Back Creek Stream and Wetland Restoration
Project No. 17
2007 Monitoring Report (Final): Year 2 of 5

March 2008

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EXECUTIVE SUMMARY

Executive Summary

The Back Creek Site is a 17.5 acre lot located in Mecklenburg County, North Carolina and is a mitigation project for the North Carolina Department of Transportation (NCDOT). The project was transferred from NCDOT to the North Carolina Ecosystem Enhancement Program (NCEEP) in 2006. 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 tributaries 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.
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 streambanks. The site contains 3.5 acres (proposed as 1.8) of wetland enhancement and 0.4 acres (proposed as 2.0) of wetland restoration. This report serves as the 2nd year of the 5 year monitoring plan for the Back Creek Stream and Wetland Restoration Site.

Results from the 2007 stream monitoring effort indicate that Back Creek and the two unnamed tributaries are maintaining vertical and lateral stability. Current drought conditions during the 2007 monitoring year have severely lowered the normal baseflow levels, creating minimal to absent flow conditions throughout the main channel. These conditions created high silt deposition within riffles and stagnant pools with algal blooms. The pattern, profile, and dimension of the restored main channel and tributaries appear stable. A few problem areas were observed, such as moderate bank erosion, moderate to poor streambank cover, loose matting, and aggradation. It is recommended that the section with poor streambank cover should be stabilized with matting and vegetation as soon as possible to prevent future problems. Areas with aggradation, such as lateral and transverse bars should be closely monitored for shifts in lateral stability.

The 2007 vegetation monitoring results indicated that the Back Creek Site appears to be meeting vegetation and wetland success criteria. Only one of the four vegetation monitoring plots (Plot 4) resulted in a low survival rate (30%) with sparse ground cover of emergent wetland plants in comparison to the 2006 monitoring year. Low plant survivability within Plot 4 is most likely due to the severe drought experienced during the 2007 growing season. Success criteria for planted woody vegetation were 320 stems per acre in year 1.

However, monitoring during 2007 (year 2 of 5) has determined an average of 420 stems per acre of planted species, which satisfies the vegetation success criteria for year 2. The survivability increase observed in year 2 is most likely due to resprouting of suspected dead stems recorded in 2006. There were no problem areas observed within the wetland restoration zones. All hydrology 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 2007 growing season.

Overall, the Back Creek Stream and Wetland Restoration Site appears to be stable and has met stream and wetland mitigation goals for monitoring year 2.

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SECTION 1
PROJECT BACKGROUND

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PROJECT BACKGROUND

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

1.1 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 project was transferred from NCDOT to the NCEEP in 2006. 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 1.1). The restoration site is located within the Piedmont eco-region and in the Yadkin-Peedee River Basin (USGS Subbasin HUC 03040105). The project site size is 17.5 acres.

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.

1.2 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 tributaries 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.
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 2) 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 Creek within 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 1.1). The relocated reaches and the restored in-place reaches were restored/enhanced using vegetation and in-stream stabilization structures, such as cross-vanes, J-hook vanes, and grade control sills. Bankfull benches were created along each reach to re-establish floodplain connection. 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 streambanks.

Table 1.1
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	P2	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	P2	400 lf	0+00 - 4+00	Channel restoration, relocation with use of grade control and bank protection structures.
Central Tributary	R	P2	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.

1.3 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 2nd year of the 5 year monitoring plan for the Back Creek project. Tables 1.2 and 1.3 provide detailed project activity, history and contact information for this project. Table 1.4 provides more in-depth watershed/site background for the project.

Table 1.2
Project Activity and Reporting History
Back Creek/Project No. 17

Activity or Report	Data Collection Completed	Actual Completion or Delivery
Restoration Plan	N/A	January 2003
Final Design-90%	N/A	N/A
Construction	N/A	December 2005
Temporary S&E mix applied to entire project area*	N/A	2005
Permanent seed mix applied to reach	N/A	N/A
Woody plantings for reach	N/A	February 2006
Mitigation Plan/ As-Built (Year 0 Monitoring)	N/A	N/A
Year 1 Monitoring	November 2006	January 2006
Year 2 Monitoring	August 2007	November 2007
Year 3 Monitoring	2008	2008
Year 4 Monitoring	2009	2009
Year 5 Monitoring	2010	2010
*Seed and mulch is added as each section of construction is completed.		

Table 1.3
Project Contacts
Back Creek/Project No. 17

Designer	EcoScience Corporation 1101 Haynes Street, Suite 101 Raleigh, NC 27604
Construction	Shamrock Environmental Corportation 503 Patton Avenue Greensboro, NC 27406
Planting Contractor	Henry Rosso
Seeding Contractor	Shamrock Environmental Corportation 503 Patton Avenue Greensboro, NC 27406
Monitoring Performers	Jordan, Jones, and Goulding, Inc. 9101 Southern Pine Blvd., Suite 160 Charlotte, NC 28273
Stream Monitoring, POC	Kirsten Young, 704-527-4106 ext.246
Vegetation Monitoring, POC	Kirsten Young, 704-527-4106 ext.246

Table 1.4
Project Background
Back Creek/Project No. 17

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%

1.4 Monitoring Plan View

The monitoring plan view map (Figure 1.2) 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 in 2006. An additional cross-section was established within the central tributary during the 2007 monitoring year. Approximately 3,100 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, vegetation plot, and at photo points that were established during the 2006 monitoring year.

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SECTION 2

PROJECT CONDITIONS AND MONITORING RESULTS

SECTION 2

PROJECT CONDITIONS AND MONITORING RESULTS

The following monitoring results are from the 2007 (year 2 of 5) survey.

2.1 Vegetative Assessment

2.1.1 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. 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 drainage ways. 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 2.1 for descriptions of the soil series and Figure 2.1 for a soil map within the project area.

Table 2.1
Preliminary Soil Data
Back Creek/Project No. 17

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

2.1.2 Vegetative Current Conditions

During the initial vegetative survey conducted March 2007 and the follow-up assessment conducted in July 2007, it was noted that some areas of the streambanks have suffered localized loss of vegetative cover. In these areas, it is expected that flood events may have caused bank erosion; therefore, removing 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 areas. Please refer to Appendix 1.1 and 1.2 for more details on vegetative current condition areas and photos.

2.1.3 Vegetative Current Condition Plan View

Please refer to Appendix 4 for location of vegetative current condition areas onsite and Appendix 1.2 for representative vegetation current condition photos.

2.1.4 Stem Counts

JJG conducted the 2007 (year 2 of 5) vegetative assessment and vegetative plot analysis in July 2007. Vegetation assessments were conducted following the NCEEP 2004 Stem Counting Protocol which consists of counting woody stems within the established vegetation plots. The four vegetative plots previously established in the design phase were selected randomly and represent the riparian buffer zone. The planted vegetative community goal for these plots is to establish a Piedmont floodplain forest. Success goals for vegetation were established in the January 2003 mitigation plan prepared by EcoScience. The following lists the vegetation success criteria used for the Back Creek Stream and Wetland Restoration Site.

- 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 2007 is 69%, which is up 15% from previous data recorded in September 2006. A survivability increase is most likely due to resprouting of suspected dead stems recorded in 2006. The monitoring data indicates an average of 21 stems per plot. Using an average of 16 stems for per plot and a plot size of 0.05 acre, the average stem density for the site is 420 stems per acre. In addition, natural recruitment stems were also monitored. The monitoring data indicates an average of 5.5 volunteer stems per plot. Including natural recruitments, the site density is approximately 530 total stems per acre. Please refer to Appendix 1.1 for vegetation raw data.

In conclusion, the riparian restoration project meets the requirements. Although the survivability rate (30%) of woody stems in Plot 4 is down 7% from last year, it appears to reflect localized vegetative losses, in part, due to the severe drought experienced during the 2007 growing season.

In addition, some loss of streambank vegetation was evident in 2006; however, the overall growth of the streambank vegetation is good and appears to have improved over the past year. The overall success of the woody vegetation monitored within three of the four plots appears to be much better than what was initially assessed in September 2006. As previously stated above, this is most likely due to the resprouting of suspected dead saplings the previous year and new volunteer species. The most likely cause of known dead saplings may be due to planting depth of the bare root saplings, the compacted soil, or the nutrient poor soil conditions. Per the success criterion for Year 2006 and 2007, the site has exceeded the predicted number of stems per acre. Refer to Table 2.2 for a summary of stem counts for planted species recorded by plot for the 2007 monitoring year.

Table 2.2
Stem Counts for Planted Species Arranged by Plot
Back Creek/Project No. 17

Planted Stems					
Species	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Year 2 Totals**
Quercus michauxii	4	6			**10**
Fraxinus pennsylvanica	6	7	12	4	**29**
Platanus occidentalis	5	7	6	1	**19**
Betula nigra	6	3	10	4	**23**
Ulmus americana	2				**2**
Unknown Dead	7	7	2	21	**37**
Total Live	23	23	28	9	**83**
Total Monitored	30	30	30	30	**120**
Percent of Planted Stems Alive	**77%**	**77%**	**93%**	**30%**	**69%**
Volunteer Stems					
Species	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Year 2 Totals**
Liquidambar styraciflua		17	3		**20**
Acer rubrum		1	1		**2**
Total Monitored	0	18	4	0	**22**

2.1.5 Vegetation Plot Photos

Please refer to Appendix 1.3 for photographs of the monitoring plots.

2.2 Stream Assessment

Stream dimension, profile, and substrate were evaluated within 3,100 linear feet of the Back Creek Stream Restoration Site. The upstream and central tributaries were also evaluated through visual assessments, and cross-sectional surveys on each tributary. Please refer to Table 2.3 for a summary of the visual stability assessment, Table 2.4 for the monitoring baseline morphology and hydraulic summary, Table 2.5 for monitoring years 2006-2007 morphology and hydraulic summary, Table 2.6 for hydrologic criteria, and Appendix 2 for more detailed stream data tables and plots.

2.2.1 Stream Current Condition Plan View

Please refer to Appendix 4 for location of stream current condition onsite.

2.2.2 Stream Current Condition Table

Please refer to Appendix 2.1 for the stream current condition table.

2.2.3 Numbered Issues Photo Section

Please refer to Appendix 2.2 for representative stream current condition photos.

2.2.4 Fixed Photo Station Photos

Please refer to Appendix 2.3 for stream photo station photos and Appendix 2.4 for stream cross-section photos.

2.2.5 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 surveyed cross-sections. Where possible, monitoring survey data was compared to the design; however, monitoring baseline data was not available for comparison.

Main Channel

The majority of project conditions reflect the design drawings. The profile and dimension of the restored channel appear stable; however, a few problem areas were noted. Please refer to Appendix 2 and below for more detailed information.

- There are a few areas with eroding point bars on the upstream and downstream sides around stationing 3+30, 3+70, and 4+50.

- Three areas within the restored reach are showing signs of aggradation; two areas have lateral bars forming (approximate stationing 20+20 and 27+65), and the third area has a transverse and mid-channel bar forming (approximate stationing 15+20). All three areas are showing a shift in the thalweg.
- Bank erosion is occurring at different levels throughout the channel, particularly where the lateral, transverse and mid-channel bars are forming and within the lower end of the project.
- The medium-sized cedar tree, which had fallen into the stream during the 2006 monitoring year, has remained in place below the convergence of the centrail tributary. The tree has begun to collect storm debris.
- The two side tributaries appear stable, but minor scouring is occurring within the central tributary.
- The majority of structures appear to be in good condition; however, a few structures have moderate erosion around the arms where they tie into the bankfull elevation.

Overall, the present stream dimensions in Back Creek appear to be stable. Several trends appear to be evident when comparing the design parameters with JJG's morphological surveyed data. The average bankfull width (31.12 ft) of the surveyed cross-sections is higher than the proposed 22.4 ft, and the average surveyed mean bankfull depth is 2.0 ft compared to the proposed 2.5 ft. Cross-section 4 did not overlay correctly since only one pin was found in 2007. The surveyed bankfull widths and depths lead to an average Width/Depth ratio of 15.64 which typifies a Rosgen C-type stream and not the proposed E-channel; however, the average Width/Depth ratio has decreased since the 2006 monitoring year indicating the channel is becoming more narrow and deep.

From the 2007 monitoring year, the substrate analysis illustrates a significant shift in bed materials; however, this change is due to the existing minimal to absent flow conditions within the restoration site. Current drought conditions have severely affected the amount of stream baseflow, which has created high silt deposition within riffles and stagnant pools with algal blooms. It is assumed that with a few high flow events these fine sediment depositions and algal blooms would be flushed out; therefore, the substrate collected in the 2007 monitoring year does not adequately represent the substrate conditions within the Back Creek site for normal rainfall conditions.

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 reach, 0.0041 and 0.0042 respectively. The surveyed water surface slope was slightly steeper than the proposed 0.0034, but similar to the 2006 surveyed slopes. The profile appears stable and is not showing significant shifting in the bed features; however, results indicate there is a slight change. This change could be due to the minimal to absent baseflow conditions observed during the 2007 longitudinal survey.

Overall, the reach appears to be maintaining vertical and lateral stability with stable structures and minimal bank erosion. Areas with aggradation, such as lateral and transverse bars in the future could potentially be flushed out with higher flows. However, this may also be an indicator that the constructed pattern is beginning to adjust within certain sections. If these areas continue to shift and aggrade they could potentially create significant lateral instability and shifts in the stream's pattern and profile. These areas should be monitored closely for major shifts in bed features and the channel thalweg.

Please refer to Table 2.3 for a summary of the visual stability assessment, Table 2.4 for the baseline morphology and hydraulic summary, Table 2.5 for monitoring years 2006-2007 morphology and hydraulic summary, Table 2.6 for hydrologic criteria, and Appendix 2 for more detailed stream data tables and plots.

Upstream Tributary

Based on current monitoring data and the visual inspection, the channel seems to be functioning properly and maintaining stability. No erosion or structure failure was observed 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. There are some areas with moderate bank erosion, but no structural failure is occurring along this reach.

Table 2.3
Categorical Stream Feature Visual Stability Assessment
Back Creek/Project No. 17

Main Reach			
Feature	**Baseline (2005)**	**MY1 (2006)**	**MY2 (2007)**
A. Riffles	-	100%	100%
B. Pools	-	99%	100%
C. Thalweg	-	100%	98%
D. Meanders	-	91%	94%
E. Bed General	-	99%	99%
F. Bank	-	*	96%
G. Vanes	-	100%	94%
H. Wads/ Boulders	-	N/A	N/A

(Cells noted with a (-), data was not provided and Cells noted with a (*), new data measurement beginning in MY 2007)

2.2.6 Quantitative Measures Tables

Tables 2.4 and 2.5 display morphological summary data for baseline conditions and from the 2006 and 2007 monitoring years. Please refer to Appendix 2 for morphological plots and raw data tables.

Table 2.4
Baseline Morphology and Hydraulic Baseline Summary
Back Creek/Project No. 17

	Existing Channel									Reference Stream			Design			Baseline*		
DIMENSION	Upstream Straightened			Downstream Sinuous C			Downstream Sinuous E			UT to Crane Creek			Back Creek			Back Creek		
	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	-	-	22.7	9.5	11.9	10.1	21.2	23.7	22.4	21.2	23.7	22.4
Floodprone Width (ft)	235.0	290.0	253.0	114.0	293.0	179.0	-	-	297.0	232.0	345.0	237.0	114.0	297.0	230.0	114.0	297.0	230.0
Bankfull Cross-sectional Area (sq.ft)	54.0			56.2			55.7			20.5			56.0			56.0		
Bankfull Mean Depth (ft)	2.2	3.4	2.9	1.6	1.9	1.8	-	-	2.5	1.9	2.1	2.0	2.4	2.6	2.5	2.4	2.6	2.5
Bankfull Max Depth (ft)	4.0	4.7	4.4	3.0	3.6	3.3	-	-	3.8	2.5	2.9	2.6	2.8	3.8	3.3	2.8	3.8	3.3
Width/Depth Ratio	5.0	10.0	7.0	16.0	23.0	19.0	-	-	9.0	5.0	6.0	5.0	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	20.0	34.5	25.0	5.1	13.3	10.3	5.1	13.3	10.3
Wetted Perimeter (ft)	-	-	-	-	-	-	-	-	-	-	-	-	25.4			25.4		
Hydraulic Radius (ft)	-	-	-	-	-	-	-	-	-	-	-	-	2.1			2.1		
PATTERN																		
Channel Beltwidth (ft)	No distinctive repetitive pattern of riffles and pools due to straightening activities			41.0	199.0	95.0	41.0	199.0	95.0	74.3	101.3	86.1	25.0	140.0	57.0	25.0	140.0	57.0
Radius of Curvature (ft)				23.0	135.0	67.0	23.0	135.0	67.0	18.6	30.4	25.3	43.0	100.0	58.0	43.0	100.0	58.0
Meander Wave Length (ft)				129.0	608.0	313.0	129.0	608.0	313.0	61.0	115.0	73.0	166.0	347.0	220.0	166.0	347.0	220.0
Meander Width Ratio				1.3	6.2	3.0	1.8	8.8	4.2	7.4	10.0	8.5	1.1	6.3	2.5	1.1	6.3	2.5
PROFILE																		
Riffle Length (ft)	No distinctive repetitive pattern of riffles and pools due to straightening activities			-			-			-			-			-		
Riffle Slope (ft/ft)				0	0.0507	0.0144	0	0.0507	0.0144	0.0006	0.0033	0.0019	0.0033	0.0079	0.005	0.0033	0.0079	0.005
Pool Length (ft)				-			-			-			-			-		
Pool to Pool Spacing (ft)				59	351	180	59	351	180	26	114	53	60	210	126	60	210	126
SUBSTRATE																		
D50 (mm)	0.7			0.6			19.8			1.9			2.0			2.0		
D84 (mm)	10.0			32.0			55.0			12.0			34.0			34.0		
ADDITIONAL REACH PARAMETERS	**Upstream Straightened**			**Downstream Sinuous C**			**Downstream Sinuous E**			**Project Reference Stream**			**Design**			**Baseline***		
Valley Length (ft)	-			-			-			-			2,200			2,200		
Channel Length (ft)	-			-			-			-			3,300			3,300		
Sinuosity	1.0			1.4			1.4			1.8			1.5			1.5		
Water Surface Slope (ft/ft)	0.0037			0.0037			0.0037			0.0014			0.0034			0.0034		
Bankfull Slope (ft/ft)	-			-			-			-			-			-		
Rosgen Classification	E5			C5			E4			E4/5			E4/5			E4/5		

*To JJG's knowledge, monitoring baseline data was not prepared for Back Creek, therefore the monitoring baseline dimensions were assumed to be the same as the proposed dimensions from Ecoscience Inc.'s mitigation plan.
USGS Gage Data and Regional Curve Intervals were not provided.

Table 2.5
Morphology and Hydraulic Monitoring Summary
Back Creek/Project No. 17

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		Cross-Section 9-Riffle
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2007
Bankfull Width (ft)	42.92	23.27	33.11	34.82	43.00	30.67	32.70	28.46	29.15	27.09	29.33	34.33	32.66	30.39	12.70	8.37	13.04
Floodprone Width (ft)	>100	>100	N/A	N/A	>100	>100	N/A	N/A	>100	>100	N/A	N/A	>100	>100	>100	>100	>100
Bankfull Cross-sectional Area	51.79	47.04	84.07	83.71	52.99	53.41	59.47	52.11	48.27	44.50	70.51	69.69	70.59	65.19	8.65	8.85	11.19
Bankfull Mean Depth	1.21	2.02	2.54	2.40	1.23	1.74	1.82	1.83	1.66	1.64	2.40	2.03	2.16	2.15	0.68	1.06	0.86
Bankfull Max Depth	3.00	3.11	5.31	5.32	3.03	3.03	3.15	4.05	2.94	2.94	5.01	4.53	3.36	3.10	1.33	1.65	1.37
Width/Depth Ratio	35.47	11.52	13.04	14.51	34.96	17.63	17.97	15.55	17.56	16.52	12.22	16.91	15.12	14.13	18.68	7.90	15.16
Entrenchment Ratio	>2.20	>2.20	N/A	N/A	>2.20	>2.20	N/A	N/A	>2.20	>2.20	N/A	N/A	>2.20	>2.20	>2.20	>2.20	>2.20
Wetted Perimeter (ft)	43.95	24.46	35.33	37.22	44.01	31.50	33.55	30.50	30.70	28.15	32.64	36.46	33.72	31.52	13.03	9.27	13.66
Hydraulic Radius (ft)	1.18	1.92	2.38	2.25	1.20	1.70	1.77	1.71	1.57	1.58	2.16	1.91	2.09	2.07	0.66	0.95	0.82
Bank Height Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SUBSTRATE																	
D50 (mm)	12.47	0.06	0.42	0.26	67.06	0.04	0.46	0.23	10.20	0.21	29.99	0.38	5.27	1.78	-	0.04	0.04
D84 (mm)	53.96	48.80	5.42	0.54	100.13	0.23	5.53	1.38	41.10	1.44	69.20	54.50	45.00	52.60	-	0.38	0.08

PROFILE	2006			2007		
	Min	Max	Med	Min	Max	Med
Riffle Length (ft)	24	77	56	7.79	124.99	84.75
Riffle Slope (ft/ft)	0.0001	0.0173	0.0063	0.0002	0.0230	0.0098
Pool Length (ft)	19	161	55	28	109.73	59.815
Pool to Pool Spacing (ft)	21	208	122.5	47.99	203.26	114.33

ADDITIONAL REACH PARAMETERS	2006	2007
Valley Length (ft)	2,200	2,200
Channel Length (ft)	3,300	3,300
Sinuosity	1.5	1.5
Water Surface Slope (ft/ft)	0.0042	0.0041
Bankfull Slope (ft/ft)	0.0043	0.0042
Rosgen Classification	C4	C4

2.2.7 Hydrologic Criteria

A crest gauge is located downstream of cross-section 6 within the Back Creek project site. Table 2.6 below, verifies that one bankfull or greater event occurred within the Back Creek restoration project in monitoring year 2007. Other indicators such as old wrack lines and staining were observed at the bankfull and greater elevations within the restoration site as well.

Table 2.6
Verification of Bankfull Events
BackCreek/Project No. 17

Date of Collection	Date of Occurrence	Method	Photo # (if available)
Summer/Fall 2006	September 13, 2006	Visual Assessment	N/A
10/9/2007	Unknown	Crest Gauge	N/A

2.3 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 are programmed to download ground water levels daily and were downloaded monthly from January to October in order to capture hydrological data during the 2007 growing season. The target wetland hydrological success criterion is saturation or inundation for at least 12.5 percent of the growing season in the lower landscape (floodplain) positions. To achieve the above hydrologic success criterion, ground water levels must be within 12-inches of the ground surface for 29 consecutive days, which is 12.5 percent of the March 22 to November 11 (235 days) growing season.

2.3.1 Wetland Problem Areas Plan View

There were no problem areas observed within the wetland restoration zones for the Back Creek Stream and Wetland 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 had hydric conditions present. Hydrophytic 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 Smartweed 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, appropriate hydrological condition for the wetland zones appears to be present.

2.3.2 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 3 for wetland raw data tables and plots and Table 2.7 for a summary of wetland criteria attainment.

Table 2.7
Wetland Criteria Attainment
BackCreek/Project No. 17

Gauge ID	Gauge Hydrology Met (Y/N)	Vegetation Plot ID	Vegetation Survival Threshold Met (Y/N)
BC-1 (000009BE9013)	Y	Plot 1	Y
BC-2 (000009DE6C7E)	Y	Plot 2	Y
BC-3 (000009BEA425)	Y	Plot 3	Y
		Plot 4	N

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SECTION 3
METHODOLOGY

SECTION 3
METHODOLOGY

3.1 Methodology

Methods employed for the Back Creek Stream Restoration Project were a combination of those established by standard regulatory guidance and procedures documents and the North Carolina State University and Soil and Environmental Consultants monitoring reports. Geomorphic and stream assessments were performed following guidelines outlined in the Stream Channel Reference Sites: An Illustrated Guide to Field Techniques (Harrelson et al., 1994) and in the Stream Restoration a Natural Channel Design Handbook (Doll et al, 2003). Vegetation assessments were conducted following the NCEEP 2004 Stem Counting Protocol which consists of counting woody stems within the established vegetation plots. JJG used the *Manual of the Vascular Flora of the Carolinas* by Albert R. Radford, Harry E. Ahles, and C. Ritchie Bell as the taxonomic standard for vegetation nomenclature for this report.

SECTION 4
REFERENCES

SECTION 4
REFERENCES

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

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

Radford, A.E., H.A. Ahles, and C.R. Bell. 1964. *Manual of the vascular flora of the Carolinas*. University of North Carolina Chapel Hill.

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

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SECTION 5
FIGURES

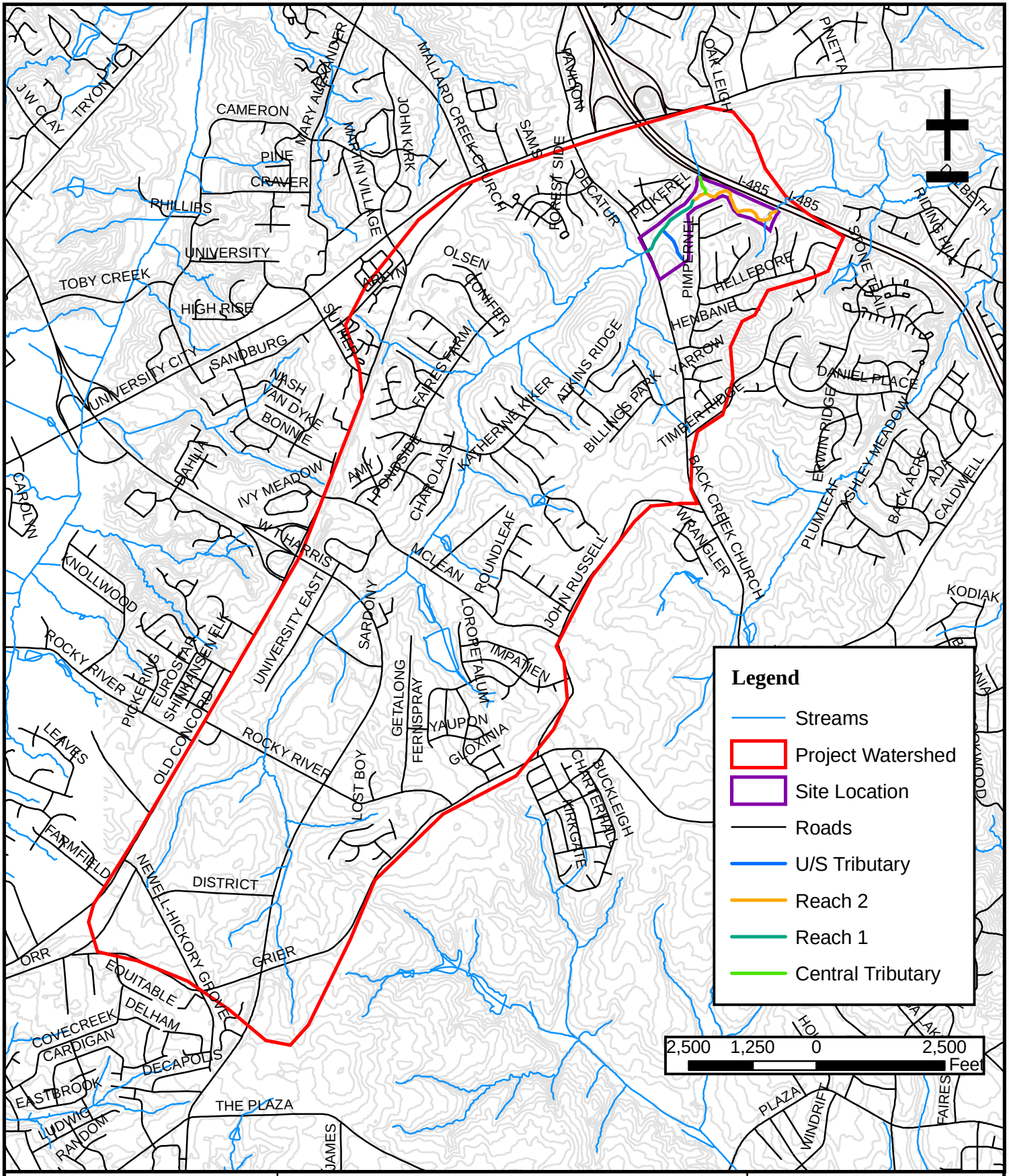


Figure 1.1 Project Location and Watershed Map
Back Creek Stream and Wetland Restoration
Mecklenburg County, NC
Monitoring Report Year 2 of 5

Project No. 17
November 2007

NC4001CS07.dwg
05.14.07

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

Ecosystem Enhancement PROGRAM

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

PROJECT NO. 17
MECKLENBURG COUNTY
NORTH CAROLINA
MONITORING
YEAR 2 of 5

JORDAN JONES & GOULDING

NC ECOSYSTEM ENHANCEMENT PROGRAM
BACK CREEK STREAM AND WETLAND RESTORATION

FIGURE 1.2
MONITORING PLAN VIEW MAP

DATE : NOVEMBER 2007
SCALE : 1"=200'
JOB NO.: 03060-001

FIGURE KEY

JTHACKSTON

LEGEND

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

16' ACCESS GATE

RAIN GAUGE

APPROXIMATE N

BACK CREEK CHURCH ROAD SR 2827

VEG PLOT 1

EXISTING 25' WIDE SANITARY SEWER EASEMENT

CROSS–SECTION #1

START LONGITUDINAL PROFILE 3+00

4+00

5+00

2+00

1+00

0+00

EXISTING 25' WIDE SANITARY SEWER EASEMENT

CONSERVATION EASEMENT BOUNDARY

EXISTING 128' WIDE DUKE POWER COMPANY R/W

MATCHLINE STA. 5+50
SEE FIGURE 2 OF 6

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

P:\03\03060\001\DWG\2006-11-16 Plan View\NC4001CS01.dwg, 11/14/2007 10:02:41 AM

Ecosystem Enhancement PROGRAM

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

PROJECT NO. 17
MECKLENBURG COUNTY
NORTH CAROLINA
MONITORING
YEAR 2 of 5

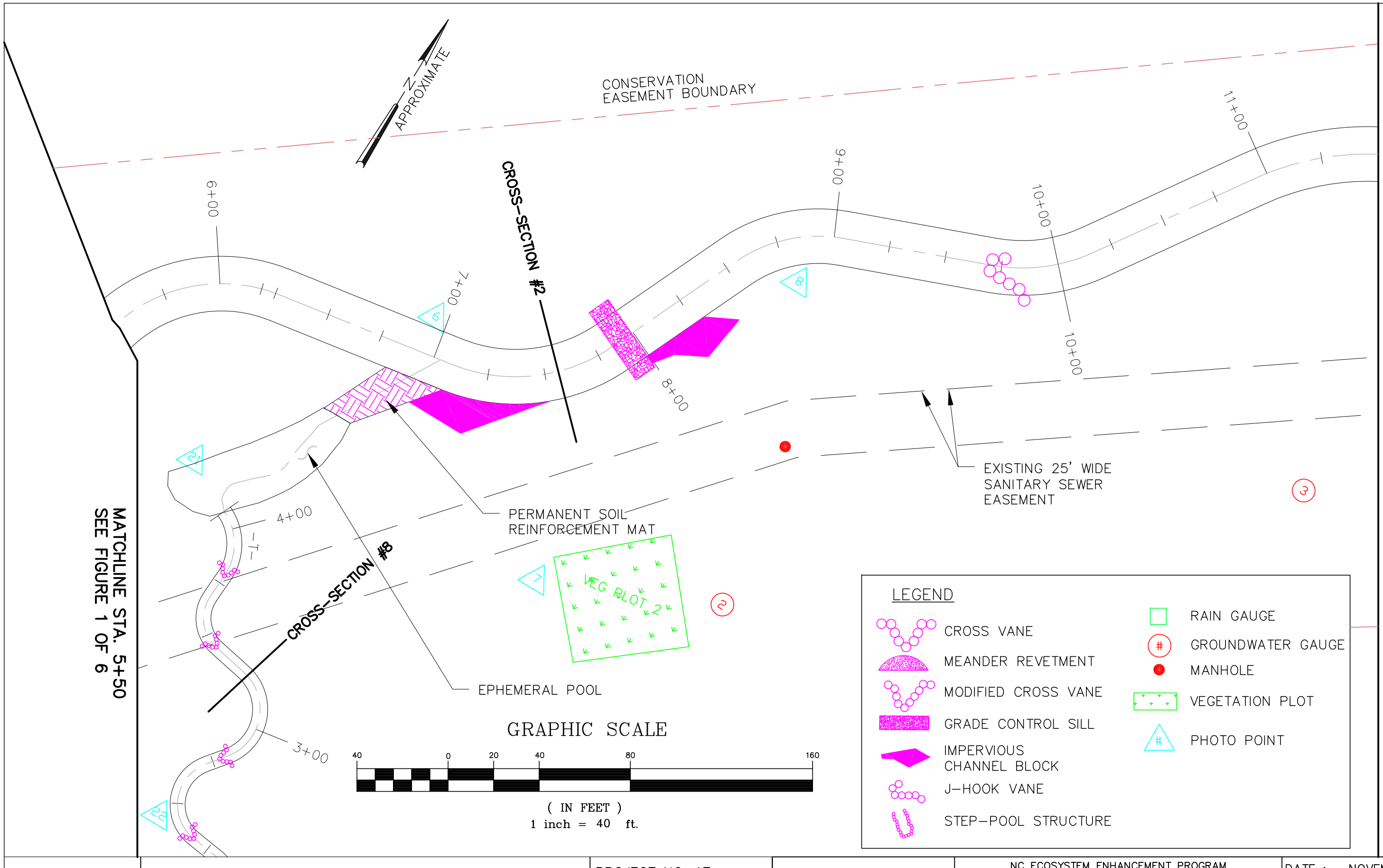
JORDAN JONES & GOULDING

NC ECOSYSTEM ENHANCEMENT PROGRAM
BACK CREEK STREAM AND WETLAND RESTORATION

FIGURE 1.2
MONITORING PLAN VIEW MAP

DATE : NOVEMBER 2007
SCALE : 1"=40'
JOB NO.: 03060–001

FIGURE 1 OF 6



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Ecosystem Enhancement PROGRAM

NOTES:
1. GENERAL SITE DATA PROVIDED BY NCEEP.
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PROJECT NO. 17
MECKLENBURG COUNTY
NORTH CAROLINA
MONITORING
YEAR 2 of 5

