.57	92.58			1055	87.6	89.76		Max Pool
263	92.48	92.58	95.13	Head of Pool	1083	89.69	89.71	92.67	Head of Riffle
270	91.2	92.58			1139	89.37	89.64	91.9	Invert Cross-Vane
291	90.44	92.56	95.3	Max Pool	1160	85.51	89.64		Max Pool
328	91.68	92.56			1182	88.39	89.59		
339	92.34	92.53	94.93	Head of Glide	1186	89.39	89.57		Head of Riffle
354.7	92.5	92.51		Head of Riffle	1200	89.13	89.41		
389	91.88	92.06			1236	88.97	89.29		Run
416	91.45	91.81	94.25		1257	88.96	89.15	91.63	Invert Cross-Vane
431.4	91.61	91.81		Invert Cross-Vane	1258	85.41	89.11		Pool
433	88.95	91.8		Max Pool	1272	85.05	89.11		
474	90.87	91.79			1282	84.28	89.11		Max Pool
492	91.49	91.79	94.88	Head of Riffle	1292	87.74	89.1		Glide
521	91.32	91.61	94.95		1297	88.88	89.1		Head of Riffle
567	91.02	91.34		Head of Pool	1314	88.83	89		
590	89.87	91.33	94.45	Max Pool	1324	88.56	88.7		Invert Cross-Vane
600	90.55	91.32			1324.2	87.25	88.63		Head of Pool
606	91.03	91.32		Head of Glide	1329	85.25	88.63		Max Pool
620	91.02	91.26	94.47		1357	86.01	88.61		
640	91.08	91.22	94.52	Head of Riffle	1375	88.31	88.61		Glide
652	90.94	91.22		Run	1379	88.42	88.61		Head of Riffle
696	90.16	91.21		Invert J-hook	1389	88.28	88.49	91.34	
705	87.34	91.21	93.86	Max Pool	1436	87.9	88.15		Run

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Appendix B6. Longitudinal Plots and Raw Data Tables

2006

STA	TW-2006	WS-2006	BKF-2006	NOTES	STA	TW-2006	WS-2006	BKF-2006	NOTES
1469	86.91	88.14		Pool @ confluence on side trib	2147	84.63	86.29		
1505.5	87.65	88.14		Glide	2158	85.26	86.23		
1509	87.93	88.1	90.92	Head of Riffle	2169.7	84.85	86.19		
1566	87.49	87.67		Run	2183	85.5	86.1		Invert Cross-Vane
1589	87.54	87.6		Invert J-hook	2192	83.31	85.94		Max Pool
1590	86.56	87.5		Pool	2203	84.7	85.94		Glide
1604	85.65	87.5	90.69	Max Pool	2209	85.42	85.94	88.24	Head of Riffle
1647	86.88	87.5		Glide	2243	85	85.72		
1650.4	86.95	87.4	90.47	Run	2277	84.25	85.31		Run
1692	86.82	87.39			2293	84.56	85.15	88.36	Riffle
1698	87.23	87.38	90.73	Head of Riffle	2338	83.41	85.09		
1715	86.9	87.36		Run	2368.5	83.76	84.7		Head Cut
1775	86.37	87.33			2370	83.37	84.61		Toe Head Cut
1800	85.17	87.33	89.98	Max Pool	2382	83.34	84.42		
1801	86.04	87.33		head pool=18ft upstn xsprev@1792	2388	83.13	84.19		Invert Cross-Vane
1821	85.12	87.33	89.74	Max Pool	2400	81.46	83.83		Max Pool
1838	86.49	87.33		Glide	2422.5	81.98	83.61		Glide
1842	86.71	87.26		Run	2425	82.78	83.59		
1879	86.81	87.25	89.38		2444.5	82.95	83.52	86.14	Invert Cross-Vane
1925	86.98	87.1		Pool	2455	80.58	83.28		Max Pool
1941	85.68	87.04		Pool	2476.2	82.5	83.28	86.26	Glide
1953	84.84	87.04	89.21	Max Pool	2482	82.81	82.97	86.14	Head of Riffle
1967	85.39	87.04		Glide	2498	82.41	82.95		Run
1972	85.37	87.04		Run	2518	82.29	82.93	85.16	
1990	85	86.8		Pool	2556.8	82.54	82.84	85.31	Invert Cross-Vane
2006	85.15	86.78	89.28		2566	79.86	82.83		Max Pool
2018	85.71	86.75		Glide	2595	80.97	82.81	85.58	
2024	85.91	86.73		Run	2606	81.35	82.73		Glide
2052	85.65	86.51			2612	82.32	82.68		Head of Pool
2070	86.14	86.49	88.58		2636	80.26	82.61	84.88	Max Pool
2086	86.34	86.34		Invert Cross-Vane	2661	81.83	82.54	85.08	Head of Riffle
2095	85.14	86.34		Pool	2717	81.7	82.49		Run
2109	84.21	86.34		Max Pool	2750	80.86	82.49	85.11	Head of Pool
2113	84.61	86.34		Pool-bdrk - compound	2767	80.11	82.47		Max Pool
2118	84.65	86.33			2780	81.46	82.47	85.59	Glide
2136	84.65	86.3	88.4		2786	81.33	82.45		

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Appendix B6. Longitudinal Plots and Raw Data Tables

2006				
STA	TW-2006	WS-2006	BKF-2006	NOTES
2819	81.81	82.38	84.92	Run
2839	81.74	82.05		Invert Cross-Vane
2843	78.88	81.72	83.94	Max Pool
2859	81.05	81.7		Glide
2862	81.25	81.53		Head of Riffle
2884	80.87	81.27	83.97	
2917	80.44	81.08		Invert Cross-Vane
2921	78.56	80.96	83.07	Max Pool
2941	79.3	80.96		
2974	79.72	80.95	83.22	
3000	80.3	80.94		Glide
3005	80.59	80.94		
3026	80.68	80.93	83.48	Head of Riffle
3050	80.17	80.77		Run
3058	79.48	80.7		Max Pool
3077	80.34	80.68		Head of Riffle
3101	78.94	80.48	82.88	

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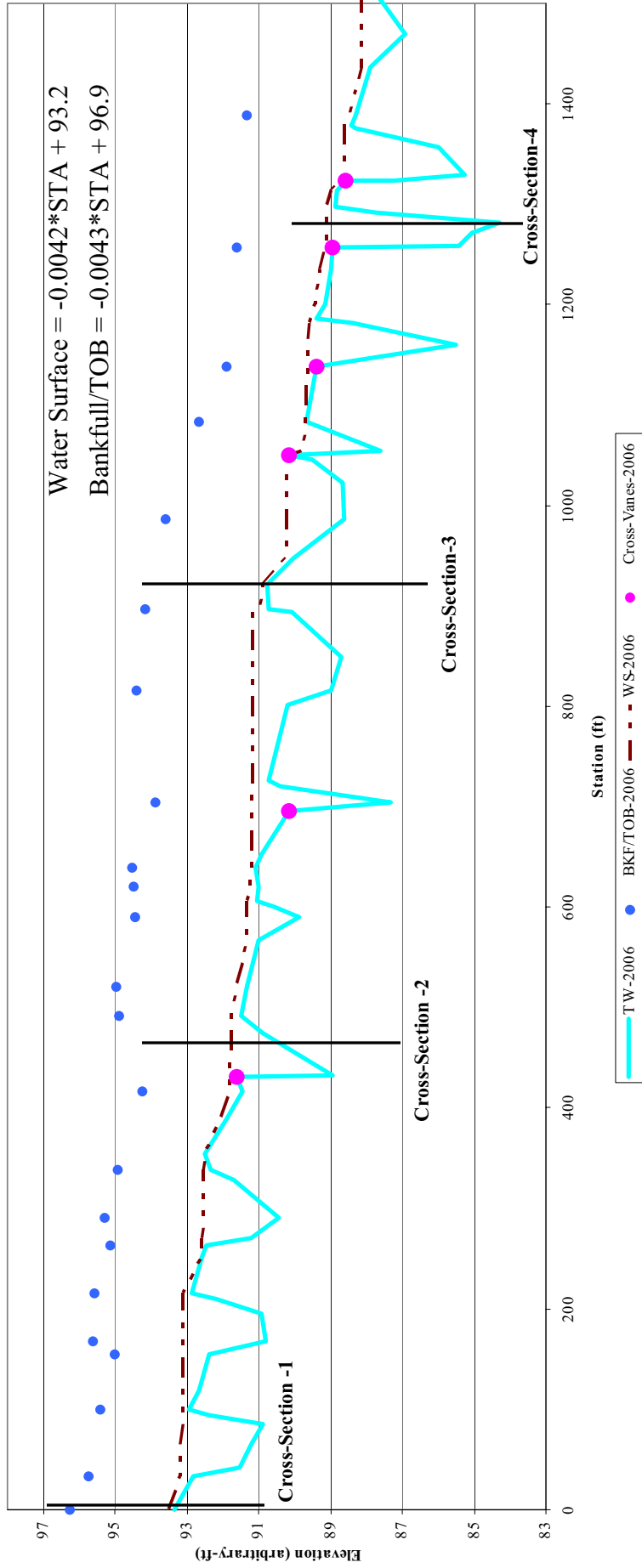
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INCORPORATED

Appendix B6. Longitudinal Plots and Raw Data Tables

Back Creek
 Longitudinal Profile
 2006 Monitoring Year



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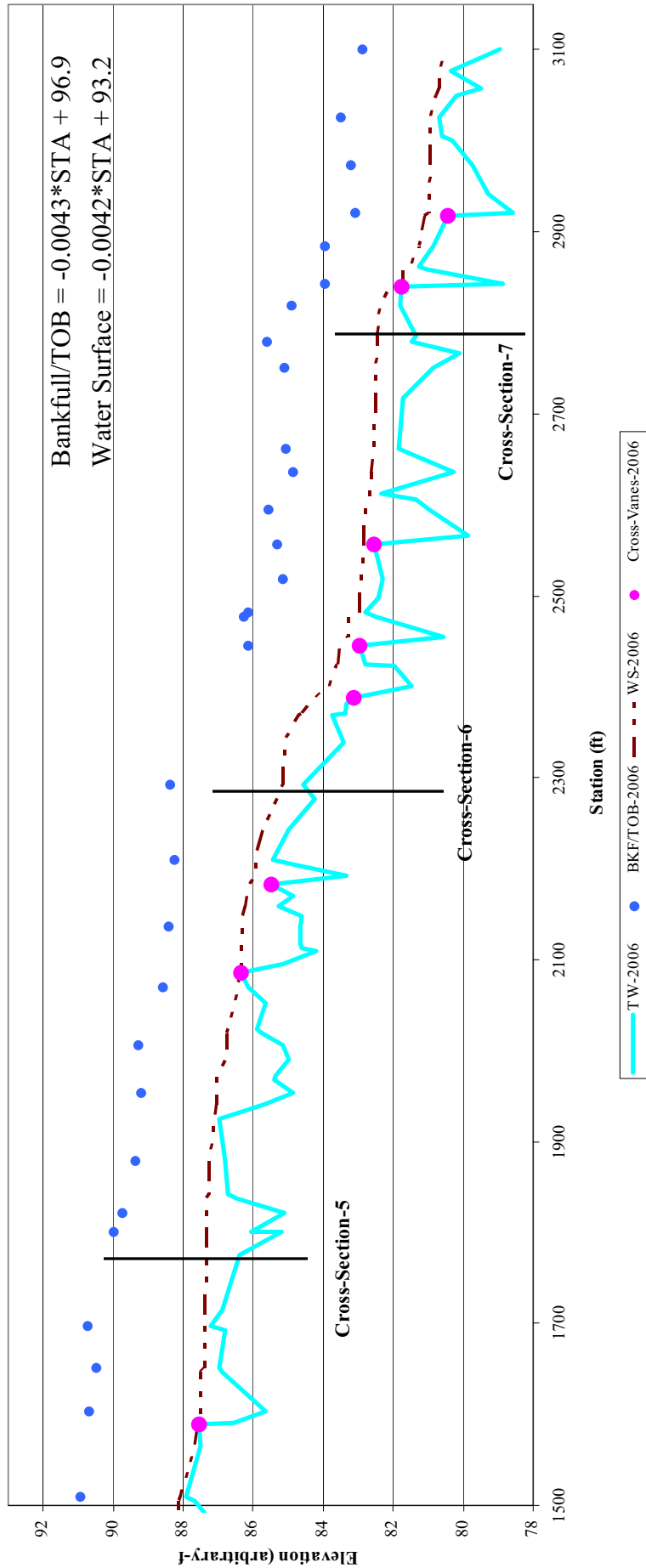
Back Creek Stream and Wetland Restoration Project
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Appendix B6. Longitudinal Plots and Raw Data Tables

Prepared For:



Back Creek
 Longitudinal Profile
 2006 Monitoring Year



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Appendix B6. Longitudinal Plots and Raw Data Tables



Name	Back Creek			
Task	Feature/Facet slope, length and spacing			
Reach	Main			
2006 RIFFLE SLOPE CALCS				
Station	Length	Water Elevation	Change	Slope
0		93.53		
33	33	93.17	0.36	1.09%
100		93.12		
155	55	93.1	0.02	0.04%
215		93.09		
263	48	92.58	0.51	1.06%
354.7		92.51		
416	61.3	91.81	0.7	1.14%
492		91.79		
567	75	91.34	0.45	0.60%
640		91.22		
696	56	91.21	0.01	0.02%
726		91.18		
802	76	91.17	0.01	0.01%
1083		89.71		
1139	56	89.64	0.07	0.12%
1186		89.57		
1257	71	89.15	0.42	0.59%
1297		89.1		
1324.2	27.2	88.63	0.47	1.73%
1379		88.61		
1436	57	88.15	0.46	0.81%
1509		88.1		
1566	57	87.67	0.43	0.75%
1698		87.38		
1775	77	87.33	0.05	0.06%
2209		85.94		
2277	68	85.31	0.63	0.93%
2482		82.97		
2518	36	82.93	0.04	0.11%
2661		82.54		
2717	56	82.49	0.05	0.09%
2862		81.53		
2917	55	81.08	0.45	0.82%
3026		80.93		
3050	24	80.77	0.16	0.67%
3077		80.68		
3101	24	80.48	0.2	0.83%

