Lyle Creek Stream Restoration
Project No. 423
2007 Monitoring Report (Final): Year 5 of 5

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Ecosystem Enhancement Program

NCDENR

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EXECUTIVE SUMMARY

Executive Summary

The following goals for the Lyle Creek Stream Restoration Project were established through the North Carolina Ecosystem Enhancement Program (NCEEP).

1. Restore 2,067 feet of an unnamed tributary (UT) to Lyle Creek.
2. Enhance the riparian area by planting native species.
3. Exclude cattle access to the UT to Lyle Creek and 800 linear feet of a secondary unnamed tributary.

The Lyle Creek Stream Restoration Project consisted of restoring approximately 2,067 linear feet of an unnamed tributary to Lyle Creek by relocating approximately 1,137 linear feet of existing channel (Restoration, Priority 1) and restoring in-place (Restoration, Priority 2) approximately 930 linear feet of existing channel. The UT's riparian areas were planted with native bare root seedlings and herbaceous cover to enhance the riparian areas and stabilize streambanks. The adjacent field was fenced to exclude cattle access, but currently the adjacent land use does not include livestock. This report serves as the 5th year of the 5 year monitoring plan for the Lyle Creek Stream Restoration Site.

Results from the 2007 survey indicate the upper, in-place restoration (Reach 1) is maintaining lateral and vertical stability, but high sedimentation rates are evident. There are areas of moderate bank erosion and some signs of stress on one cross-vane within the reach, but no major stressors are apparent. Within Reach 2, bed migration has occurred within several riffles, shifting the coarser material immediately upstream of the pool. Typically the bend immediately downstream of these areas has experienced either moderate or in some cases severe bank erosion at some point during the 5-year monitoring period. Approximately 12% of reach 2 includes areas that have experienced instances of severe erosion at some point, with 4% exhibiting more moderate erosion. Based on visual observations over the last few years these areas have exhibited some advancement, but this has been minimal. The site includes a fair amount of existing mature vegetation such that a partial canopy exists and some of these mature trees are near the bank directly adjacent to these areas of instability. It appears that these prior adjustments that the channel has made have now slowed or equilibrated with the vegetation, because the advancement of the bank stability issues has been moderate. However, it is still possible that further adjustment or some chute cutoffs may occur in these areas, given the tight pattern that exists and some of the observed bed migration.

The overall success of the planted restoration zones is good. Live stakes (*Salix nigra* and *Cornus amomum*) and herbaceous species (*Carex* spp. and *Juncus* spp.) along the streambank are healthy and abundant. The riparian buffer is dominated by a thick herbaceous layer with numerous shrubs and saplings throughout. The survival rate for woody vegetation monitored for 2007 is 90%, which is up 3% from last year. This is most likely due to the resprouting of apparent dead saplings in 2006. An average of 14 planted stems per plot was recorded from the 2007 monitoring survey. The site density is approximately 560 planted stems per acre. The site has exceeded the vegetation success goal for monitoring year 5 (2007).

The natural recruitment woody stems recorded substantially exceeds the number of live planted stems per plot. There is an average of approximately 33 recruitment stems per plot. In total, approximately 47 woody stems per plot were recorded. A review of the planted and natural recruits monitored indicates a current site density of approximately 1,880 stems per acre.

In conclusion, reach 1 is functioning, but has experienced some fines input from above the project. Reach 2 has experienced failure of structures at the very bottom, some bank instability and some bed migration at points, but the bed migration issues have not apparently advanced significantly over the last few years.

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SECTION 1
PROJECT BACKGROUND

SECTION 1
PROJECT BACKGROUND

The background information provided in this report is referenced from previous reports conducted by EcoScience, Inc., North Carolina State University, and Soil and Environmental Consultants, PA.

1.1 Location and Setting

The Lyle Creek Mitigation Site was developed by the North Carolina Ecosystem Enhancement Program (NCEEP). The site is located in Catawba County, North Carolina immediately northwest of the intersection of Wyke Road and US-70 (Figure 1.1). The Lyle Creek Stream Restoration Project consisted of restoring approximately 2,067 linear feet of an unnamed tributary (UT) to Lyle Creek by relocating approximately 1,137 linear feet of existing channel (Restoration, Priority 1) and restoring, in-place (Restoration, Priority 2) approximately 930 linear feet of existing channel. The restored channel was designed and constructed as an E-channel. The project also included enhancing the associated riparian zone. The restoration project was completed in July 2002.

To access site from Interstate 40, take Exit 138 and turn south onto Wyke Road. Turn right onto Stagecoach Road. Continue on Stagecoach Road for approximately 1 mile, at which point the road will cross the UT to Lyle Creek. The restoration project is located approximately 1,000 feet downstream from Stagecoach Road.

1.2 Mitigation Structure and Objectives

The Lyle Creek stream restoration project was developed as a mitigation site through the NCEEP. The restoration site is located within the northeastern Piedmont region of the Catawba River Basin (HUC 3050101). Historically, the site was utilized for livestock grazing and agricultural hay production. Previous land uses, such as riparian vegetation removal, dredging and straightening, and livestock access contributed to the UT's degraded state. These activities were thought to have inhibited stream stability, producing an incised channel, with a headcut migration occurring through the site.