JORDAN JONES & GOULDING

NC ECOSYSTEM ENHANCEMENT PROGRAM
BACK CREEK STREAM AND WETLAND RESTORATION

FIGURE 1.2
MONITORING PLAN VIEW MAP

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

FIGURE 2 OF 6

MATCHLINE STA. 11+50
SEE FIGURE 2 OF 6

APPROXIMATE N

CROSS-SECTION #3

CROSS-SECTION #4

12+00

13+00

14+00

15+00

16+00

17+00

BOULDER TOE PROTECTION STA. 12+50 TO 13+00

A V O I D A N C E
A R E A

VEG PLOT 3

SAFETY FENCE

EXISTING 15' WIDE SANITARY SEWER EASEMENT

CONSERVATION EASEMENT BOUNDARY

MATCHLINE STA. 17+25
SEE FIGURE 4 OF 6

LEGEND

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

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

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

PROJECT NO. 17
MECKLENBURG COUNTY
NORTH CAROLINA
MONITORING
YEAR 2 of 5

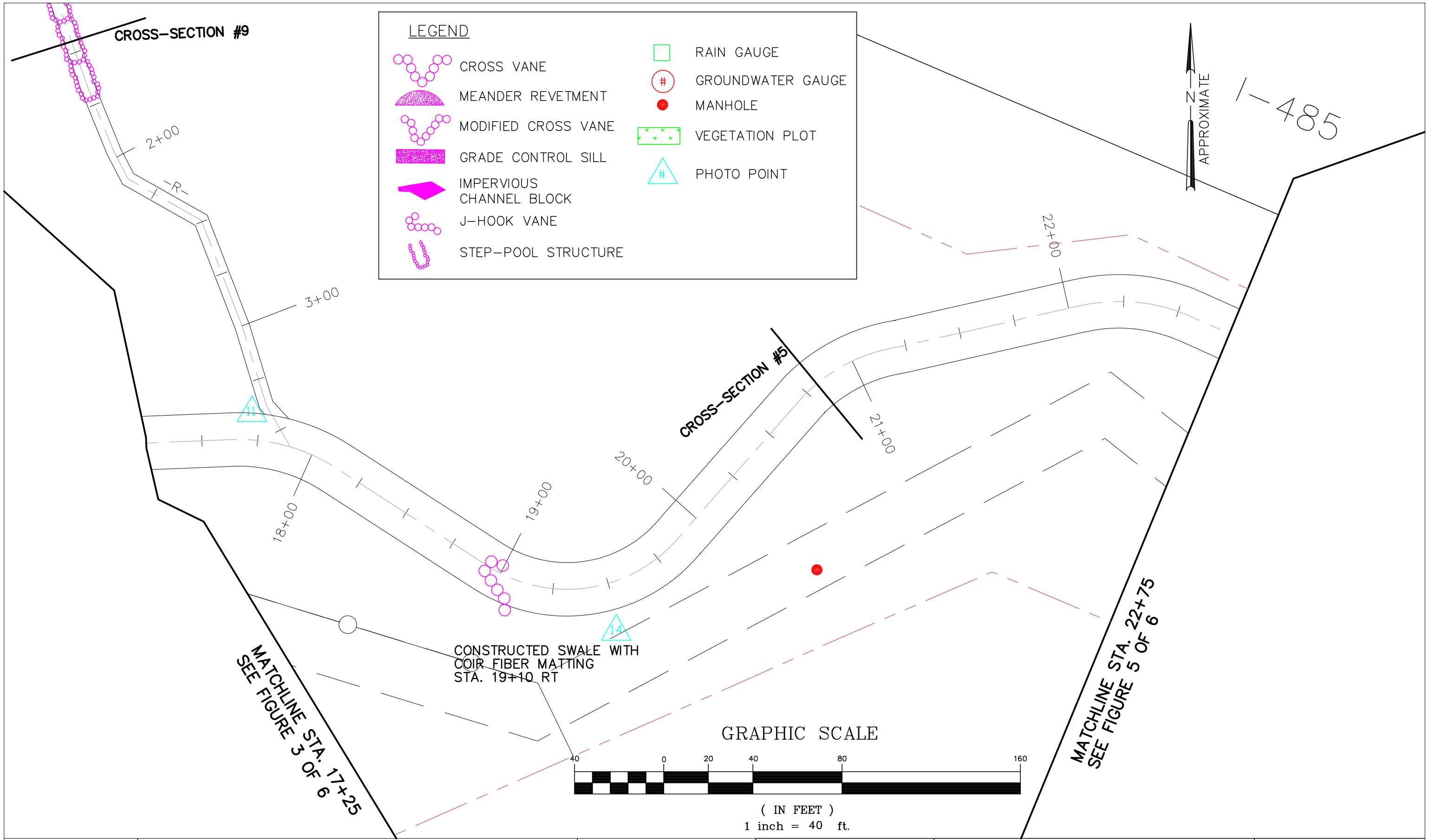
JORDAN JONES & GOULDING

NC ECOSYSTEM ENHANCEMENT PROGRAM
BACK CREEK STREAM AND WETLAND RESTORATION

FIGURE 1.2
MONITORING PLAN VIEW MAP

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

FIGURE 3 OF 6



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

PROJECT NO. 17
MECKLENBURG COUNTY
NORTH CAROLINA
MONITORING
YEAR 2 of 5

JORDAN JONES & GOULDING

NC ECOSYSTEM ENHANCEMENT PROGRAM
BACK CREEK STREAM AND WETLAND RESTORATION

FIGURE 1.2
MONITORING PLAN VIEW MAP

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

FIGURE 4 OF 6

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

N

23+00

24+00

25+00

26+00

27+00

28+00

15

16

POTENTIAL DISPOSAL/
STOCKPILE AREA

FENCE

EXISTING 25' WIDE
SANITARY SEWER EASEMENT

CROSS-SECTION #6

EXISTING 128' WIDE
DUKE POWER COMPANY R/W

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
- RAIN GAUGE
- GROUNDWATER GAUGE
- MANHOLE
- VEGETATION PLOT
- PHOTO POINT

Ecosystem Enhancement PROGRAM

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

PROJECT NO. 17
MECKLENBURG COUNTY
NORTH CAROLINA
MONITORING
YEAR 2 of 5

JORDAN JONES & GOULDING

NC ECOSYSTEM ENHANCEMENT PROGRAM
BACK CREEK STREAM AND WETLAND RESTORATION

FIGURE 1.2
MONITORING PLAN VIEW MAP

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

FIGURE 5 OF 6

LEGEND

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

EXISTING 128' WIDE DUKE POWER COMPANY R/W

EXISTING 25' WIDE SANITARY SEWER EASEMENT

N

VEG PLOT 4

CROSS-SECTION #7

END LONGITUDINAL PROFILE

29+00 30+00 31+00 32+00 33+00 34+00 35+00 36+00 37+00

17 18 19 20

MATCHLINE STA. 28+75
SEE FIGURE 5 OF 6

CONSERVATION EASEMENT BOUNDARY

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

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Ecosystem Enhancement PROGRAM

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

PROJECT NO. 17
MECKLENBURG COUNTY
NORTH CAROLINA
MONITORING
YEAR 2 of 5

JORDAN JONES & GOULDING

NC ECOSYSTEM ENHANCEMENT PROGRAM
BACK CREEK STREAM AND WETLAND RESTORATION

FIGURE 1.2
MONITORING PLAN VIEW MAP

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

FIGURE 6 OF 6

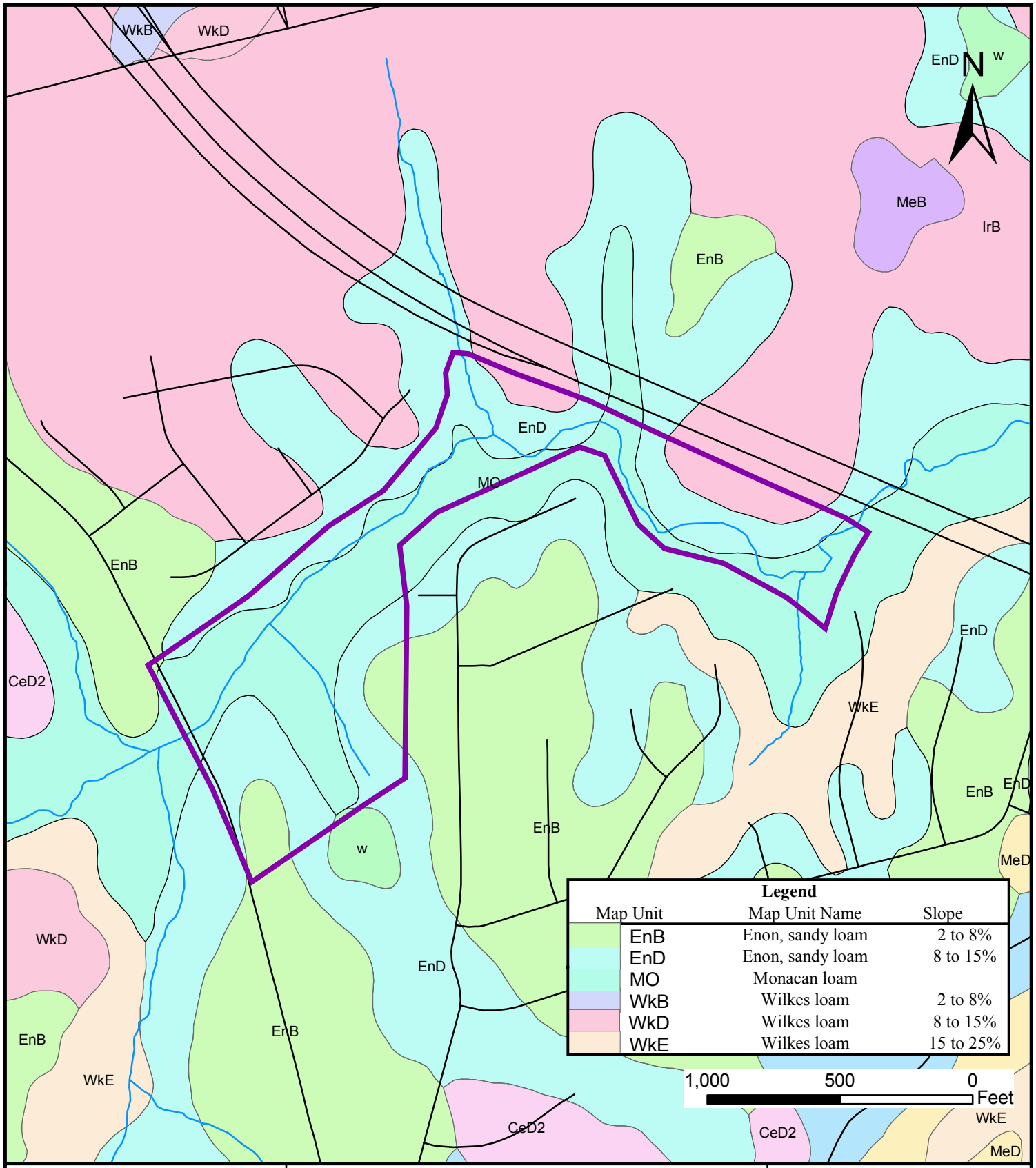

Figure 2.1. SOIL MAP
Back Creek Stream and Wetland Restoration
Mecklenburg County, NC
Monitoring Report Year 2 of 5

Project No. 17
February 2008

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SECTION 6
APPENDICES

Appendix 1 - Vegetation Raw Data

Appendix 2 - Geomorphic and Stream Stability Data

Appendix 3 - Wetland Raw Data

Appendix 4 – Integrated Current Condition Plan View

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APPENDIX 1
VEGETATION RAW DATA

1. Vegetation Survey Data Tables*

2. Representative Vegetation Current Condition Photos

3. Vegetation Monitoring Plot Photos

*Raw data tables have been provided electronically.

Stem Counts for Planted Species Arranged by Plot – MY-2007						
	Vegetation Plots Monitored (MY-2007)				MY1 - 2006	MY2 - 2007
Species	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Totals**	**Totals**
*Quercus michauxii**	4	6			**6**	**10**
*Fraxinus pennsylvanica**	6	7	12	4	**28**	**29**
Platanus occidentalis	5	7	6	1	**16**	**19**
Betula nigra	6	3	10	4	**14**	**23**
Ulmus americana	2				**1**	**2**
Unknown Dead	7	7	2	21	**55**	**37**
Total Planted Live Stems (2007)	**23**	**23**	**28**	**9**	**N/A**	**120**
Total Planted Stems (2006)	**30**	**30**	**30**	**30**	**120**	**N/A**
Average # of Stems (2007)	**21**					
Average # of Stems (2006)	**16**					
Stem Density (2007)	**420**					
Percent Survival (2007)	**77%**	**77%**	**93%**	**30%**	**Avg=69%**	
Volunteer Stems						
Species	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Totals**	**Totals**
Liquidambar styraciflua		17	3		**12**	**20**
Acer rubrum		1	1		**2**	**2**
Total Volunteer Strems (2007)	0	18	4	0	**14**	**22**

Table 2. Vegetation Problem Areas Table

Feature Issue	Station Numbers	Suspected Cause	Photo ID #*
Vegetation Cover - Poor	6+60-6+68	Poor vegetative cover - RB	3
	8+65-8+80	Poor vegetative cover - LB	
	33+75-33+80	Bare bank needs coverage - RB	
	35+00 - 35+50	Bare bank needs coverage - RB	

LB - Left Bank Looking Downstream, RB - Right Bank Looking Downstream, BB - Both Banks, TOB - Top of Bank
Please refer to Appendix 1.2 for Problem Area Photos
*Photos 1 and 2 illustrate poor vegeation associated with bank erosion

1. Bank Erosion: Moderate
3/22/2007

2. Bank Erosion: Severe
3/22/2007

3. Streambank Cover Poor
3/22/2007

1. Monitoring Plot 1
10/9/2007

2. Monitoring Plot 2
10/9/2007

3. Monitoring Plot 3
10/9/2007

4. Monitoring Plot 4
10/9/2007

Prepared For:

Ecosystem Enhancement Program

Back Creek Stream and Wetland Restoration
Year 2 of 5

Appendix 1.3 Vegetation Monitoring Plot Photos

Date: November 2007
Project No.: 17

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APPENDIX 2
GEOMORPHIC AND STREAM STABILITY DATA

1. **Stream Current Condition Table**
2. **Representative Stream Current Condition Photos**
3. **Stream Photo Station Photos**
4. **Stream Cross-Section Photos**
5. **Qualitative Visual Stability Assessment**
6. **Cross-Section Plots and Raw Data Tables***
7. **Longitudinal Plots and Raw Data Tables***
8. **Pebble Count Plots and Raw Data Tables***

*Raw data tables have been provided electronically.

E-Type Channel

Feature Issue	Station Numbers	Suspected Cause	Photo ID #
Bank Erosion - Moderate	2+50-2+65	Change in near bank stress - RB	1
	3+05-3+20	Loose, torn matting, change in near bank stress - LB	
	3+65-3+85		
	4+30-4+50	Change in near bank stress - RB	
	4+60-4+75		
	4+85-5+00		
	5+75-6+50	Poor vegetation cover, no matting - LB	
	6+05-6+25	Eroding under matting/Poor vegetative cover - RB	
	12+40 - 12+75	Toe protection slightly undermined - TOB/RB	
	13+00-13+20	Change in near bank stress, eroding under matting - RB	
	19+30-19+33	Change in near bank stress, eroding under matting - RB	
	21+15-21+25	Change in near bank stress, eroding under matting - LB	
	23+40-23+45	Loose matting, bank eroding underneath - LB	
	24+40-24+60	Very moderate bank erosion under matting - LB	
	24+72-25+25		
	24+75-26+75	Little vegetation, moderate bank erosion under matting - RB	
	27+00-27+20	Change in near bank stress, eroding under loose matting - RB	
	27+65-27+90	Change in near bank stress, eroding under matting - RB	
	29+00-29+50	Change in near bank stress - LB	
	31+75-31+78	Change in near bank stress, eroding under matting - LB	
	33+42-33+52	Change in near bank stress, eroding under matting - RB	
	34+00-34+20	Bare bank, lack of vegetative cover - RB	
	34+55-34+70	Change in near bank stress, eroding under matting - LB	
Bank Erosion - Severe	8+80-9+15	Loose matting - LB	2
	14+60-14+85	Loose matting, bank erosion - RB	
	14+60 - 15+30	Loose matting, bank erosion under matting - LB	
	22+20-22+40	Bank erosion under matting - LB	
	22+55-22+65		
	22+81-22+91		
	26+70-26+75	Loose matting, bank erosion under matting - LB	
	27+40-27+60	Loose matting, bank erosion under matting - RB	
	27+49-27+51	Loose matting, bank erosion under matting - LB	
	30+75-31+00	Change in near bank stress, eroding under matting - RB	
	35+00-35+50	Loose matting, vertical bank - RB	
Aggradation	13+20	Heavy sediment deposition in tributary	8
	15+20	Overwidened channel - transverse/mid channel bar forming	4
	20+20 - 20+60	Overwidened channel - lateral bar forming - LB	9
	27+65-27+90	Overwidened channel - lateral bar forming, pushing TW to REW - LB	
Down Tree	17+85	Down tree from stream bank - potential for debris jam	3
Loose Matting	23+20-23+30	Loose matting, stakes failed to hold	5
Point Bar Eroding - Moderate	3+30-3+35	Channel dimension adjusting - RB	6
	3+70-3+80	Channel dimension adjusting - RB	
	4+50-4+53	Channel dimension adjusting - LB	
Structure- Stressed	7+25	Scour under arm at BKF - RB	10
	14+60	Scour under arm - LB	
Streambank Cover - Poor	6+60-6+68	Poor vegetative cover - RB	7
	8+65-8+80	Poor vegetative cover - LB	
	33+75-33+80	Bare bank needs coverage - RB	
	35+00 - 35+50	Bare bank needs coverage - RB	

B-Type Channel

Feature Issue	Station Numbers	Suspected Cause	Photo ID #
Bank Erosion-Moderate	0+5-0+15	Eroding under matting - RB	6
	2+02-2+15	Eroding under matting - LB	
	2+25-2+26	Eroding under matting - LB	

LB - Left Bank Looking Downstream, RB - Right Bank Looking Downstream, BB - Both Banks, TOB - Top of Bank
Please refer to Appendix 2.2 for Problem Area Photos

1. Bank Erosion: Moderate
3/22/2007

2. Bank Erosion: Severe
3/22/2007

3. Tree Down
3/22/2007

4. Aggradation: Transverse Bar
3/22/2007

5. Loose Matting
3/22/2007

6. Point Bar Erosion
3/22/2007

7. Stream Bank Cover Poor
3/22/2007

8. Heavy Sediment Deposition in Stormwater Swale
3/22/2007

9. Aggradation: Lateral Bar
3/22/2007

10. Structure Stressed
3/22/2007

Photo Point 1: Facing Southeast-8/27/2007

Photo Point 1: Facing West-8/27/2007

Photo Point 2: -8/27/2007

Prepared For: Ecosystem Enhancement Program	Back Creek Stream and Wetland Restoration Year 2 of 5	Date: November 2007 Project No.: 17
	Appendix 2.3 Stream Photo Station Photos	JORDAN JONES & GOULDING

Photo Point 3: Upstream-8/27/2007

Photo Point 3: Downstream-8/27/2007

Photo Point 4: Upstream-8/27/2007

Photo Point 4: Downstream-8/27/2007

Photo Point 5: Upstream-8/27/2007

Photo Point 5: Downstream-8/27/2007

Photo Point 6: Upstream-10/9/2007

Photo Point 6: Downstream-10/9/2007

Photo Point 7: Facing Southwest-8/27/2007

Photo Point 8: Upstream-8/27/2007

Photo Point 8: Downstream-8/27/2007

Photo Point 9: Upstream-10/9/2007

Photo Point 9: Downstream-10/9/2007

Photo Point 10: Upstream-8/27/2007

Photo Point 10: Downstream-8/27/2007

Photo Point 11: Upstream-10/9/2007

Photo Point 11: Downstream-10/9/2007

Photo Point 12: Upstream-10/9/2007

Photo Point 12: Downstream-10/9/2007

Photo Point 13: 8/27/2007

Photo Point 14: Upstream-8/27/2007

Photo Point 14: Downstream-8/27/2007

Photo Point 15: Upstream-8/27/2007

Photo Point 15: Downstream-8/27/2007

Photo Point 16: Upstream-8/27/2007

Photo Point 16: Downstream-8/27/2007

Photo Point 17: Veg Plot 4-8/27/2007

Photo Point 18: Upstream-8/27/2007

Photo Point 18: Downstream-8/27/2007

Photo Point 19: Upstream-8/27/2007

Photo Point 19: Downstream-8/27/2007

Photo Point 20: Upstream-8/27/2007

Photo Point 20: Downstream-8/27/2007

Photo Point 21: Upstream-10/9/2007

Photo Point 21: Downstream-10/9/2007

Cross-Section 1: Upstream-8/27/2007

Cross-Section 1: Downstream-8/27/2007

Cross-Section 2: Upstream-8/27/2007

Cross-Section 2: Downstream-8/27/2007

Cross-Section 3: Upstream-8/27/2007

Cross-Section 3: Downstream-8/27/2007

Cross-Section 4: Upstream-8/27/2007

Cross-Section 4: Downstream-8/27/2007

Cross-Section 5: Upstream-8/27/2007

Cross-Section 5: Downstream-8/27/2007

Cross-Section 6: Upstream-8/27/2007

Cross-Section 6: Downstream-8/27/2007

Cross-Section 7: Upstream-8/27/2007

Cross-Section 7: Downstream-8/27/2007

Cross-Section 8: Upstream-8/27/2007

Cross-Section 8: Downstream-8/27/2007

Cross-Section 9: Upstream-10/9/2007

Cross-Section 9: Downstream-10/9/2007

Main Channel

Feature Category		(# Stable) Number Performing as Intended	Total Number assessed per 2007 survey	Total Number/ feet in unstable state	% Perform in Stable Condition	Feature Perform Mean or Total
A. Riffles	1. Present?	24	24	N/A	10%	**100%**
	2. Armor Stable?	24			100%	
	3. Facet grade appears stable?	24			100%	
	4. Minimal evidence of embedding/fining?	24			100%	
	5. Length appropriate?	24			100%	
B. Pools	1. Present?	26	26	N/A	100%	**100%**
	2. Sufficiently deep?	26			100%	
	3. Length Appropriate?	26			100%	
C. Thalweg	1. Upstream of meander bend centering?	25	26	N/A	96%	**98%**
	2. Downstream of meander centering?	26			100%	
D. Meanders	1. Outer bend in state of limited/controlled erosion?	20	26	N/A	77%	**94%**
	2. Of those eroding, # w/concomitant point bar formation?	20			100%	
	3. Apparent Rc within spec?	26			100%	
	4. Sufficient floodplain access and relief?	26			100%	
E. Bed General	1. General channel bed aggradation areas (bar formation)?	N/A		4 / 85	97%	**99%**
	2. Channel bed degradation - areas of increasing down-cutting or head cutting?			0	100%	
F. Bank	1. Actively eroding, wasting, or slumping bank	N/A		11 / 272	96%	**96%**
G. Vanes	1. Free of back or arm scour?	16	18	N/A	89%	**94%**
	2. Height appropriate?	-			-	
	3. Angle and geometry appear appropriate?	-			-	
	4. Free of piping or other structural failures?	18			100%	
H. Wads/ Boulders	1. Free of scour?	N/A				
	2. Footing stable?					

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

2006			2007		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
0.0	96.46	lpin grd	0	96.63	
0.0	96.63	lpin top	0.01	96.63	lpin top
2.0	96.57		4.01	96.54	
4.0	96.68		4.05	96.55	
8.0	96.51		11.2	96.25	
12.0	96.38		20.29	96.23	
16.0	96.46		25.5	95.96	
20.0	96.31		30.49	96.05	
23.0	96.17		32.82	96.21	
26.0	95.99		35.43	96.18	
29.0	96.19		36.38	96.12	BKF
32.0	96.3		38.58	95.34	
35.0	96.28		40.28	94.79	
36.0	96.22	BKF	42.24	94.25	
37.0	95.86		43.1	93.6	
38.0	95.58		43.89	93.48	
39.0	95.15		45.22	93.34	
40.0	94.73	Inner Berm	45.27	93.31	LEW
41.0	94.58		47.04	93.18	
42.0	94.35		48.32	93.01	
43.0	93.7		49.37	93.06	
45.0	93.55		49.61	93.06	TW
45.5	93.4	LEW	50.34	93.06	
46.6	93.33		52.23	93.09	
49.0	93.19	tw	53.4	93.31	REW
50	93.23		53.94	93.56	
51	93.23		54.94	94.02	
53	93.38	REW	56.91	94.69	
54	93.8		57.98	95.23	
55	94.17		59.65	96.12	BKF
56	94.55		61.42	95.42	
56.25	94.73	Inner Berm	63.67	95.64	
57	95.1		70.04	95.68	
58	95.48		74.92	95.71	
59	95.66		75.09	95.73	
61	95.63		75.19	95.76	
64	95.82		79.06	95.94	
67	95.9		80.24	96.41	
71	95.97		83.48	96.83	
74	95.98		87.49	97.15	
77	96.05				
79	96.16	BKF			
80.5	96.63				
82	96.9	terrace			
84	97.03				
86	97.01				
87.2	97.06	rpin grd			
87.2	97.2	rpin top			

Project Name: Back Creek
Cross-Section: 2
Feature: Pool

2006			2007		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
0.0	95.46	lpin ground	0	95.7	lpin top
0.0	95.7	lpin top	0.71	95.61	lpin ground
6.0	95.39		5.49	95.6	
12.0	95.44		11.84	95.57	
21.0	94.87		18.15	95.17	
24.7	94.59	BKF	23.54	94.99	
27.0	94.06		25.11	94.96	BKF
29.2	93.56		27.41	94.27	
32.3	92.77		30.77	93.51	
35.8	92.29		33.81	93.07	
36.6	91.8	LEW	34.81	92.62	
36.6	91.66		35.81	91.8	
38.0	90.72		36.4	91.42	LEW
40.5	89.92		37.66	90.79	
43.3	89.34		38.09	90.72	
44.0	89.33	TW	40.39	90.27	
45.0	89.57		42.16	89.94	
47.0	90.22		45.38	89.65	TW
48.6	91.1		46.22	90.19	
49.1	91.8	REW	47.73	91.18	
50.0	92.18		48.26	91.63	REW
52.5	93.02		49.16	92.79	
55.0	93.91		51.57	93.46	
58.0	94.69	BKF	54.12	94.11	
59.7	95.12		58.86	94.8	BKF
60.7	95.66	terrace	61.65	95.67	
66	95.76		64.63	95.77	
75	95.64		68.91	95.77	
78	95.81		74	95.74	
80.6	95.66	rpin grd	77.84	95.75	
80.6	95.38	rpin top	80.69	95.74	
			80.98	95.78	

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

2006			2007		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
0.0	94.89	lpin top	0	94.89	lpin top
0.3	94.03		0.1	94.67	lpin ground
2.3	94		3.91	94.24	
6.3	93.8		8.57	93.68	
10.3	93.06		12.47	93.28	
14.3	92.92		16.59	93.09	
18.3	92.77		21.26	92.96	
21.3	92.63		26.43	92.43	
24.3	92.45		29.3	92.41	BKF
27.3	92.65		32.7	91.6	
30.3	92.76		36.32	91.12	
33.3	92.74		38.74	90.22	
34.3	92.68	BKF	41.43	89.55	LEW
35.3	92.32		43.2	89.51	
36.3	92.04		44.27	89.48	
37.3	91.61		46.98	89.38	
38.3	91.19	ib	48.23	89.38	TW
39.3	91.04		49.95	89.54	REW
40.3	90.81		51.21	90.07	
41.3	90.16		54.37	91.05	
43.3	90.01		56.77	91.94	
43.8	89.86	LEW	59.97	92.41	BKF
44.9	89.79		63.33	92.8	
47.3	89.65	TW	69.12	92.83	
48.3	89.69		74.11	92.97	
49.3	89.69		78.36	93.03	
51.3	89.86	REW	82.43	93.01	
52.3	90.26		88.19	92.74	
53.3	90.63		91.81	92.42	
54.3	91.01		94.45	92.16	rpin ground
54.55	91.19	ib	94.54	92.23	rpin top
55.3	91.56				
56.3	91.94				
57.3	92.12				
59.3	92.09				
62.3	92.28				
65.3	92.36				
69.3	92.43				
72.3	92.44				
75.3	92.51				
77.3	92.68	BKF			
78.8	93.09				
80.3	93.36	terrace			
82.3	93.49				
84.3	93.47				
85.5	93.52				
87.5	92.68				
87.5	92.92	rpin top			

Project Name: Back Creek
Cross-Section: 4
Feature: Pool

2006			2007		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
0.0	92.98	l pin top	6.21	92.29	
3.2	93.25		10.73	92.3	
11.1	92.6		12.32	91.97	
19.7	92.1		14.36	91.79	
23.0	92.11	BKF	16.82	91.48	
26.5	91.35		19.31	91.31	
29.2	90.81		22.88	90.97	
31.0	90.25		26.2	90.79	
33.5	89.48		28.92	90.78	
35.3	89.11	LEW	30.86	90.51	
37.1	89.03		31.59	90.24	
37.7	89.05		32.83	89.19	XS4-LEW
39.7	89.01		34.73	88.45	
41.6	88.96	tw	36.06	87.74	
43.9	89.04		37.58	87.44	
44.5	89.11	REW	39.25	87.07	
45.4	89.33		40.3	87.1	
47.3	90.22		41.64	87.11	XS4-TW
50.7	91.35		42.56	87.5	
54.2	91.89		44.52	88.1	
55.7	92.11	BKF	46.13	89.17	XS4-REW
69.7	92.58		47.44	89.69	
82.7	92.2		48	90.26	
88.7	91.83	rpin top	48.38	90.88	
			49.76	91.12	
			50.7	91.77	
			51.79	91.95	
			53.22	92.36	
			54.48	92.27	
			57.61	92.42	
				91.83	rpin top

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

2006			2007		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
0.0	95.42		0	95.48	lpin-ground
0.5	95.59	lpin-top	0.82	95.59	lpin-top
1.2	95.45		2.08	95.5	
6.9	93.95		4.17	94.72	
11.2	93.94		5.7	94.1	
13.6	93.81	BKF	10.04	94.04	
15.6	93.32		12.49	93.8	BKF
17.3	92.89		14.65	93.9	
19.1	92.48		16.38	93.52	
21.2	92.26		18.01	92.94	
23.1	92.2		21.43	92.23	
25.0	91.41		23.76	92.23	
26.5	91.26		25.15	91.35	
27.0	91.2	lew-ws	26.44	91.19	LEW
29.0	91.16	bdrk	27.93	91.11	
30.3	91.25	bdrk	29.73	91.27	
32.0	91		30.42	91.34	
32.6	90.87		31.25	91.34	
33.3	91.2	REW	32.04	91.22	
34.4	91.45		33.16	90.99	
35.7	91.88		33.34	90.86	
38.0	91.58		33.93	91.2	REW
40.0	93.7		36.32	92.03	
43.0	93.8	BKF	37.51	92.53	
45.0	94.37		39.67	93.14	
48	94.52		42.2	93.8	BKF
51	94.69		44	94.33	
55	94.77		46.31	94.67	
57	95.12		47.45	94.73	
58	95.5		53.56	94.87	
59	95.68		59.67	95.38	rpin-top
59.6	95.07	rpin grd	59.83	95.16	rpin-ground
59.6	95.29	ib			
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	terrace			
84	97.05				
86	97.03				
87.2	97.08				

Project Name: Back Creek
Cross-Section: 6
Feature: Pool

2006			2007		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
0.0	87.46	lpin grd	-11.74	88.36	
0.0	87.91	lpin top	-6.23	88.07	
2.0	87.46		-2.29	88	
5.0	87.39		4.49	87.98	
8.0	87.31		8.09	87.92	
12.0	87.33		11.56	87.81	bkf
12.6	87.31	BKF	13.19	87.5	
13.0	87.01		16.27	86.87	
16.0	86.71		17.74	86.48	
18.0	86.37		20.83	85.62	
19.5	85.78		21.87	84.99	
21.0	85.39		23.18	84.44	
22.0	84.46	lew-ws	24.6	83.93	
22.0	84.25		25.21	83.8	XS6-LEW
23.6	83.26		26.3	83.55	
25.5	82.85		29.37	83.16	
27.7	82.29		31.7	83.26	
29.6	82.25		32.61	83.8	XS6-REW
31.0	82.69		34.36	84.25	
33.0	83.51		35.31	84.68	
34.9	83.68	rew	36.24	86.21	
34.9	84.48	ws	36.87	86.8	
36.0	86.09		39.01	86.98	
38.0	86.38		42.08	87.49	
40.0	86.93		42.53	87.51	
42	87.21	BKF	46.96	87.71	bkf
45	87.27		47	87.27	
48	87.55		48	87.55	
50.7	87.71	rpin-grd	50.7	87.71	
50.7	87.99		50.7	87.99	