Name	Back Creek	
Task	Feature/Facet slope, length and spacing	
Reach	Main	
2006 POOL SPACING CALCS		
Station	p-p spacing (ft)	
85.3		
168	82.7	
291	123	
433	142	
590	157	
705	115	
849	144	
987	138	
1055	68	
1160	105	
1282	122	
1329	47	
1469	140	
1604	135	
1800	196	
1821	21	
1953	132	
2109	156	
2192	83	
2400	208	
2455	55	
2566	111	
2636	70	
2767	131	
2843	76	
2921	78	
3058	137	

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Appendix B6. Longitudinal Plots and Raw Data Tables

Name	Back Creek		
Task	Feature/Facet slope, length and spacing		
Reach	Main		
2006 POOL LENGTH CALCS			
Station (ft)	pool length (ft)	Station (ft)	pool length (ft)
33		1590	
100	67	1650	60
155		1775	
215	60	1842	67
263		1925	
354.7	91.7	2086	161
433		2087	
492	59	2183	96
567		2183	
606	39	2209	26
696		2388	
726	30	2425	37
802		2445	
897	95	2482	37
921		2556.8	
1050	129	2612	55.2
1055		2612	
1083	28	2661	49
1139		2717	
1186	47	2780	63
1258		2843	
1297	39	2862	19
1324.2		2917	
1379	54.8	3005	88
		3050	
		3077	27

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Appendix B6. Longitudinal Plots and Raw Data Tables

Prepared For:



Name	Back Creek		
Task	Pattern Measurements		
Reach	Main		
	Radius of Curvature	Meander Wavelength	Channel Beltwidth
	91.00	180	95
	90.00	210	80
	107.00	245	61
	77.00	260	76
	75.00	225	45
	78.00	260	72
	89.00	295	95
	80.00	270	117
	78.00	225	54
	80.00	190	65
	105.00	300	80
	91.00	370	65
	79.00	318	94
	67.00	300	116
		285	
		275	
		270	
		212	
		215	
		165	
Min	165	67	45
Max	370	107	117
Median	260	80	78

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Appendix B6. Longitudinal Plots and Raw Data Tables

Project Name: Back Creek					
Cross-Section: 1					
Feature: Ruffle					
Cross-Section # 1				2006	
Description	Material	Size (mm)	Total #	Item %	Cum %
Silt/Clay	silt/clay	0-0.062	0	0%	0%
	very fine sand	0.062-0.125	0	0%	0%
Sand	fine sand	0.125-0.25	25	24%	24%
	medium sand	0.25-0.50	8	8%	32%
	coarse sand	0.50-1.0	1	1%	33%
	very coarse sand	1.0-2.0	2	2%	35%
	very fine gravel	2.0-4.0	2	2%	37%
G r a v e l	fine gravel	4.0-5.7	1	1%	38%
	fine gravel	5.7-8.0	4	4%	41%
	medium gravel	8.0-11.3	7	7%	48%
	medium gravel	11.3-16.0	8	8%	56%
	course gravel	16.0-22.6	1	1%	57%
	course gravel	22.6-32.0	4	4%	61%
	very coarse gravel	32-45	16	15%	76%
	very coarse gravel	45-64	19	18%	94%
	small cobble	64-90	5	5%	99%
	medium cobble	90-128	1	1%	100%
Cobble	large cobble	128-180	0	0%	100%
	very large cobble	180-256	0	0%	100%
	small boulder	256-362	0	0%	100%
Boulder	small boulder	362-512	0	0%	100%
	medium boulder	512-1024	0	0%	100%
	large boulder	1024-2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			104	100%	100%

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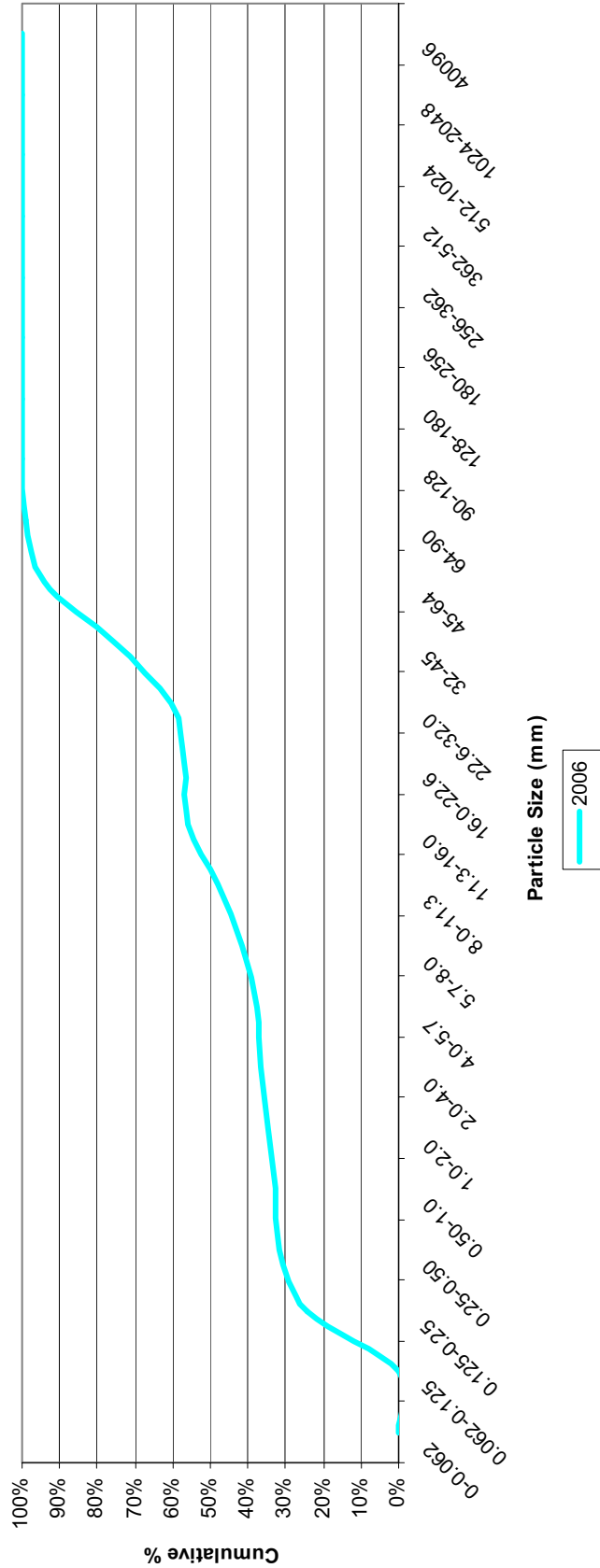


Back Creek Stream and Wetland Restoration Project
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Appendix B7. Pebble Counts and Raw Data Tables

Cross-Section #1-Riffle
Back Creek



Project Name: Back Creek			
Cross-Section: 1			
Feature: Riffle			
2006	d16	d35	d50
	0.21	2.40	12.47
		d84	d95
		53.36	68.16
			d100
			128.00

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Appendix B7. Pebble Counts and Raw Data Tables

Project Name: Back Creek					
Cross-Section: 2					
Feature: Pool					
Cross-Section # 2					2006
Description	Material	Size (mm)	Total #	Item %	Cum %
Silt/Clay	silt/clay	0-0.062	3	3%	3%
Sand	very fine sand	0.062-0.125	20	20%	23%
	fine sand	0.125-0.25	11	11%	34%
	medium sand	0.25-0.50	24	24%	58%
	coarse sand	0.50-1.0	4	4%	62%
G r a v e l	very coarse sand	1.0-2.0	10	10%	72%
	very fine gravel	2.0-4.0	2	2%	74%
	fine gravel	4.0-5.7	12	12%	86%
	fine gravel	5.7-8.0	5	5%	91%
	medium gravel	8.0-11.3	2	2%	93%
	medium gravel	11.3-16.0	2	2%	95%
	course gravel	16.0-22.6	0	0%	95%
	course gravel	22.6-32.0	0	0%	95%
	very coarse gravel	32-45	0	0%	95%
	very coarse gravel	45-64	1	1%	96%
Cobble	small cobble	64-90	2	2%	98%
	medium cobble	90-128	1	1%	99%
	large cobble	128-180	1	1%	100%
	very large cobble	180-256	0	0%	100%
Boulder	small boulder	256-362	0	0%	100%
	small boulder	362-512	0	0%	100%
	medium boulder	512-1024	0	0%	100%
	large boulder	1024-2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			100	100%	100%

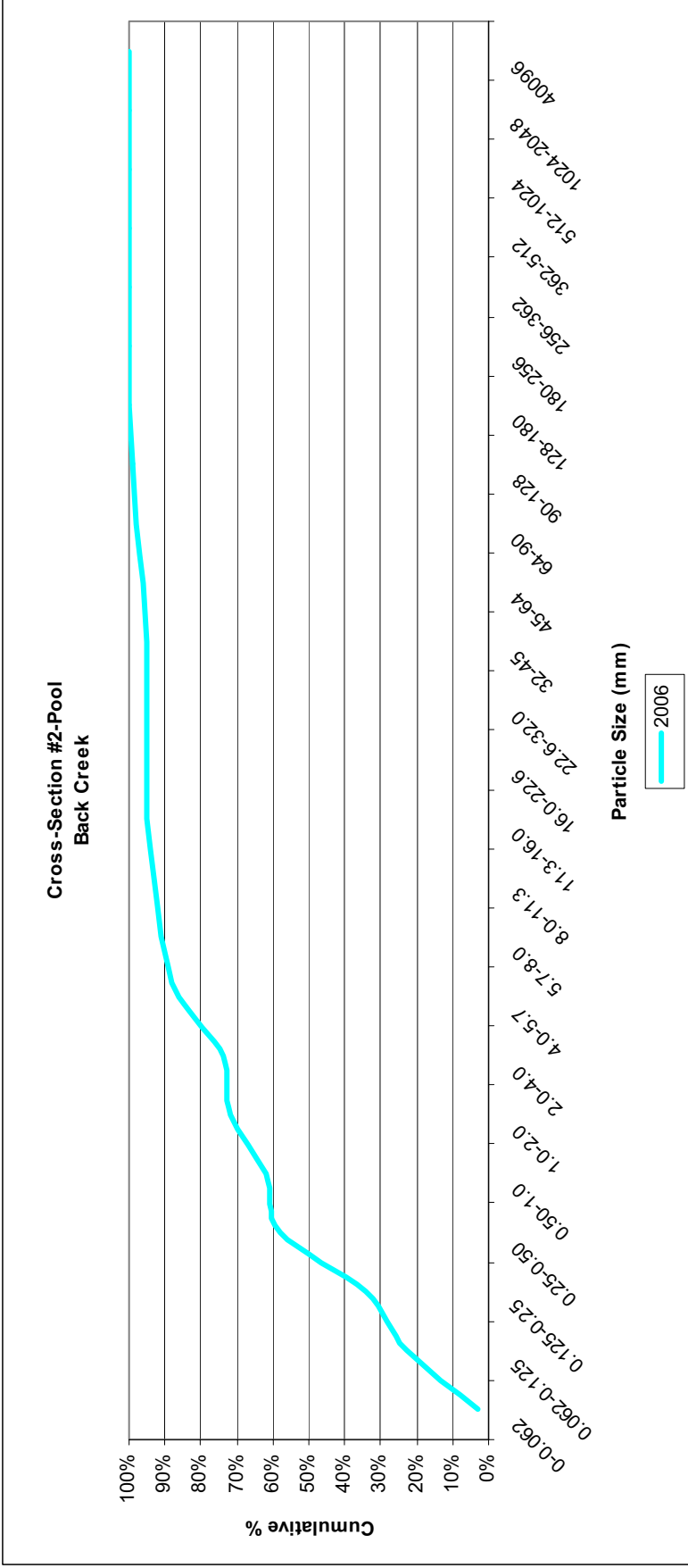
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Appendix B7. Pebble Counts and Raw Data Tables



Project Name: Back Creek					
Cross-Section: 2					
Feature: Pool					
2006	d16	d35	d50	d84	d100
	0.10	0.26	0.42	5.42	16.00
					179.99

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Appendix B7. Pebble Counts and Raw Data Tables

Project Name: Back Creek				
Cross-Section: 3				
Feature: Riffle				
Cross-Section # 3				2006
Description	Material	Size (mm)	Total #	Item %
Silt/Clay	silt/clay	0-0.062	0	0%
Sand	very fine sand	0.062-0.125	0	0%
	fine sand	0.125-0.25	15	15%
	medium sand	0.25-0.50	0	0%
	coarse sand	0.50-1.0	6	6%
	very coarse sand	1.0-2.0	0	0%
	very fine gravel	2.0-4.0	0	0%
	fine gravel	4.0-5.7	0	0%
	fine gravel	5.7-8.0	0	0%
	medium gravel	8.0-11.3	0	0%
	medium gravel	11.3-16.0	0	0%
G r a v e l	course gravel	16.0-22.6	0	0%
	course gravel	22.6-32.0	2	2%
	very coarse gravel	32-45	7	7%
	very coarse gravel	45-64	16	16%
	small cobble	64-90	34	34%
	medium cobble	90-128	15	15%
	large cobble	128-180	5	5%
	very large cobble	180-256	0	0%
	small boulder	256-362	0	0%
	small boulder	362-512	0	0%
Boulder	medium boulder	512-1024	0	0%
	large boulder	1024-2048	0	0%
Bedrock	bedrock	40096	0	0%
TOTAL % of whole count			100	100%

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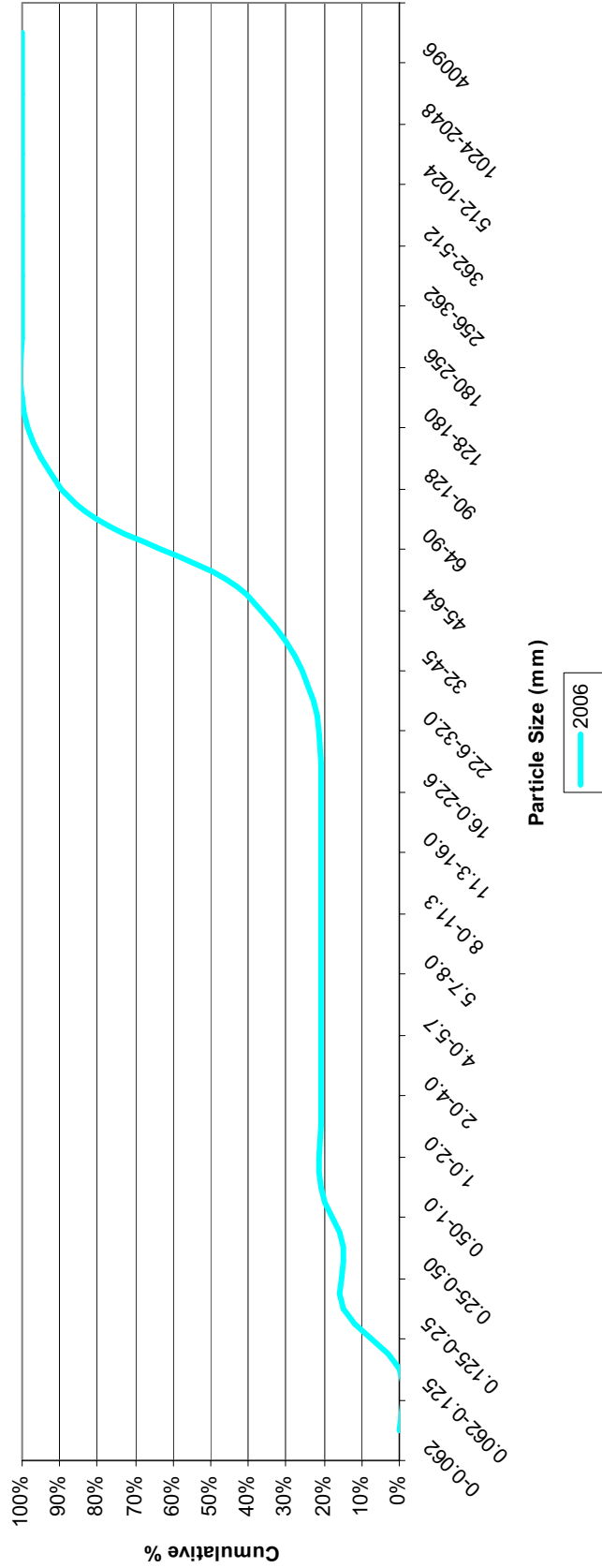
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Appendix B7. Pebble Counts and Raw Data Tables



Prepared For:

**Cross-Section #3-Riffle
Back Creek**



Project Name: Back Creek					
Cross-Section: 3					
Feature: Riffle					
2006	d16	d35	d50	d84	d95
	0.58	50.94	67.06	100.13	128.00
					180.00



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Appendix B7. Pebble Counts and Raw Data Tables

Project Name: Back Creek					
Cross-Section: 4					
Feature: Pool					
Cross-Section # 4					2006
Description	Material	Size (mm)	Total #	Item %	Cum %
Silt/Clay	silt/clay	0-0.062	6	6%	6%
	very fine sand	0.062-0.125	17	17%	23%
Sand	fine sand	0.125-0.25	10	10%	33%
	medium sand	0.25-0.50	20	20%	53%
	coarse sand	0.50-1.0	12	12%	65%
	very coarse sand	1.0-2.0	4	4%	69%
	very fine gravel	2.0-4.0	6	6%	75%
G r a v e l	fine gravel	4.0-5.7	10	10%	85%
	fine gravel	5.7-8.0	0	0%	85%
	medium gravel	8.0-11.3	5	5%	90%
	medium gravel	11.3-16.0	6	6%	96%
	course gravel	16.0-22.6	0	0%	96%
	course gravel	22.6-32.0	0	0%	96%
	very coarse gravel	32-45	1	1%	97%
	very coarse gravel	45-64	0	0%	97%
Cobble	small cobble	64-90	1	1%	98%
	medium cobble	90-128	0	0%	98%
	large cobble	128-180	2	2%	100%
	very large cobble	180-256	0	0%	100%
Boulder	small boulder	256-362	0	0%	100%
	small boulder	362-512	0	0%	100%
	medium boulder	512-1024	0	0%	100%
	large boulder	1024-2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			100	100%	100%

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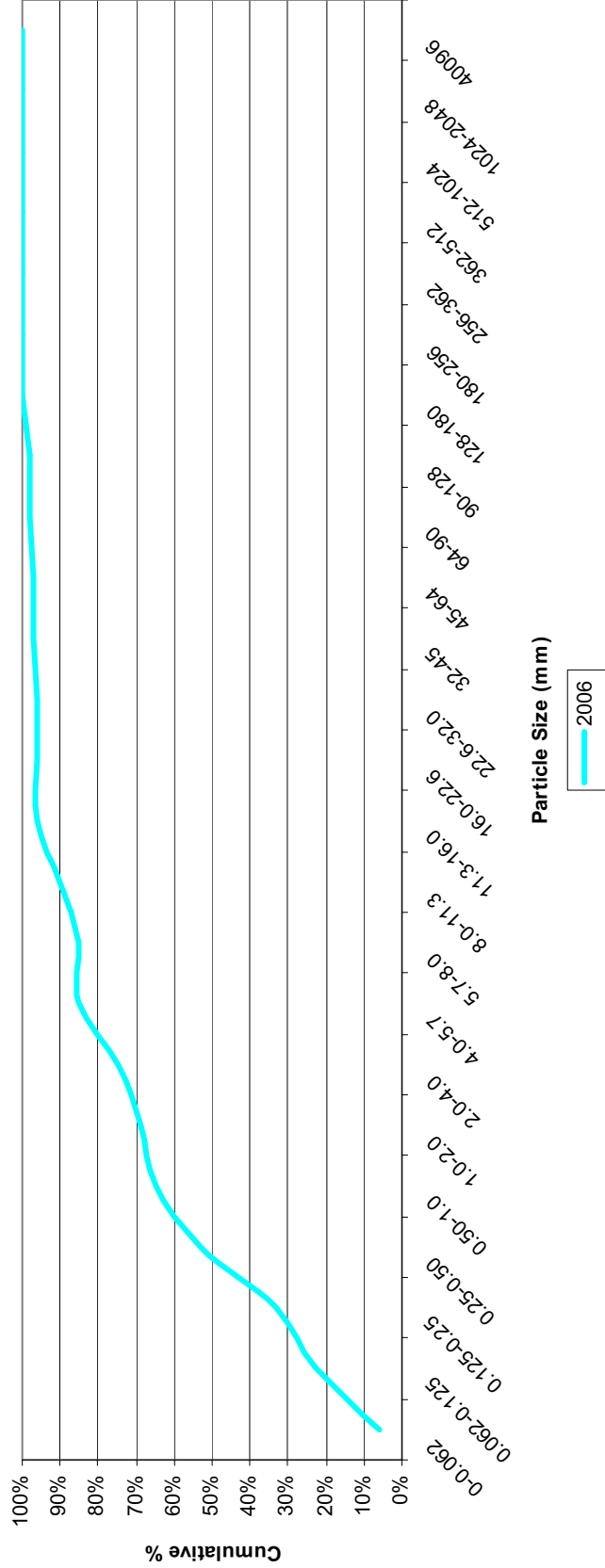


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Appendix B7. Pebble Counts and Raw Data Tables

Cross-Section #4-Pool
Back Creek



Project Name: Back Creek						
Cross-Section: 4						
Feature: Pool						
2006	d16	d35	d50	d84	d95	d100
	0.10	0.28	0.46	5.53	15.22	180.00

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Appendix B7. Pebble Counts and Raw Data Tables

Prepared For:



Project Name: Back Creek					
Cross-Section: 5					
Feature: Ruffle					
Cross-Section # 5					2006
Description	Material	Size (mm)	Total #	Item %	Cum %
Sand	Silt/clay	0-0.062	0	0%	0%
	very fine sand	0.062-0.125	1	1%	1%
	fine sand	0.125-0.25	9	9%	10%
	medium sand	0.25-0.50	7	7%	17%
	coarse sand	0.50-1.0	15	15%	32%
	very coarse sand	1.0-2.0	2	2%	34%
	very fine gravel	2.0-4.0	9	9%	43%
	fine gravel	4.0-5.7	2	2%	45%
	fine gravel	5.7-8.0	1	1%	46%
	medium gravel	8.0-11.3	6	6%	52%
G r a v e l	medium gravel	11.3-16.0	4	4%	56%
	course gravel	16.0-22.6	8	8%	64%
	course gravel	22.6-32.0	13	13%	77%
	very coarse gravel	32-45	10	10%	87%
	very coarse gravel	45-64	9	9%	96%
	small cobble	64-90	2	2%	98%
	medium cobble	90-128	2	2%	100%
	large cobble	128-180	0	0%	100%
	very large cobble	180-256	0	0%	100%
	small boulder	256-362	0	0%	100%
Boulder	small boulder	362-512	0	0%	100%
	medium boulder	512-1024	0	0%	100%
	large boulder	1024-2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			100	100%	100%

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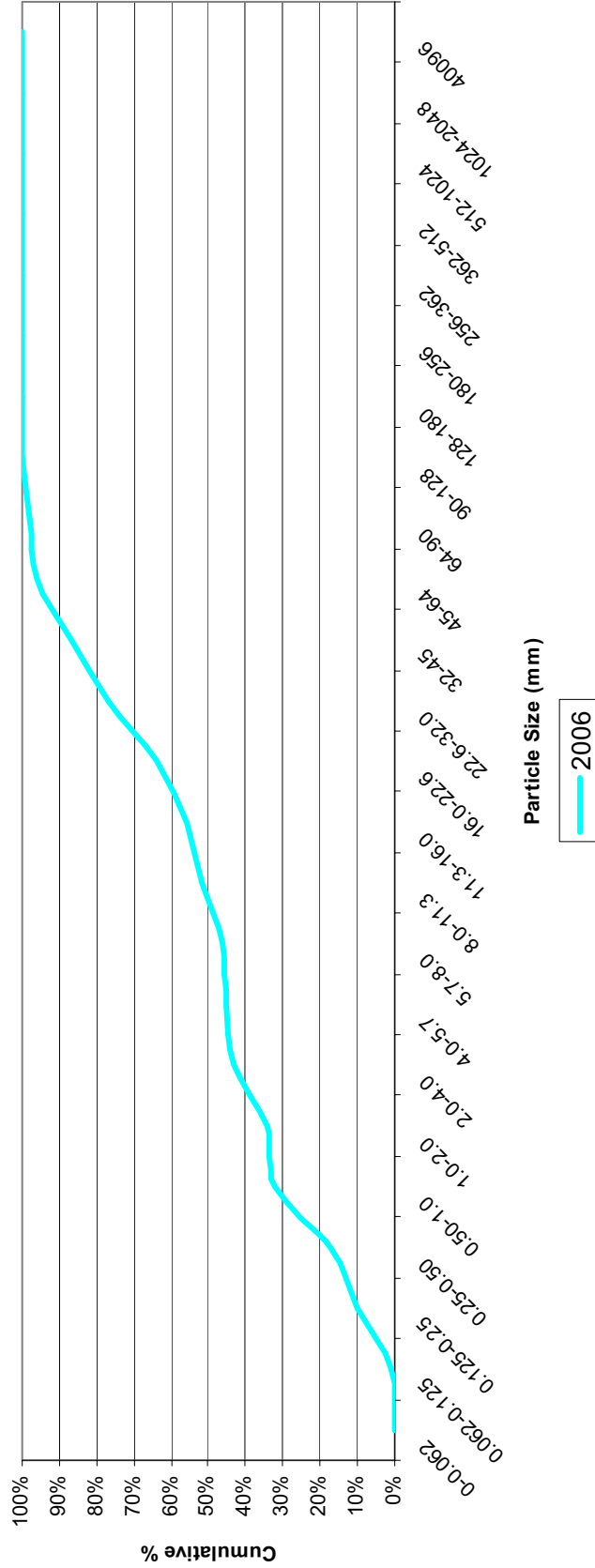


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Appendix B7. Pebble Counts and Raw Data Tables

Cross-Section #5-Riffle
Back Creek



Project Name: Back Creek						
Cross-Section: 5						
Feature: Riffle						
2006	d16	d35	d50	d84	d95	d100
	0.46	2.22	10.20	41.10	61.89	128.00

Date: March 2007
Project No.: 17

Back Creek Stream and Wetland Restoration Project
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Appendix B7. Pebble Counts and Raw Data Tables