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

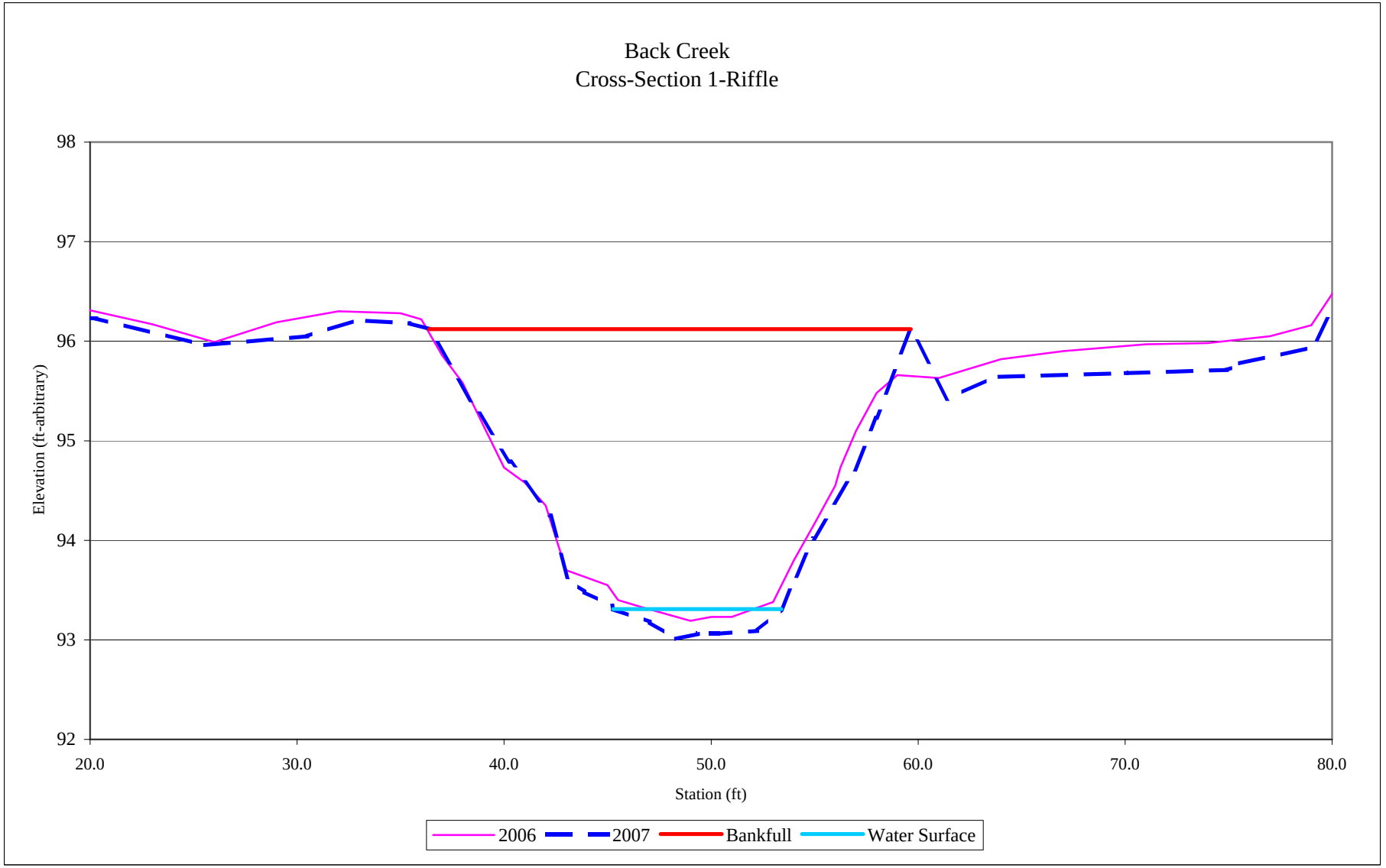
2006			2007		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
0.0	83.31	lpin/g	0	83.49	
0.0	83.49	lpin/top	0.29	83.21	
3.5	83.39		2.48	83.28	
9.0	83.39		9.22	83.24	
12.0	83.39		13.31	83.48	
15.0	83.46		15.66	82.97	
17.0	82.92	BKF	18.3	82.35	
18.0	82.65		19.49	81.79	BKF
19.5	81.97		21.37	81.15	
21.1	81.39		23.82	80.48	
23.0	80.92		24.82	80.05	
25.6	80.12		25.05	79.93	
29.7	79.98	lew/ws	28.03	79.82	
30.7	79.91		30.89	79.74	
32.5	79.82		32.31	79.74	
34.0	79.77		33.51	79.78	
36.5	79.81		34.76	79.63	
37.8	79.57		36.54	79.53	
39.0	79.76		37.46	79.52	
39.2	79.98	rew/ws	38.28	79.62	
41.0	80.51		40.23	80.03	
43.6	80.96		41.62	80.45	
46.3	81.82		42.74	80.83	
47.7	82.46		45.34	81.42	
49.7	82.94	BKF	47.02	81.95	BKF
52.4	83.19		47.54	82.62	
56.4	83.51		50.43	82.9	
59	83.79		53.62	83.34	
61.7	83.59	rpin/gr	56.84	83.47	
61.7	83.69		61.08	83.47	
			64.99	83.52	
			68.72	83.61	
			73.97	83.82	
			73.97	83.82	

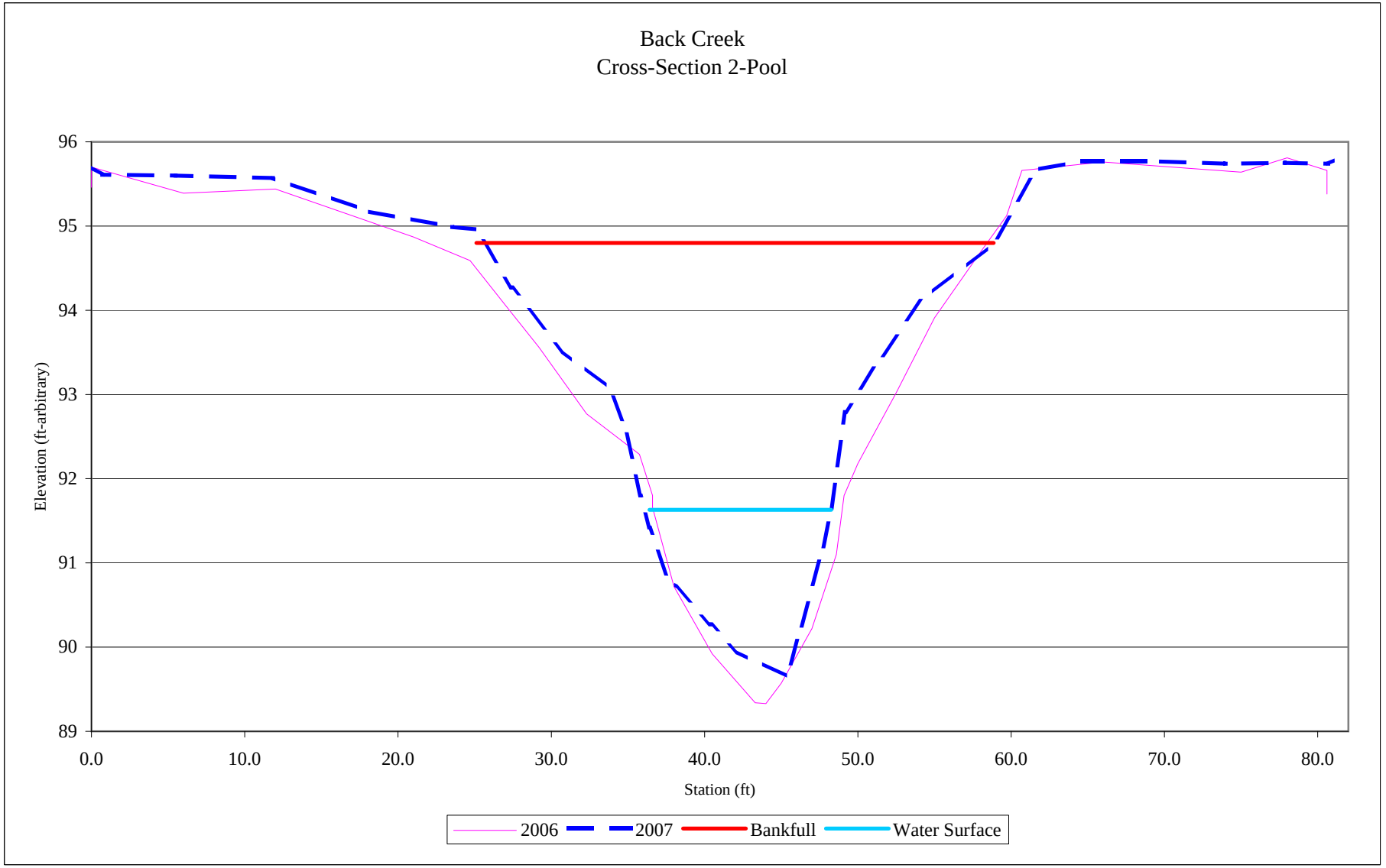
Project Name: Back Creek
Cross-Section: 8
Feature: Riffle

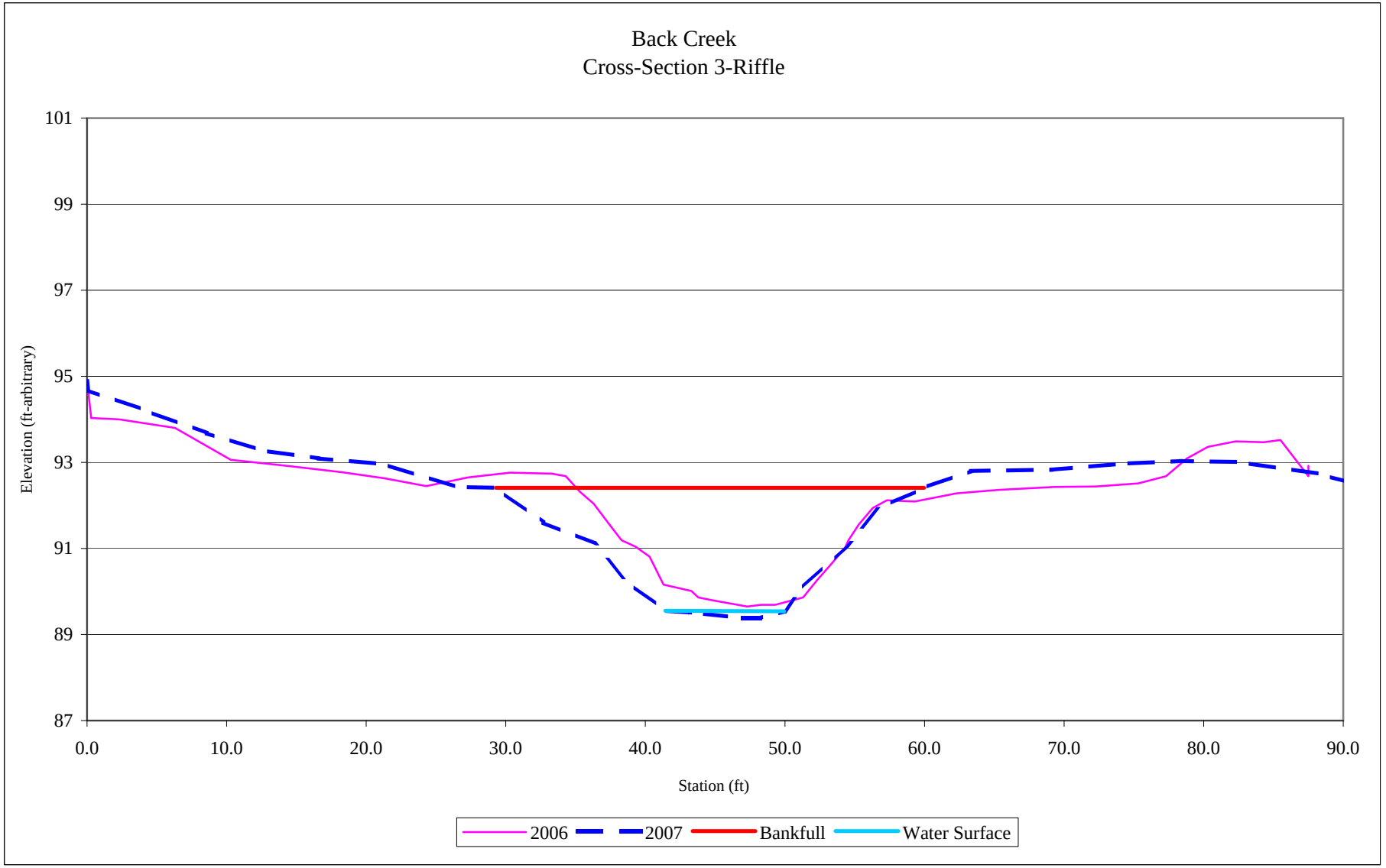
2006			2007		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
7.8	93.69	lpin-grd	0		
7.8	93.92	lpin-top	5.13	93.52	
10.8	93.9		9.94	93.37	
14.8	93.74		13.23	93.67	
18.8	93.65		18.68	93.94	
19.8	93.63		20.93	93.64	BKF
21.8	93.26	BKF	23.11	93.25	
23.8	92.54		23.87	92.34	
25.8	92.21		25.51	91.71	
26.8	91.95		26.84	91.66	
28.8	92.24		27.73	91.71	
30.8	92.7		31.27	93.37	
32.8	93.11		32.81	93.67	BKF
34.8	93.31	BKF	34.88	93.79	
35.8	93.28				
37.8	93.11				
39.8	93.1				
42.1	93.16	rpin-grd			
42.1	93.36				

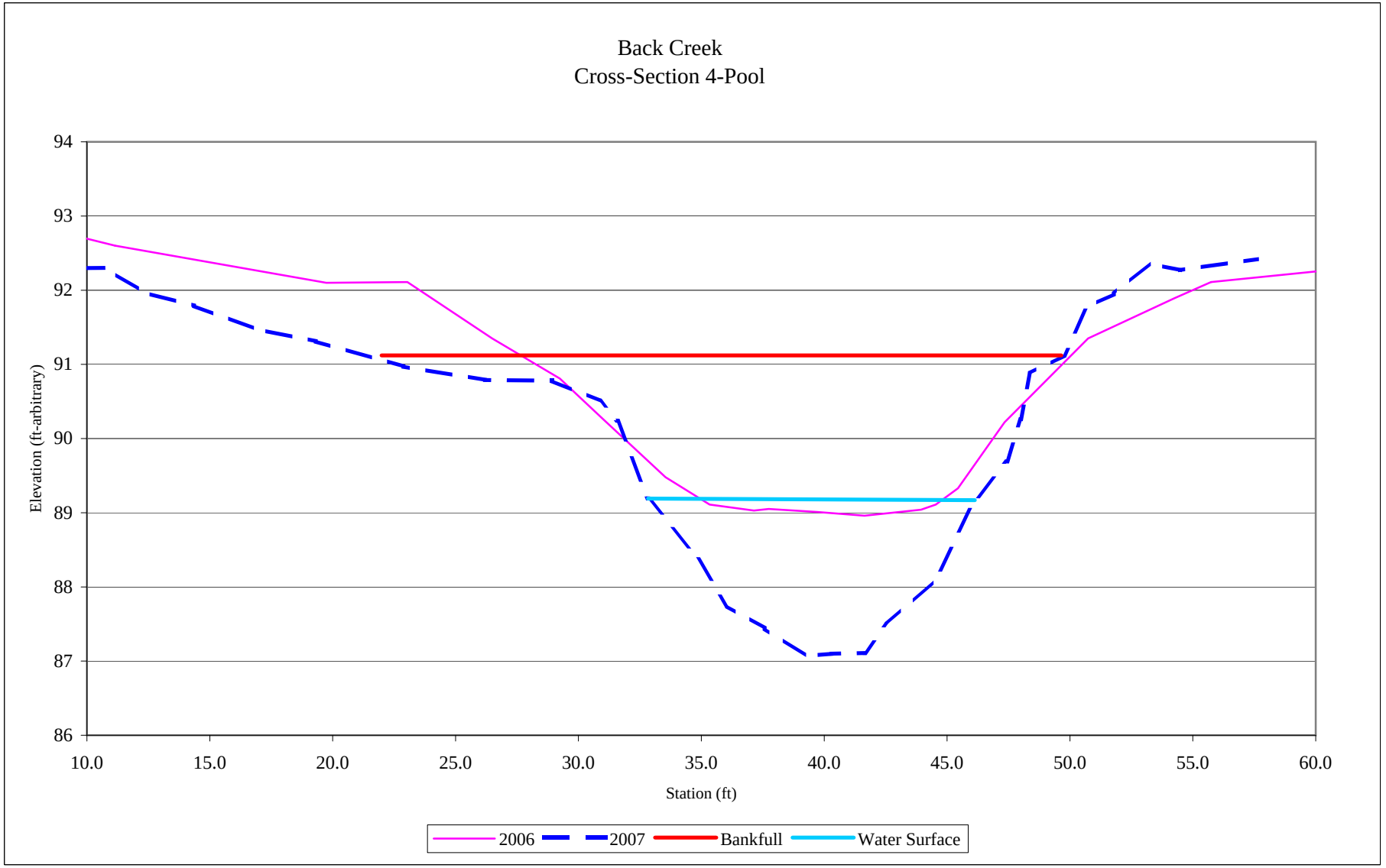
Project Name: Back Creek
Cross-Section: 9
Feature: Riffle

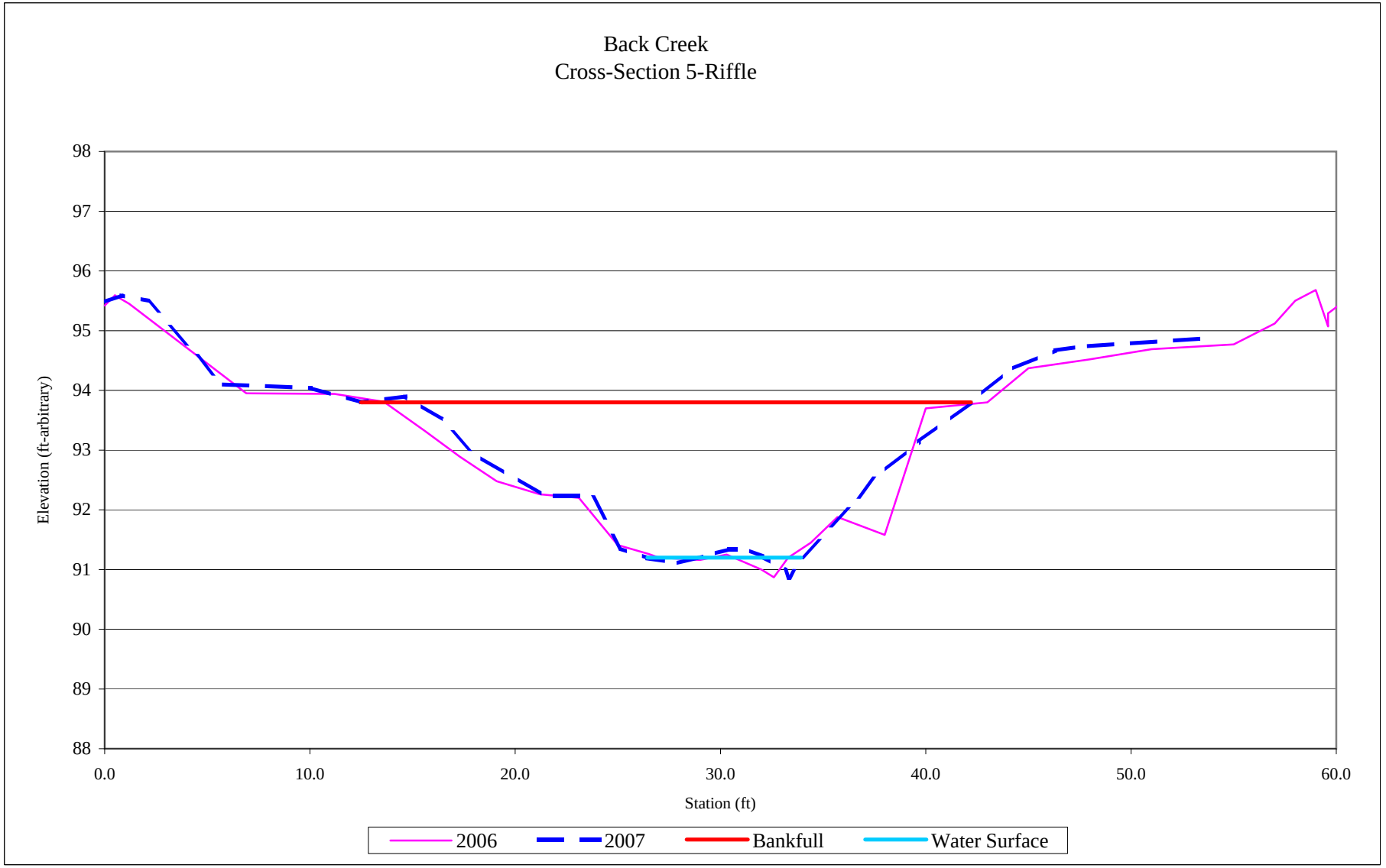
2007		
Station	**Elevation**	**Notes**
0	1000.49	rpin-ground
0.16	1000.71	rpin-top
6.27	1000.2	
12.38	1000.06	
13.51	1000	BKF
15.83	999.66	
17.62	999.08	
20.15	998.47	
22.32	997.86	
23.51	997.36	
25.89	996.53	REW
26.49	996.19	
26.67	996.32	
27.78	996.55	
28.58	996.67	
29.4	996.67	
30.1	996.6	
31.89	996.44	
33.38	996.52	LEW
34.7	996.68	
36.07	997.56	
38.4	997.56	
41.81	998.27	
43.44	998.85	
45.18	999.23	
47.34	999.22	BKF
49.78	999.37	
54.12	999.43	
55.65	1000.05	
57.75	1000.83	
59	1000.92	lpin-top
59.83	1000.81	lpin-ground

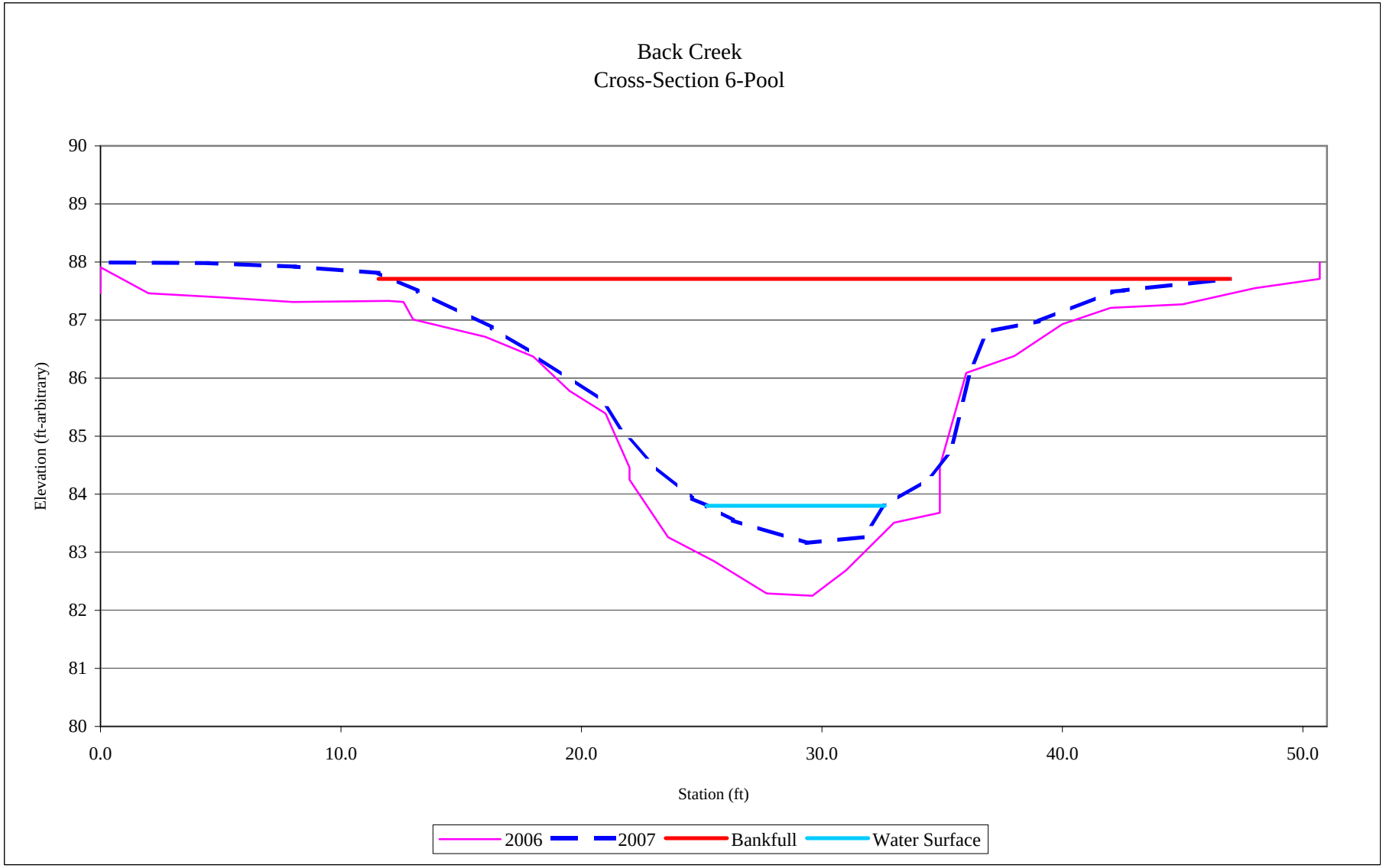

Back Creek
Cross-Section 1-Riffle
98
97
96
95
94
93
92
Elevation (ft-arbitrary)
20.0
30.0
40.0
50.0
60.0
70.0
80.0
Station (ft)
2006
2007
Bankfull
Water Surface

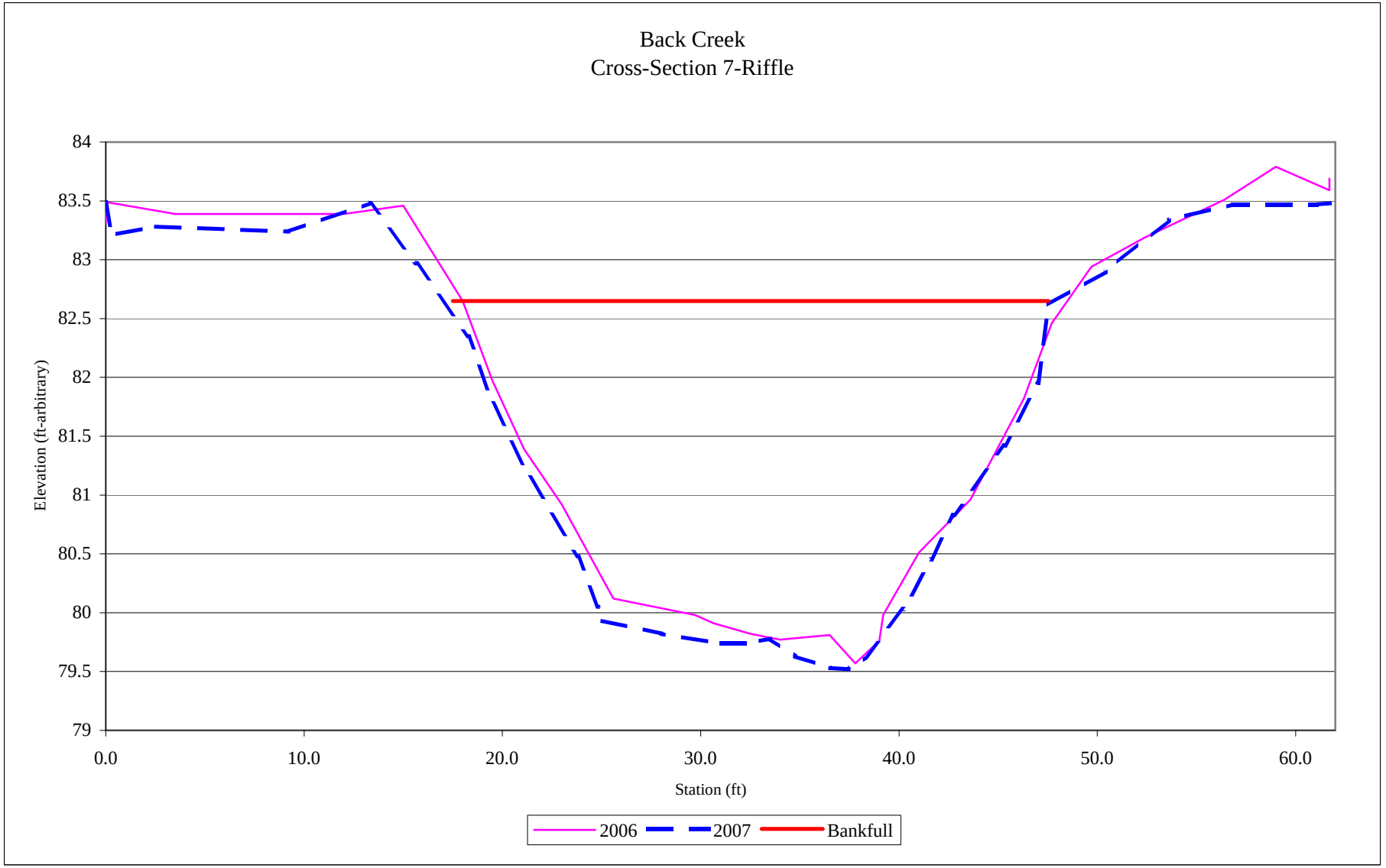

Back Creek
Cross-Section 2-Pool
Elevation (ft-arbitrary)
96
95
94
93
92
91
90
89
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
Station (ft)
2006
2007
Bankfull
Water Surface

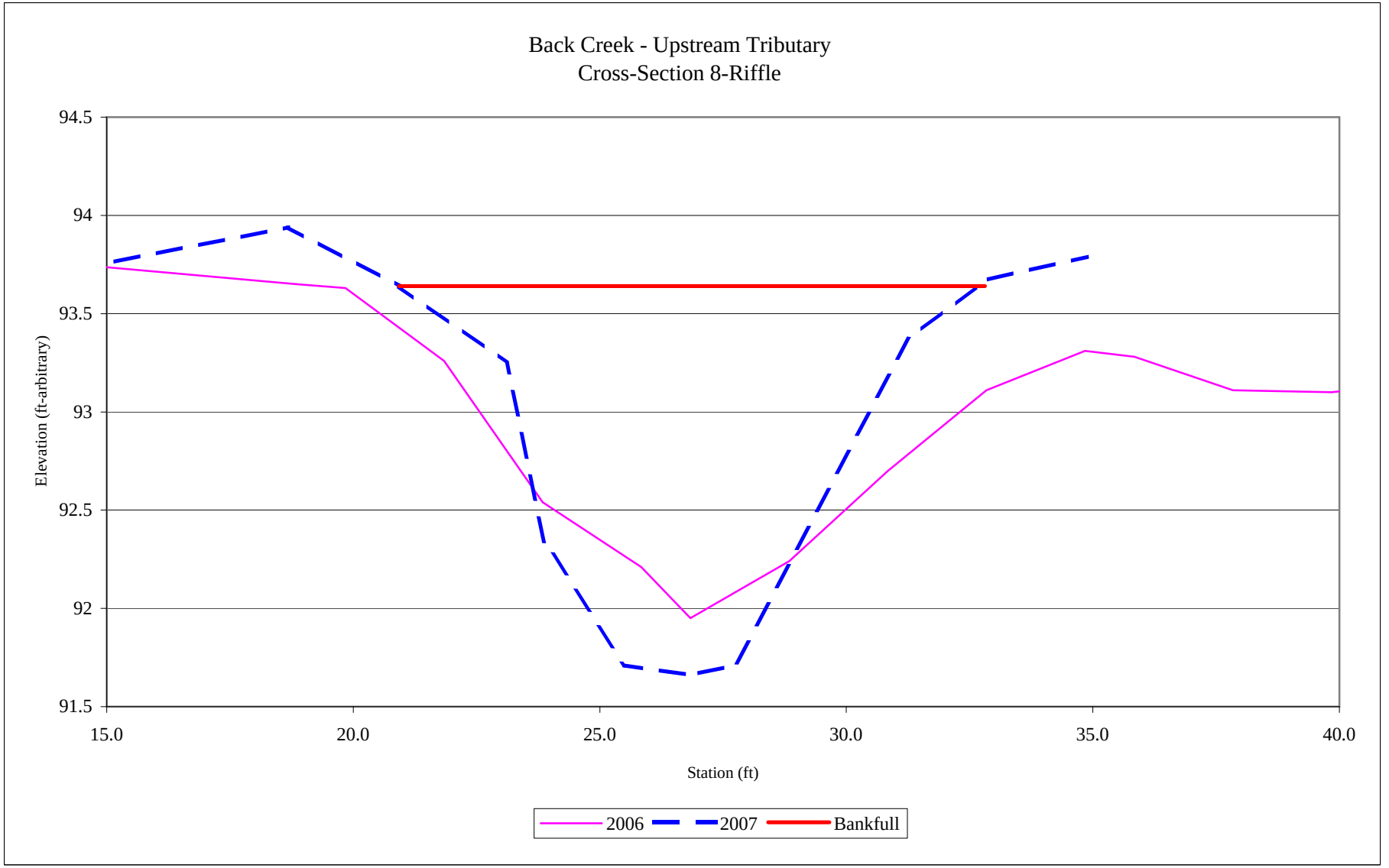

Back Creek
Cross-Section 3-Riffle
Elevation (ft-arbitrary)
101
99
97
95
93
91
89
87
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
Station (ft)
2006
2007
Bankfull
Water Surface

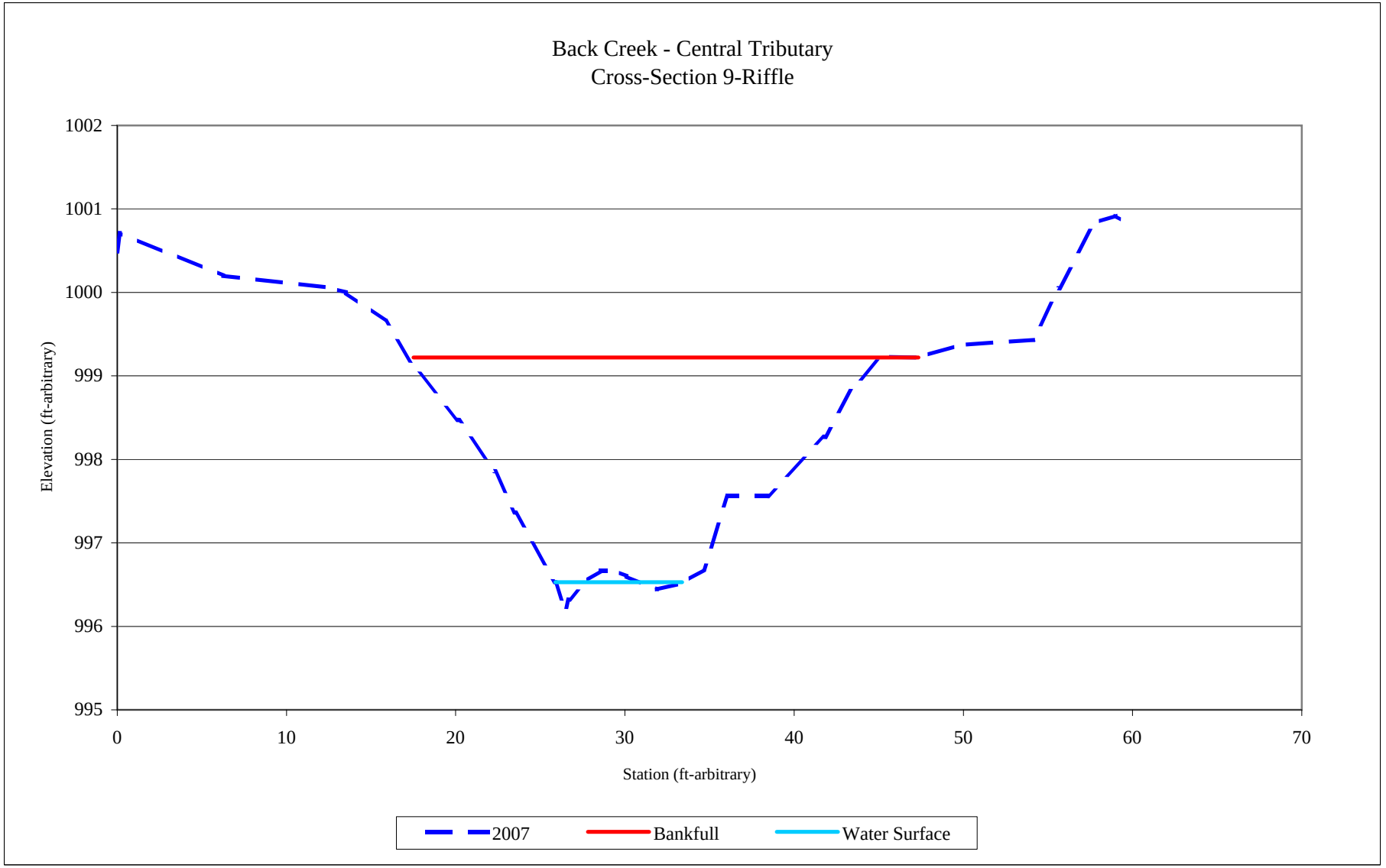

Back Creek
Cross-Section 4-Pool
94
93
92
91
90
89
88
87
86
Elevation (ft-arbitrary)
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0
Station (ft)
2006
2007
Bankfull
Water Surface