Project Name: Back Creek					
Cross-Section: 6					
Feature: Pool					
Cross-Section # 6					
Description	Material	Size (mm)	Total #	Item %	Cum %
Silt/Clay	silt/clay	0-0.062	0	0%	0%
	very fine sand	0.062-0.125	0	0%	0%
Sand	fine sand	0.125-0.25	8	8%	8%
	medium sand	0.25-0.50	5	5%	13%
	coarse sand	0.50-1.0	7	7%	20%
	very coarse sand	1.0-2.0	6	6%	26%
	very fine gravel	2.0-4.0	0	0%	26%
	fine gravel	4.0-5.7	0	0%	26%
	fine gravel	5.7-8.0	0	0%	26%
G r a v e l	medium gravel	8.0-11.3	2	2%	28%
	medium gravel	11.3-16.0	3	3%	31%
	course gravel	16.0-22.6	8	8%	39%
	course gravel	22.6-32.0	14	14%	53%
	very coarse gravel	32-45	13	13%	66%
	very coarse gravel	45-64	16	16%	82%
	small cobble	64-90	10	10%	92%
	medium cobble	90-128	6	6%	98%
Cobble	large cobble	128-180	2	2%	100%
	very large cobble	180-256	0	0%	100%
	small boulder	256-362	0	0%	100%
Boulder	small boulder	362-512	0	0%	100%
	medium boulder	512-1024	0	0%	100%
	large boulder	1024-2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			100	100%	100%

Date: March 2007
Project No.: 17

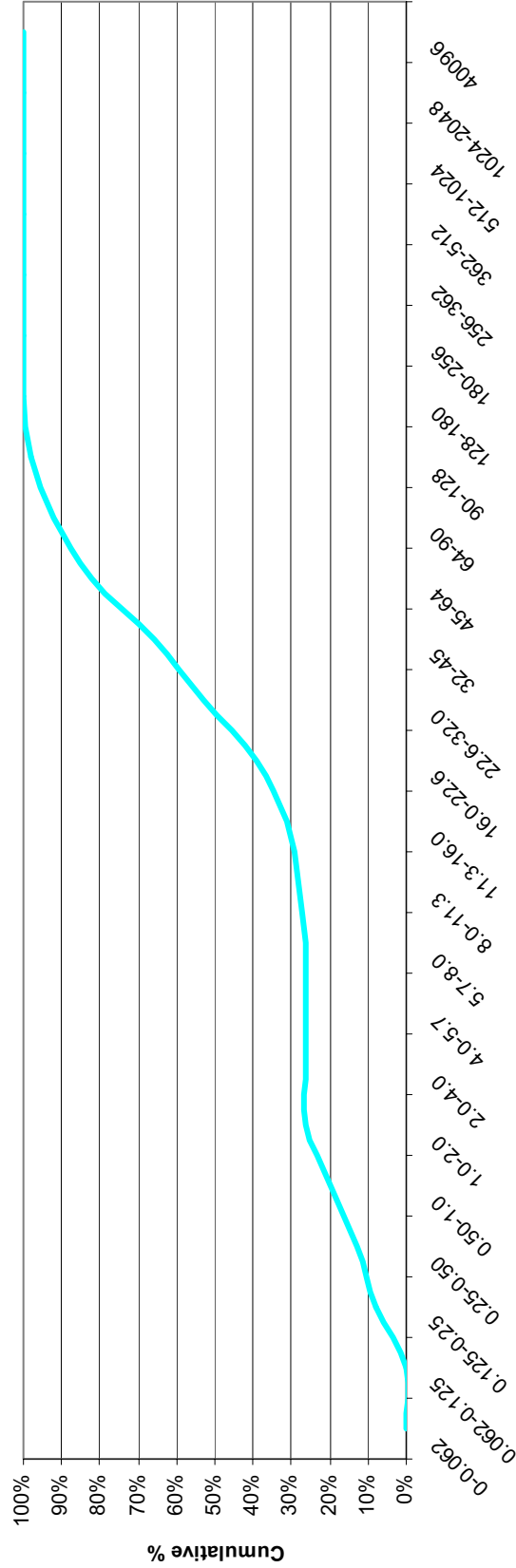


Back Creek Stream and Wetland Restoration Project
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Appendix B7. Pebble Counts and Raw Data Tables

Cross-Section #6-Pool
Back Creek



Particle Size (mm)

2006

Project Name: Back Creek					
Cross-Section: 6					
Feature: Pool					
2006	d16	d35	d50	d84	d100
	0.71	19.30	29.99	69.20	109.00
					180.00

Prepared For:


Back Creek Stream and Wetland Restoration Project
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Date: March 2007
 Project No.: 17



Appendix B7. Pebble Counts and Raw Data Tables

Project Name: Back Creek					
Cross-Section: 7					
Feature: Riffle					
Cross-Section # 7					
Description	Material	Size (mm)	Total #	Item %	Cum %
Silt/Clay	silt/clay	0-0.062	0	0%	0%
Sand	very fine sand	0.062-0.125	1	1%	1%
	fine sand	0.125-0.25	3	3%	4%
	medium sand	0.25-0.50	16	16%	20%
	coarse sand	0.50-1.0	9	9%	29%
	very coarse sand	1.0-2.0	10	10%	39%
G r a v e l	very fine gravel	2.0-4.0	5	5%	44%
	fine gravel	4.0-5.7	8	8%	52%
	fine gravel	5.7-8.0	3	3%	55%
	medium gravel	8.0-11.3	7	7%	62%
	medium gravel	11.3-16.0	7	7%	69%
	course gravel	16.0-22.6	4	4%	73%
	course gravel	22.6-32.0	8	8%	81%
	very coarse gravel	32-45	3	3%	84%
	very coarse gravel	45-64	10	10%	94%
	small cobble	64-90	4	4%	98%
Cobble	medium cobble	90-128	1	1%	99%
	large cobble	128-180	1	1%	100%
	very large cobble	180-256	0	0%	100%
Boulder	small boulder	256-362	0	0%	100%
	small boulder	362-512	0	0%	100%
	medium boulder	512-1024	0	0%	100%
	large boulder	1024-2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			100	100%	100%

Date: March 2007
Project No.: 17

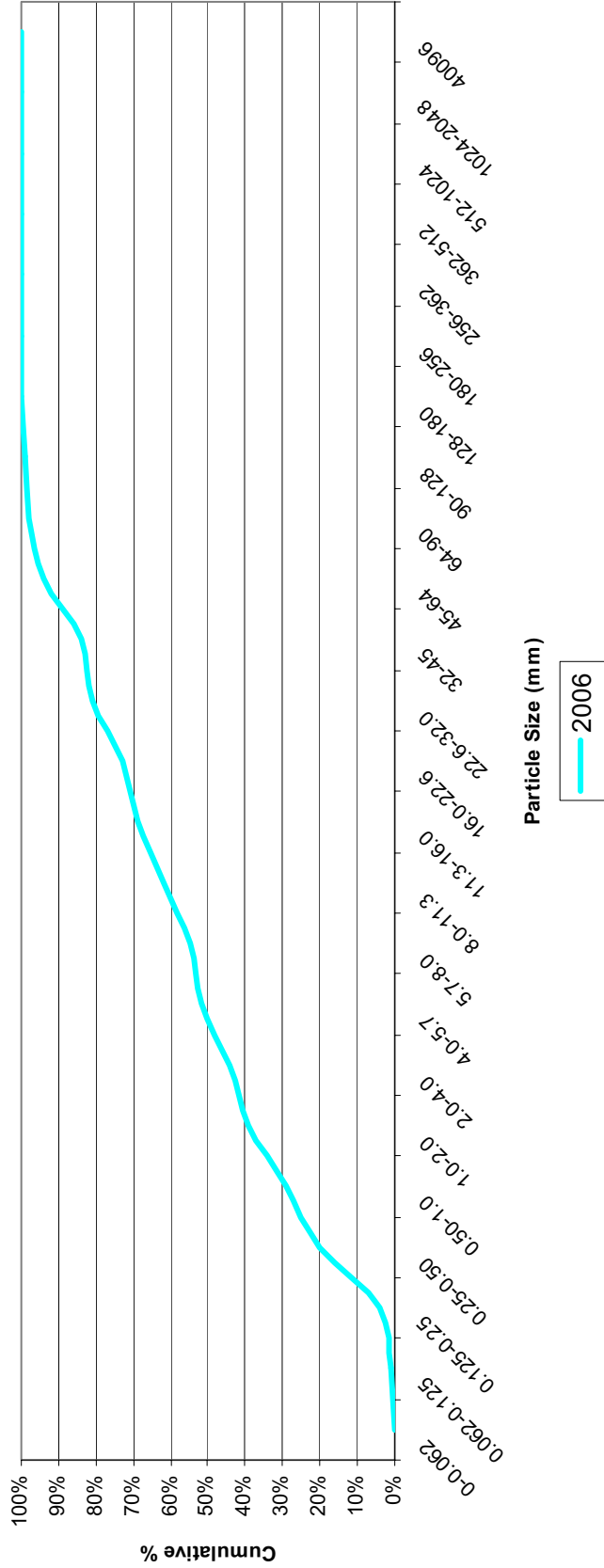


Back Creek Stream and Wetland Restoration Project
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Appendix B7. Pebble Counts and Raw Data Tables

Cross-Section #7-Riffle
Back Creek



Project Name: Back Creek					
Cross-Section: 7					
Feature: Riffle					
2006	d16	d35	d50	d84	d100
	0.44	1.60	5.27	45.00	179.99
				70.50	

Date: March 2007
Project No.: 17



Back Creek Stream and Wetland Restoration Project
Year 1 of 5 Monitoring



Prepared For:

Appendix B7. Pebble Counts and Raw Data Tables

APPENDIX C

Wetland Raw Data*

- 1. Data Tables for Hydrological Data**
- 2. Precipitation – Water Level Plots for Well**

*Raw data tables have been provided electronically.

Ecozone Unit: Level Loggers = Well 1
 Serial Number: 000019BE9013
 Probe Number: 00001032283

Date	Time	Level	Units
3/29/2006	7:00	1.3	in
3/30/2006	7:00	1.4	in
3/31/2006	7:00	1.5	in
4/1/2006	7:00	1.7	in
4/2/2006	7:00	1.6	in
4/3/2006	7:00	1.7	in
4/4/2006	7:00	1.6	in
4/5/2006	7:00	1.6	in
4/6/2006	7:00	1.7	in
4/7/2006	7:00	1.7	in
4/8/2006	7:00	1.9	in
4/9/2006	7:00	1.7	in
4/10/2006	7:00	1.7	in
4/11/2006	7:00	1.8	in
4/12/2006	7:00	1.9	in
4/13/2006	7:00	1.8	in
4/14/2006	7:00	2	in
4/15/2006	7:00	2.1	in
4/16/2006	7:00	2.1	in
4/17/2006	7:00	2.1	in
4/18/2006	7:00	2.1	in
4/19/2006	7:00	2.2	in
4/20/2006	7:00	2.3	in
4/22/2006	7:00	2.4	in
4/23/2006	7:00	2.4	in
4/24/2006	7:00	2.4	in
4/25/2006	7:00	2.4	in
4/26/2006	7:00	2.5	in
4/27/2006	7:00	2.5	in
4/28/2006	7:00	2.4	in
4/29/2006	7:00	2.4	in
4/30/2006	7:00	2.4	in
5/1/2006	7:00	2.4	in
5/2/2006	7:00	2.4	in
5/3/2006	7:00	2.5	in
5/4/2006	7:00	2.4	in
5/5/2006	7:00	2.6	in
5/6/2006	7:00	2.6	in
5/7/2006	7:00	2.6	in
5/8/2006	7:00	2.5	in
5/9/2006	7:00	2.4	in
5/10/2006	7:00	2.4	in
5/11/2006	7:00	2.6	in
5/12/2006	7:00	2.5	in
5/13/2006	7:00	2.5	in
5/14/2006	7:00	2.6	in
5/15/2006	7:00	2.5	in
5/16/2006	7:00	2.5	in
5/17/2006	7:00	2.5	in
5/18/2006	7:00	2.5	in
5/19/2006	7:00	2.5	in
5/20/2006	7:00	2.7	in
5/21/2006	7:00	2.7	in
5/22/2006	7:00	2.7	in
5/23/2006	7:00	2.7	in
5/24/2006	7:00	2.7	in
5/25/2006	7:00	2.7	in
5/26/2006	7:00	2.7	in
5/27/2006	7:00	3.1	in
5/28/2006	7:00	3.1	in
5/29/2006	7:00	3.1	in
5/30/2006	7:00	3.1	in
5/31/2006	7:00	2.8	in

Ecozone Unit: Level Loggers = Well 2
 Serial Number: 000019BE6ECTE
 Probe Number: 00001032CEE

Date	Time	Level	Units
3/29/2006	7:00	-0.9	in
3/30/2006	7:00	-1.6	in
3/31/2006	7:00	-2.5	in
4/1/2006	7:00	-2.2	in
4/2/2006	7:00	-3.4	in
4/3/2006	7:00	-4.2	in
4/4/2006	7:00	-5.3	in
4/5/2006	7:00	-6.7	in
4/6/2006	7:00	-8.5	in
4/7/2006	7:00	-8.8	in
4/8/2006	7:00	-9.8	in
4/9/2006	7:00	-6.2	in
4/10/2006	7:00	-8.8	in
4/11/2006	7:00	-10.6	in
4/12/2006	7:00	-11.4	in
4/13/2006	7:00	-11.9	in
4/14/2006	7:00	-12	in
4/15/2006	7:00	-13.2	in
4/16/2006	7:00	-14.3	in
4/17/2006	7:00	-15.3	in
4/18/2006	7:00	-13.9	in
4/19/2006	7:00	-14.3	in
4/20/2006	7:00	-5.7	in
4/21/2006	7:00	-8	in
4/22/2006	7:00	-6.6	in
4/23/2006	7:00	-0.2	in
4/24/2006	7:00	-4.7	in
4/25/2006	7:00	-7.3	in
4/26/2006	7:00	-10.1	in
4/27/2006	7:00	-10	in
4/28/2006	7:00	2.1	in
4/29/2006	7:00	-0.3	in
4/30/2006	7:00	-3.7	in
5/1/2006	7:00	-5.9	in
5/2/2006	7:00	-9.2	in
5/3/2006	7:00	-11	in
5/4/2006	7:00	-13.7	in
5/5/2006	7:00	-15.3	in
5/6/2006	7:00	-14.7	in
5/7/2006	7:00	-16.1	in
5/8/2006	7:00	-10.9	in
5/9/2006	7:00	-10.7	in
5/10/2006	7:00	-11.2	in
5/11/2006	7:00	-12.2	in
5/12/2006	7:00	-14.3	in
5/13/2006	7:00	-16.9	in
5/14/2006	7:00	-17.6	in
5/15/2006	7:00	-18.3	in
5/16/2006	7:00	-18.6	in
5/17/2006	7:00	-20.4	in
5/18/2006	7:00	-21.2	in
5/19/2006	7:00	-22	in
5/20/2006	7:00	-22.2	in
5/21/2006	7:00	-21	in
5/22/2006	7:00	-21.6	in
5/23/2006	7:00	-21.7	in
5/24/2006	7:00	-23.1	in
5/25/2006	7:00	-23.5	in
5/26/2006	7:00	-24.1	in
5/27/2006	7:00	-16.8	in
5/28/2006	7:00	-16.8	in
5/29/2006	7:00	-17.8	in
5/30/2006	7:00	-18.6	in
5/31/2006	7:00	-21.3	in

Ecozone Unit: Level Loggers = Well 3
 Serial Number: 000019BEA425
 Probe Number: 000010379C4

Date	Time	Level	Units
3/29/2006	7:00	1.5	in
3/30/2006	7:00	1.2	in
3/31/2006	7:00	1.1	in
4/1/2006	7:00	1.6	in
4/2/2006	7:00	1.2	in
4/3/2006	7:00	1.1	in
4/4/2006	7:00	0.7	in
4/5/2006	7:00	0	in
4/6/2006	7:00	-1.1	in
4/7/2006	7:00	-2.2	in
4/8/2006	7:00	-0.8	in
4/9/2006	7:00	1	in
4/10/2006	7:00	-0.3	in
4/11/2006	7:00	-1.4	in
4/12/2006	7:00	-2.9	in
4/13/2006	7:00	-3.3	in
4/14/2006	7:00	-3.8	in
4/15/2006	7:00	-5.8	in
4/16/2006	7:00	-6.8	in
4/17/2006	7:00	-8.5	in
4/18/2006	7:00	-5.2	in
4/19/2006	7:00	-7.7	in
4/20/2006	7:00	1.7	in
4/21/2006	7:00	0.3	in
4/22/2006	7:00	1.9	in
4/23/2006	7:00	2.9	in
4/24/2006	7:00	1.6	in
4/25/2006	7:00	-0.1	in
4/26/2006	7:00	-3.1	in
4/27/2006	7:00	3.2	in
4/28/2006	7:00	3	in
4/29/2006	7:00	2.3	in
4/30/2006	7:00	0.8	in
5/1/2006	7:00	0	in
5/2/2006	7:00	-3.3	in
5/3/2006	7:00	-5.7	in
5/4/2006	7:00	-8.8	in
5/5/2006	7:00	-10.1	in
5/6/2006	7:00	-6.7	in
5/7/2006	7:00	-10.1	in
5/8/2006	7:00	-1	in
5/9/2006	7:00	-2.4	in
5/10/2006	7:00	-4.6	in
5/11/2006	7:00	-8.6	in
5/12/2006	7:00	-8.6	in
5/13/2006	7:00	-12.2	in
5/14/2006	7:00	-12.6	in
5/15/2006	7:00	-14.1	in
5/16/2006	7:00	-18.4	in
5/17/2006	7:00	-18	in
5/18/2006	7:00	-18.2	in
5/19/2006	7:00	-18.8	in
5/20/2006	7:00	-18.8	in
5/21/2006	7:00	-14.6	in
5/22/2006	7:00	-17.8	in
5/23/2006	7:00	-15.7	in
5/24/2006	7:00	-18.8	in
5/25/2006	7:00	-21	in
5/26/2006	7:00	-22.5	in
5/27/2006	7:00	-0.3	in
5/28/2006	7:00	-8	in
5/29/2006	7:00	-12.6	in
5/30/2006	7:00	-15.3	in
5/31/2006	7:00	-18.1	in

Rain Gauge

Date	Time	Level	Units
29-Mar-2006	23:59:59	0	in
30-Mar-2006	23:59:59	0	in
31-Mar-2006	23:59:59	0	in
01-Apr-2006	23:59:59	0.05	in
02-Apr-2006	23:59:59	0	in
03-Apr-2006	23:59:59	0.07	in
04-Apr-2006	23:59:59	0	in
05-Apr-2006	23:59:59	0	in
06-Apr-2006	23:59:59	0	in
07-Apr-2006	23:59:59	0.18	in
08-Apr-2006	23:59:59	0	in
09-Apr-2006	23:59:59	0	in
10-Apr-2006	23:59:59	0	in
11-Apr-2006	23:59:59	0	in
12-Apr-2006	23:59:59	0	in
13-Apr-2006	23:59:59	0	in
14-Apr-2006	23:59:59	0	in
15-Apr-2006	23:59:59	0	in
16-Apr-2006	23:59:59	0.16	in
17-Apr-2006	23:59:59	0	in
18-Apr-2006	23:59:59	0	in
19-Apr-2006	23:59:59	0.3	in
20-Apr-2006	23:59:59	0.03	in
21-Apr-2006	23:59:59	0.01	in
22-Apr-2006	23:59:59	0.01	in
23-Apr-2006	23:59:59	0.01	in
24-Apr-2006	23:59:59	0.01	in
25-Apr-2006	23:59:59	0.01	in
26-Apr-2006	23:59:59	0	in
27-Apr-2006	23:59:59	0	in
28-Apr-2006	23:59:59	0.01	in
29-Apr-2006	23:59:59	0	in
30-Apr-2006	23:59:59	0	in
01-May-2006	23:59:59	0.01	in
02-May-2006	23:59:59	0	in
03-May-2006	23:59:59	0	in
04-May-2006	23:59:59	0	in
05-May-2006	23:59:59	0.03	in
06-May-2006	23:59:59	0.03	in
07-May-2006	23:59:59	0.25	in
08-May-2006	23:59:59	0.01	in
09-May-2006	23:59:59	0	in
10-May-2006	23:59:59	0	in
11-May-2006	23:59:59	0	in
12-May-2006	23:59:59	0	in
13-May-2006	23:59:59	0	in
14-May-2006	23:59:59	0.11	in
15-May-2006	23:59:59	0	in
16-May-2006	23:59:59	0	in
17-May-2006	23:59:59	0	in
18-May-2006	23:59:59	0.05	in
19-May-2006	23:59:59	0	in
20-May-2006	23:59:59	0.28	in
21-May-2006	23:59:59	0	in
22-May-2006	23:59:59	0.07	in
23-May-2006	23:59:59	0	in
24-May-2006	23:59:59	0	in
25-May-2006	23:59:59	0	in
26-May-2006	23:59:59	0.34	in
27-May-2006	23:59:59	0.06	in
28-May-2006	23:59:59	0.01	in
29-May-2006	23:59:59	0	in
30-May-2006	23:59:59	0	in
31-May-2006	23:59:59	0	in

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Appendix C1. Data Tables for Hydrological Data

Ecotone Unit: Level Logger = Well 1
 Serial Number: 000009BE9413
 Probe Number: 000001D32253

6/1/2006	7.00	3.2	in
6/2/2006	7.00	-2.2	in
6/3/2006	7.00	-23.7	in
6/4/2006	7.00	-23.8	in
6/5/2006	7.00	-24.1	in
6/6/2006	7.00	-24.7	in
6/7/2006	7.00	-25	in
6/8/2006	7.00	-25.3	in
6/9/2006	7.00	-26.1	in
6/10/2006	7.00	-27	in
6/11/2006	7.00	-28	in
6/12/2006	7.00	-24.9	in
6/13/2006	7.00	-23.6	in
6/14/2006	7.00	-18.2	in
6/15/2006	7.00	4.1	in
6/16/2006	7.00	3.5	in
6/17/2006	7.00	0.2	in
6/18/2006	7.00	-4.6	in
6/19/2006	7.00	-9	in
6/20/2006	7.00	-12.2	in
6/21/2006	7.00	-14.4	in
6/22/2006	7.00	-16.3	in
6/23/2006	7.00	-18.1	in
6/24/2006	7.00	-18.6	in
6/25/2006	7.00	-18.7	in
6/26/2006	7.00	-18.4	in
6/27/2006	7.00	-13.1	in
6/28/2006	7.00	4.4	in
6/29/2006	7.00	1.1	in
6/30/2006	7.00	-4.4	in
7/1/2006	7.00	-9.2	in
7/2/2006	7.00	-12.2	in
7/3/2006	7.00	-14.6	in
7/4/2006	7.00	-16.4	in
7/5/2006	7.00	-17.9	in
7/6/2006	7.00	-19	in
7/7/2006	7.00	-14.8	in
7/8/2006	7.00	-16.2	in
7/9/2006	7.00	-17.9	in
7/10/2006	7.00	-19.2	in
7/11/2006	7.00	-20.4	in
7/12/2006	7.00	-21.7	in
7/13/2006	7.00	-23.1	in
7/14/2006	7.00	-24.2	in
7/15/2006	7.00	-24.9	in
7/16/2006	7.00	-25.7	in
7/17/2006	7.00	-27.2	in
7/18/2006	7.00	-28.4	in
7/19/2006	7.00	-29.9	in
7/20/2006	7.00	-30.8	in
7/21/2006	7.00	-31.6	in
7/22/2006	7.00	-32.2	in
7/23/2006	7.00	-27.3	in
7/24/2006	7.00	-25.9	in
7/25/2006	7.00	-25	in
7/26/2006	7.00	-24.8	in
7/27/2006	7.00	-25	in
7/28/2006	7.00	-26	in
7/29/2006	7.00	-27.5	in
7/30/2006	7.00	-28.5	in
7/31/2006	7.00	-30.1	in

Ecotone Unit: Level Logger = Well 2
 Serial Number: 000009BE6ECTE
 Probe Number: 000001D32253

6/1/2006	7.00	-22.2	in
6/2/2006	7.00	-23.7	in
6/3/2006	7.00	-23.8	in
6/4/2006	7.00	-24.1	in
6/5/2006	7.00	-24.7	in
6/6/2006	7.00	-25	in
6/7/2006	7.00	-25.3	in
6/8/2006	7.00	-26.1	in
6/9/2006	7.00	-27	in
6/10/2006	7.00	-28	in
6/11/2006	7.00	-24.9	in
6/12/2006	7.00	-23.6	in
6/13/2006	7.00	-18.2	in
6/14/2006	7.00	4.1	in
6/15/2006	7.00	3.5	in
6/16/2006	7.00	0.2	in
6/17/2006	7.00	-4.6	in
6/18/2006	7.00	-9	in
6/19/2006	7.00	-12.2	in
6/20/2006	7.00	-14.4	in
6/21/2006	7.00	-16.3	in
6/22/2006	7.00	-18.1	in
6/23/2006	7.00	-18.6	in
6/24/2006	7.00	-18.7	in
6/25/2006	7.00	-18.4	in
6/26/2006	7.00	-13.1	in
6/27/2006	7.00	4.4	in
6/28/2006	7.00	1.1	in
6/29/2006	7.00	-4.4	in
6/30/2006	7.00	-9.2	in
7/1/2006	7.00	-12.2	in
7/2/2006	7.00	-14.6	in
7/3/2006	7.00	-16.4	in
7/4/2006	7.00	-17.9	in
7/5/2006	7.00	-19	in
7/6/2006	7.00	-14.8	in
7/7/2006	7.00	-16.2	in
7/8/2006	7.00	-17.9	in
7/9/2006	7.00	-19.2	in
7/10/2006	7.00	-20.4	in
7/11/2006	7.00	-21.7	in
7/12/2006	7.00	-23.1	in
7/13/2006	7.00	-24.2	in
7/14/2006	7.00	-24.9	in
7/15/2006	7.00	-25.7	in
7/16/2006	7.00	-27.2	in
7/17/2006	7.00	-28.4	in
7/18/2006	7.00	-29.9	in
7/19/2006	7.00	-30.8	in
7/20/2006	7.00	-31.6	in
7/21/2006	7.00	-32.2	in
7/22/2006	7.00	-27.3	in
7/23/2006	7.00	-25.9	in
7/24/2006	7.00	-25	in
7/25/2006	7.00	-24.8	in
7/26/2006	7.00	-25	in
7/27/2006	7.00	-26	in
7/28/2006	7.00	-27.5	in
7/29/2006	7.00	-28.5	in
7/30/2006	7.00	-30.1	in
7/31/2006	7.00	-30.1	in

Ecotone Unit: Level Logger = Well 3
 Serial Number: 000009BE4A25
 Probe Number: 000001D379C4