Back Creek
Cross-Section 5-Riffle
Elevation (ft-arbitrary)
98
97
96
95
94
93
92
91
90
89
88
0.0
10.0
20.0
30.0
40.0
50.0
60.0
Station (ft)
2006
2007
Bankfull
Water Surface


Back Creek
Cross-Section 6-Pool
Elevation (ft-arbitrary)
90
89
88
87
86
85
84
83
82
81
80
0.0
10.0
20.0
30.0
40.0
50.0
Station (ft)
2006
2007
Bankfull
Water Surface


Back Creek
Cross-Section 7-Riffle
84
83.5
83
82.5
82
81.5
81
80.5
80
79.5
79
Elevation (ft-arbitrary)
0.0
10.0
20.0
30.0
40.0
50.0
60.0
Station (ft)
2006
2007
Bankfull


Back Creek - Upstream Tributary
Cross-Section 8-Riffle
94.5
94
93.5
93
92.5
92
91.5
Elevation (ft-arbitrary)
15.0
20.0
25.0
30.0
35.0
40.0
Station (ft)
2006
2007
Bankfull


Back Creek - Central Tributary
Cross-Section 9-Riffle
1002
1001
1000
999
998
997
996
995
Elevation (ft-arbitrary)
0
10
20
30
40
50
60
70
Station (ft-arbitrary)
2007
Bankfull
Water Surface

Back Creek
MY-2006 Longitudinal Profile

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

Back Creek
MY-2007 Longitudinal Profile

STA	TW-2007	Notes	STA	WS-2007	STA	BKF-2007
0	93.43	R	8.36	93.33	3.69	95.57
6.55	93.08		5.67	93.28	131.47	95.4
33.5	92.48	P	35.14	93.11	205.17	95.52
44.48	91.41		55.6	93.1	276.42	95.11
58.21	90.73	MP	66.91	93.11	322.24	94.64
70.28	92.03		83.64	93.08	406.31	95.35
79.72	92	P	95.03	93.07	432.15	93.91
94.88	91.64		104.93	93.08	467.75	93.9
105.23	92.97	R	156.34	93.09	579.42	94.64
132.13	92.69	U	201.77	93.04	599.43	94.51
155.95	92.61	P	217.33	93.11	602.16	95.4
176.14	91.7		243.93	93.02	663.27	94.9
196.11	90.73	MP	274.15	92.44	719.51	94.29
217.77	92.66	G	322.12	92.54	780.32	94.62
220.19	92.94	R	401.74	92.4	804.52	93.94
243.3	92.75	P	443.63	91.98	814.03	94.88
271.99	91.7		444.08	91.92	834.83	94.6
296.92	90.48	MP	519.19	91.99	852.74	94.4
320.36	90.94		523.53	91.66	875.78	94.52
340.86	91.63	G	551.24	91.67	920.3	94.4
346.19	92.37	R	579.19	91.42	972.75	93.54
362.38	92.22	P	634.61	91.5	986.5	93.97
373.44	92.07		702.79	91.49	1009.16	93.84
402.95	92.21	R	727.37	91.47	1045.97	93.24
430.51	91.63		760.73	91.53	1062.3	93.13
442.37	91.66	CV-INV/P	826.69	91.4	1062.4	92.87
450.14	89.12	MP	847.13	91.43	1068.69	93.38
472.45	89.93		873.31	91.48	1090.63	92.52
491.86	90.76	G	899.15	91.47	1113.78	92.4
502.65	91.8	R	941.55	91.43	1155.54	92.47
579.27	90.74	P	970.32	90.74	1191.79	92.5
604.96	90.22	MP	1001.89	90.7	1231.6	92.95
618.05	90.88	G	1055.93	90.7	1310.94	92.17
620.28	91.49	R	1061.04	90.63	1352.33	91.71
639.32	91.22	U	1068.55	90.7	1363.24	91.48
657.37	91.26		1070.43	90.36	1373.02	91.05
681.09	91.04	JH-INV	1073.26	90.37	1461.8	91.29
694.5	89.6		1083.92	90.37	1493.7	91.34
699.23	89.29	MP	1149.8	90.06	1528.43	91.3
735.86	91.02	G	1148.9	90	1614.84	91.05
737.32	91.06	R	1232.71	89.79	1629.33	91.2
759.17	90.77	U	1250.89	89.64	1639.77	91.01
778.89	90.71		1290.77	89.4	1669.44	90.71
809.83	90.35	P	1351.88	88.94	1682.5	90.94
826.99	89.26	MP	1361.35	88.89	1683.04	90.97
840.48	89.24		1364.26	88.92	1765.63	90.64
862.89	89.47		1371.39	88.9	1798.43	89.72
870.89	89.65		1394.01	88.99	1807.91	90.81
884.82	89.63		1414.44	88.78	1810.84	90.56
888.69	90.21	P	1476.12	88.5	1830.04	90.52
896.94	89.81		1528.48	88.51	1913.18	89.86
912.81	90.74	G	1553.14	88.3	1959.63	89.06
919.56	91.16	R	1604.26	88.13	1975.37	88.95
940.94	91.15		1646.59	87.69	2051.5	89.23
970.97	89.98	P	1743.49	87.78	2055.25	88.61
977.69	88.95	MP	1840.67	87.78	2094.57	89.13
984.24	89.75		1848.27	87.79	2125.65	88.72
1000.88	89.42		1913.69	87.68	2140.71	88.76
1030.62	89.05		1955.41	87.62	2142.66	88.87
1050.29	89.45		1999.85	86.85	2148.1	88.43
1061.24	90.71	CV-INV	2023.23	86.79	2167.18	88.32
1064.41	88.58		2025.14	86.8	2315.78	87.79
1080.32	89.21		2049.78	86.82	2403.97	86.41
1092.24	89.91	G	2091.83	86.56	2453.52	86.93
1095.13	90.35	R	2095.53	85.85	2565.99	85.89
1111.97	90.11		2125.47	85.68	2770.7	84.93
1144.22	89.87		2144.18	85.8	2870.24	84.52
1145.94	90.14	CV-INV	2161.13	85.85	2929.11	84.2

Structures 2006

station	elevation
431.4	91.61
696	90.16
1050	90.16
1139	89.37
1257	88.96
1324	88.56
1589	87.54
2086	86.34
2183	85.5
2388	83.13
2444.5	82.95
2556.8	82.54
2839	81.74
2917	80.44

Structures 2007

station	elevation
442.37	91.66
681	91
1061.24	90.71
1145.94	90.14
1268.78	89.65
1337.43	89.18
1606.47	88.12
2081.54	86.68
2172.42	85.65
2379.48	83.08
2436.78	82.91
2549.28	82.43
2839.02	81.78
2922.25	80.77

Back Creek
MY-2006 Longitudinal Profile

STA	TW-2006	WS-2006	BKF-2006	NOTES
1375	88.31	88.61		Glide
1379	88.42	88.61		Head of Riffle
1389	88.28	88.49	91.34	
1436	87.9	88.15		Run
1469	86.91	88.14		Pool @ confluence os side trib
1505.5	87.65	88.14		Glide
1509	87.93	88.1	90.92	Head of Riffle
1566	87.49	87.67		Run
1589	87.54	87.6		Invert J-hook
1590	86.56	87.5		Pool
1604	85.65	87.5	90.69	Max Pool
1647	86.88	87.5		Glide
1650.4	86.95	87.4	90.47	Run
1692	86.82	87.39		
1698	87.23	87.38	90.73	Head of Riffle
1715	86.9	87.36		Run
1775	86.37	87.33		
1800	85.17	87.33	89.98	Max Pool
1801	86.04	87.33		head pool=18ft upstrm xsprev@1792
1821	85.12	87.33	89.74	Max Pool
1838	86.49	87.33		Glide
1842	86.71	87.26		Run
1879	86.81	87.25	89.38	
1925	86.98	87.1		Pool
1941	85.68	87.04		Pool
1953	84.84	87.04	89.21	Max Pool
1967	85.39	87.04		Glide
1972	85.37	87.04		Run
1990	85	86.8		Pool
2006	85.15	86.78	89.28	
2018	85.71	86.75		Glide
2024	85.91	86.73		Run
2052	85.65	86.51		
2070	86.14	86.49	88.58	
2086	86.34	86.34		Invert Cross-Vane
2095	85.14	86.34		Pool
2109	84.21	86.34		Max Pool
2113	84.61	86.34		Pool-bdrk -compound
2118	84.65	86.33		
2136	84.65	86.3	88.4	
2147	84.63	86.29		
2158	85.26	86.23		
2169.7	84.85	86.19		
2183	85.5	86.1		Invert Cross-Vane
2192	83.31	85.94		Max Pool
2203	84.7	85.94		Glide
2209	85.42	85.94	88.24	Head of Riffle
2243	85	85.72		
2277	84.25	85.31		Run
2293	84.56	85.15	88.36	Riffle
2338	83.41	85.09		
2368.5	83.76	84.7		Head Cut
2370	83.37	84.61		Toe Head Cut
2382	83.34	84.42		
2388	83.13	84.19		Invert Cross-Vane
2400	81.46	83.83		Max Pool
2422.5	81.98	83.61		
2425	82.78	83.59		Glide
2444.5	82.95	83.52	86.14	Invert Cross-Vane
2455	80.58	83.28		Max Pool
2476.2	82.5	83.28	86.26	Glide
2482	82.81	82.97	86.14	Head of Riffle
2498	82.41	82.95		Run
2518	82.29	82.93	85.16	
2556.8	82.54	82.84	85.31	Invert Cross-Vane
2566	79.86	82.83		Max Pool
2595	80.97	82.81	85.58	
2606	81.35	82.73		Glide
2612	82.32	82.68		Head of Pool

Back Creek
MY-2007 Longitudinal Profile

STA	TW-2007	Notes	STA	WS-2007	STA	BKF-2007
1153.03	88.12		2222.07	84.51	3006	83.6
1158.93	87.41	P	2389.44	82.67	3038.85	83.42
1165.11	86.11		2404.92	82.61	3105.47	83.01
1172.66	86.03	MP	2442.07	82.64		
1185.53	86.76		2466.21	82.66		
1202.1	89.89	G	2494.13	82.85		
1205.29	89.92	R	2551.88	81.71		
1220.63	89.61		2565.63	81.81		
1234.24	89.76		2583.63	81.78		
1248.07	89.58		2603.3	81.78		
1268.78	89.65	CV-INV	2606.46	81.79		
1271.49	87.18	P	2632.77	82.53		
1277.71	86.92	MP	2739.48	81.8		
1287.56	87.41		2757.59	81.22		
1298.1	87.48		2770.35	81.12		
1307.23	89.24	G	2845.64	80.22		
1310.71	89.41	R	2860.04	80.23		
1337.43	89.18		2870.88	81.59		
1337.43	89.18	CV-INV	2923.89	80.8		
1348.98	87.07		2932	79.71		
1386.11	88.23		2942.19	79.82		
1389.96	88.69		2975.52	79.73		
1394.63	88.91	R	3023.52	80.93		
1414.22	88.63		3115.14	80.43		
1435.04	88.54	R				
1451.18	88.43	R				
1465.77	87.85					
1484.11	87.57					
1507.38	87.62	U				
1526.66	88.45					
1530.82	88.51					
1552.96	88.14	G?				
1580.02	87.89	R				
1591.71	87.81					
1606.47	88.12	JH-INV				
1608.09	87.29					
1621.43	86.66					
1629.88	86.99	P				
1642.66	86.85	MP				
1658.01	86.8					
1701.58	87.26					
1707.32	87.52	R				
1715.6	87.31					
1717.1	87.15	R				
1731.34	87.37					
1746.55	87.47					
1754.33	87.32					
1772.11	87.53	P				
1783.27	87.14					
1795.69	86.57					
1807.94	85.87	P				
1816	85.59					
1821.86	86.22	P				
1825.61	87.31	MP				
1830.56	87.44	R				
1845.8	87.06					
1858.53	87.25					
1877.3	87.4					
1890.9	87.15					
1901.11	87.11					
1926.49	87.02	P				
1930.22	86.38					
1943.59	85.59	MP				
1967.4	86.16	P				
1989.63	85.55	MP				
2003.96	85.65	P				
2015.16	86.36	P				
2018.97	86.52	P				
2037.72	85.98	MP				

Back Creek
MY-2006 Longitudinal Profile

STA	TW-2006	WS-2006	BKF-2006	NOTES
2636	80.26	82.61	84.88	Max Pool
2661	81.83	82.54	85.08	Head of Riffle
2717	81.7	82.49		Run
2750	80.86	82.49	85.11	Head of Pool
2767	80.11	82.47		Max Pool
2780	81.46	82.47	85.59	Glide
2786	81.33	82.45		
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	

Back Creek
MY-2007 Longitudinal Profile

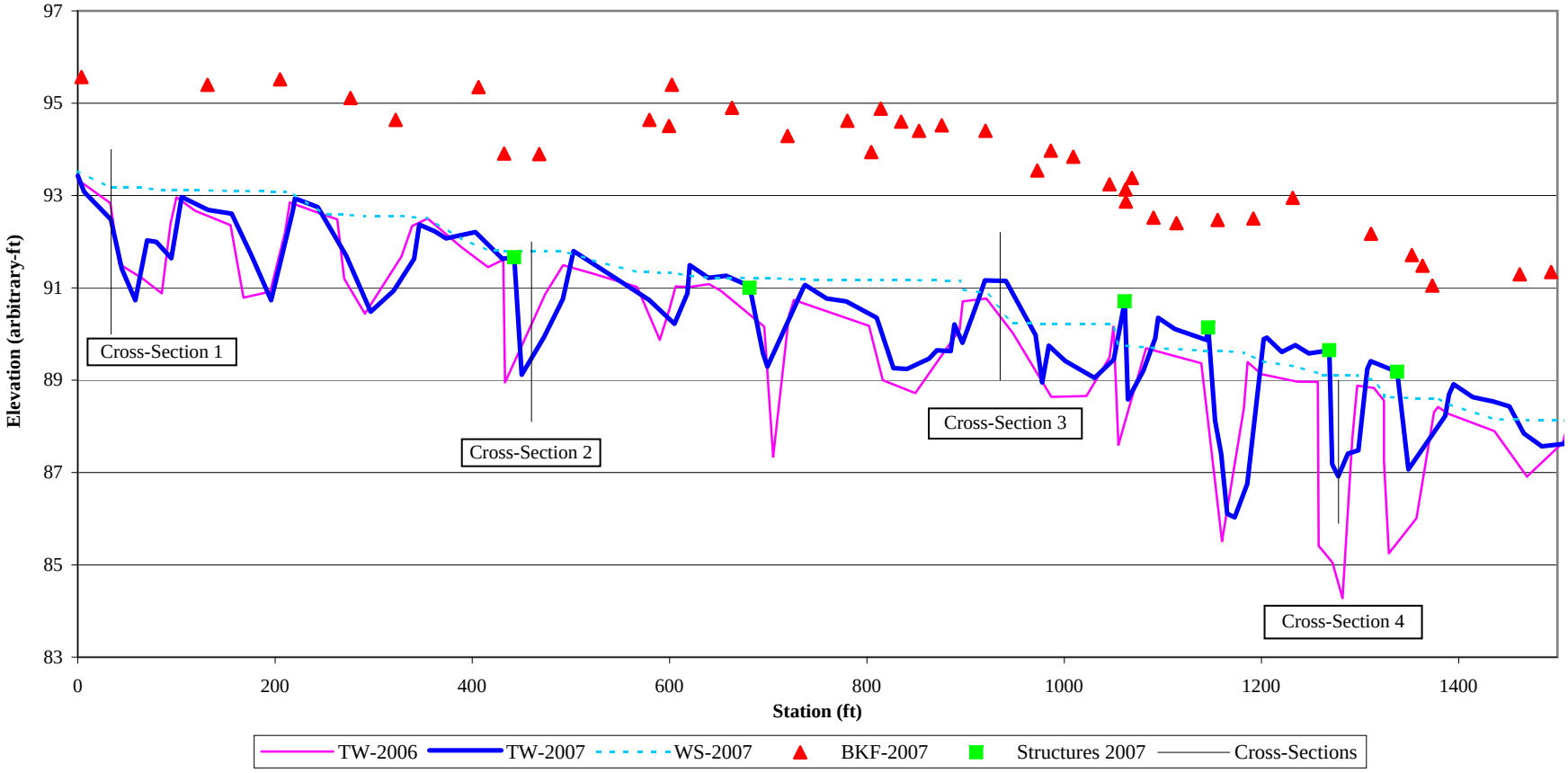
STA	TW-2007	Notes	STA	WS-2007	STA	BKF-2007
2055.28	86.27					
2061.85	86.36					
2066.43	86.78					
2079.18	86.4					
2081.54	86.68	CV-INV				
2092.79	85.19					
2105.29	84.62	MP				
2113.2	85.28	P				
2113.93	85.29	MP				
2135.01	85.12	G				
2144.96	85.34	U				
2172.42	85.65	CV-INV				
2182.38	82.49	MP				
2197.67	84.43	G				
2205.97	84.4	R				
2249.44	84.27	U				
2270.89	83.54					
2314.74	83.71	P				
2334.04	83.11	P				
2357.61	82.87	MP				
2363.78	83.38	R				
2372.09	83.27	R				
2379.48	83.08	CV				
2382.59	82.36	P				
2400.9	81.87	MP				
2417.22	82.3	G				
2428.99	82.98	R				
2436.78	82.91	CV				
2439.7	81.81	P				
2451.18	80.58	MP				
2480.81	82.66	R				
2495.67	82.6	R				
2539.87	82.31	R				
2549.28	82.43	CV				
2551.27	81	P				
2564.87	80.23	MP				
2582.76	81.24	P				
2607.68	81.85	G				
2623.75	82.34	R				
2652.38	81.39	U				
2701.94	81.3	R				
2734.55	81.2	R				
2748.74	81.02	P				
2766.01	80.09	MP				
2782.16	81.57	G				
2786.05	81.86	R				
2839.02	81.78	CV				
2841.28	79.25	P				
2853.67	79	MP				
2865.38	80.9	G				
2867.05	80.98	R				
2910.26	80.85	R				
2922.25	80.77	CV				
2925.42	78.81	P				
2929.6	78.31	MP				
2961.07	79.51	P				
3011.06	80.36	G				
3014.25	80.63	R				
3043.54	80.6	R				
3064.43	79.36	R				
3074.28	79.34	R				
3089.06	80.32	R				

Back Creek
Longitudinal Profile
2007 Monitoring Year

*Water Surface Elevations below stream bed indicate areas where the channel was dry

Bankfull/Top of Bank = -0.0042*STA + 97.337

Water Surface = -0.0041*STA + 94.611

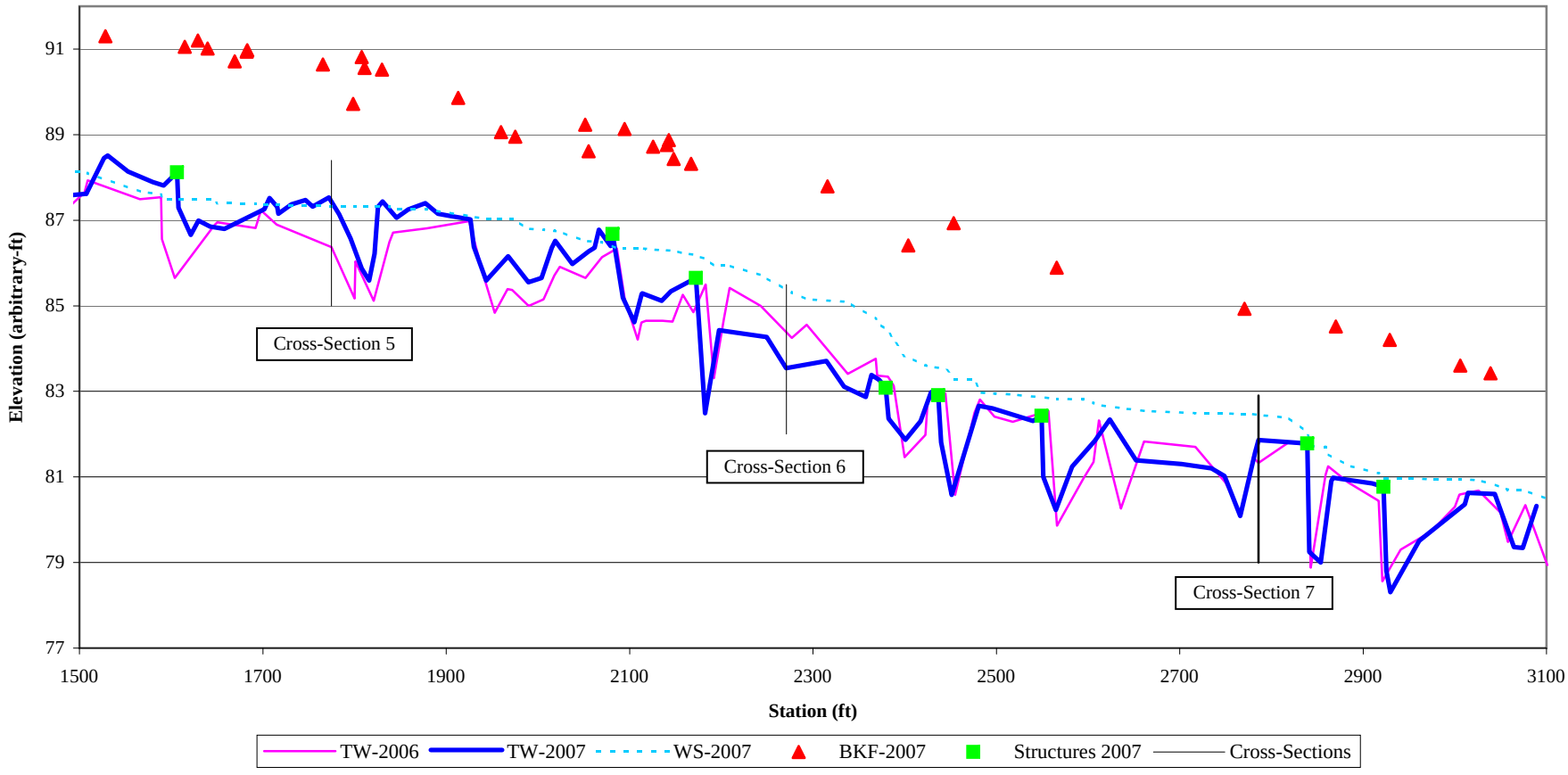


Back Creek
Longitudinal Profile
2007 Monitoring Year

*Water Surface Elevations below stream bed indicate areas where the channel was dry

Bankfull/Top of Bank = -0.0042*STA + 97.337

Water Surface = -0.0041*STA + 94.611



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

			2006			2007		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	0	0%	0%	51	51%	51%
Sand	very fine sand	0.125	0	0%	0%	0	0%	51%
	fine sand	0.250	25	24%	24%	6	6%	57%
	medium sand	0.50	8	8%	32%	14	14%	71%
	coarse sand	1.00	1	1%	33%	0	0%	71%
	very coarse sand	2.0	2	2%	35%	3	3%	74%
Gravel	very fine gravel	4.0	2	2%	37%	0	0%	74%
	fine gravel	5.7	1	1%	38%	0	0%	74%
	fine gravel	8.0	4	4%	41%	0	0%	74%
	medium gravel	11.3	7	7%	48%	0	0%	74%
	medium gravel	16.0	8	8%	56%	0	0%	74%
	course gravel	22.3	1	1%	57%	0	0%	74%
	course gravel	32.0	4	4%	61%	3	3%	77%
	very coarse gravel	45	16	15%	76%	5	5%	82%
	very coarse gravel	64	19	18%	94%	10	10%	92%
Cobble	small cobble	90	5	5%	99%	5	5%	97%
	medium cobble	128	1	1%	100%	1	1%	98%
	large cobble	180	0	0%	100%	2	2%	100%
	very large cobble	256	0	0%	100%	0	0%	100%
Boulder	small boulder	362	0	0%	100%	0	0%	100%
	small boulder	512	0	0%	100%	0	0%	100%
	medium boulder	1024	0	0%	100%	0	0%	100%
	large boulder	2048	0	0%	100%	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%	0	0%	100%
TOTAL % of whole count			104	100%	100%	100	100%	100%

Project Name: Back Creek
Cross-Section: 2
Feature: Pool

			2006			2007		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	3	3%	3%	19	19%	19%
Sand	very fine sand	0.125	20	20%	23%	4	4%	23%
	fine sand	0.250	11	11%	34%	26	26%	49%
	medium sand	0.50	24	24%	58%	34	34%	83%
	coarse sand	1.00	4	4%	62%	14	14%	97%
	very coarse sand	2.0	10	10%	72%	3	3%	100%
Gravel	very fine gravel	4.0	2	2%	74%	0	0%	100%
	fine gravel	5.7	12	12%	86%	0	0%	100%
	fine gravel	8.0	5	5%	91%	0	0%	100%
	medium gravel	11.3	2	2%	93%	0	0%	100%
	medium gravel	16.0	2	2%	95%	0	0%	100%
	course gravel	22.3	0	0%	95%	0	0%	100%
	course gravel	32.0	0	0%	95%	0	0%	100%
	very coarse gravel	45	0	0%	95%	0	0%	100%
	very coarse gravel	64	1	1%	96%	0	0%	100%
Cobble	small cobble	90	2	2%	98%	0	0%	100%
	medium cobble	128	1	1%	99%	0	0%	100%
	large cobble	180	1	1%	100%	0	0%	100%
	very large cobble	256	0	0%	100%	0	0%	100%
Boulder	small boulder	362	0	0%	100%	0	0%	100%
	small boulder	512	0	0%	100%	0	0%	100%
	medium boulder	1024	0	0%	100%	0	0%	100%
	large boulder	2048	0	0%	100%	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%	0	0%	100%
	TOTAL % of whole count		100	100%	100%	100	100%	100%

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

			2006			2007		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	0	0%	0%	70	70%	70%
Sand	very fine sand	0.125	0	0%	0%	8	8%	78%
	fine sand	0.250	15	15%	15%	7	7%	85%
	medium sand	0.50	0	0%	15%	0	0%	85%
	coarse sand	1.00	6	6%	21%	0	0%	85%
	very coarse sand	2.0	0	0%	21%	0	0%	85%
Gravel	very fine gravel	4.0	0	0%	21%	0	0%	85%
	fine gravel	5.7	0	0%	21%	0	0%	85%
	fine gravel	8.0	0	0%	21%	0	0%	85%
	medium gravel	11.3	0	0%	21%	0	0%	85%
	medium gravel	16.0	0	0%	21%	0	0%	85%
	course gravel	22.3	0	0%	21%	0	0%	85%
	course gravel	32.0	2	2%	23%	0	0%	85%
	very coarse gravel	45	7	7%	30%	1	1%	86%
	very coarse gravel	64	16	16%	46%	3	3%	89%
Cobble	small cobble	90	34	34%	80%	7	7%	96%
	medium cobble	128	15	15%	95%	3	3%	99%
	large cobble	180	5	5%	100%	1	1%	100%
	very large cobble	256	0	0%	100%	0	0%	100%
Boulder	small boulder	362	0	0%	100%	0	0%	100%
	small boulder	512	0	0%	100%	0	0%	100%
	medium boulder	1024	0	0%	100%	0	0%	100%
	large boulder	2048	0	0%	100%	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%	0	0%	100%
	TOTAL % of whole count		100	100%	100%	100	100%	100%

Project Name: Back Creek
Cross-Section: 4
Feature: Pool

			2006			2007		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	6	6%	6%	15	15%	15%
Sand	very fine sand	0.125	17	17%	23%	7	7%	22%
	fine sand	0.250	10	10%	33%	34	34%	56%
	medium sand	0.50	20	20%	53%	16	16%	72%
	coarse sand	1.00	12	12%	65%	9	9%	81%
	very coarse sand	2.0	4	4%	69%	8	8%	89%
Gravel	very fine gravel	4.0	6	6%	75%	0	0%	89%
	fine gravel	5.7	10	10%	85%	0	0%	89%
	fine gravel	8.0	0	0%	85%	0	0%	89%
	medium gravel	11.3	5	5%	90%	0	0%	89%
	medium gravel	16.0	6	6%	96%	0	0%	89%
	course gravel	22.3	0	0%	96%	0	0%	89%
	course gravel	32.0	0	0%	96%	0	0%	89%
	very coarse gravel	45	1	1%	97%	0	0%	89%
	very coarse gravel	64	0	0%	97%	0	0%	89%
Cobble	small cobble	90	1	1%	98%	0	0%	89%
	medium cobble	128	0	0%	98%	4	4%	93%
	large cobble	180	2	2%	100%	4	4%	97%
	very large cobble	256	0	0%	100%	3	3%	100%
Boulder	small boulder	362	0	0%	100%	0	0%	100%
	small boulder	512	0	0%	100%	0	0%	100%
	medium boulder	1024	0	0%	100%	0	0%	100%
	large boulder	2048	0	0%	100%	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%	0	0%	100%
	TOTAL % of whole count		100	100%	100%	100	100%	100%

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

			2006			2007		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	0	0%	0%	11	11%	11%
Sand	very fine sand	0.125	1	1%	1%	17	17%	28%
	fine sand	0.250	9	9%	10%	17	17%	45%
	medium sand	0.50	7	7%	17%	2	2%	47%
	coarse sand	1.00	15	15%	32%	18	18%	65%
	very coarse sand	2.0	2	2%	34%	5	5%	70%
Gravel	very fine gravel	4.0	9	9%	43%	0	0%	70%
	fine gravel	5.7	2	2%	45%	0	0%	70%
	fine gravel	8.0	1	1%	46%	0	0%	70%
	medium gravel	11.3	6	6%	52%	0	0%	70%
	medium gravel	16.0	4	4%	56%	0	0%	70%
	course gravel	22.3	8	8%	64%	1	1%	71%
	course gravel	32.0	13	13%	77%	1	1%	72%
	very coarse gravel	45	10	10%	87%	1	1%	73%
	very coarse gravel	64	9	9%	96%	3	3%	76%
Cobble	small cobble	90	2	2%	98%	2	2%	78%
	medium cobble	128	2	2%	100%	2	2%	80%
	large cobble	180	0	0%	100%	0	0%	80%
	very large cobble	256	0	0%	100%	0	0%	80%
Boulder	small boulder	362	0	0%	100%	0	0%	80%
	small boulder	512	0	0%	100%	0	0%	80%
	medium boulder	1024	0	0%	100%	0	0%	80%
	large boulder	2048	0	0%	100%	0	0%	80%
Bedrock	bedrock	40096	0	0%	100%	20	20%	100%
	TOTAL % of whole count		100	100%	100%	100	100%	100%

Project Name: Back Creek
Cross-Section: 6
Feature: Pool

			2006			2007		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	0	0%	0%	15	15%	15%
Sand	very fine sand	0.125	0	0%	0%	10	10%	25%
	fine sand	0.250	8	8%	8%	16	16%	41%
	medium sand	0.50	5	5%	13%	17	17%	58%
	coarse sand	1.00	7	7%	20%	5	5%	63%
	very coarse sand	2.0	6	6%	26%	8	8%	71%
Gravel	very fine gravel	4.0	0	0%	26%	2	2%	73%
	fine gravel	5.7	0	0%	26%	0	0%	73%
	fine gravel	8.0	0	0%	26%	0	0%	73%
	medium gravel	11.3	2	2%	28%	0	0%	73%
	medium gravel	16.0	3	3%	31%	0	0%	73%
	course gravel	22.3	8	8%	39%	0	0%	73%
	course gravel	32.0	14	14%	53%	2	2%	75%
	very coarse gravel	45	13	13%	66%	6	6%	81%
	very coarse gravel	64	16	16%	82%	6	6%	87%
Cobble	small cobble	90	10	10%	92%	5	5%	92%
	medium cobble	128	6	6%	98%	1	1%	93%
	large cobble	180	2	2%	100%	6	6%	99%
	very large cobble	256	0	0%	100%	1	1%	100%
Boulder	small boulder	362	0	0%	100%	0	0%	100%
	small boulder	512	0	0%	100%	0	0%	100%
	medium boulder	1024	0	0%	100%	0	0%	100%
	large boulder	2048	0	0%	100%	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%	0	0%	100%
	TOTAL % of whole count		100	100%	100%	100	100%	100%

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

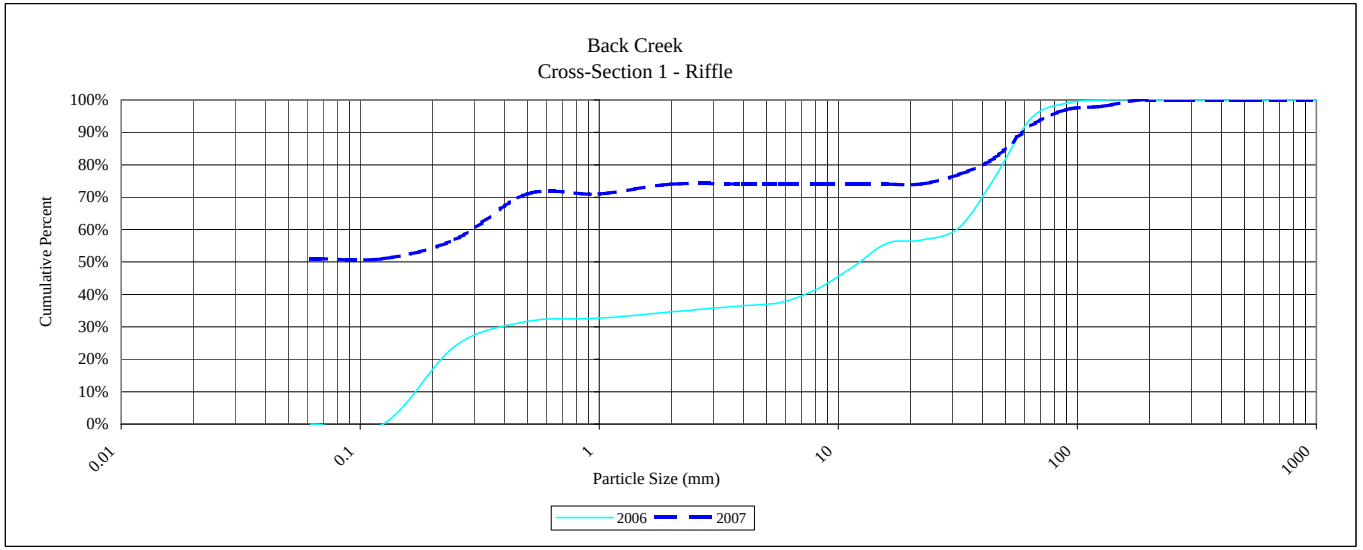
			2006			2007		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	0	0%	0%	14	14%	14%
Sand	very fine sand	0.125	1	1%	1%	8	8%	22%
	fine sand	0.250	3	3%	4%	12	12%	34%
	medium sand	0.50	16	16%	20%	5	5%	39%
	coarse sand	1.00	9	9%	29%	4	4%	43%
	very coarse sand	2.0	10	10%	39%	9	9%	52%
Gravel	very fine gravel	4.0	5	5%	44%	1	1%	53%
	fine gravel	5.7	8	8%	52%	1	1%	54%
	fine gravel	8.0	3	3%	55%	2	2%	56%
	medium gravel	11.3	7	7%	62%	0	0%	56%
	medium gravel	16.0	7	7%	69%	1	1%	57%
	course gravel	22.3	4	4%	73%	1	1%	58%
	course gravel	32.0	8	8%	81%	8	8%	66%
	very coarse gravel	45	3	3%	84%	14	14%	80%
	very coarse gravel	64	10	10%	94%	10	10%	90%
Cobble	small cobble	90	4	4%	98%	7	7%	97%
	medium cobble	128	1	1%	99%	2	2%	99%
	large cobble	180	1	1%	100%	0	0%	99%
	very large cobble	256	0	0%	100%	0	0%	99%
Boulder	small boulder	362	0	0%	100%	1	1%	100%
	small boulder	512	0	0%	100%	0	0%	100%
	medium boulder	1024	0	0%	100%	0	0%	100%
	large boulder	2048	0	0%	100%	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%	0	0%	100%
	TOTAL % of whole count		100	100%	100%	100	100%	100%