6/1/2006	7.00	-17.8	in
6/2/2006	7.00	-18.6	in
6/3/2006	7.00	-17	in
6/4/2006	7.00	-18.1	in
6/5/2006	7.00	-18.5	in
6/6/2006	7.00	-18.9	in
6/7/2006	7.00	-21.4	in
6/8/2006	7.00	-22.2	in
6/9/2006	7.00	-23.8	in
6/10/2006	7.00	-23.8	in
6/11/2006	7.00	-11.8	in
6/12/2006	7.00	-12	in
6/13/2006	7.00	0.9	in
6/14/2006	7.00	4.5	in
6/15/2006	7.00	3.4	in
6/16/2006	7.00	1.4	in
6/17/2006	7.00	-1.1	in
6/18/2006	7.00	-6	in
6/19/2006	7.00	-9.8	in
6/20/2006	7.00	-11.9	in
6/21/2006	7.00	-13.9	in
6/22/2006	7.00	-15.5	in
6/23/2006	7.00	-16.6	in
6/24/2006	7.00	-13.6	in
6/25/2006	7.00	-12.8	in
6/26/2006	7.00	-12.8	in
6/27/2006	7.00	-2.1	in
6/28/2006	7.00	3.5	in
6/29/2006	7.00	2	in
6/30/2006	7.00	-1.4	in
7/1/2006	7.00	-5.8	in
7/2/2006	7.00	-9.6	in
7/3/2006	7.00	-12.3	in
7/4/2006	7.00	-14.2	in
7/5/2006	7.00	-15	in
7/6/2006	7.00	-15.5	in
7/7/2006	7.00	-7.2	in
7/8/2006	7.00	-11.6	in
7/9/2006	7.00	-14.1	in
7/10/2006	7.00	-15	in
7/11/2006	7.00	-17.4	in
7/12/2006	7.00	-18.5	in
7/13/2006	7.00	-20	in
7/14/2006	7.00	-21.2	in
7/15/2006	7.00	-21.7	in
7/16/2006	7.00	-22.7	in
7/17/2006	7.00	-23.8	in
7/18/2006	7.00	-24.8	in
7/19/2006	7.00	-25.2	in
7/20/2006	7.00	-26.4	in
7/21/2006	7.00	-27	in
7/22/2006	7.00	-27.6	in
7/23/2006	7.00	-15	in
7/24/2006	7.00	-13.6	in
7/25/2006	7.00	-15.3	in
7/26/2006	7.00	-17	in
7/27/2006	7.00	-18.6	in
7/28/2006	7.00	-20.3	in
7/29/2006	7.00	-21.9	in
7/30/2006	7.00	-23	in
7/31/2006	7.00	-24.6	in

Rain Gauge

01-Jun-2006	23,595.59	0	in
02-Jun-2006	23,595.59	0.03	in
03-Jun-2006	23,595.59	0.01	in
04-Jun-2006	23,595.59	0.01	in
05-Jun-2006	23,595.59	0	in
06-Jun-2006	23,595.59	0	in
07-Jun-2006	23,595.59	0	in
08-Jun-2006	23,595.59	0	in
09-Jun-2006	23,595.59	0	in
10-Jun-2006	23,595.59	0.08	in
11-Jun-2006	23,595.59	0.17	in
12-Jun-2006	23,595.59	0.05	in
13-Jun-2006	23,595.59	0.02	in
14-Jun-2006	23,595.59	0.04	in
15-Jun-2006	23,595.59	0.02	in
16-Jun-2006	23,595.59	0.02	in
17-Jun-2006	23,595.59	0.17	in
18-Jun-2006	23,595.59	0	in
19-Jun-2006	23,595.59	0.01	in
20-Jun-2006	23,595.59	0	in
21-Jun-2006	23,595.59	0	in
22-Jun-2006	23,595.59	0	in
23-Jun-2006	23,595.59	0.31	in
24-Jun-2006	23,595.59	0.19	in
25-Jun-2006	23,595.59	0.06	in
26-Jun-2006	23,595.59	0.03	in
27-Jun-2006	23,595.59	0.02	in
28-Jun-2006	23,595.59	0.02	in
29-Jun-2006	23,595.59	0.01	in
30-Jun-2006	23,595.59	0.01	in
01-Jul-2006	23,595.59	0.02	in
02-Jul-2006	23,595.59	0.01	in
03-Jul-2006	23,595.59	0.02	in
04-Jul-2006	23,595.59	0.01	in
05-Jul-2006	23,595.59	0.03	in
06-Jul-2006	23,595.59	0.02	in
07-Jul-2006	23,595.59	0.02	in
08-Jul-2006	23,595.59	0.01	in
09-Jul-2006	23,595.59	0.01	in
10-Jul-2006	23,595.59	0.01	in
11-Jul-2006	23,595.59	0.01	in
12-Jul-2006	23,595.59	0	in
13-Jul-2006	23,595.59	0.04	in
14-Jul-2006	23,595.59	0.04	in
15-Jul-2006	23,595.59	0.04	in
16-Jul-2006	23,595.59	0	in
17-Jul-2006	23,595.59	0	in
18-Jul-2006	23,595.59	0	in
19-Jul-2006	23,595.59	0	in
20-Jul-2006	23,595.59	0	in
21-Jul-2006	23,595.59	0	in
22-Jul-2006	23,595.59	0.08	in
23-Jul-2006	23,595.59	0.02	in
24-Jul-2006	23,595.59	0.01	in
25-Jul-2006	23,595.59	0	in
26-Jul-2006	23,595.59	0	in
27-Jul-2006	23,595.59	0	in
28-Jul-2006	23,595.59	0	in
29-Jul-2006	23,595.59	0	in
30-Jul-2006	23,595.59	0	in
31-Jul-2006	23,595.59	0	in

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Appendix C1. Data Tables for Hydrological Data

Ecotone Unit: Level Logger = Well 1
 Serial Number: 000009BE9013
 Probe Number: 000001D32E53

8/1/2006	7.00	0.5	in
8/2/2006	7.00	-0.2	in
8/3/2006	7.00	-3.9	in
8/4/2006	7.00	-6.7	in
8/5/2006	7.00	4	in
8/6/2006	7.00	-4.8	in
8/7/2006	7.00	3.8	in
8/8/2006	7.00	3.7	in
8/9/2006	7.00	3.4	in
8/10/2006	7.00	3.5	in
8/11/2006	7.00	3.9	in
8/12/2006	7.00	4.1	in
8/13/2006	7.00	3.9	in
8/14/2006	7.00	3.7	in
8/15/2006	7.00	3.9	in
8/16/2006	7.00	4.3	in
8/17/2006	7.00	4.1	in
8/18/2006	7.00	3.7	in
8/19/2006	7.00	3.9	in
8/20/2006	7.00	4	in
8/21/2006	7.00	3.9	in
8/22/2006	7.00	4.3	in
8/23/2006	7.00	4.3	in
8/24/2006	7.00	4.1	in
8/25/2006	7.00	3.9	in
8/26/2006	7.00	3.7	in
8/27/2006	7.00	3.8	in
8/28/2006	7.00	3.8	in
8/29/2006	7.00	4	in
8/30/2006	7.00	4	in
8/31/2006	7.00	4.4	in
9/1/2006	7.00	4.4	in
9/2/2006	7.00	3.9	in
9/3/2006	7.00	4.2	in
9/4/2006	7.00	4.2	in
9/5/2006	7.00	4.5	in
9/6/2006	7.00	4.3	in
9/7/2006	7.00	4	in
9/8/2006	7.00	4.2	in
9/9/2006	7.00	3.9	in
9/10/2006	7.00	3.9	in
9/11/2006	7.00	3.9	in
9/12/2006	7.00	3.8	in
9/13/2006	7.00	4	in
9/14/2006	7.00	4.1	in
9/15/2006	7.00	4	in
9/16/2006	7.00	3.9	in
9/17/2006	7.00	3.8	in
9/18/2006	7.00	3.8	in
9/19/2006	7.00	4.4	in
9/20/2006	7.00	3.7	in
9/21/2006	7.00	3.5	in
9/22/2006	7.00	3.6	in
9/23/2006	7.00	3.5	in
9/24/2006	7.00	3.3	in
9/25/2006	7.00	3.3	in
9/26/2006	7.00	3.3	in
9/27/2006	7.00	3.7	in
9/28/2006	7.00	3.6	in
9/29/2006	7.00	3.5	in
9/30/2006	7.00	3.3	in

Ecotone Unit: Level Logger = Well 2
 Serial Number: 000009BE6C7E
 Probe Number: 000001D32CEE

8/1/2006	7.00	-31.6	in
8/2/2006	7.00	-32.7	in
8/3/2006	7.00	-32.9	in
8/4/2006	7.00	-33	in
8/5/2006	7.00	-28.7	in
8/6/2006	7.00	-4.8	in
8/7/2006	7.00	2.2	in
8/8/2006	7.00	2	in
8/9/2006	7.00	-8.7	in
8/10/2006	7.00	-11.8	in
8/11/2006	7.00	-13	in
8/12/2006	7.00	-11.4	in
8/13/2006	7.00	-5.6	in
8/14/2006	7.00	-5.7	in
8/15/2006	7.00	-10.1	in
8/16/2006	7.00	-4.2	in
8/17/2006	7.00	4.5	in
8/18/2006	7.00	4.8	in
8/19/2006	7.00	-0.3	in
8/20/2006	7.00	-5.1	in
8/21/2006	7.00	-5.7	in
8/22/2006	7.00	4.9	in
8/23/2006	7.00	4.9	in
8/24/2006	7.00	4.9	in
8/25/2006	7.00	3.5	in
8/26/2006	7.00	0.6	in
8/27/2006	7.00	-3.7	in
8/28/2006	7.00	-7.2	in
8/29/2006	7.00	-9.8	in
8/30/2006	7.00	-12.4	in
8/31/2006	7.00	5	in
9/1/2006	7.00	5	in
9/2/2006	7.00	4.8	in
9/3/2006	7.00	4.8	in
9/4/2006	7.00	2.5	in
9/5/2006	7.00	5	in
9/6/2006	7.00	5	in
9/7/2006	7.00	4.9	in
9/8/2006	7.00	4.7	in
9/9/2006	7.00	2.8	in
9/10/2006	7.00	1.1	in
9/11/2006	7.00	-1	in
9/12/2006	7.00	-3.2	in
9/13/2006	7.00	-4	in
9/14/2006	7.00	4.8	in
9/15/2006	7.00	4.8	in
9/16/2006	7.00	4.7	in
9/17/2006	7.00	4	in
9/18/2006	7.00	2.7	in
9/19/2006	7.00	2.3	in
9/20/2006	7.00	0.5	in
9/21/2006	7.00	-2.8	in
9/22/2006	7.00	-4	in
9/23/2006	7.00	-4.16	in
9/24/2006	7.00	-4.16	in
9/25/2006	7.00	-4.16	in
9/26/2006	7.00	-4.16	in
9/27/2006	7.00	-4.16	in
9/28/2006	7.00	-4.16	in
9/29/2006	7.00	-4.16	in
9/30/2006	7.00	-4.16	in

Ecotone Unit: Level Logger = Well 3
 Serial Number: 000009BEA425
 Probe Number: 000001D379C4

8/1/2006	7.00	-26.3	in
8/2/2006	7.00	-27.6	in
8/3/2006	7.00	-28	in
8/4/2006	7.00	-28.1	in
8/5/2006	7.00	-16.2	in
8/6/2006	7.00	4.3	in
8/7/2006	7.00	2.8	in
8/8/2006	7.00	1.6	in
8/9/2006	7.00	-1.4	in
8/10/2006	7.00	-4.3	in
8/11/2006	7.00	-4.8	in
8/12/2006	7.00	-3.5	in
8/13/2006	7.00	3.5	in
8/14/2006	7.00	1.3	in
8/15/2006	7.00	-1.1	in
8/16/2006	7.00	5.3	in
8/17/2006	7.00	4.5	in
8/18/2006	7.00	4.3	in
8/19/2006	7.00	3.9	in
8/20/2006	7.00	3.2	in
8/21/2006	7.00	1.8	in
8/22/2006	7.00	4.8	in
8/23/2006	7.00	5.5	in
8/24/2006	7.00	5.5	in
8/25/2006	7.00	5.1	in
8/26/2006	7.00	4	in
8/27/2006	7.00	2.6	in
8/28/2006	7.00	1	in
8/29/2006	7.00	-1.1	in
8/30/2006	7.00	-3.9	in
8/31/2006	7.00	5.3	in
9/1/2006	7.00	5.3	in
9/2/2006	7.00	5	in
9/3/2006	7.00	5.3	in
9/4/2006	7.00	5.3	in
9/5/2006	7.00	5.4	in
9/6/2006	7.00	5.4	in
9/7/2006	7.00	5.3	in
9/8/2006	7.00	5.5	in
9/9/2006	7.00	5.3	in
9/10/2006	7.00	5.2	in
9/11/2006	7.00	5	in
9/12/2006	7.00	4.4	in
9/13/2006	7.00	4.3	in
9/14/2006	7.00	5	in
9/15/2006	7.00	5.6	in
9/16/2006	7.00	5.5	in
9/17/2006	7.00	5.4	in
9/18/2006	7.00	5.4	in
9/19/2006	7.00	5.6	in
9/20/2006	7.00	5.5	in
9/21/2006	7.00	4.8	in
9/22/2006	7.00	4.8	in
9/23/2006	7.00	5	in
9/24/2006	7.00	4.2	in
9/25/2006	7.00	3.3	in
9/26/2006	7.00	2.7	in
9/27/2006	7.00	1.8	in
9/28/2006	7.00	1.8	in
9/29/2006	7.00	0.5	in
9/30/2006	7.00	-0.2	in