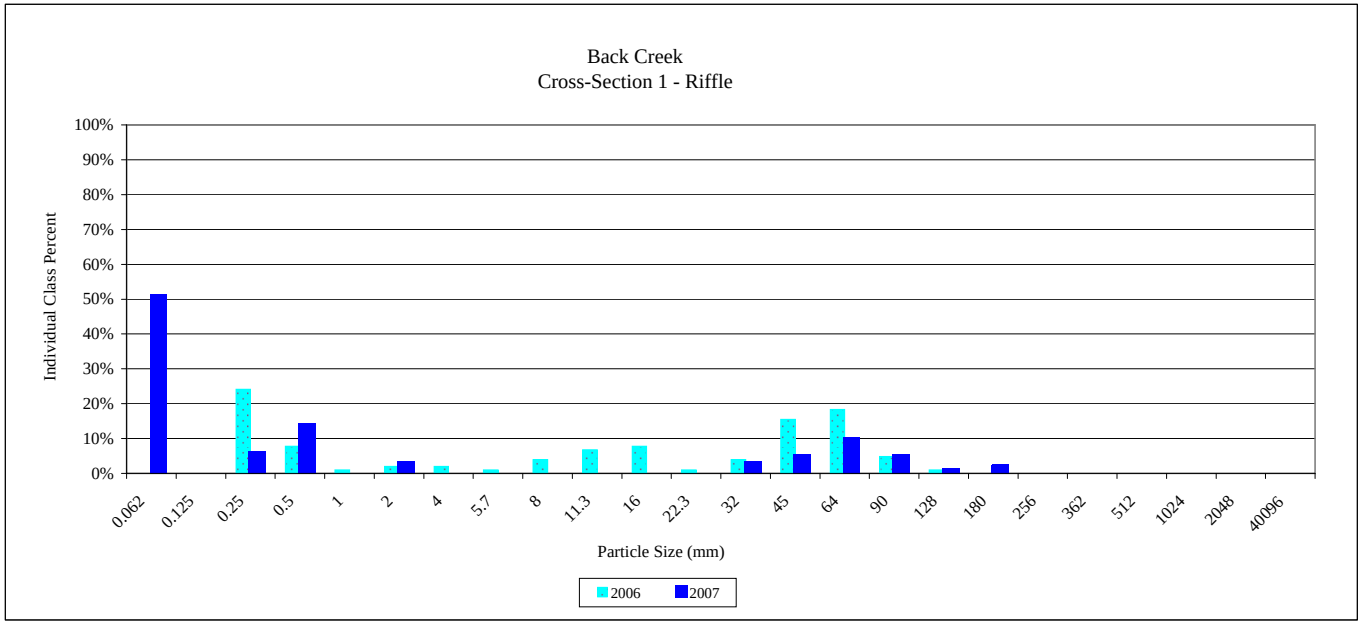
Project Name: Back Creek
Cross-Section: 8
Feature: Riffle

			2007		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	72	72%	72%
Sand	very fine sand	0.125	0	0%	72%
	fine sand	0.250	1	1%	73%
	medium sand	0.50	21	21%	94%
	coarse sand	1.00	3	3%	97%
	very coarse sand	2.0	0	0%	97%
Gravel	very fine gravel	4.0	0	0%	97%
	fine gravel	5.7	0	0%	97%
	fine gravel	8.0	0	0%	97%
	medium gravel	11.3	0	0%	97%
	medium gravel	16.0	0	0%	97%
	course gravel	22.3	0	0%	97%
	course gravel	32.0	0	0%	97%
	very coarse gravel	45	0	0%	97%
	very coarse gravel	64	0	0%	97%
Cobble	small cobble	90	3	3%	100%
	medium cobble	128	0	0%	100%
	large cobble	180	0	0%	100%
	very large cobble	256	0	0%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			100	100%	100%

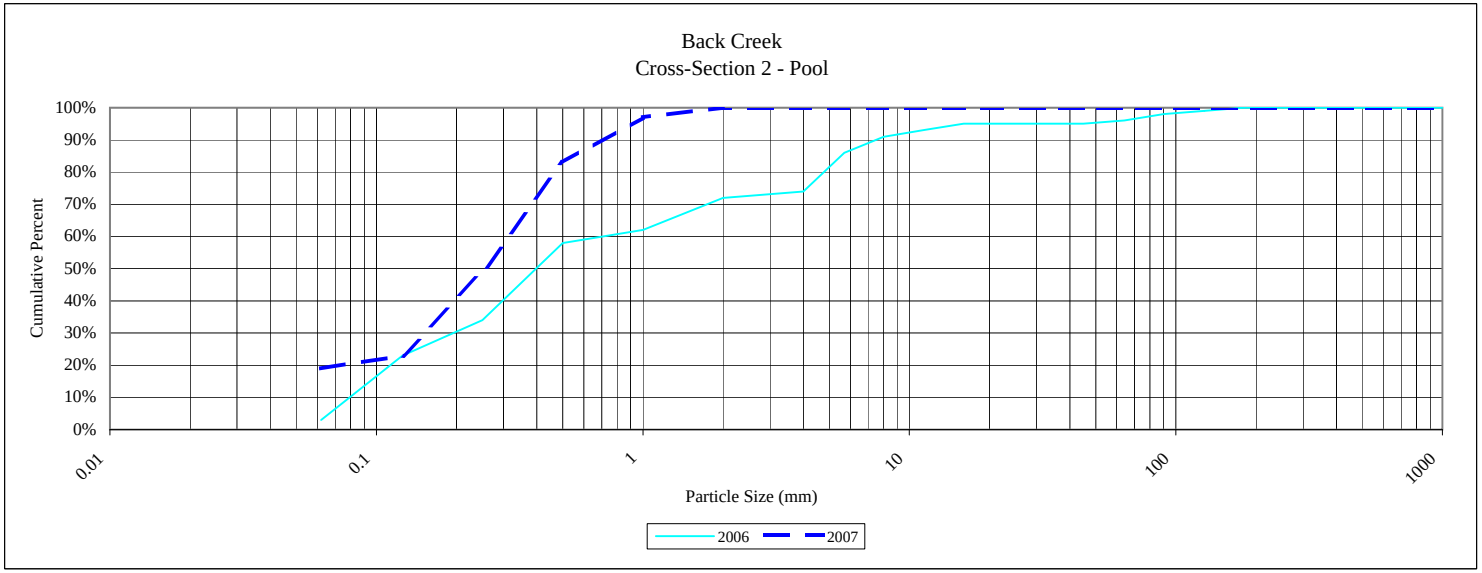
Project Name: Back Creek
Cross-Section: 9
Feature: Riffle

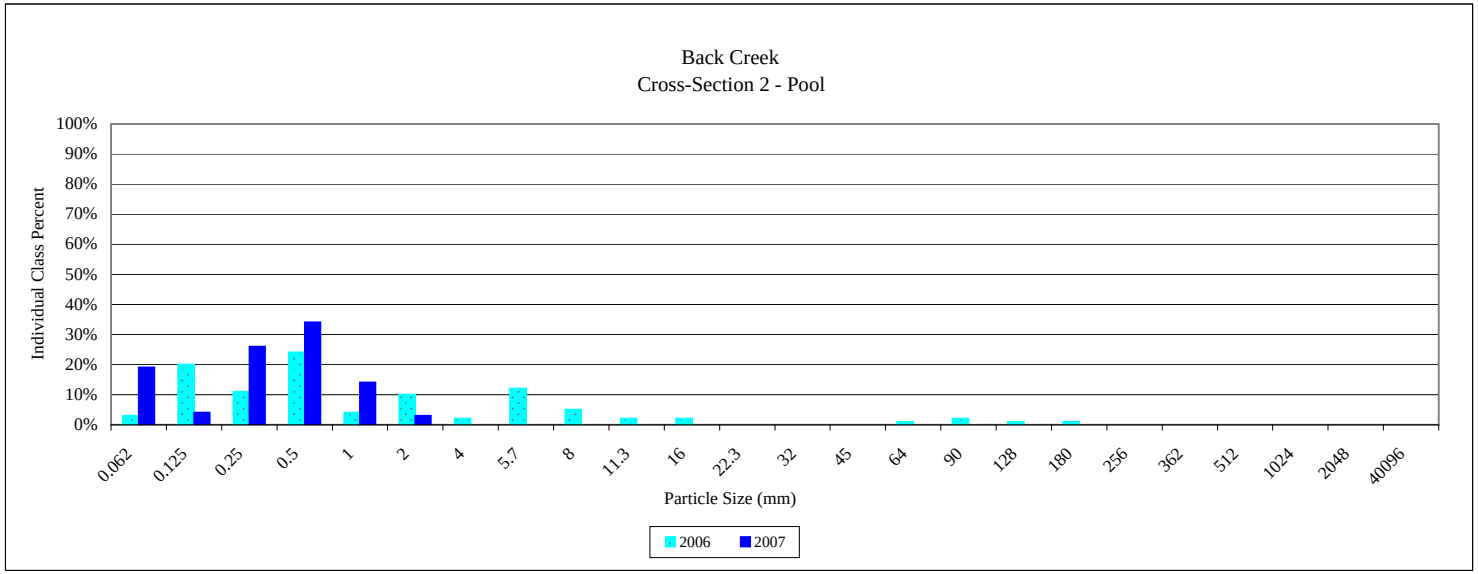
			2007		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	82	82%	82%
Sand	very fine sand	0.125	6	6%	88%
	fine sand	0.250	0	0%	88%
	medium sand	0.50	0	0%	88%
	coarse sand	1.00	6	6%	94%
	very coarse sand	2.0	4	4%	98%
Gravel	very fine gravel	4.0	0	0%	98%
	fine gravel	5.7	0	0%	98%
	fine gravel	8.0	0	0%	98%
	medium gravel	11.3	0	0%	98%
	medium gravel	16.0	0	0%	98%
	course gravel	22.3	0	0%	98%
	course gravel	32.0	0	0%	98%
	very coarse gravel	45	0	0%	98%
	very coarse gravel	64	0	0%	98%
Cobble	small cobble	90	0	0%	98%
	medium cobble	128	2	2%	100%
	large cobble	180	0	0%	100%
	very large cobble	256	0	0%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			100	100%	100%

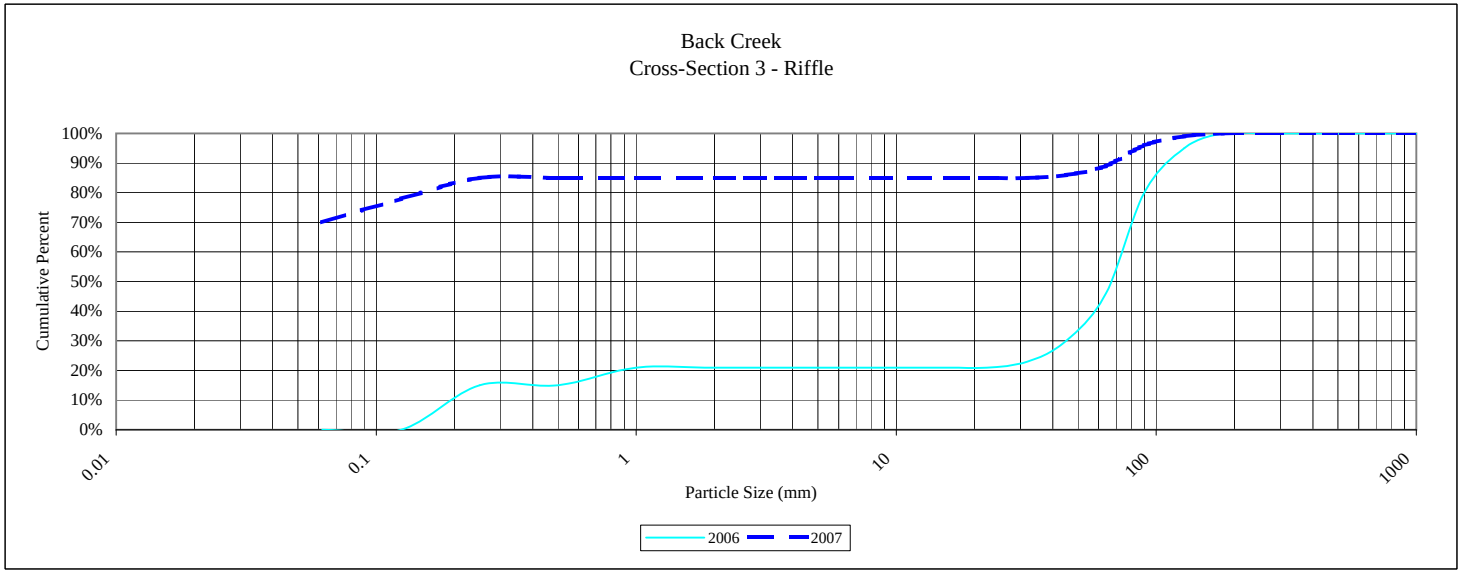


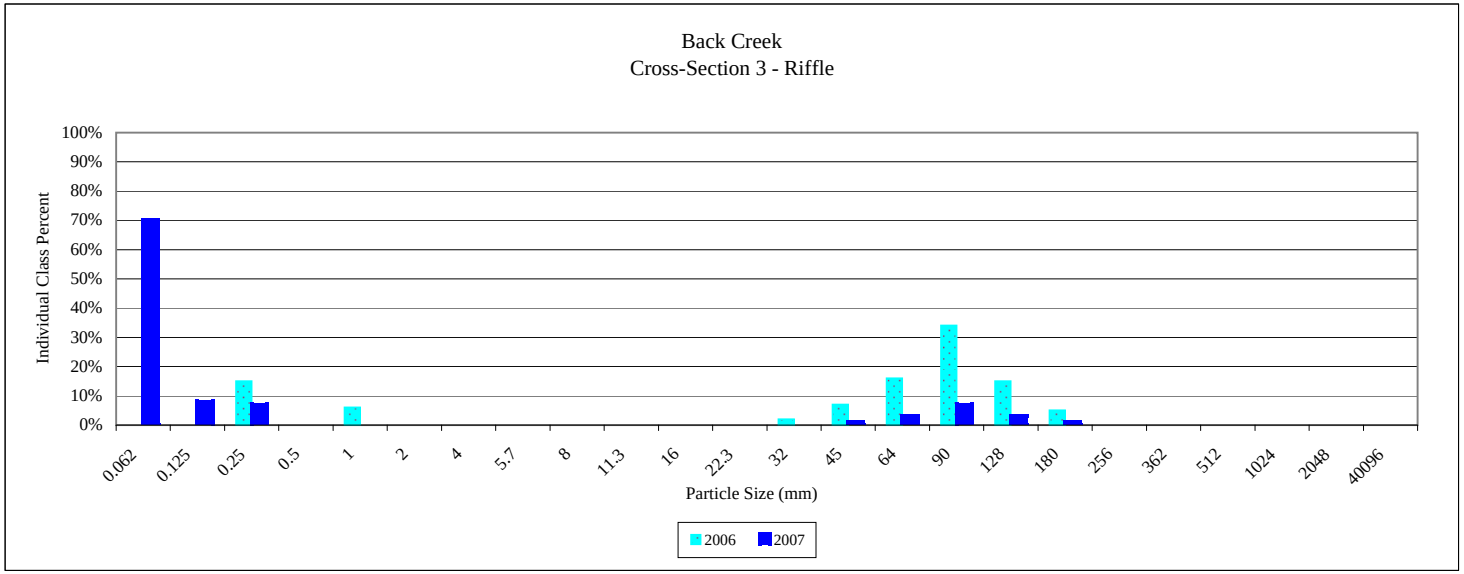


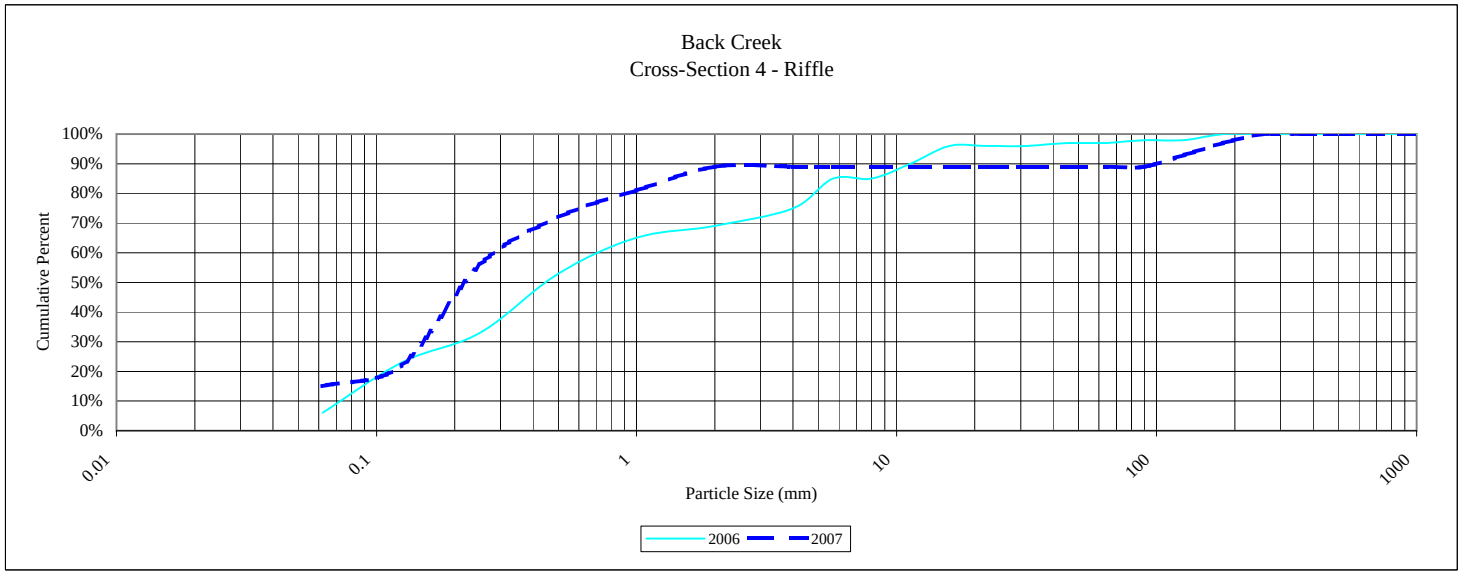
Appendix 2.8 Pebble Count Plots and Raw Data Tables
Back Creek Stream and Wetland Restoration
Year 2 of 5

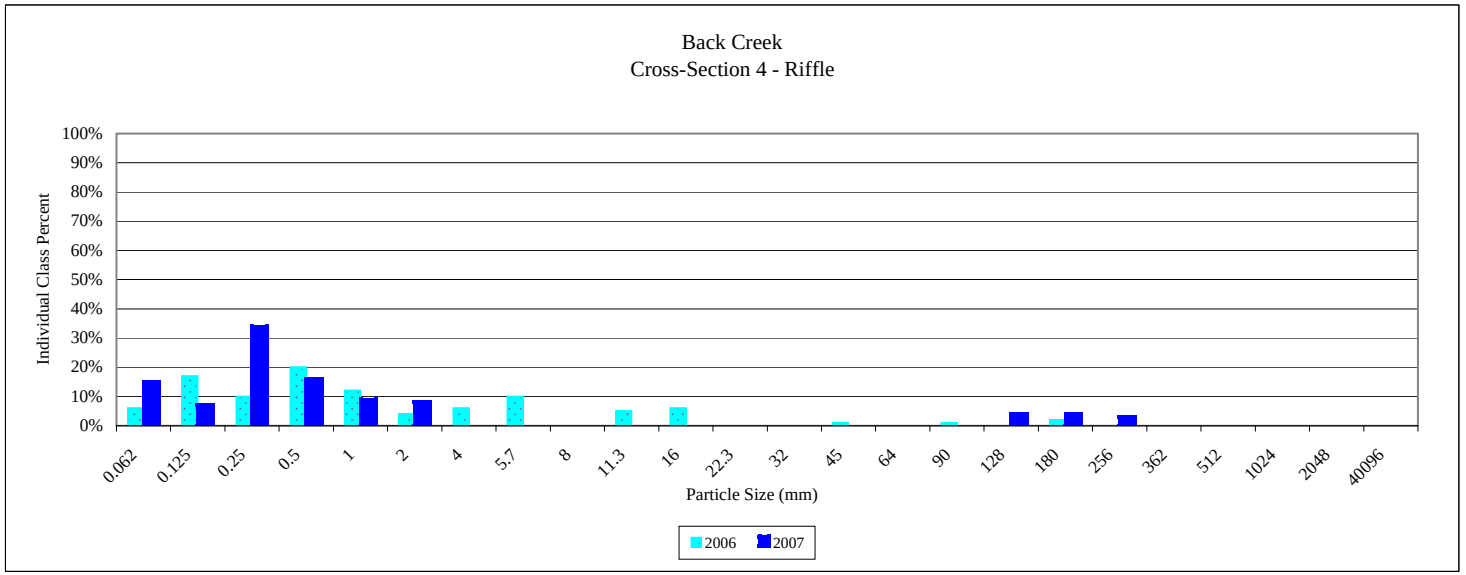

Back Creek
Cross-Section 2 - Pool
Cumulative Percent
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.01
0.1
1
10
100
1000
Particle Size (mm)
2006
2007

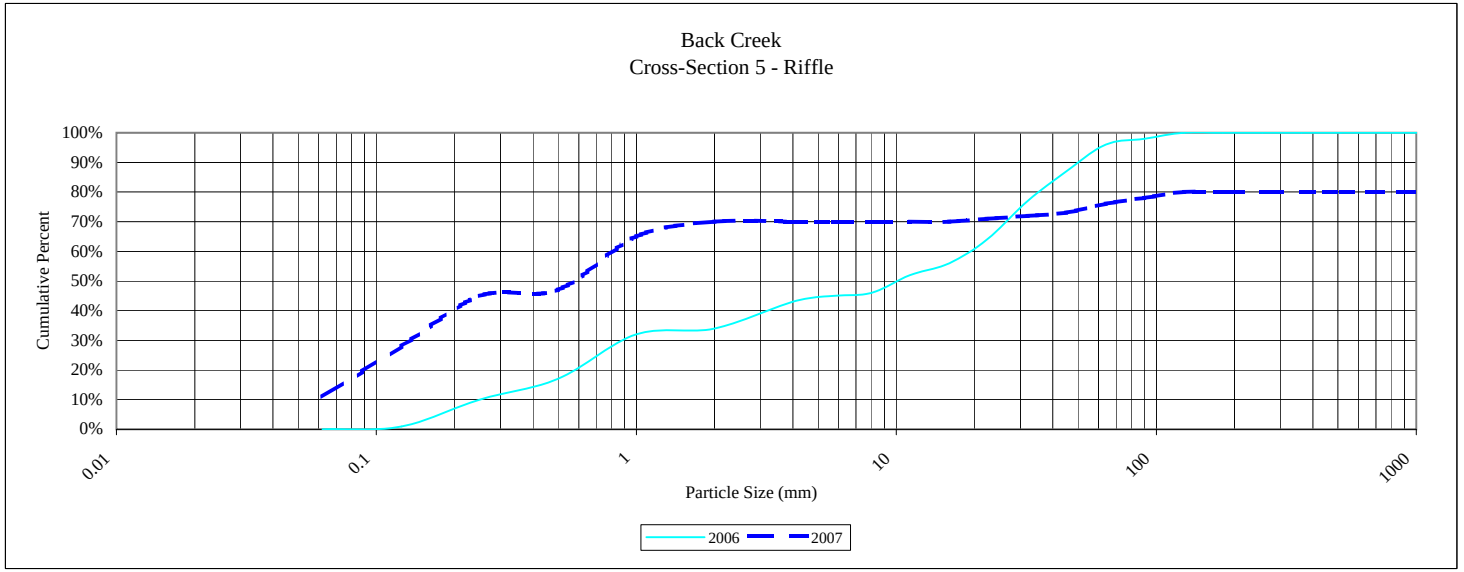

Back Creek
Cross-Section 2 - Pool
Individual Class Percent
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.062
0.125
0.25
0.5
1
2
4
5.7
8
11.3
16
22.3
32
45
64
90
128
180
256
362
512
1024
2048
40096
Particle Size (mm)
2006
2007

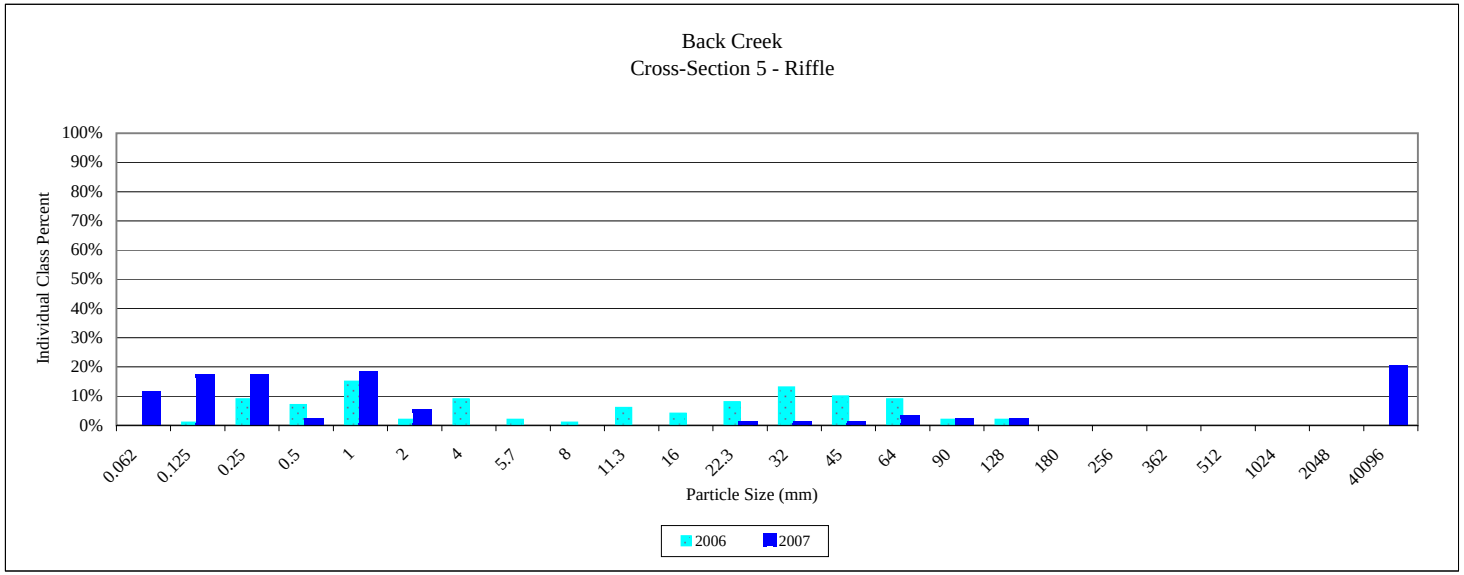

Back Creek
Cross-Section 3 - Riffle
Cumulative Percent
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.01
0.1
1
10
100
1000
Particle Size (mm)
2006
2007

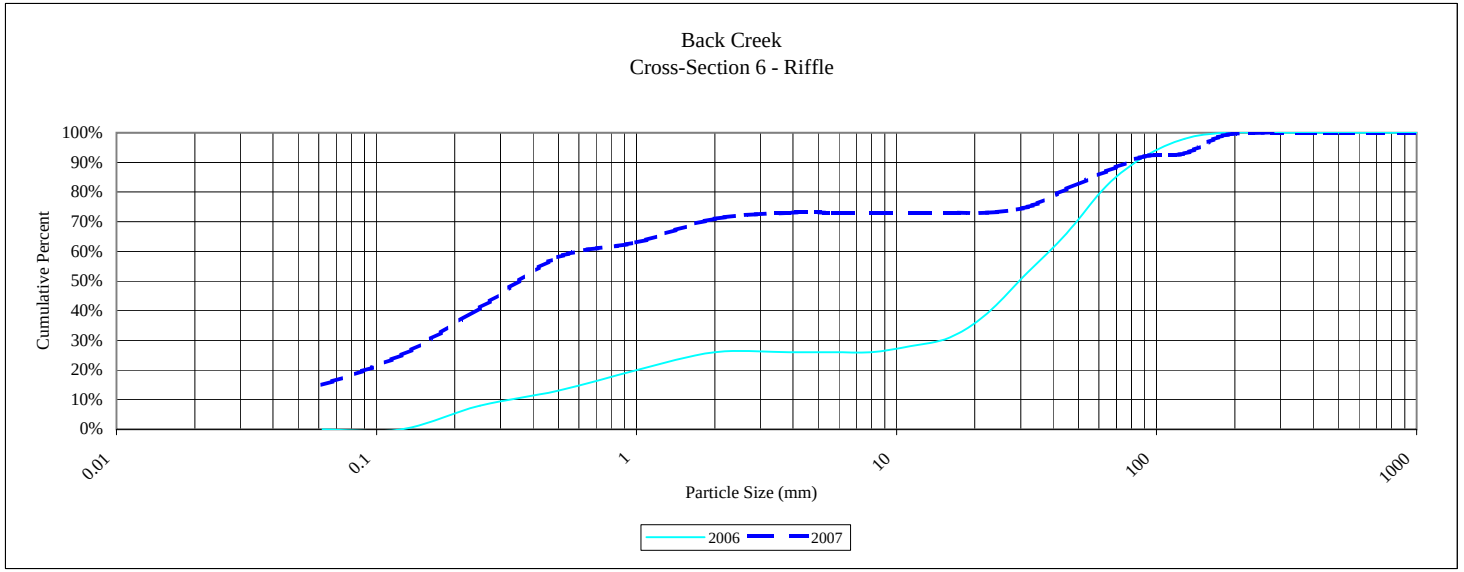

Back Creek
Cross-Section 3 - Riffle
Individual Class Percent
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.062
0.125
0.25
0.5
1
2
4
5.7
8
11.3
16
22.3
32
45
64
90
128
180
256
362
512
1024
2048
40096
Particle Size (mm)
2006
2007

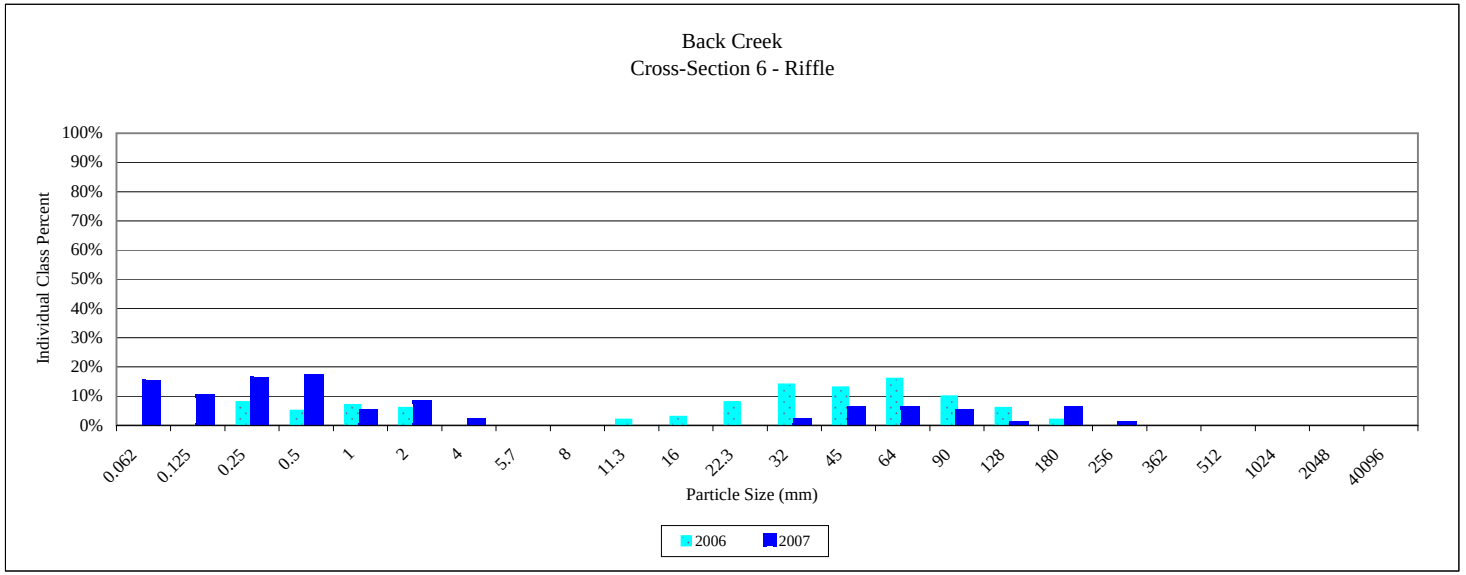

Back Creek
Cross-Section 4 - Riffle
Cumulative Percent
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.01
0.1
1
10
100
1000
Particle Size (mm)
2006
2007


Back Creek
Cross-Section 4 - Riffle
Individual Class Percent
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.062
0.125
0.25
0.5
1
2
4
5.7
8
11.3
16
22.3
32
45
64
90
128
180
256
362
512
1024
2048
40096
Particle Size (mm)
2006
2007