Rain Gauge

01-Aug-2006	23.9959	0	in
02-Aug-2006	23.9959	0	in
03-Aug-2006	23.9959	0	in
04-Aug-2006	23.9959	0.07	in
05-Aug-2006	23.9959	0	in
06-Aug-2006	23.9959	0	in
07-Aug-2006	23.9959	0.01	in
08-Aug-2006	23.9959	0	in
09-Aug-2006	23.9959	0.01	in
10-Aug-2006	23.9959	0	in
11-Aug-2006	23.9959	0.01	in
12-Aug-2006	23.9959	0	in
13-Aug-2006	23.9959	0.01	in
14-Aug-2006	23.9959	0	in
15-Aug-2006	23.9959	0.06	in
16-Aug-2006	23.9959	0.01	in
17-Aug-2006	23.9959	0.02	in
18-Aug-2006	23.9959	0.01	in
19-Aug-2006	23.9959	0	in
20-Aug-2006	23.9959	0	in
21-Aug-2006	23.9959	0	in
22-Aug-2006	23.9959	0	in
23-Aug-2006	23.9959	0	in
24-Aug-2006	23.9959	0	in
25-Aug-2006	23.9959	0	in
26-Aug-2006	23.9959	0.01	in
27-Aug-2006	23.9959	0	in
28-Aug-2006	23.9959	0.01	in
29-Aug-2006	23.9959	0	in
30-Aug-2006	23.9959	0.01	in
31-Aug-2006	23.9959	0	in
1-Sep-2006	23.9959	0.06	in
2-Sep-2006	23.9959	0.01	in
3-Sep-2006	23.9959	0.02	in
4-Sep-2006	23.9959	0.01	in
5-Sep-2006	23.9959	0	in
6-Sep-2006	23.9959	0	in
7-Sep-2006	23.9959	0	in
8-Sep-2006	23.9959	0	in
9-Sep-2006	23.9959	0	in
10-Sep-2006	23.9959	0	in
11-Sep-2006	23.9959	0	in
12-Sep-2006	23.9959	0.04	in
13-Sep-2006	23.9959	1.6	in
14-Sep-2006	23.9959	0.06	in
15-Sep-2006	23.9959	0	in
16-Sep-2006	23.9959	0	in
17-Sep-2006	23.9959	0	in
18-Sep-2006	23.9959	0.01	in
19-Sep-2006	23.9959	0	in
20-Sep-2006	23.9959	0.04	in
21-Sep-2006	23.9959	0.04	in
22-Sep-2006	23.9959	0.04	in
23-Sep-2006	23.9959	0.01	in
24-Sep-2006	23.9959	0.01	in
25-Sep-2006	23.9959	0	in
26-Sep-2006	23.9959	0	in
27-Sep-2006	23.9959	0.01	in
28-Sep-2006	23.9959	0	in
29-Sep-2006	23.9959	0	in
30-Sep-2006	23.9959	0	in

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Appendix C1. Data Tables for Hydrological Data

Ecotone Unit Level Logger = Well 1
 Serial Number: 000009E9013
 Probe Number: 00001032253

10/1/2006	7.00	3.5	in
10/2/2006	7.00	3.3	in
10/3/2006	7.00	3.3	in
10/4/2006	7.00	3.4	in
10/5/2006	7.00	3.4	in
10/6/2006	7.00	4	in
10/7/2006	7.00	3.5	in
10/8/2006	7.00	3.6	in
10/9/2006	7.00	3.7	in
10/10/2006	7.00	3.6	in
10/11/2006	7.00	3.6	in
10/12/2006	7.00	3.9	in
10/13/2006	7.00	3.4	in
10/14/2006	7.00	3.2	in
10/15/2006	7.00	3.1	in
10/16/2006	7.00	3.2	in
10/17/2006	7.00	3.7	in
10/18/2006	7.00	4	in
10/19/2006	7.00	3.9	in
10/20/2006	7.00	3.9	in
10/21/2006	7.00	3.3	in
10/22/2006	7.00	3.4	in
10/23/2006	7.00	3.3	in
10/24/2006	7.00	3.1	in
10/25/2006	7.00	3	in
10/26/2006	7.00	3.3	in
10/27/2006	7.00	3.4	in
10/28/2006	7.00	3.9	in
10/29/2006	7.00	3.2	in
10/30/2006	7.00	3.1	in
10/31/2006	7.00	3.2	in
11/1/2006	7.00	3.3	in
11/2/2006	7.00	3.5	in
11/3/2006	7.00	2.9	in
11/4/2006	7.00	2.7	in
11/5/2006	7.00	2.7	in
11/6/2006	7.00	2.7	in
11/7/2006	7.00	3.2	in
11/8/2006	7.00	3.5	in
11/9/2006	7.00	3.3	in
11/10/2006	7.00	3	in

Ecotone Unit Level Logger = Well 2
 Serial Number: 000009E467E
 Probe Number: 00001032CEE

10/1/2006	7.00	-41.6	in
10/2/2006	7.00	-41.6	in
10/3/2006	7.00	-41.6	in
10/4/2006	7.00	-41.6	in
10/5/2006	7.00	-41.6	in
10/6/2006	7.00	-41.6	in
10/7/2006	7.00	-41.6	in
10/8/2006	7.00	-41.6	in
10/9/2006	7.00	-41.6	in
10/10/2006	7.00	-41.6	in
10/11/2006	7.00	-41.6	in
10/12/2006	7.00	-41.6	in
10/13/2006	7.00	-41.6	in
10/14/2006	7.00	-41.6	in
10/15/2006	7.00	-41.6	in
10/16/2006	7.00	-41.6	in
10/17/2006	7.00	-41.6	in
10/18/2006	7.00	-41.6	in
10/19/2006	7.00	-41.6	in
10/20/2006	7.00	-41.6	in
10/21/2006	7.00	-41.6	in
10/22/2006	7.00	-41.6	in
10/23/2006	7.00	-41.6	in
10/24/2006	7.00	-41.6	in
10/25/2006	7.00	-41.6	in
10/26/2006	7.00	-41.6	in
10/27/2006	7.00	-41.6	in
10/28/2006	7.00	-41.6	in
10/29/2006	7.00	-41.6	in
10/30/2006	7.00	-41.6	in
10/31/2006	7.00	-41.6	in
11/1/2006	7.00	-41.6	in
11/2/2006	7.00	-41.6	in
11/3/2006	7.00	-41.6	in
11/4/2006	7.00	-41.6	in
11/5/2006	7.00	-41.6	in
11/6/2006	7.00	-41.6	in
11/7/2006	7.00	-41.6	in
11/8/2006	7.00	-41.6	in
11/9/2006	7.00	-41.6	in
11/10/2006	7.00	-41.6	in

Ecotone Unit Level Logger = Well 3
 Serial Number: 000009E4425
 Probe Number: 000010379C4

10/1/2006	7.00	-1	in
10/2/2006	7.00	-3	in
10/3/2006	7.00	-4.1	in
10/4/2006	7.00	-4.4	in
10/5/2006	7.00	-5.3	in
10/6/2006	7.00	-4.8	in
10/7/2006	7.00	-0.3	in
10/8/2006	7.00	-0.4	in
10/9/2006	7.00	0	in
10/10/2006	7.00	4.3	in
10/11/2006	7.00	3.5	in
10/12/2006	7.00	3.8	in
10/13/2006	7.00	2.9	in
10/14/2006	7.00	0.6	in
10/15/2006	7.00	0.3	in
10/16/2006	7.00	0.1	in
10/17/2006	7.00	-1.3	in
10/18/2006	7.00	-0.4	in
10/19/2006	7.00	5.1	in
10/20/2006	7.00	5.2	in
10/21/2006	7.00	4.8	in
10/22/2006	7.00	4.7	in
10/23/2006	7.00	4.5	in
10/24/2006	7.00	4.4	in
10/25/2006	7.00	4.4	in
10/26/2006	7.00	4.4	in
10/27/2006	7.00	4.5	in
10/28/2006	7.00	4.6	in
10/29/2006	7.00	4.4	in
10/30/2006	7.00	4.4	in
10/31/2006	7.00	4.4	in
11/1/2006	7.00	4.5	in
11/2/2006	7.00	4.6	in
11/3/2006	7.00	4	in
11/4/2006	7.00	3.8	in
11/5/2006	7.00	3.7	in
11/6/2006	7.00	3.7	in
11/7/2006	7.00	3.9	in
11/8/2006	7.00	4.2	in
11/9/2006	7.00	4.2	in
11/10/2006	7.00	3.7	in

Rain Gauge

1-Oct-2006	2359.59	0.03	in
2-Oct-2006	2359.59	0.03	in
3-Oct-2006	2359.59	0.25	in
4-Oct-2006	2359.59	0.01	in
5-Oct-2006	2359.59	0	in
6-Oct-2006	2359.59	0	in
7-Oct-2006	2359.59	0	in
8-Oct-2006	2359.59	0	in
9-Oct-2006	2359.59	0	in
10-Oct-2006	2359.59	0.11	in
11-Oct-2006	2359.59	0	in
12-Oct-2006	2359.59	0	in
13-Oct-2006	2359.59	0	in
14-Oct-2006	2359.59	0.05	in
15-Oct-2006	2359.59	0	in
16-Oct-2006	2359.59	0.28	in
17-Oct-2006	2359.59	0.06	in
18-Oct-2006	2359.59	0.01	in
19-Oct-2006	2359.59	0.02	in
20-Oct-2006	2359.59	0.01	in
21-Oct-2006	2359.59	0	in
22-Oct-2006	2359.59	0	in
23-Oct-2006	2359.59	0	in
24-Oct-2006	2359.59	0	in
25-Oct-2006	2359.59	0	in
26-Oct-2006	2359.59	0	in
27-Oct-2006	2359.59	0	in
28-Oct-2006	2359.59	0.04	in
29-Oct-2006	2359.59	0.02	in
30-Oct-2006	2359.59	0.06	in
31-Oct-2006	2359.59	0.29	in
1-Nov-2006	2359.59	0.19	in
2-Nov-2006	2359.59	0.06	in
3-Nov-2006	2359.59	0.03	in
4-Nov-2006	2359.59	0.03	in
5-Nov-2006	2359.59	0.02	in
6-Nov-2006	2359.59	0.01	in
7-Nov-2006	2359.59	0.01	in
8-Nov-2006	2359.59	0.02	in
9-Nov-2006	2359.59	0.01	in
10-Nov-2006	2359.59	0	in

Prepared For:



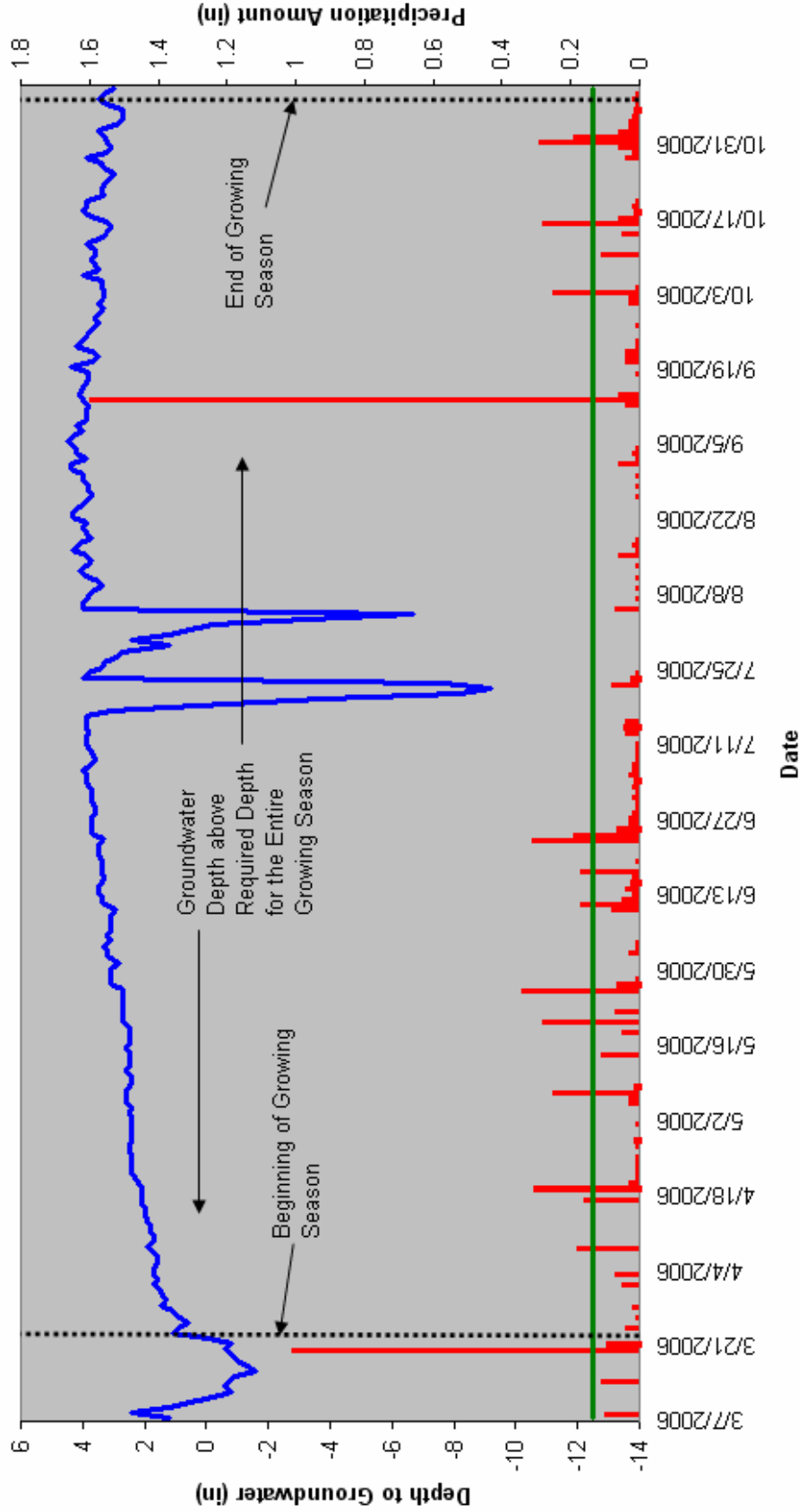
Back Creek Stream Restoration
 Year 1 of 5