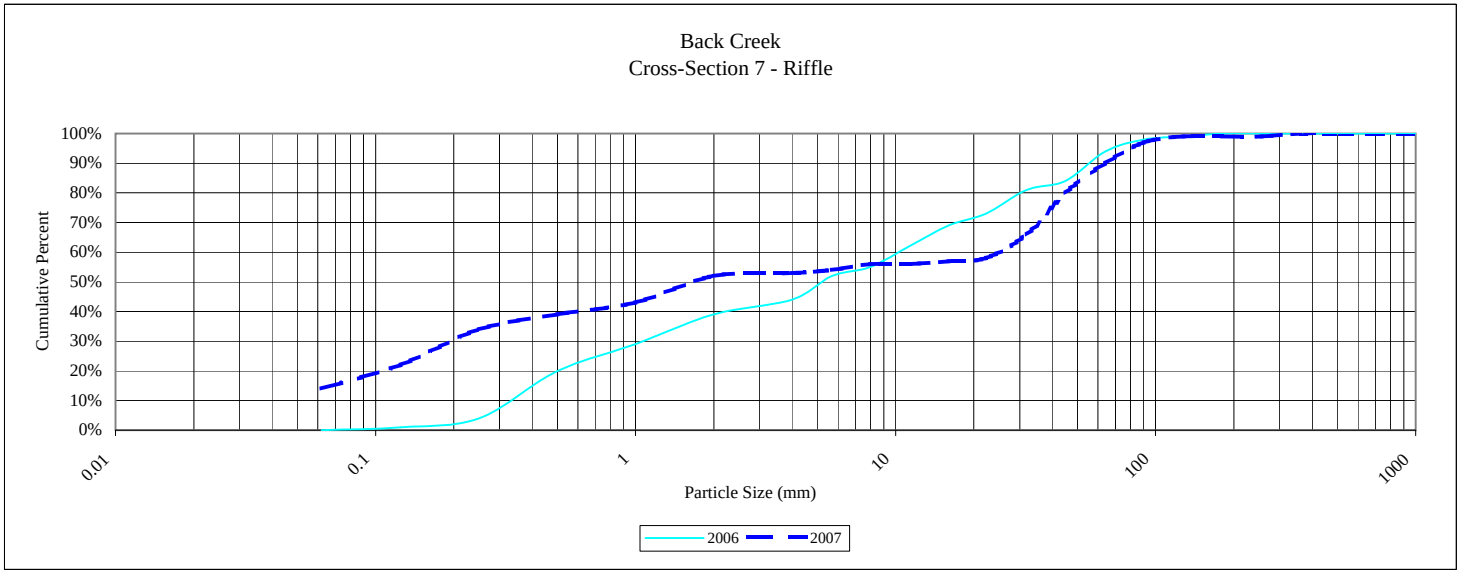

Back Creek
Cross-Section 5 - Riffle
Cumulative Percent
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.01
0.1
1
10
100
1000
Particle Size (mm)
2006
2007

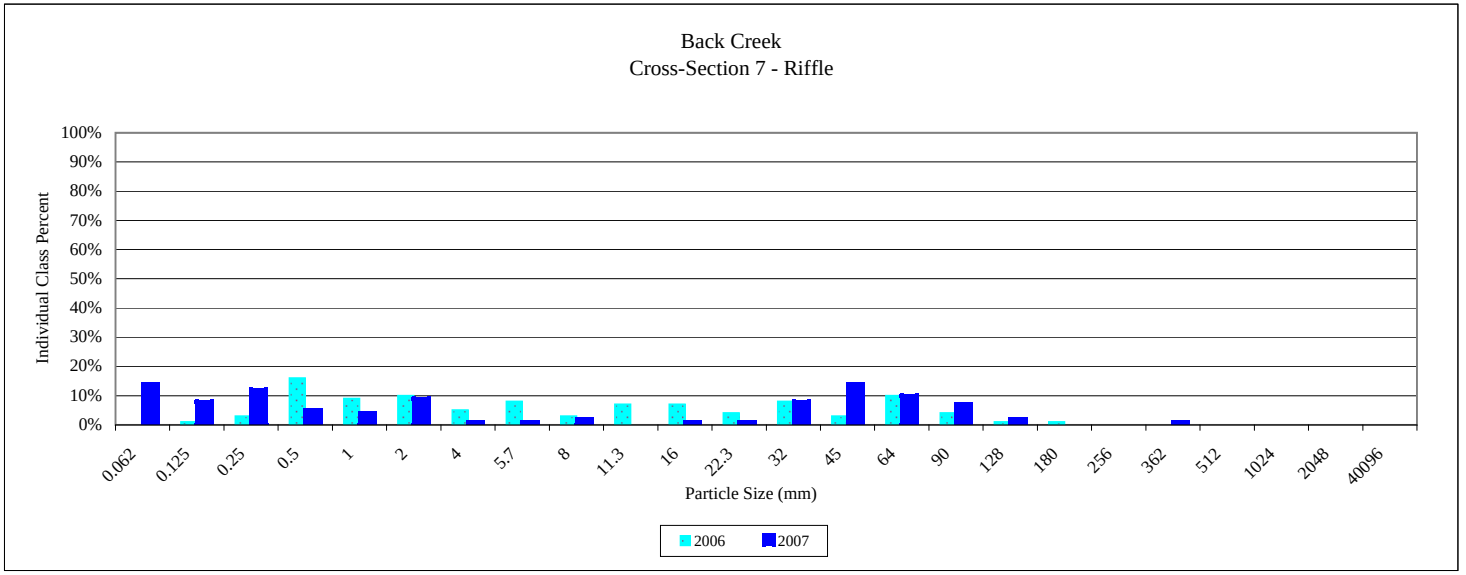

Back Creek
Cross-Section 5 - Riffle
Individual Class Percent
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.062
0.125
0.25
0.5
1
2
4
5.7
8
11.3
16
22.3
32
45
64
90
128
180
256
362
512
1024
2048
40096
Particle Size (mm)
2006
2007



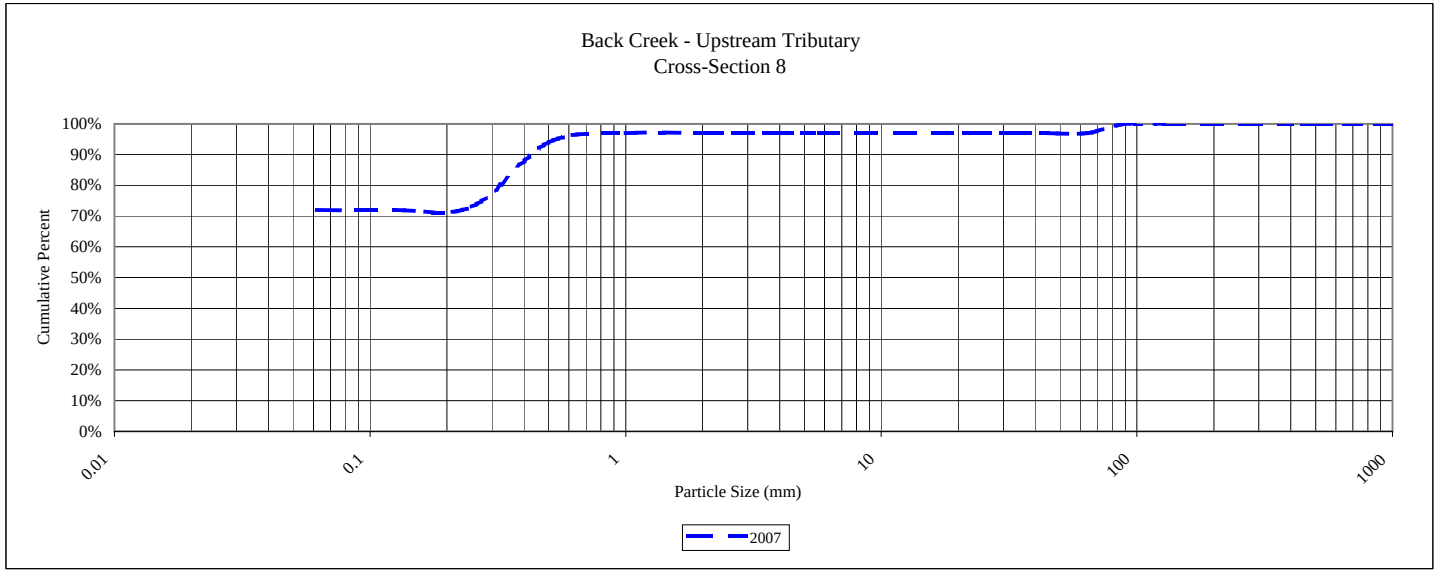


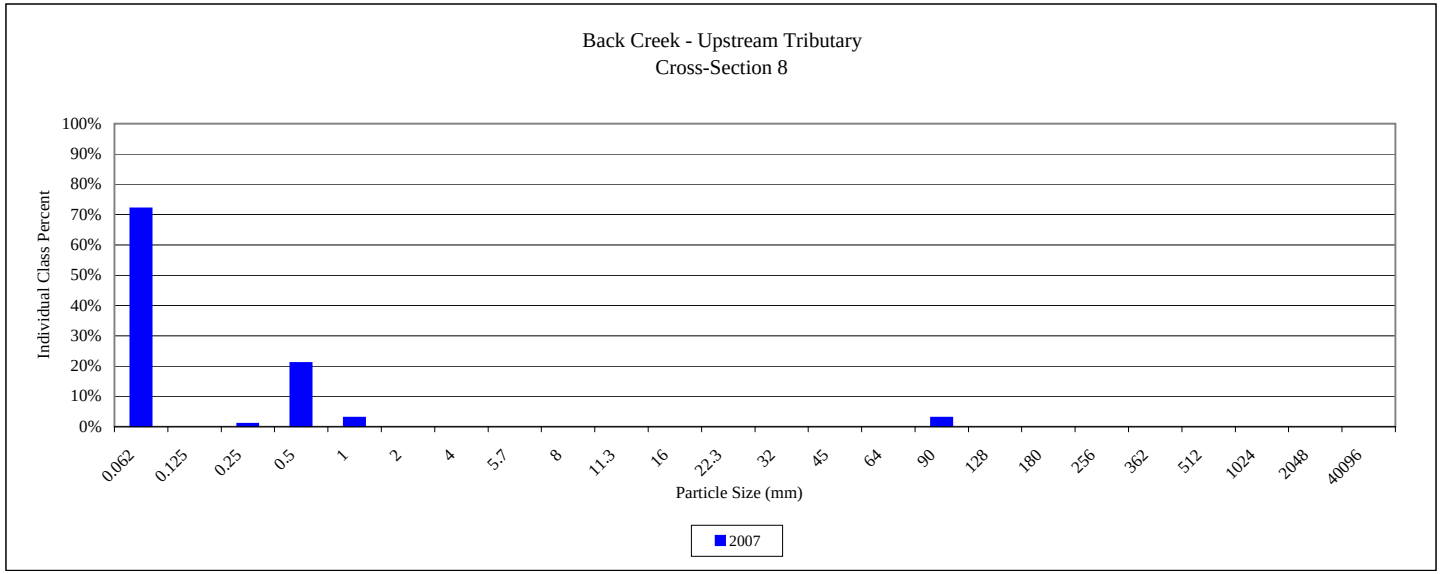
Appendix 2.8 Pebble Count Plots and Raw Data Tables
Back Creek Stream and Wetland Restoration
Year 2 of 5



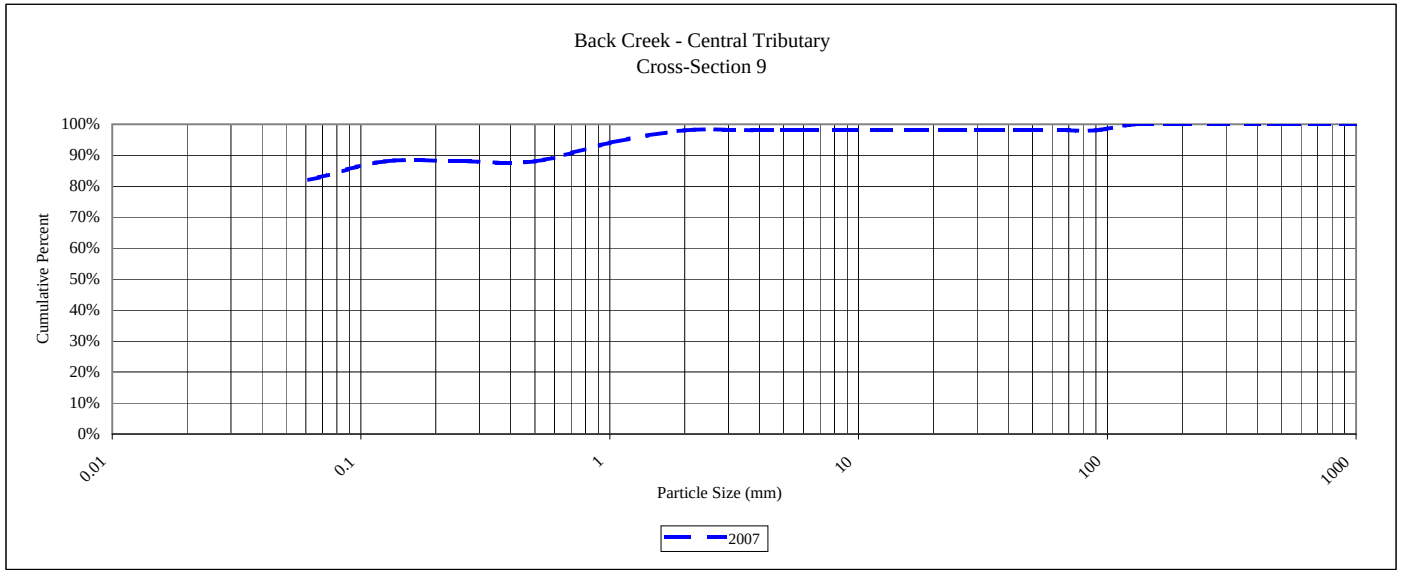


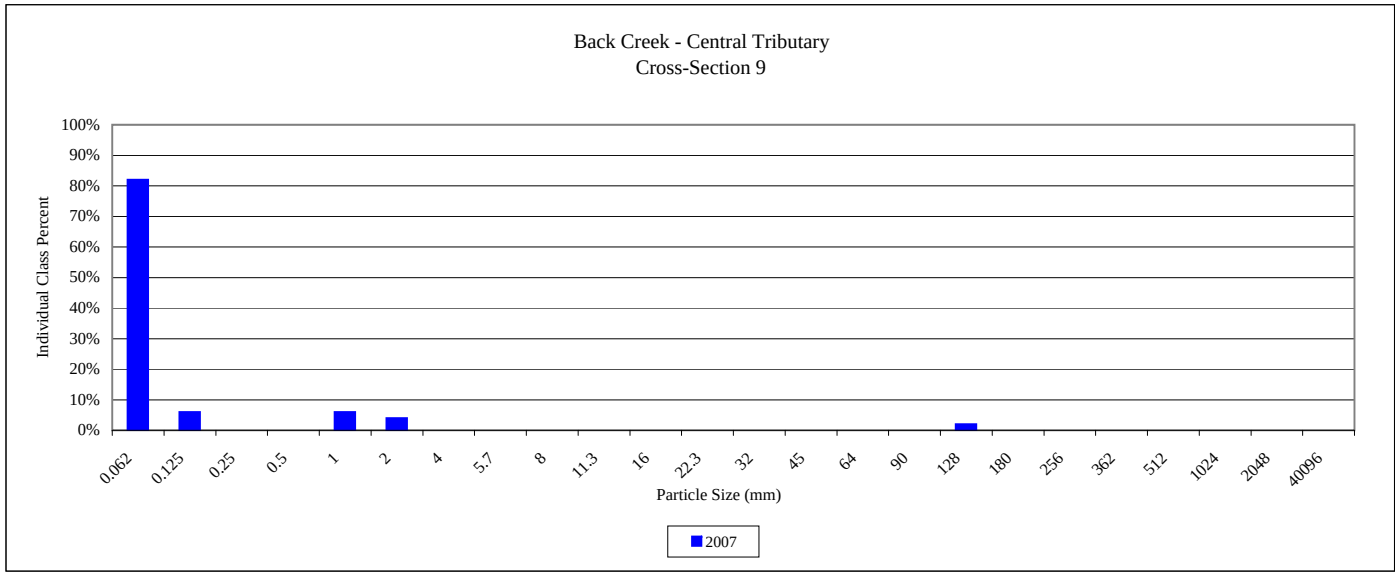
Appendix 2.8 Pebble Count Plots and Raw Data Tables
Back Creek Stream and Wetland Restoration
Year 2 of 5





Appendix 2.8 Pebble Count Plots and Raw Data Tables
Back Creek Stream and Wetland Restoration
Year 2 of 5





Appendix 2.8 Pebble Count Plots and Raw Data Tables
Back Creek Stream and Wetland Restoration
Year 2 of 5

Jordan Jones & Goulding

APPENDIX 3
WETLAND RAW DATA

1. Data Tables for Hydrological Data*

2. Precipitation – Water Level Plots for Gauges*

*Raw data tables have been provided electronically.

Ecotone Unit: Level Logger = **Gauge 1**

Serial Number: 000009BE9013

Probe Number: 000001D32253

Date	Time	Level	Units
1/1/2007	7:00	4.4	in
1/2/2007	7:00	3.1	in
1/3/2007	7:00	3	in
1/4/2007	7:00	3.5	in
1/5/2007	7:00	4.2	in
1/6/2007	7:00	4.2	in
1/7/2007	7:00	3.5	in
1/8/2007	7:00	4.4	in
1/9/2007	7:00	3.3	in
1/10/2007	7:00	3.1	in
1/11/2007	7:00	3.1	in
1/12/2007	7:00	3.3	in
1/13/2007	7:00	3.4	in
1/14/2007	7:00	3.4	in
1/15/2007	7:00	4	in
1/16/2007	7:00	4.1	in
1/17/2007	7:00	3.2	in
1/18/2007	7:00	3.2	in
1/19/2007	7:00	3.3	in
1/20/2007	7:00	3.1	in
1/21/2007	7:00	3.2	in
1/22/2007	7:00	3.3	in
1/23/2007	7:00	3.2	in
1/24/2007	7:00	3.1	in
1/25/2007	7:00	3.1	in
1/26/2007	7:00	3	in
1/27/2007	7:00	3	in
1/28/2007	7:00	3.3	in
1/29/2007	7:00	2.9	in
1/30/2007	7:00	2.9	in
1/31/2007	7:00	2.8	in
2/1/2007	7:00	3	in
2/2/2007	7:00	3.2	in

Ecotone Unit: Level Logger = **Gauge 2**

Serial Number: 000009DE6C7E

Probe Number: 000001302CEE

Date	Time	Level	Units
1/1/2007	7:00	4.1	in
1/2/2007	7:00	4.1	in
1/3/2007	7:00	3.9	in
1/4/2007	7:00	3.8	in
1/5/2007	7:00	4.1	in
1/6/2007	7:00	4.2	in
1/7/2007	7:00	4.2	in
1/8/2007	7:00	4.2	in
1/9/2007	7:00	4.2	in
1/10/2007	7:00	3.8	in
1/11/2007	7:00	3.7	in
1/12/2007	7:00	3.7	in
1/13/2007	7:00	3.8	in
1/14/2007	7:00	4	in
1/15/2007	7:00	4.1	in
1/16/2007	7:00	4.3	in
1/17/2007	7:00	4.2	in
1/18/2007	7:00	3.9	in
1/19/2007	7:00	3.8	in
1/20/2007	7:00	3.7	in
1/21/2007	7:00	3.7	in
1/22/2007	7:00	3.7	in
1/23/2007	7:00	3.7	in
1/24/2007	7:00	3.7	in
1/25/2007	7:00	3.7	in
1/26/2007	7:00	3.6	in
1/27/2007	7:00	3.6	in
1/28/2007	7:00	3.7	in
1/29/2007	7:00	3.8	in
1/30/2007	7:00	3.7	in
1/31/2007	7:00	3.7	in
2/1/2007	7:00	3.7	in
2/2/2007	7:00	3.7	in

Ecotone Unit: Level Logger = **Gauge 3**

Serial Number: 000009BEA425

Probe Number: 000001D379C4

Date	Time	Level	Units
1/1/2007	7:00	5.2	in
1/2/2007	7:00	5.1	in
1/3/2007	7:00	5	in
1/4/2007	7:00	5.1	in
1/5/2007	7:00	5.3	in
1/6/2007	7:00	5.3	in
1/7/2007	7:00	5.3	in
1/8/2007	7:00	5.4	in
1/9/2007	7:00	5.2	in
1/10/2007	7:00	5.1	in
1/11/2007	7:00	5.1	in
1/12/2007	7:00	5.1	in
1/13/2007	7:00	5.4	in
1/14/2007	7:00	5.3	in
1/15/2007	7:00	5.6	in
1/16/2007	7:00	5.5	in
1/17/2007	7:00	5.3	in
1/18/2007	7:00	5.2	in
1/19/2007	7:00	5.2	in
1/20/2007	7:00	5.2	in
1/21/2007	7:00	5.2	in
1/22/2007	7:00	5.2	in
1/23/2007	7:00	5.1	in
1/24/2007	7:00	5.1	in
1/25/2007	7:00	5.1	in
1/26/2007	7:00	5	in
1/27/2007	7:00	5	in
1/28/2007	7:00	5.3	in
1/29/2007	7:00	5	in
1/30/2007	7:00	5	in
1/31/2007	7:00	4.9	in
2/1/2007	7:00	5	in
2/2/2007	7:00	5	in

Rain Gauge

Date	Time	Level	Units
1/1/2007	23:59:59	0	in
1/2/2007	23:59:59	0.1	in
1/3/2007	23:59:59	0	in
1/4/2007	23:59:59	0	in
1/5/2007	23:59:59	0	in
1/6/2007	23:59:59	0	in
1/7/2007	23:59:59	0	in
1/8/2007	23:59:59	0.11	in
1/9/2007	23:59:59	0	in
1/10/2007	23:59:59	0	in
1/11/2007	23:59:59	0	in
1/12/2007	23:59:59	0	in
1/13/2007	23:59:59	0	in
1/14/2007	23:59:59	1.01	in
1/15/2007	23:59:59	0.09	in
1/16/2007	23:59:59	0	in
1/17/2007	23:59:59	0	in
1/18/2007	23:59:59	0.04	in
1/19/2007	23:59:59	0	in
1/20/2007	23:59:59	0.01	in
1/21/2007	23:59:59	0	in
1/22/2007	23:59:59	0.02	in
1/23/2007	23:59:59	0	in
1/24/2007	23:59:59	0	in
1/25/2007	23:59:59	0	in
1/26/2007	23:59:59	0.05	in
1/27/2007	23:59:59	0	in
1/28/2007	23:59:59	0.07	in
1/29/2007	23:59:59	0	in
1/30/2007	23:59:59	0	in
1/31/2007	23:59:59	0	in
2/1/2007	23:59:59	0	in
2/2/2007	23:59:59	0.18	in

Appendix 3.1 Data Tables for Hydrological Data
Back Creek Stream and Wetland Restoration
Year 2 of 5

Ecotone Unit: Level Logger = **Gauge 1**

Serial Number: 000009BE9013

Probe Number: 000001D32253

Date	Time	Level	Units
2/3/2007	7:00	2.9	in
2/4/2007	7:00	2.9	in
2/5/2007	7:00	2.8	in
2/6/2007	7:00	2.8	in
2/7/2007	7:00	3	in
2/8/2007	7:00	2.9	in
2/9/2007	7:00	2.9	in
2/10/2007	7:00	2.9	in
2/11/2007	7:00	2.8	in
2/12/2007	7:00	3	in
2/13/2007	7:00	3.6	in
2/14/2007	7:00	3.3	in
2/15/2007	7:00	2.9	in
2/16/2007	7:00	2.9	in
2/17/2007	7:00	2.9	in
2/18/2007	7:00	2.9	in
2/19/2007	7:00	2.9	in
2/20/2007	7:00	3.1	in
2/21/2007	7:00	3.9	in
2/22/2007	7:00	3.3	in
2/23/2007	7:00	3	in
2/24/2007	7:00	3	in
2/25/2007	7:00	3.3	in
2/26/2007	7:00	3.4	in
2/27/2007	7:00	3.1	in
2/28/2007	7:00	3.1	in
3/1/2007	7:00	3.3	in
3/2/2007	7:00	3.7	in
3/3/2007	7:00	3.3	in
3/4/2007	7:00	3.3	in
3/5/2007	7:00	3.1	in
3/6/2007	7:00	3.3	in
3/7/2007	7:00	3.3	in

Ecotone Unit: Level Logger = **Gauge 2**

Serial Number: 000009DE6C7E

Probe Number: 000001302CEE

Date	Time	Level	Units
2/3/2007	7:00	3.8	in
2/4/2007	7:00	3.7	in
2/5/2007	7:00	3.7	in
2/6/2007	7:00	3.7	in
2/7/2007	7:00	3.7	in
2/8/2007	7:00	3.7	in
2/9/2007	7:00	3.7	in
2/10/2007	7:00	3.7	in
2/11/2007	7:00	3.6	in
2/12/2007	7:00	3.6	in
2/13/2007	7:00	3.7	in
2/14/2007	7:00	3.8	in
2/15/2007	7:00	3.8	in
2/16/2007	7:00	3.7	in
2/17/2007	7:00	3.7	in
2/18/2007	7:00	3.6	in
2/19/2007	7:00	3.7	in
2/20/2007	7:00	3.6	in
2/21/2007	7:00	3.9	in
2/22/2007	7:00	4	in
2/23/2007	7:00	3.9	in
2/24/2007	7:00	3.8	in
2/25/2007	7:00	4	in
2/26/2007	7:00	4	in
2/27/2007	7:00	4	in
2/28/2007	7:00	3.9	in
3/1/2007	7:00	4	in
3/2/2007	7:00	4.2	in
3/3/2007	7:00	4.1	in
3/4/2007	7:00	4.1	in
3/5/2007	7:00	4	in
3/6/2007	7:00	3.9	in
3/7/2007	7:00	4	in

Ecotone Unit: Level Logger = **Gauge 3**

Serial Number: 000009BEA425

Probe Number: 000001D379C4

Date	Time	Level	Units
2/3/2007	7:00	4.9	in
2/4/2007	7:00	4.9	in
2/5/2007	7:00	4.9	in
2/6/2007	7:00	5	in
2/7/2007	7:00	5	in
2/8/2007	7:00	5.1	in
2/9/2007	7:00	5.1	in
2/10/2007	7:00	5	in
2/11/2007	7:00	5	in
2/12/2007	7:00	5.1	in
2/13/2007	7:00	5.3	in
2/14/2007	7:00	5.5	in
2/15/2007	7:00	5.2	in
2/16/2007	7:00	5.1	in
2/17/2007	7:00	5.1	in
2/18/2007	7:00	5.1	in
2/19/2007	7:00	5.1	in
2/20/2007	7:00	5.1	in
2/21/2007	7:00	5.5	in
2/22/2007	7:00	5.4	in
2/23/2007	7:00	5.3	in
2/24/2007	7:00	5.2	in
2/25/2007	7:00	5.7	in
2/26/2007	7:00	5.7	in
2/27/2007	7:00	5.4	in
2/28/2007	7:00	5.4	in
3/1/2007	7:00	5.6	in
3/2/2007	7:00	5.7	in
3/3/2007	7:00	5.5	in
3/4/2007	7:00	5.3	in
3/5/2007	7:00	5.1	in
3/6/2007	7:00	5.2	in
3/7/2007	7:00	5.1	in

Rain Gauge

Date	Time	Level	Units
2/3/2007	23:59:59	0	in
2/4/2007	23:59:59	0	in
2/5/2007	23:59:59	0	in
2/6/2007	23:59:59	0	in
2/7/2007	23:59:59	0	in
2/8/2007	23:59:59	0	in
2/9/2007	23:59:59	0	in
2/10/2007	23:59:59	0	in
2/11/2007	23:59:59	0.16	in
2/12/2007	23:59:59	0	in
2/13/2007	23:59:59	0.3	in
2/14/2007	23:59:59	0.03	in
2/15/2007	23:59:59	0.01	in
2/16/2007	23:59:59	0.01	in
2/17/2007	23:59:59	0.01	in
2/18/2007	23:59:59	0.01	in
2/19/2007	23:59:59	0.01	in
2/20/2007	23:59:59	0	in
2/21/2007	23:59:59	0.01	in
2/22/2007	23:59:59	0.01	in
2/23/2007	23:59:59	0	in
2/24/2007	23:59:59	0	in
2/25/2007	23:59:59	0.01	in
2/26/2007	23:59:59	0	in
2/27/2007	23:59:59	0	in
2/28/2007	23:59:59	0	in
3/1/2007	23:59:59	0.03	in
3/2/2007	23:59:59	0.03	in
3/3/2007	23:59:59	0.25	in
3/4/2007	23:59:59	0.01	in
3/5/2007	23:59:59	0	in
3/6/2007	23:59:59	0	in
3/7/2007	23:59:59	0	in

Ecotone Unit: Level Logger = **Gauge 1**

Serial Number: 000009BE9013

Probe Number: 000001D32253

Date	Time	Level	Units
3/8/2007	7:00	3.3	in
3/9/2007	7:00	3.3	in
3/10/2007	7:00	3.4	in
3/11/2007	7:00	3.5	in
3/12/2007	7:00	3.5	in
3/13/2007	7:00	3.5	in
3/14/2007	7:00	3.7	in
3/15/2007	7:00	3.7	in
3/16/2007	7:00	3.9	in
3/17/2007	7:00	3.5	in
3/18/2007	7:00	3.4	in
3/19/2007	7:00	3.3	in
3/20/2007	7:00	3.6	in
3/21/2007	7:00	3.8	in
3/22/2007	7:00	3.8	in
3/23/2007	7:00	3.7	in
3/24/2007	7:00	3.8	in
3/25/2007	7:00	3.8	in
3/26/2007	7:00	3.8	in
3/27/2007	7:00	4	in
3/28/2007	7:00	3.9	in
3/29/2007	7:00	4.1	in
3/30/2007	7:00	4	in
3/31/2007	7:00	3.9	in
4/1/2007	7:00	4.2	in
4/2/2007	7:00	4.3	in
4/3/2007	7:00	4	in
4/4/2007	7:00	4	in
4/5/2007	7:00	3.7	in
4/6/2007	7:00	3.7	in
4/7/2007	7:00	3.5	in
4/8/2007	7:00	3.5	in
4/9/2007	7:00	3.6	in

Ecotone Unit: Level Logger = **Gauge 2**

Serial Number: 000009DE6C7E

Probe Number: 000001302CEE

Date	Time	Level	Units
3/8/2007	7:00	4	in
3/9/2007	7:00	4	in
3/10/2007	7:00	4	in
3/11/2007	7:00	4.2	in
3/12/2007	7:00	4.2	in
3/13/2007	7:00	4.2	in
3/14/2007	7:00	4.3	in
3/15/2007	7:00	4.5	in
3/16/2007	7:00	4.7	in
3/17/2007	7:00	4.6	in
3/18/2007	7:00	4.4	in
3/19/2007	7:00	4.4	in
3/20/2007	7:00	4.6	in
3/21/2007	7:00	4.7	in
3/22/2007	7:00	4.7	in
3/23/2007	7:00	4.8	in
3/24/2007	7:00	4.7	in
3/25/2007	7:00	4.2	in
3/26/2007	7:00	3.7	in
3/27/2007	7:00	3.5	in
3/28/2007	7:00	2.9	in
3/29/2007	7:00	2	in
3/30/2007	7:00	2.3	in
3/31/2007	7:00	3.1	in
4/1/2007	7:00	2.5	in
4/2/2007	7:00	2.7	in
4/3/2007	7:00	3.3	in
4/4/2007	7:00	2.7	in
4/5/2007	7:00	0.3	in
4/6/2007	7:00	-1.1	in
4/7/2007	7:00	-2.1	in
4/8/2007	7:00	-3.2	in
4/9/2007	7:00	-3.5	in

Ecotone Unit: Level Logger = **Gauge 3**

Serial Number: 000009BEA425

Probe Number: 000001D379C4

Date	Time	Level	Units
3/8/2007	7:00	5.2	in
3/9/2007	7:00	5.1	in
3/10/2007	7:00	5.2	in
3/11/2007	7:00	5.4	in
3/12/2007	7:00	5.1	in
3/13/2007	7:00	5.1	in
3/14/2007	7:00	5.4	in
3/15/2007	7:00	5.3	in
3/16/2007	7:00	5.6	in
3/17/2007	7:00	5.3	in
3/18/2007	7:00	5.1	in
3/19/2007	7:00	5	in
3/20/2007	7:00	5.5	in
3/21/2007	7:00	5.2	in
3/22/2007	7:00	5.5	in
3/23/2007	7:00	5.5	in
3/24/2007	7:00	5.5	in
3/25/2007	7:00	5.4	in
3/26/2007	7:00	5.3	in
3/27/2007	7:00	5.5	in
3/28/2007	7:00	5.4	in
3/29/2007	7:00	5.2	in
3/30/2007	7:00	5.6	in
3/31/2007	7:00	5.5	in
4/1/2007	7:00	5.6	in
4/2/2007	7:00	5.4	in
4/3/2007	7:00	5.5	in
4/4/2007	7:00	5.4	in
4/5/2007	7:00	5.1	in
4/6/2007	7:00	4.9	in
4/7/2007	7:00	4.6	in
4/8/2007	7:00	3.9	in
4/9/2007	7:00	3.8	in

Rain Gauge

Date	Time	Level	Units
3/8/2007	23:59:59	0	in
3/9/2007	23:59:59	0	in
3/10/2007	23:59:59	0.11	in
3/11/2007	23:59:59	0	in
3/12/2007	23:59:59	0	in
3/13/2007	23:59:59	0	in
3/14/2007	23:59:59	0.05	in
3/15/2007	23:59:59	0	in
3/16/2007	23:59:59	0.28	in
3/17/2007	23:59:59	0	in
3/18/2007	23:59:59	0.07	in
3/19/2007	23:59:59	0	in
3/20/2007	23:59:59	0	in
3/21/2007	23:59:59	0	in
3/22/2007	23:59:59	0.34	in
3/23/2007	23:59:59	0.06	in
3/24/2007	23:59:59	0.01	in
3/25/2007	23:59:59	0	in
3/26/2007	23:59:59	0	in
3/27/2007	23:59:59	0	in
3/28/2007	23:59:59	0	in
3/29/2007	23:59:59	0.03	in
3/30/2007	23:59:59	0.01	in
3/31/2007	23:59:59	0.01	in
4/1/2007	23:59:59	0	in
4/2/2007	23:59:59	0	in
4/3/2007	23:59:59	0	in
4/4/2007	23:59:59	0	in
4/5/2007	23:59:59	0	in
4/6/2007	23:59:59	0.08	in
4/7/2007	23:59:59	0.17	in
4/8/2007	23:59:59	0.05	in
4/9/2007	23:59:59	0.02	in

Ecotone Unit: Level Logger = **Gauge 1**

Serial Number: 000009BE9013

Probe Number: 000001D32253

Date	Time	Level	Units
4/10/2007	7:00	3.5	in
4/11/2007	7:00	3.8	in
4/12/2007	7:00	4.1	in
4/13/2007	7:00	3.7	in
4/14/2007	7:00	3.7	in
4/15/2007	7:00	4.4	in
4/16/2007	7:00	3.8	in
4/17/2007	7:00	3.7	in
4/18/2007	7:00	3.8	in
4/19/2007	7:00	3.8	in
4/20/2007	7:00	3.9	in
4/21/2007	7:00	3.8	in
4/22/2007	7:00	3.8	in
4/23/2007	7:00	3.8	in
4/24/2007	7:00	3.8	in
4/25/2007	7:00	4	in
4/26/2007	7:00	4	in
4/27/2007	7:00	4.6	in
4/28/2007	7:00	4	in
4/29/2007	7:00	3.9	in
4/30/2007	7:00	3.9	in
5/1/2007	7:00	3.9	in
5/2/2007	7:00	3.8	in
5/3/2007	7:00	3.8	in
5/4/2007	7:00	4	in
5/5/2007	7:00	4.4	in
5/6/2007	7:00	4.6	in
5/7/2007	7:00	3.9	in
5/8/2007	7:00	3.8	in
5/9/2007	7:00	4.3	in
5/10/2007	7:00	4.4	in
5/11/2007	7:00	4.2	in
5/12/2007	7:00	4	in

Ecotone Unit: Level Logger = **Gauge 2**

Serial Number: 000009DE6C7E

Probe Number: 000001302CEE

Date	Time	Level	Units
4/10/2007	7:00	-3.7	in
4/11/2007	7:00	-3.7	in
4/12/2007	7:00	4.2	in
4/13/2007	7:00	4.5	in
4/14/2007	7:00	4.6	in
4/15/2007	7:00	4.8	in
4/16/2007	7:00	4.7	in
4/17/2007	7:00	4.6	in
4/18/2007	7:00	4.6	in
4/19/2007	7:00	4.7	in
4/20/2007	7:00	4.7	in
4/21/2007	7:00	4.8	in
4/22/2007	7:00	4.7	in
4/23/2007	7:00	4.7	in
4/24/2007	7:00	4.6	in
4/25/2007	7:00	4.3	in
4/26/2007	7:00	3.1	in
4/27/2007	7:00	5	in
4/28/2007	7:00	4.8	in
4/29/2007	7:00	3.9	in
4/30/2007	7:00	1.6	in
5/1/2007	7:00	-0.4	in
5/2/2007	7:00	-2.6	in
5/3/2007	7:00	-4.3	in
5/4/2007	7:00	-4.8	in
5/5/2007	7:00	4.6	in
5/6/2007	7:00	4.8	in
5/7/2007	7:00	2.2	in
5/8/2007	7:00	-0.3	in
5/9/2007	7:00	-1.5	in
5/10/2007	7:00	-2.5	in
5/11/2007	7:00	-4	in
5/12/2007	7:00	-6.1	in

Ecotone Unit: Level Logger = **Gauge 3**

Serial Number: 000009BEA425

Probe Number: 000001D379C4

Date	Time	Level	Units
4/10/2007	7:00	3.8	in
4/11/2007	7:00	4.6	in
4/12/2007	7:00	5.3	in
4/13/2007	7:00	5.2	in
4/14/2007	7:00	5.3	in
4/15/2007	7:00	5.3	in
4/16/2007	7:00	5.9	in
4/17/2007	7:00	5.7	in
4/18/2007	7:00	5.8	in
4/19/2007	7:00	6	in
4/20/2007	7:00	5.9	in
4/21/2007	7:00	5.6	in
4/22/2007	7:00	5.5	in
4/23/2007	7:00	5.6	in
4/24/2007	7:00	5.7	in
4/25/2007	7:00	5.6	in
4/26/2007	7:00	5.5	in
4/27/2007	7:00	5.2	in
4/28/2007	7:00	5.7	in
4/29/2007	7:00	5.7	in
4/30/2007	7:00	5.3	in
5/1/2007	7:00	5	in
5/2/2007	7:00	4.1	in
5/3/2007	7:00	3.2	in
5/4/2007	7:00	3.2	in
5/5/2007	7:00	5.3	in
5/6/2007	7:00	5.7	in
5/7/2007	7:00	5.1	in
5/8/2007	7:00	4.6	in
5/9/2007	7:00	4.5	in
5/10/2007	7:00	3.9	in
5/11/2007	7:00	2.9	in
5/12/2007	7:00	2.2	in

Rain Gauge

Date	Time	Level	Units
4/10/2007	23:59:59	0.04	in
4/11/2007	23:59:59	0.02	in
4/12/2007	23:59:59	0.02	in
4/13/2007	23:59:59	0.17	in
4/14/2007	23:59:59	0	in
4/15/2007	23:59:59	0.01	in
4/16/2007	23:59:59	0	in
4/17/2007	23:59:59	0	in
4/18/2007	23:59:59	0	in
4/19/2007	23:59:59	0.31	in
4/20/2007	23:59:59	0.19	in
4/21/2007	23:59:59	0.06	in
4/22/2007	23:59:59	0.03	in
4/23/2007	23:59:59	0.03	in
4/24/2007	23:59:59	0.02	in
4/25/2007	23:59:59	0.01	in
4/26/2007	23:59:59	0.01	in
4/27/2007	23:59:59	0.02	in
4/28/2007	23:59:59	0.01	in
4/29/2007	23:59:59	0.02	in
4/30/2007	23:59:59	0.01	in
5/1/2007	23:59:59	0.03	in
5/2/2007	23:59:59	0.02	in
5/3/2007	23:59:59	0.02	in
5/4/2007	23:59:59	0.01	in
5/5/2007	23:59:59	0.01	in
5/6/2007	23:59:59	0.01	in
5/7/2007	23:59:59	0.01	in
5/8/2007	23:59:59	0	in
5/9/2007	23:59:59	0.03	in
5/10/2007	23:59:59	0	in
5/11/2007	23:59:59	0	in
5/12/2007	23:59:59	0.11	in

Appendix 3.1 Data Tables for Hydrological Data
Back Creek Stream and Wetland Restoration
Year 2 of 5

Ecotone Unit: Level Logger = **Gauge 1**

Serial Number: 000009BE9013

Probe Number: 000001D32253

Date	Time	Level	Units
5/13/2007	7:00	4.3	in
5/14/2007	7:00	3.9	in
5/15/2007	7:00	3.8	in
5/16/2007	7:00	3.6	in
5/17/2007	7:00	3.4	in
5/18/2007	7:00	3.3	in
5/19/2007	7:00	3.5	in
5/20/2007	7:00	3.5	in
5/21/2007	7:00	3.4	in
5/22/2007	7:00	3.3	in
5/23/2007	7:00	3.3	in
5/24/2007	7:00	3.6	in
5/25/2007	7:00	3.2	in
5/26/2007	7:00	3	in
5/27/2007	7:00	2.7	in
5/28/2007	7:00	2.7	in
5/29/2007	7:00	2.4	in
5/30/2007	7:00	2.2	in
5/31/2007	7:00	2.1	in
6/1/2007	7:00	1.9	in
6/2/2007	7:00	1.6	in
6/3/2007	7:00	5	in
6/4/2007	7:00	4.5	in
6/5/2007	7:00	4.1	in
6/6/2007	7:00	3.9	in
6/7/2007	7:00	3.7	in
6/8/2007	7:00	3.6	in
6/9/2007	7:00	4.6	in
6/10/2007	7:00	3.9	in
6/11/2007	7:00	3.5	in
6/12/2007	7:00	4.2	in
6/13/2007	7:00	4.2	in
6/14/2007	7:00	4.6	in

Ecotone Unit: Level Logger = **Gauge 2**

Serial Number: 000009DE6C7E

Probe Number: 000001302CEE

Date	Time	Level	Units
5/13/2007	7:00	-4.4	in
5/14/2007	7:00	-7.2	in
5/15/2007	7:00	-9	in
5/16/2007	7:00	-10.1	in
5/17/2007	7:00	-11.6	in
5/18/2007	7:00	-13	in
5/19/2007	7:00	-14.4	in
5/20/2007	7:00	-15.2	in
5/21/2007	7:00	-16.2	in
5/22/2007	7:00	-17.1	in
5/23/2007	7:00	-17.9	in
5/24/2007	7:00	-18.6	in
5/25/2007	7:00	-19.2	in
5/26/2007	7:00	-19.8	in
5/27/2007	7:00	-20.5	in
5/28/2007	7:00	-21.2	in
5/29/2007	7:00	-21.9	in
5/30/2007	7:00	-22.6	in
5/31/2007	7:00	-23.3	in
6/1/2007	7:00	-23.9	in
6/2/2007	7:00	-24.5	in
6/3/2007	7:00	-23.2	in
6/4/2007	7:00	-20.7	in
6/5/2007	7:00	-19.9	in
6/6/2007	7:00	-20.1	in
6/7/2007	7:00	-21.3	in
6/8/2007	7:00	-23	in
6/9/2007	7:00	-24.1	in
6/10/2007	7:00	-24.8	in
6/11/2007	7:00	-25.5	in
6/12/2007	7:00	-25.9	in
6/13/2007	7:00	-26.3	in
6/14/2007	7:00	-26.4	in

Ecotone Unit: Level Logger = **Gauge 3**

Serial Number: 000009BEA425

Probe Number: 000001D379C4

Date	Time	Level	Units
5/13/2007	7:00	1.4	in
5/14/2007	7:00	1.3	in
5/15/2007	7:00	0.1	in
5/16/2007	7:00	-1	in
5/17/2007	7:00	-2.8	in
5/18/2007	7:00	-4.9	in
5/19/2007	7:00	-6.8	in
5/20/2007	7:00	-8.5	in
5/21/2007	7:00	-9.8	in
5/22/2007	7:00	-10.9	in
5/23/2007	7:00	-11.7	in
5/24/2007	7:00	-12.3	in
5/25/2007	7:00	-13.3	in
5/26/2007	7:00	-14.1	in
5/27/2007	7:00	-15.2	in
5/28/2007	7:00	-16.3	in
5/29/2007	7:00	-17.1	in
5/30/2007	7:00	-17.7	in
5/31/2007	7:00	-18.1	in
6/1/2007	7:00	-18.1	in
6/2/2007	7:00	-17.9	in
6/3/2007	7:00	-16.5	in
6/4/2007	7:00	-7	in
6/5/2007	7:00	-10.8	in
6/6/2007	7:00	-13.5	in
6/7/2007	7:00	-16.1	in
6/8/2007	7:00	-18.1	in
6/9/2007	7:00	-17.7	in
6/10/2007	7:00	-17.8	in
6/11/2007	7:00	-17.9	in
6/12/2007	7:00	-17.9	in
6/13/2007	7:00	-18.1	in
6/14/2007	7:00	-18.2	in

Rain Gauge

Date	Time	Level	Units
5/13/2007	23:59:59	0	in
5/14/2007	23:59:59	0	in
5/15/2007	23:59:59	0	in
5/16/2007	23:59:59	0	in
5/17/2007	23:59:59	0	in
5/18/2007	23:59:59	0	in
5/19/2007	23:59:59	0	in
5/20/2007	23:59:59	0	in
5/21/2007	23:59:59	0	in
5/22/2007	23:59:59	0	in
5/23/2007	23:59:59	0	in
5/24/2007	23:59:59	0	in
5/25/2007	23:59:59	0	in
5/26/2007	23:59:59	0	in
5/27/2007	23:59:59	0	in
5/28/2007	23:59:59	0	in
5/29/2007	23:59:59	0	in
5/30/2007	23:59:59	0	in
5/31/2007	23:59:59	0	in
6/1/2007	23:59:59	0	in
6/2/2007	23:59:59	0.1	in
6/3/2007	23:59:59	0.61	in
6/4/2007	23:59:59	0	in
6/5/2007	23:59:59	0	in
6/6/2007	23:59:59	0	in
6/7/2007	23:59:59	0	in
6/8/2007	23:59:59	0.21	in
6/9/2007	23:59:59	0.01	in
6/10/2007	23:59:59	0	in
6/11/2007	23:59:59	0.03	in
6/12/2007	23:59:59	0	in
6/13/2007	23:59:59	0.23	in
6/14/2007	23:59:59	0.67	in

Appendix 3.1 Data Tables for Hydrological Data
Back Creek Stream and Wetland Restoration
Year 2 of 5

Ecotone Unit: Level Logger = **Gauge 1**

Serial Number: 000009BE9013

Probe Number: 000001D32253

Date	Time	Level	Units
6/15/2007	7:00	4.8	in
6/16/2007	7:00	4.9	in
6/17/2007	7:00	4.6	in
6/18/2007	7:00	4.2	in
6/19/2007	7:00	3.9	in
6/20/2007	7:00	4.2	in
6/21/2007	7:00	3.8	in
6/22/2007	7:00	2.4	in
6/23/2007	7:00	1.8	in
6/24/2007	7:00	1.5	in
6/25/2007	7:00	5.1	in
6/26/2007	7:00	5.1	in
6/27/2007	7:00	4.9	in
6/28/2007	7:00	4.7	in
6/29/2007	7:00	4.5	in
6/30/2007	7:00	4.3	in
7/1/2007	7:00	4.6	in
7/2/2007	7:00	3.9	in
7/3/2007	7:00	4.2	in
7/4/2007	7:00	3.7	in
7/5/2007	7:00	2.4	in
7/6/2007	7:00	1.6	in
7/7/2007	7:00	1.8	in
7/8/2007	7:00	1.8	in
7/9/2007	7:00	1.5	in
7/10/2007	7:00	4	in
7/11/2007	7:00	3	in
7/12/2007	7:00	4.2	in
7/13/2007	7:00	3.3	in
7/14/2007	7:00	4.1	in
7/15/2007	7:00	4.2	in
7/16/2007	7:00	4.8	in
7/17/2007	7:00	4.5	in

Ecotone Unit: Level Logger = **Gauge 2**

Serial Number: 000009DE6C7E

Probe Number: 000001302CEE

Date	Time	Level	Units
6/15/2007	7:00	-22.5	in
6/16/2007	7:00	-20.6	in
6/17/2007	7:00	-19.8	in
6/18/2007	7:00	-20	in
6/19/2007	7:00	-20.7	in
6/20/2007	7:00	-22.2	in
6/21/2007	7:00	-23.8	in
6/22/2007	7:00	-25.3	in
6/23/2007	7:00	-27	in
6/24/2007	7:00	-27.9	in
6/25/2007	7:00	-25.5	in
6/26/2007	7:00	-23.4	in
6/27/2007	7:00	-22.2	in
6/28/2007	7:00	-21.9	in
6/29/2007	7:00	-22.2	in
6/30/2007	7:00	-23.7	in
7/1/2007	7:00	-25	in
7/2/2007	7:00	-26.6	in
7/3/2007	7:00	-27.7	in
7/4/2007	7:00	-28.4	in
7/5/2007	7:00	-28.5	in
7/6/2007	7:00	-28.6	in
7/7/2007	7:00	-28.7	in
7/8/2007	7:00	-28.7	in
7/9/2007	7:00	-28.8	in
7/10/2007	7:00	-28.8	in
7/11/2007	7:00	-28.7	in
7/12/2007	7:00	-28.8	in
7/13/2007	7:00	-28.8	in
7/14/2007	7:00	-28.7	in
7/15/2007	7:00	-28.8	in
7/16/2007	7:00	-28.8	in
7/17/2007	7:00	-28.8	in

Ecotone Unit: Level Logger = **Gauge 3**

Serial Number: 000009BEA425

Probe Number: 000001D379C4

Date	Time	Level	Units
6/15/2007	7:00	-4.9	in
6/16/2007	7:00	-7	in
6/17/2007	7:00	-10.1	in
6/18/2007	7:00	-13.2	in
6/19/2007	7:00	-15.5	in
6/20/2007	7:00	-17	in
6/21/2007	7:00	-17.9	in
6/22/2007	7:00	-18.1	in
6/23/2007	7:00	-18.5	in
6/24/2007	7:00	-18.3	in
6/25/2007	7:00	-10.7	in
6/26/2007	7:00	-6.5	in
6/27/2007	7:00	-10.5	in
6/28/2007	7:00	-12.7	in
6/29/2007	7:00	-15.1	in
6/30/2007	7:00	-17.3	in
7/1/2007	7:00	-17.8	in
7/2/2007	7:00	-18	in
7/3/2007	7:00	-18.2	in
7/4/2007	7:00	-18.3	in
7/5/2007	7:00	-18.4	in
7/6/2007	7:00	-18.5	in
7/7/2007	7:00	-18.6	in
7/8/2007	7:00	-18.6	in
7/9/2007	7:00	-18.2	in
7/10/2007	7:00	-18.3	in
7/11/2007	7:00	-18.2	in
7/12/2007	7:00	-18.3	in
7/13/2007	7:00	-18.3	in
7/14/2007	7:00	-18.5	in
7/15/2007	7:00	-18.6	in
7/16/2007	7:00	-18.6	in
7/17/2007	7:00	-18.6	in

Rain Gauge

Date	Time	Level	Units
6/15/2007	23:59:59	0.01	in
6/16/2007	23:59:59	0	in
6/17/2007	23:59:59	0	in
6/18/2007	23:59:59	0	in
6/19/2007	23:59:59	0.07	in
6/20/2007	23:59:59	0.05	in
6/21/2007	23:59:59	0	in
6/22/2007	23:59:59	0	in
6/23/2007	23:59:59	0	in
6/24/2007	23:59:59	1.01	in
6/25/2007	23:59:59	0.29	in
6/26/2007	23:59:59	0.03	in
6/27/2007	23:59:59	0.01	in
6/28/2007	23:59:59	0	in
6/29/2007	23:59:59	0	in
6/30/2007	23:59:59	0.17	in
7/1/2007	23:59:59	0	in
7/2/2007	23:59:59	0	in
7/3/2007	23:59:59	0	in
7/4/2007	23:59:59	0	in
7/5/2007	23:59:59	0	in
7/6/2007	23:59:59	0	in
7/7/2007	23:59:59	0	in
7/8/2007	23:59:59	0	in
7/9/2007	23:59:59	0.2	in
7/10/2007	23:59:59	0	in
7/11/2007	23:59:59	0.17	in
7/12/2007	23:59:59	0	in
7/13/2007	23:59:59	0	in
7/14/2007	23:59:59	0	in
7/15/2007	23:59:59	0.46	in
7/16/2007	23:59:59	0.01	in
7/17/2007	23:59:59	0.28	in

Appendix 3.1 Data Tables for Hydrological Data
Back Creek Stream and Wetland Restoration
Year 2 of 5

Ecotone Unit: Level Logger = **Gauge 1**

Serial Number: 000009BE9013

Probe Number: 000001D32253

Date	Time	Level	Units
7/18/2007	7:00	5.1	in
7/19/2007	7:00	4.6	in
7/20/2007	7:00	4.2	in
7/21/2007	7:00	3.7	in
7/22/2007	7:00	2.7	in
7/23/2007	7:00	1.1	in
7/24/2007	7:00	1.1	in
7/25/2007	7:00	1.1	in
7/26/2007	7:00	0.2	in
7/27/2007	7:00	0.5	in
7/28/2007	7:00	3.5	in
7/29/2007	7:00	3.3	in
7/30/2007	7:00	3.5	in
7/31/2007	7:00	4.2	in
8/1/2007	7:00	3.3	in
8/2/2007	7:00	1.8	in
8/3/2007	7:00	0.2	in
8/4/2007	7:00	-0.1	in
8/5/2007	7:00	-1.6	in
8/6/2007	7:00	-4.3	in
8/7/2007	7:00	-6.9	in
8/8/2007	7:00	-9.1	in
8/9/2007	7:00	-11.9	in
8/10/2007	7:00	-13.5	in
8/11/2007	7:00	-15.1	in
8/12/2007	7:00	-16.6	in
8/13/2007	7:00	-15.9	in
8/14/2007	7:00	-17.1	in
8/15/2007	7:00	-19.9	in
8/16/2007	7:00	-20	in
8/17/2007	7:00	-20.7	in
8/18/2007	7:00	-19.1	in
8/19/2007	7:00	-19.4	in

Ecotone Unit: Level Logger = **Gauge 2**

Serial Number: 000009DE6C7E

Probe Number: 000001302CEE

Date	Time	Level	Units
7/18/2007	7:00	-28.8	in
7/19/2007	7:00	-28.8	in
7/20/2007	7:00	-28.8	in
7/21/2007	7:00	-28.7	in
7/22/2007	7:00	-28.3	in
7/23/2007	7:00	-28.4	in
7/24/2007	7:00	-28.5	in
7/25/2007	7:00	-28.5	in
7/26/2007	7:00	-28.5	in
7/27/2007	7:00	-28.5	in
7/28/2007	7:00	-28.5	in
7/29/2007	7:00	-28.6	in
7/30/2007	7:00	-28.6	in
7/31/2007	7:00	-28.6	in
8/1/2007	7:00	-28.7	in
8/2/2007	7:00	-28.7	in
8/3/2007	7:00	-28.7	in
8/4/2007	7:00	-28.7	in
8/5/2007	7:00	-28.7	in
8/6/2007	7:00	-28.8	in
8/7/2007	7:00	-28.8	in
8/8/2007	7:00	-28.8	in
8/9/2007	7:00	-28.8	in
8/10/2007	7:00	-28.8	in
8/11/2007	7:00	-28.9	in
8/12/2007	7:00	-28.9	in
8/13/2007	7:00	-28.9	in
8/14/2007	7:00	-28.9	in
8/15/2007	7:00	-28.8	in
8/16/2007	7:00	-28.8	in
8/17/2007	7:00	-29	in
8/18/2007	7:00	-29	in
8/19/2007	7:00	-28.9	in

Ecotone Unit: Level Logger = **Gauge 3**

Serial Number: 000009BEA425

Probe Number: 000001D379C4

Date	Time	Level	Units
7/18/2007	7:00	-18.4	in
7/19/2007	7:00	-18.4	in
7/20/2007	7:00	-18.5	in
7/21/2007	7:00	-18.5	in
7/22/2007	7:00	-18.6	in
7/23/2007	7:00	-18.7	in
7/24/2007	7:00	-18.8	in
7/25/2007	7:00	-18.8	in
7/26/2007	7:00	-18.8	in
7/27/2007	7:00	-18.9	in
7/28/2007	7:00	-18.6	in
7/29/2007	7:00	-18.7	in
7/30/2007	7:00	-18.8	in
7/31/2007	7:00	-18.5	in
8/1/2007	7:00	-18.6	in
8/2/2007	7:00	-18.7	in
8/3/2007	7:00	-18.7	in
8/4/2007	7:00	-18.8	in
8/5/2007	7:00	-18.9	in
8/6/2007	7:00	-18.9	in
8/7/2007	7:00	-18.9	in
8/8/2007	7:00	-19	in
8/9/2007	7:00	-19	in
8/10/2007	7:00	-19	in
8/11/2007	7:00	-19	in
8/12/2007	7:00	-19	in
8/13/2007	7:00	-19.2	in
8/14/2007	7:00	-19.2	in
8/15/2007	7:00	-19.4	in
8/16/2007	7:00	-19.6	in
8/17/2007	7:00	-19.9	in
8/18/2007	7:00	-19.9	in
8/19/2007	7:00	-20	in

Rain Gauge

Date	Time	Level	Units
7/18/2007	23:59:59	0	in
7/19/2007	23:59:59	0	in
7/20/2007	23:59:59	0	in
7/21/2007	23:59:59	0	in
7/22/2007	23:59:59	0	in
7/23/2007	23:59:59	0	in
7/24/2007	23:59:59	0.01	in
7/25/2007	23:59:59	0	in
7/26/2007	23:59:59	0	in
7/27/2007	23:59:59	0.18	in
7/28/2007	23:59:59	0	in
7/29/2007	23:59:59	0	in
7/30/2007	23:59:59	0.15	in
7/31/2007	23:59:59	0.01	in
8/1/2007	23:59:59	0	in
8/2/2007	23:59:59	0	in
8/3/2007	23:59:59	0	in
8/4/2007	23:59:59	0	in
8/5/2007	23:59:59	0	in
8/6/2007	23:59:59	0	in
8/7/2007	23:59:59	0	in
8/8/2007	23:59:59	0	in
8/9/2007	23:59:59	0	in
8/10/2007	23:59:59	0	in
8/11/2007	23:59:59	0	in
8/12/2007	23:59:59	0	in
8/13/2007	23:59:59	0	in
8/14/2007	23:59:59	0	in
8/15/2007	23:59:59	0	in
8/16/2007	23:59:59	0	in
8/17/2007	23:59:59	0	in
8/18/2007	23:59:59	0	in
8/19/2007	23:59:59	0	in

Ecotone Unit: Level Logger = **Gauge 1**

Serial Number: 000009BE9013

Probe Number: 000001D32253

Date	Time	Level	Units
8/20/2007	7:00	-20.5	in
8/21/2007	7:00	-21.5	in
8/22/2007	7:00	-22.1	in
8/23/2007	7:00	-22.5	in
8/24/2007	7:00	0.3	in
8/25/2007	7:00	-1.5	in
8/26/2007	7:00	-9.4	in
8/27/2007	7:00	0	in
8/28/2007	7:00	-0.5	in
8/29/2007	7:00	0	in
8/30/2007	7:00	-0.2	in
8/31/2007	7:00	2.4	in
9/1/2007	7:00	0.2	in
9/2/2007	7:00	0.5	in
9/3/2007	7:00	0	in
9/4/2007	7:00	0	in
9/5/2007	7:00	-0.2	in
9/6/2007	7:00	-0.5	in
9/7/2007	7:00	-0.8	in
9/8/2007	7:00	-1.2	in
9/9/2007	7:00	-2	in
9/10/2007	7:00	-3	in
9/11/2007	7:00	-3.7	in
9/12/2007	7:00	-7.1	in
9/13/2007	7:00	-7.6	in
9/14/2007	7:00	-4.6	in
9/15/2007	7:00	2.4	in
9/16/2007	7:00	0.9	in
9/17/2007	7:00	0.6	in
9/18/2007	7:00	0.5	in
9/19/2007	7:00	0.5	in
9/20/2007	7:00	2.4	in
9/21/2007	7:00	4	in

Ecotone Unit: Level Logger = **Gauge 2**

Serial Number: 000009DE6C7E

Probe Number: 000001302CEE

Date	Time	Level	Units
8/20/2007	7:00	-28.9	in
8/21/2007	7:00	-29	in
8/22/2007	7:00	-28.8	in
8/23/2007	7:00	-28.8	in
8/24/2007	7:00	-28.8	in
8/25/2007	7:00	-28.8	in
8/26/2007	7:00	-28.8	in
8/27/2007	7:00	-28.8	in
8/28/2007	7:00	-28.7	in
8/29/2007	7:00	-28.7	in
8/30/2007	7:00	-28.7	in
8/31/2007	7:00	-28.8	in
9/1/2007	7:00	-28.7	in
9/2/2007	7:00	-28.8	in
9/3/2007	7:00	-28.7	in
9/4/2007	7:00	-28.8	in
9/5/2007	7:00	-28.8	in
9/6/2007	7:00	-28.8	in
9/7/2007	7:00	-28.9	in
9/8/2007	7:00	-29	in
9/9/2007	7:00	-29	in
9/10/2007	7:00	-29	in
9/11/2007	7:00	-29	in
9/12/2007	7:00	-29.1	in
9/13/2007	7:00	-29.1	in
9/14/2007	7:00	-29	in
9/15/2007	7:00	-29	in
9/16/2007	7:00	-29	in
9/17/2007	7:00	-29	in
9/18/2007	7:00	-29	in
9/19/2007	7:00	-29	in
9/20/2007	7:00	-29.2	in
9/21/2007	7:00	-29.2	in

Ecotone Unit: Level Logger = **Gauge 3**

Serial Number: 000009BEA425

Probe Number: 000001D379C4

Date	Time	Level	Units
8/20/2007	7:00	-20.1	in
8/21/2007	7:00	-20.2	in
8/22/2007	7:00	-20.3	in
8/23/2007	7:00	-20.4	in
8/24/2007	7:00	-20.3	in
8/25/2007	7:00	-20.4	in
8/26/2007	7:00	-20.4	in
8/27/2007	7:00	-20.3	in
8/28/2007	7:00	-20.1	in
8/29/2007	7:00	-20.3	in
8/30/2007	7:00	-20.4	in
8/31/2007	7:00	-20.3	in
9/1/2007	7:00	-20.2	in
9/2/2007	7:00	-20.2	in
9/3/2007	7:00	-20.1	in
9/4/2007	7:00	-20	in
9/5/2007	7:00	-20.1	in
9/6/2007	7:00	-20.1	in
9/7/2007	7:00	-20.1	in
9/8/2007	7:00	-20.2	in
9/9/2007	7:00	-20.3	in
9/10/2007	7:00	-20.4	in
9/11/2007	7:00	-20.5	in
9/12/2007	7:00	-20.6	in
9/13/2007	7:00	-20.6	in
9/14/2007	7:00	-20.7	in
9/15/2007	7:00	-20.6	in
9/16/2007	7:00	-20.7	in
9/17/2007	7:00	-20.7	in
9/18/2007	7:00	-20.4	in
9/19/2007	7:00	-20.5	in
9/20/2007	7:00	-20.5	in
9/21/2007	7:00	-20.5	in

Rain Gauge

Date	Time	Level	Units
8/20/2007	23:59:59	0	in
8/21/2007	23:59:59	0.02	in
8/22/2007	23:59:59	0.02	in
8/23/2007	23:59:59	0.45	in
8/24/2007	23:59:59	0.01	in
8/25/2007	23:59:59	0	in
8/26/2007	23:59:59	0.5	in
8/27/2007	23:59:59	0.01	in
8/28/2007	23:59:59	0	in
8/29/2007	23:59:59	0	in
8/30/2007	23:59:59	0.8	in
8/31/2007	23:59:59	0.01	in
9/1/2007	23:59:59	0	in
9/2/2007	23:59:59	0	in
9/3/2007	23:59:59	0	in
9/4/2007	23:59:59	0	in
9/5/2007	23:59:59	0	in
9/6/2007	23:59:59	0	in
9/7/2007	23:59:59	0	in
9/8/2007	23:59:59	0	in
9/9/2007	23:59:59	0	in
9/10/2007	23:59:59	0	in
9/11/2007	23:59:59	0	in
9/12/2007	23:59:59	0	in
9/13/2007	23:59:59	0	in
9/14/2007	23:59:59	0.71	in
9/15/2007	23:59:59	0.01	in
9/16/2007	23:59:59	0	in
9/17/2007	23:59:59	0	in
9/18/2007	23:59:59	0	in
9/19/2007	23:59:59	0	in
9/20/2007	23:59:59	0.01	in
9/21/2007	23:59:59	0	in

Ecotone Unit: Level Logger = **Gauge 1**

Serial Number: 000009BE9013

Probe Number: 000001D32253

Date	Time	Level	Units
9/22/2007	7:00	4.2	in
9/23/2007	7:00	2.2	in
9/24/2007	7:00	1.1	in
9/25/2007	7:00	0.2	in
9/26/2007	7:00	0	in
9/27/2007	7:00	-0.1	in
9/28/2007	7:00	-0.1	in
9/29/2007	7:00	-1.8	in
9/30/2007	7:00	-2.2	in
10/1/2007	7:00	-2.2	in
10/2/2007	7:00	-1.7	in
10/3/2007	7:00	-1	in
10/4/2007	7:00	0	in
10/5/2007	7:00	1.6	in
10/6/2007	7:00	1.2	in
10/7/2007	7:00	0.9	in
10/8/2007	7:00	0.9	in
10/9/2007	7:00	1.1	in
10/10/2007	7:00	2	in
10/11/2007	7:00	0	in
10/12/2007	7:00	-0.4	in
10/13/2007	7:00	-0.7	in
10/14/2007	7:00	-0.3	in
10/15/2007	7:00	0	in
10/16/2007	7:00	0.3	in
10/17/2007	7:00	1.2	in
10/18/2007	7:00	3.1	in
10/19/2007	7:00	5.5	in
10/20/2007	7:00	1	in
10/21/2007	7:00	0.5	in
10/22/2007	7:00	0.9	in
10/23/2007	7:00	4.7	in
10/24/2007	7:00	5.1	in

Ecotone Unit: Level Logger = **Gauge 2**

Serial Number: 000009DE6C7E

Probe Number: 000001302CEE

Date	Time	Level	Units
9/22/2007	7:00	-29.3	in
9/23/2007	7:00	-29.3	in
9/24/2007	7:00	-29.4	in
9/25/2007	7:00	-29.4	in
9/26/2007	7:00	-29.4	in
9/27/2007	7:00	-29.4	in
9/28/2007	7:00	-29.4	in
9/29/2007	7:00	-29.4	in
9/30/2007	7:00	-29.5	in
10/1/2007	7:00	-29.5	in
10/2/2007	7:00	-29.6	in
10/3/2007	7:00	-29.6	in
10/4/2007	7:00	-29.6	in
10/5/2007	7:00	-29.5	in
10/6/2007	7:00	-29.6	in
10/7/2007	7:00	-29.5	in
10/8/2007	7:00	-29.5	in
10/9/2007	7:00	-29.6	in
10/10/2007	7:00	-29.3	in
10/11/2007	7:00	-29.4	in
10/12/2007	7:00	-29.5	in
10/13/2007	7:00	-29.6	in
10/14/2007	7:00	-29.6	in
10/15/2007	7:00	-29.6	in
10/16/2007	7:00	-29.7	in
10/17/2007	7:00	-29.6	in
10/18/2007	7:00	-29.6	in
10/19/2007	7:00	-29.6	in
10/20/2007	7:00	-29.6	in
10/21/2007	7:00	-29.7	in
10/22/2007	7:00	-29.6	in
10/23/2007	7:00	-29.6	in
10/24/2007	7:00	-29.5	in

Ecotone Unit: Level Logger = **Gauge 3**

Serial Number: 000009BEA425

Probe Number: 000001D379C4

Date	Time	Level	Units
9/22/2007	7:00	-20.5	in
9/23/2007	7:00	-20.6	in
9/24/2007	7:00	-20.7	in
9/25/2007	7:00	-20.7	in
9/26/2007	7:00	-20.8	in
9/27/2007	7:00	-20.9	in
9/28/2007	7:00	-21	in
9/29/2007	7:00	-21.3	in
9/30/2007	7:00	-21.2	in
10/1/2007	7:00	-21.1	in
10/2/2007	7:00	-21.2	in
10/3/2007	7:00	-21.2	in
10/4/2007	7:00	-21.2	in
10/5/2007	7:00	-21.2	in
10/6/2007	7:00	-21.2	in
10/7/2007	7:00	-21.3	in
10/8/2007	7:00	-21.4	in
10/9/2007	7:00	-21.4	in
10/10/2007	7:00	-21.8	in
10/11/2007	7:00	-21.9	in
10/12/2007	7:00	-21.8	in
10/13/2007	7:00	-21.9	in
10/14/2007	7:00	-21.9	in
10/15/2007	7:00	-22	in
10/16/2007	7:00	-21.9	in
10/17/2007	7:00	-21.9	in
10/18/2007	7:00	-21.8	in
10/19/2007	7:00	-21.8	in
10/20/2007	7:00	-21.5	in
10/21/2007	7:00	-21.5	in
10/22/2007	7:00	-21.5	in
10/23/2007	7:00	-21.5	in
10/24/2007	7:00	-21.4	in