Date: March 2007
 Project No.: 17



Appendix C1. Data Tables for Hydrological Data

**Back Creek Hydrology Monitoring
Mecklenburg County, North Carolina
Groundwater Gauge 1**



■ Rainfall Amount — BC-WLG1 9BE9013 — Required Depth



Prepared For:

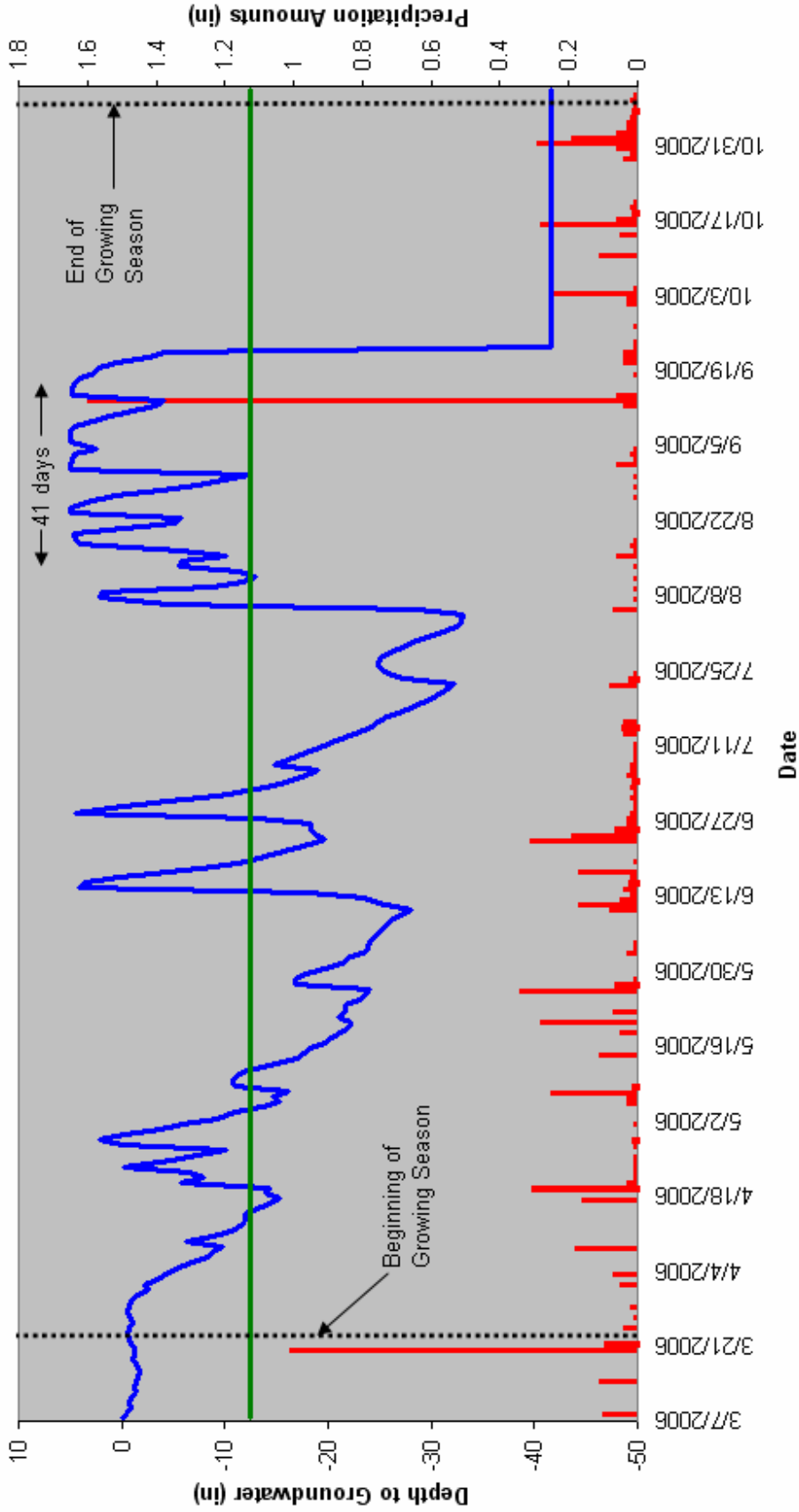
Back Creek Stream Restoration
Year 1 of 5

Date: March 2007
Project No.: 17

Appendix C2. Precipitation – Water Level Plots for Wells



Back Creek Hydrology Monitoring
 Mecklenburg County, North Carolina
 Groundwater Gauge 2



Legend:
 Rainfall Amount (Red line)
 BC-WLG2 9DE6C7E (Blue line)
 Required Depth (Green vertical line)

Prepared For:



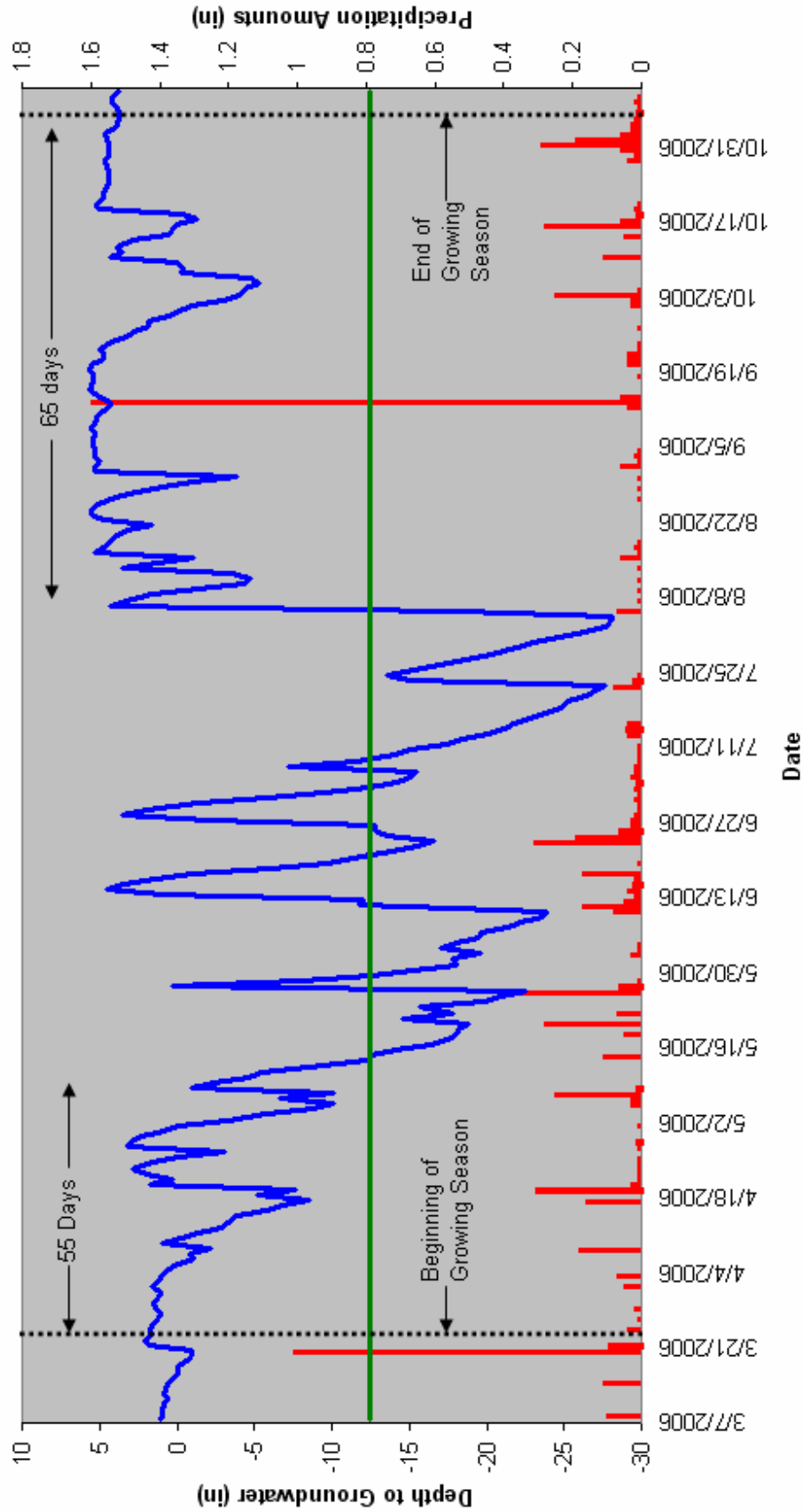
Back Creek Stream Restoration
 Year 1 of 5

Date: March 2007
 Project No.: 17



Appendix C2. Precipitation – Water Level Plots for Wells

Back Creek Hydrology Monitoring
 Mecklenburg County, North Carolina
 Groundwater Gauge 3



■ Rainfall Amount
 — BC-WLG3 9BEA425
 — Required Depth

Prepared For:



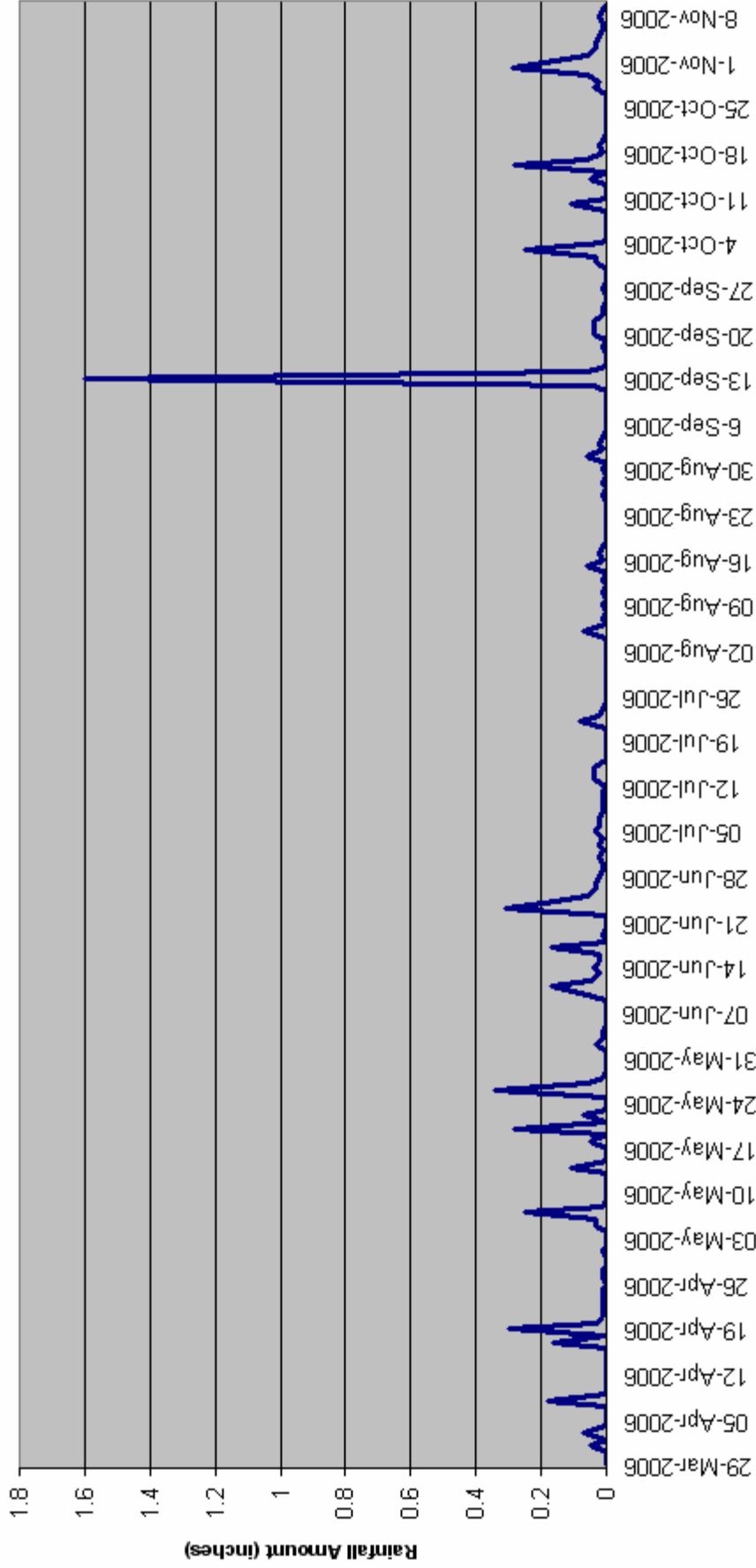
Back Creek Stream Restoration
 Year 1 of 5

Date: March 2007
 Project No.: 17



Appendix C2. Precipitation – Water Level Plots for Wells

**Back Creek Stream and Wetland Restoration
Project No. 17
Mecklenburg County, NC**



Date (weekly)

— Precipitation

Prepared For:



Back Creek Stream Restoration
Year 1 of 5

Date: March 2007
Project No.: 17



Appendix C2. Precipitation – Water Level Plots for Wells