Rain Gauge

Date	Time	Level	Units
9/22/2007	23:59:59	0	in
9/23/2007	23:59:59	0	in
9/24/2007	23:59:59	0	in
9/25/2007	23:59:59	0	in
9/26/2007	23:59:59	0	in
9/27/2007	23:59:59	0	in
9/28/2007	23:59:59	0	in
9/29/2007	23:59:59	0	in
9/30/2007	23:59:59	0	in
10/1/2007	23:59:59	0	in
10/2/2007	23:59:59	0	in
10/3/2007	23:59:59	0	in
10/4/2007	23:59:59	0	in
10/5/2007	23:59:59	0	in
10/6/2007	23:59:59	0	in
10/7/2007	23:59:59	0	in
10/8/2007	23:59:59	0	in
10/9/2007	23:59:59	0.05	in
10/10/2007	23:59:59	0	in
10/11/2007	23:59:59	0	in
10/12/2007	23:59:59	0	in
10/13/2007	23:59:59	0	in
10/14/2007	23:59:59	0	in
10/15/2007	23:59:59	0	in
10/16/2007	23:59:59	0	in
10/17/2007	23:59:59	0	in
10/18/2007	23:59:59	0	in
10/19/2007	23:59:59	0.56	in
10/20/2007	23:59:59	0.01	in
10/21/2007	23:59:59	0	in
10/22/2007	23:59:59	0	in
10/23/2007	23:59:59	0.14	in
10/24/2007	23:59:59	0.86	in

Appendix 3.1 Data Tables for Hydrological Data
Back Creek Stream and Wetland Restoration
Year 2 of 5

Ecotone Unit: Level Logger = **Gauge 1**

Serial Number: 000009BE9013

Probe Number: 000001D32253

Date	Time	Level	Units
10/25/2007	7:00	6.2	in
10/26/2007	7:00	4.8	in
10/27/2007	7:00	4.5	in
10/28/2007	7:00	2	in
10/29/2007	7:00	1	in
10/30/2007	7:00	0.9	in
10/31/2007	7:00	1.2	in
11/1/2007	7:00	1.9	in
11/2/2007	7:00	2.3	in
11/3/2007	7:00	1.4	in
11/4/2007	7:00	1.3	in
11/5/2007	7:00	1.5	in
11/6/2007	7:00	2.4	in
11/7/2007	7:00	1.4	in
11/8/2007	7:00	1.4	in

Ecotone Unit: Level Logger = **Gauge 2**

Serial Number: 000009DE6C7E

Probe Number: 000001302CEE

Date	Time	Level	Units
10/25/2007	7:00	-29.5	in
10/26/2007	7:00	-29.4	in
10/27/2007	7:00	-29.4	in
10/28/2007	7:00	-29.4	in
10/29/2007	7:00	-29.6	in
10/30/2007	7:00	-29.6	in
10/31/2007	7:00	-29.6	in
11/1/2007	7:00	-29.6	in
11/2/2007	7:00	-29.6	in
11/3/2007	7:00	-29.6	in
11/4/2007	7:00	-29.7	in
11/5/2007	7:00	-29.8	in
11/6/2007	7:00	-29.7	in
11/7/2007	7:00	-29.8	in
11/8/2007	7:00	-29.9	in

Ecotone Unit: Level Logger = **Gauge 3**

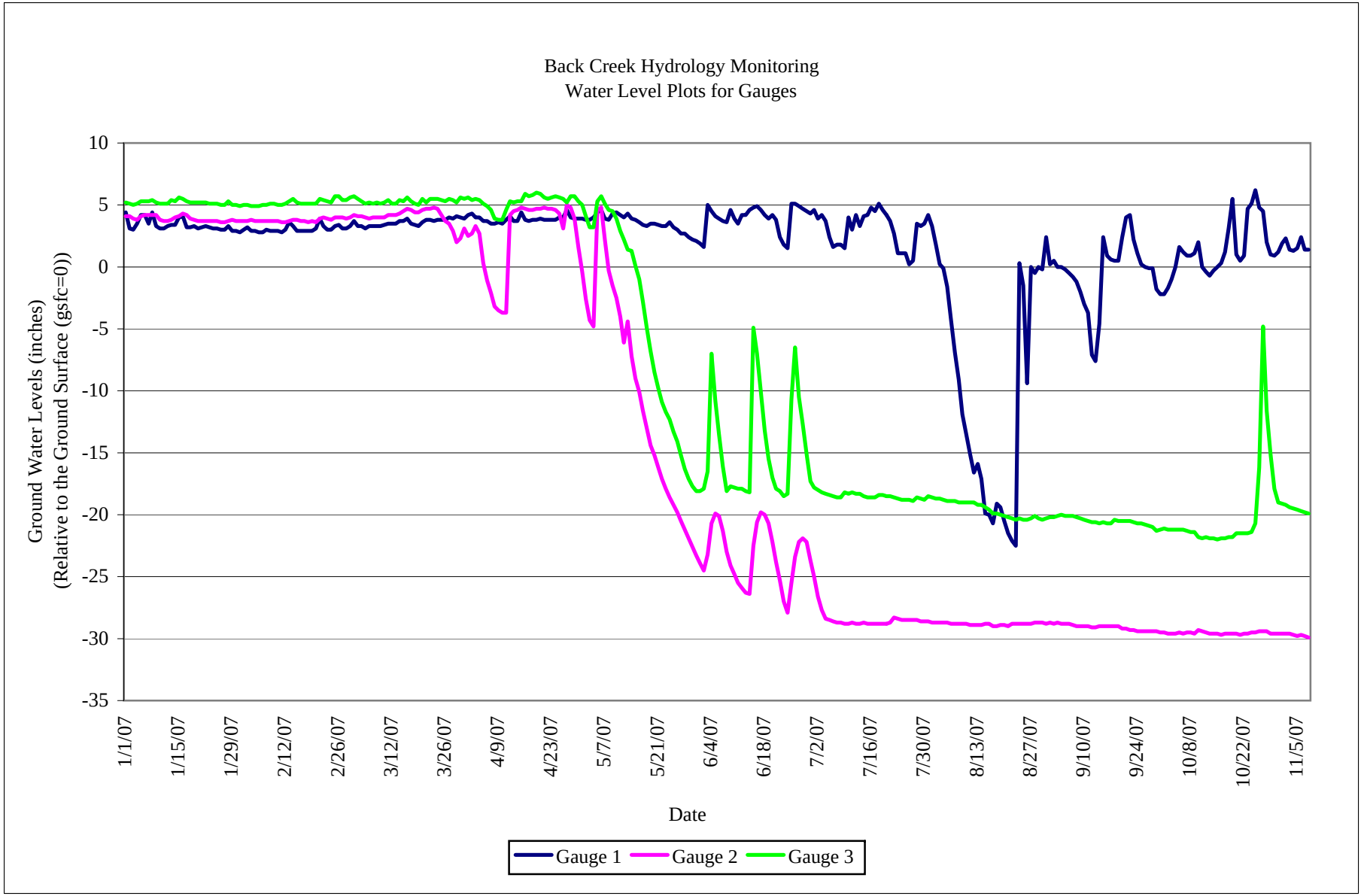
Serial Number: 000009BEA425

Probe Number: 000001D379C4

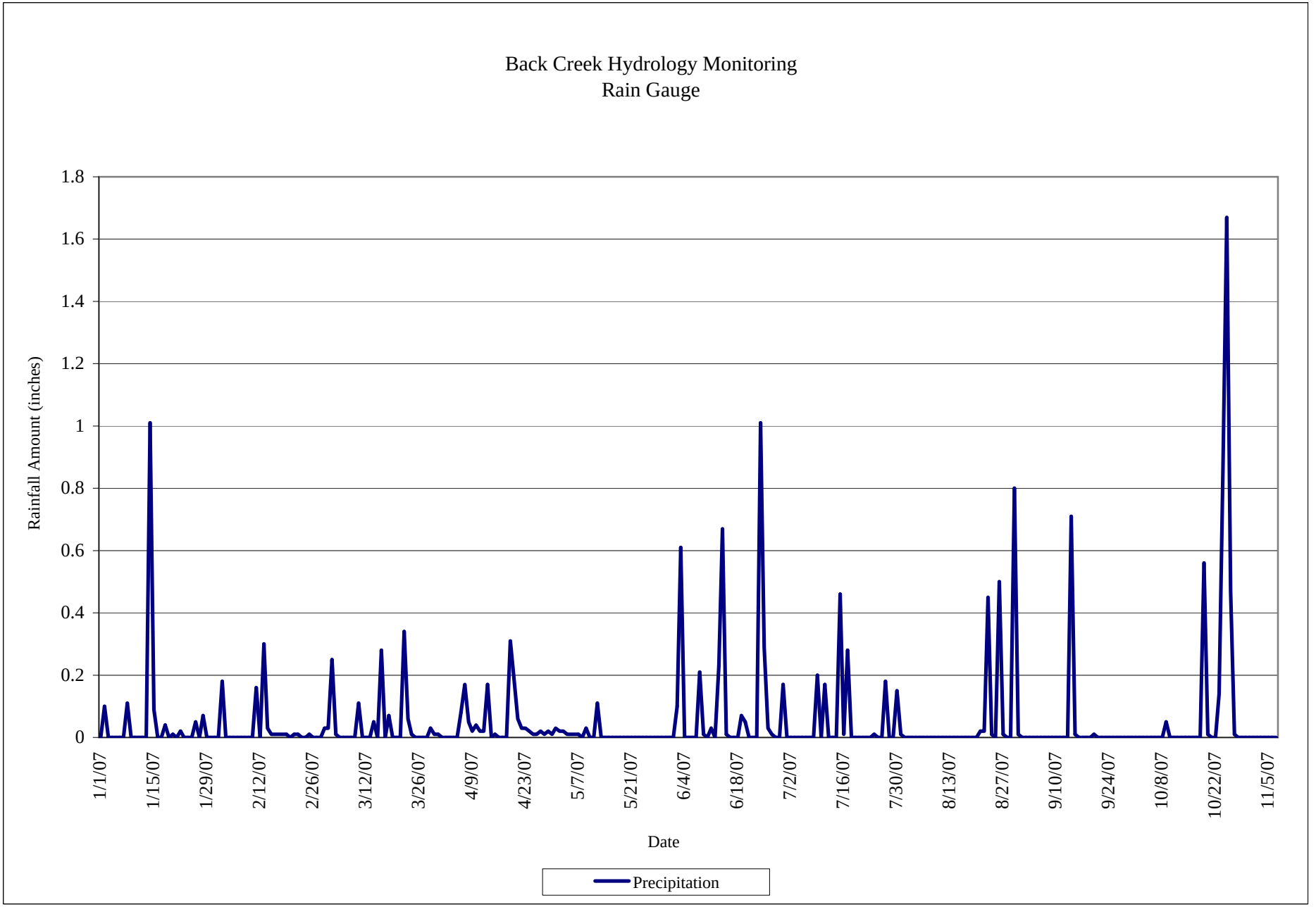
Date	Time	Level	Units
10/25/2007	7:00	-20.7	in
10/26/2007	7:00	-16.2	in
10/27/2007	7:00	-4.8	in
10/28/2007	7:00	-11.6	in
10/29/2007	7:00	-15.1	in
10/30/2007	7:00	-17.9	in
10/31/2007	7:00	-19	in
11/1/2007	7:00	-19.1	in
11/2/2007	7:00	-19.2	in
11/3/2007	7:00	-19.4	in
11/4/2007	7:00	-19.5	in
11/5/2007	7:00	-19.6	in
11/6/2007	7:00	-19.7	in
11/7/2007	7:00	-19.8	in
11/8/2007	7:00	-19.9	in

Rain Gauge

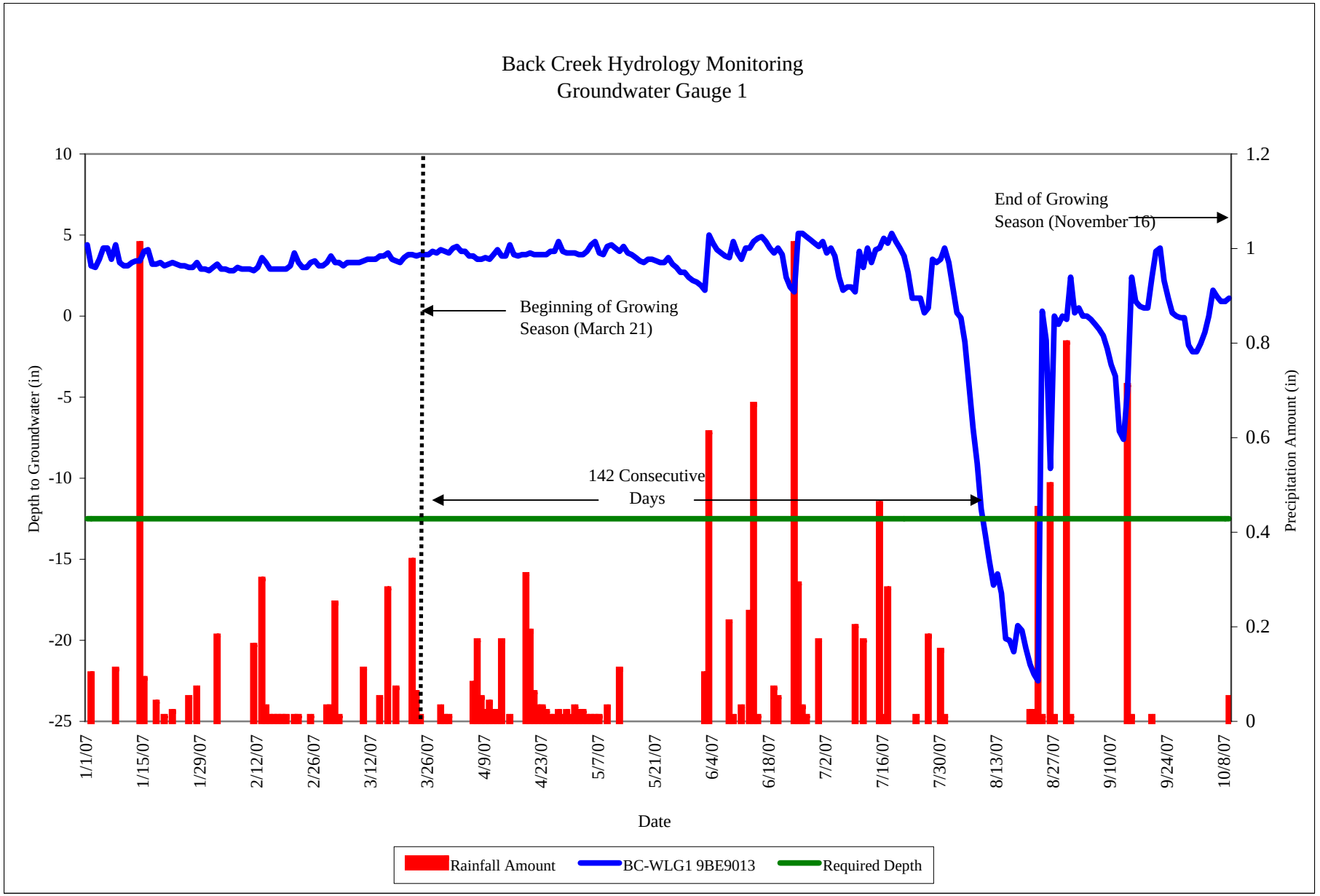
Date	Time	Level	Units
10/25/2007	23:59:59	1.67	in
10/26/2007	23:59:59	0.47	in
10/27/2007	23:59:59	0.01	in
10/28/2007	23:59:59	0	in
10/29/2007	23:59:59	0	in
10/30/2007	23:59:59	0	in
10/31/2007	23:59:59	0	in
11/1/2007	23:59:59	0	in
11/2/2007	23:59:59	0	in
11/3/2007	23:59:59	0	in
11/4/2007	23:59:59	0	in
11/5/2007	23:59:59	0	in
11/6/2007	23:59:59	0	in
11/7/2007	23:59:59	0	in



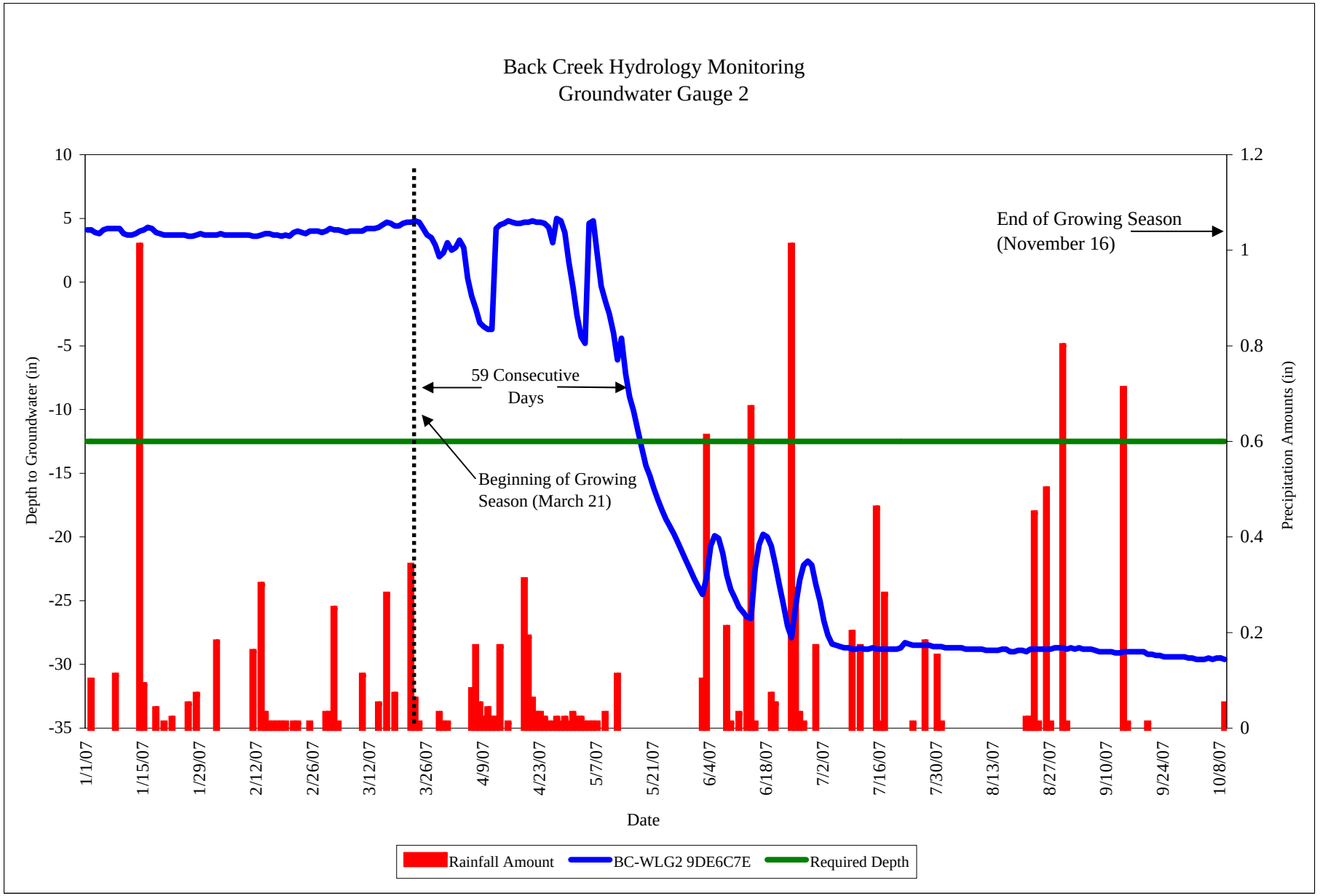
Appendix 3.2 Precipitation - Water Level Plots for Gauges
Back Creek Stream and Wetland Restoration
Year 2 of 5



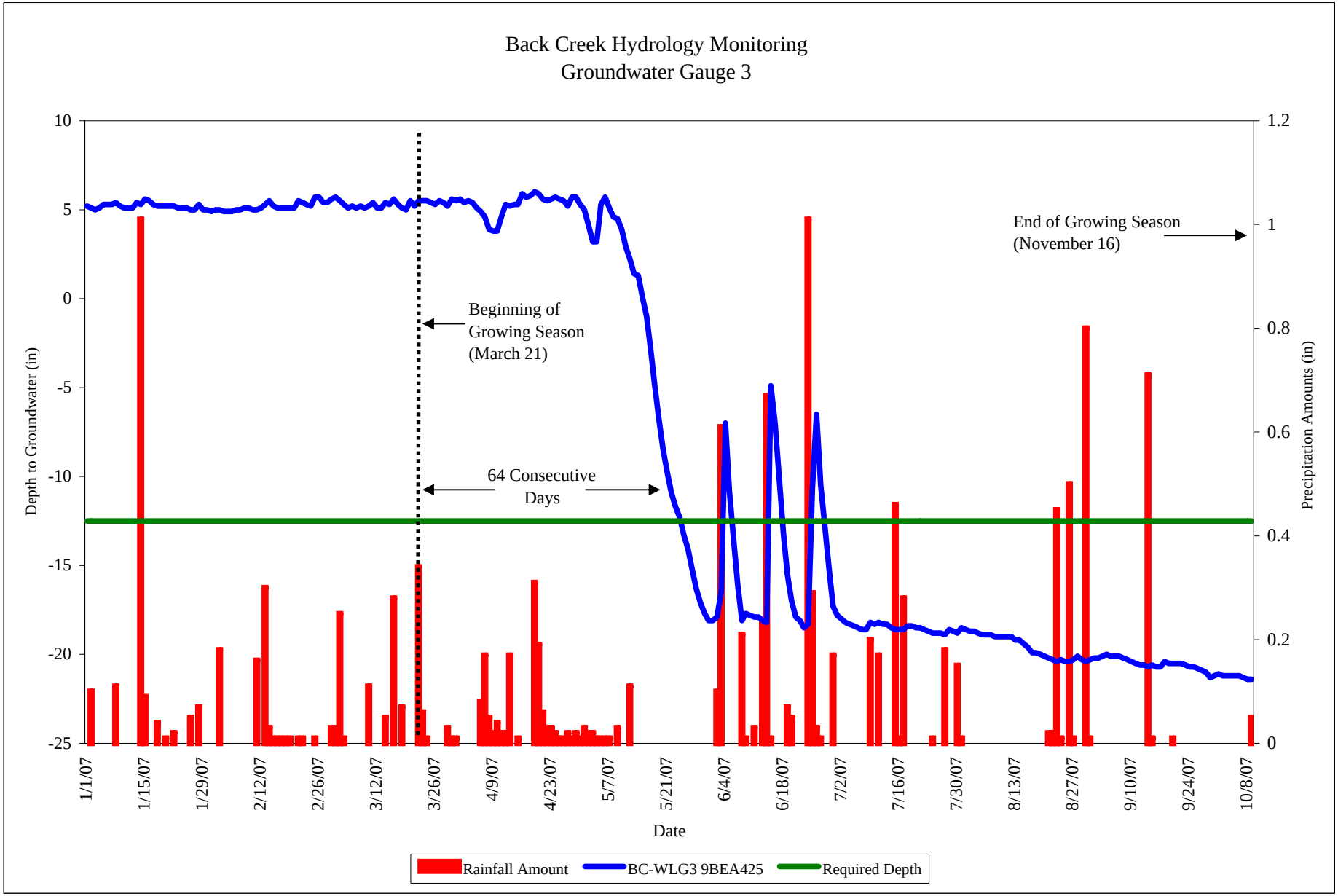
Appendix 3.2 Precipitation - Water Level Plots for Gauges
Back Creek Stream and Wetland Restoration
Year 2 of 5



Appendix 3.2 Precipitation - Water Level Plots for Gauges
Back Creek Stream and Wetland Restoration
Year 2 of 5



Appendix 3.2 Precipitation - Water Level Plots for Gauges
Back Creek Stream and Wetland Restoration
Year 2 of 5



Appendix 3.2 Precipitation - Water Level Plots for Gauges
Back Creek Stream and Wetland Restoration
Year 2 of 5

Jordan Jones & Goulding

APPENDIX 4
INTEGRATED CURRENT CONDITION PLAN VIEW

1. Current Condition Plan View Map (Integrated)

NC4001CS07.dwg
05.14.07

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

Ecosystem Enhancement PROGRAM

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

PROJECT NO. 17
MECKLENBURG COUNTY
NORTH CAROLINA
MONITORING
YEAR 2 of 5

JORDAN JONES & GOULDING

NC ECOSYSTEM ENHANCEMENT PROGRAM
BACK CREEK STREAM AND WETLAND RESTORATION

APPENDIX 4
CURRENT CONDITION PLAN VIEW

DATE : NOVEMBER 2007
SCALE : 1"=200'
JOB NO.: 03060-001

FIGURE KEY

JTHACKSTON

LEGEND

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

16' ACCESS GATE

RAIN GAUGE

BACK CREEK CHURCH ROAD SR 2827

VEG PLOT 1

EXISTING 25' WIDE SANITARY SEWER EASEMENT

EXISTING 25' WIDE SANITARY SEWER EASEMENT

EXISTING 128' WIDE DUKE POWER COMPANY R/W

CONSERVATION EASEMENT BOUNDARY

0+00

1+00

2+00

3+00

4+00

5+00

N

MATCHLINE STA. 5+50
SEE FIGURE 2 OF 6

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

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

PROJECT NO. 17
MECKLENBURG COUNTY
NORTH CAROLINA
MONITORING
YEAR 2 of 5

JORDAN JONES & GOULDING

NC ECOSYSTEM ENHANCEMENT PROGRAM
BACK CREEK STREAM AND WETLAND RESTORATION

APPENDIX 4
CURRENT CONDITION PLAN VIEW

DATE : NOVEMBER 2007
SCALE : 1"=40'
JOB NO.: 03060–001

FIGURE 1 OF 6

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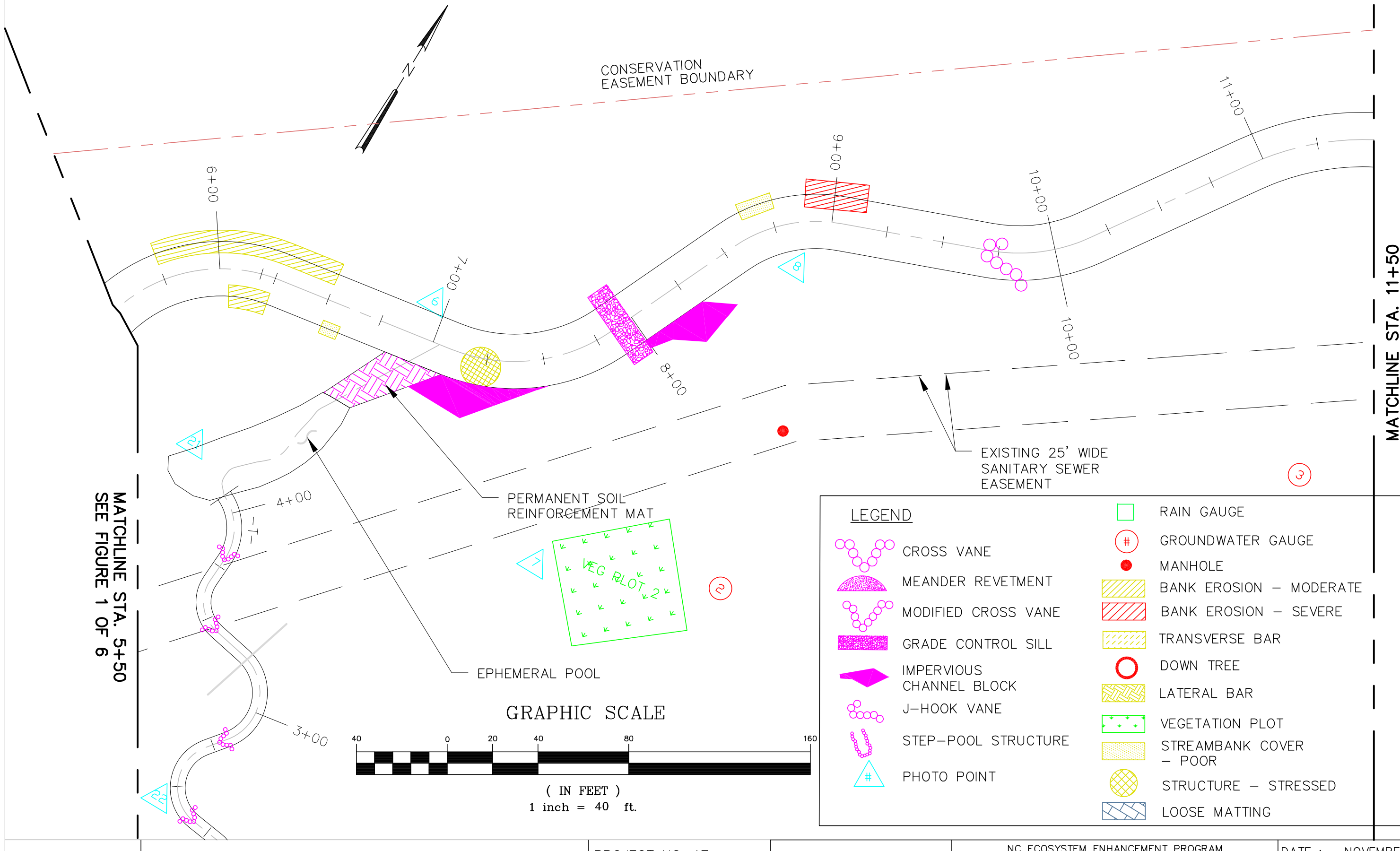

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Ecosystem Enhancement PROGRAM

NOTES:
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PROJECT NO. 17
MECKLENBURG COUNTY
NORTH CAROLINA
MONITORING
YEAR 2 of 5

JORDAN JONES & GOULDING

NC ECOSYSTEM ENHANCEMENT PROGRAM
BACK CREEK STREAM AND WETLAND RESTORATION

APPENDIX 4
CURRENT CONDITION PLAN VIEW

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

FIGURE 2 OF 6

MATCHLINE STA. 11+50
SEE FIGURE 2 OF 6

N

12+00

BOULDER TOE PROTECTION
STA. 12+50 TO 13+00

13+00

14+00

15+00

16+00

17+00

MATCHLINE STA. 17+25
SEE FIGURE 4 OF 6

AVOIDANCE AREA

VEG PLOT 3

SAFETY FENCE

EXISTING 15' WIDE SANITARY SEWER EASEMENT

CONSERVATION EASEMENT BOUNDARY

LEGEND

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

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

Ecosystem Enhancement PROGRAM

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

PROJECT NO. 17
MECKLENBURG COUNTY
NORTH CAROLINA
MONITORING
YEAR 2 of 5

JORDAN JONES & GOULDING

NC ECOSYSTEM ENHANCEMENT PROGRAM
BACK CREEK STREAM AND WETLAND RESTORATION

APPENDIX 4
CURRENT CONDITION PLAN VIEW

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

FIGURE 3 OF 6

LEGEND

- CROSS VANE
- MEANDER REVETMENT
- MODIFIED CROSS VANE
- GRADE CONTROL SILL
- IMPERVIOUS CHANNEL BLOCK
- J–HOOK VANE
- STEP–POOL STRUCTURE
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- DOWN TREE
- LATERAL BAR – MODERATE
- VEGETATION PLOT
- STREAMBANK COVER – POOR
- STRUCTURE – STRESSED
- LOOSE MATTING

N

I–485

CONSERVATION EASEMENT BOUNDARY

2+00 3+00 17+00 18+00 19+00 20+00 21+00 22+00 23+00 24+00

12 11 14

CONSTRUCTED SWALE WITH COIR FIBER MATTING STA. 19+10 RT

SAFETY FENCE

MATCHLINE STA. 17+25 SEE FIGURE 3 OF 6

MATCHLINE STA. 22+75 SEE FIGURE 5 OF 6

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)

1 inch = 40 ft.

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Ecosystem Enhancement PROGRAM

NOTES:
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PROJECT NO. 17
MECKLENBURG COUNTY
NORTH CAROLINA
MONITORING
YEAR 2 of 5

JORDAN JONES & GOULDING

NC ECOSYSTEM ENHANCEMENT PROGRAM
BACK CREEK STREAM AND WETLAND RESTORATION

APPENDIX 4
CURRENT CONDITION PLAN VIEW

DATE : NOVEMBER 2007
SCALE : 1"=40'
JOB NO.: 03060–001

FIGURE 4 OF 6

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

N

23+00

24+00

25+00

26+00

27+00

28+00

15

16

POTENTIAL DISPOSAL/
STOCKPILE AREA

FENCE

EXISTING 25' WIDE
SANITARY SEWER EASEMENT

EXISTING 128' WIDE
DUKE POWER COMPANY R/W

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
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- STRUCTURE - STRESSED
- LOOSE MATTING

Ecosystem Enhancement PROGRAM

NOTES:
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2. ALL LOCATIONS ARE APPROXIMATE.

PROJECT NO. 17
MECKLENBURG COUNTY
NORTH CAROLINA
MONITORING
YEAR 2 of 5

JORDAN JONES & GOULDING

NC ECOSYSTEM ENHANCEMENT PROGRAM
BACK CREEK STREAM AND WETLAND RESTORATION

APPENDIX 4
CURRENT CONDITION PLAN VIEW

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

FIGURE 5 OF 6

LEGEND

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

EXISTING 25' WIDE SANITARY SEWER EASEMENT

N

VEG PLOT A

29+00 30+00 31+00 32+00 33+00 34+00 35+00 36+00 37+00

17 18 19 20

MATCHLINE STA. 28+75
SEE FIGURE 5 OF 6

CONSERVATION EASEMENT BOUNDARY

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

NOTES:
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PROJECT NO. 17
MECKLENBURG COUNTY
NORTH CAROLINA
MONITORING
YEAR 2 of 5

Ecosystem Enhancement PROGRAM

JORDAN JONES & GOULDING

NC ECOSYSTEM ENHANCEMENT PROGRAM
BACK CREEK STREAM AND WETLAND RESTORATION

APPENDIX 4
CURRENT CONDITION PLAN VIEW

DATE : NOVEMBER 2007
SCALE : 1"=40'
JOB NO.: 03060–001

FIGURE 6 OF 6

The stream and its tributaries were restored by relocating the existing channel (Restoration, Priority 2) 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 Creek within 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 1.1). The relocated reaches and the restored in-place reaches were restored/enhanced using vegetation and in-stream stabilization structures, such as cross-vanes, J-hook vanes, and grade control sills. Bankfull benches were created along each reach to re-establish floodplain connection. 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 streambanks.

Table 1.1
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	P2	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	P2	400 lf	0+00 - 4+00	Channel restoration, relocation with use of grade control and bank protection structures.
Central Tributary	R	P2	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.