The following goals for the Lyle Creek Stream Restoration Project were established.

1. Restore 2,067 feet of an UT to Lyle Creek.
2. Enhance the riparian area by planting native species.
3. Exclude cattle access to the UT to Lyle Creek and 800 linear feet of a secondary unnamed tributary.

Restoring 2,067 linear feet of the UT to Lyle Creek was implemented by enhancing 930 linear feet and relocating 1,137 linear feet within a 12.4 acre plot of the UT to Lyle Creek (Table 1.1). The 930 linear feet of stream enhancement, noted as Reach 1 in this monitoring report, involved an in-place restoration approach. The reach was restored using vegetation and bank stabilization structures, such as single arm vanes, cross-vanes, j-hooks, and root wads. The restoration of 1,137 linear feet of the UT, noted as Reach 2 in this monitoring report, involved relocating the channel away from a previously straightened ditch. A sinuous, stable pattern, with riffle-pool bed features was constructed. Cross-vanes, j-hooks, and constructed riffles were installed to provide bank stabilization, habitat, and maintain grade control. On a second unnamed tributary to Lyle Creek, approximately 800 linear feet of stream preservation was included in the conservation easement.

The UT's riparian areas were planted with native bare root seedlings and herbaceous cover to enhance the riparian areas and stabilize streambanks. The adjacent field was fenced to exclude cattle access to the UT Reach 1 and 2 and the second UT (approximately 800 linear feet) to Lyle Creek.

Table 1.1
Project Mitigation Structure and Objectives
Lyle Creek/Project No. 423

Segment/Reach	Mitigation Type	Approach	Linear Feet	Stationing (ft)	Comments
Reach 1 UT to Lyle Creek	R	P2	930	0+00-9+30	Channel restoration, in-place with use of grade control and bank protection structures.
Reach 2 UT to Lyle Creek	R	P1	1,137	9+30-20+67	Channel restoration, relocation with use of grade control and bank protection structures.
2nd UT to Lyle Creek			800	N/A	Area included in conservation easement.

(EI=Enhancement Level I, R=Restoration, P=Preservation)

1.3 Project History and Background

The stream restoration was designed by EcoScience Corporation and constructed by North State Environmental. Construction activities were completed in 2002. Monitoring has been conducted annually from 2003 to present, with an as-built survey completed in late 2002/early 2003. This report serves as the 5th year of the 5 year monitoring plan for the Lyle Creek stream restoration site. 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
Lyle Creek/Project No. 423

Activity or Report	Data Collection Completed	Actual Completion or Delivery
Restoration Plan	N/A	N/A
Final Design-90%	N/A	N/A
Construction	2002	July 2002
Temporary S&E mix applied to entire project area*	2002	2002
Permanent seed mix applied to reach	2002	Fall 2002
Mitigation Plan/ As-Built (Year 0 Monitoring)	2002	February 2003
Year 1 Monitoring	November 2003	February 2004
Year 2 Monitoring	July 2004	February 2005
Year 3 Monitoring	December 2005	February 2006
Year 4 Monitoring	September 2006	November 2006
Year 5 Monitoring	August/September 2007	November 2007
*Seed and mulch is added as each section of construction is completed.		

Table 1.3
Project Contacts
Lyle Creek/Project No. 423

Designer	EcoScience Corporation 1101 Haynes Street, Suite 101 Raleigh, NC 27604
Contractor's Name	North State Environmental, Inc. 2889 Lowery St., Suite B Winston-Salem, NC 27101
Planting Contractor	Unknown
Seeding Contractor	Unknown
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
Lyle Creek/Project No. 423

Project County	Catawba County, North Carolina
Drainage Area	0.74 sq mi
Drainage impervious cover estimate	~10%
Stream Order	3rd
Physiographic Region	Piedmont
Ecoregion	Piedmont
Rosgen Classification of As-built	E
Cowardin Classification	N/A
Dominant soil types	Cecil-Chewacla
Reference Site ID	Unknown
USGS HUC for Project and Reference	3050101
NCDWQ Sub-basin for Project and Reference	03-08-32
NCDWQ classification for Project and Reference	WS-IV;CA
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?	0%

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 previously established within Reach 1 and 2. Approximately 1,800 linear feet of longitudinal profile were monitored. Three vegetation plots were previously established in Monitoring Year 2002 and four new vegetation plots were established by JJG in Monitoring Year 2006. The new plots were established in accordance with CVS-EEP for recording vegetation protocol (2006). Photographs were taken upstream and downstream at each cross-section and at existing photo point stations.

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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 5 of 5) survey completed in August, 2007.

2.1 Vegetation Assessment

Planted zones related to the stream restoration consist of the streambank and the buffer area adjacent to the stream. The riparian zone begins at the top of bank and proceeds perpendicular to the stream for an average distance of 50 feet. The planted streambank initiates at base flow elevation and extends to the top of bank. The overall success of these two particular planted zones is good. Live stakes (*Salix nigra* and *Cornus amomum*) and herbaceous species (*Carex* spp. and *Juncus* spp.) along the streambank are healthy and abundant. The riparian buffer is dominated by a thick herbaceous layer with numerous shrubs and saplings throughout. Natural recruitment vegetation appears to be dominant. This is likely due to the undisturbed forested areas along the right bank of the restoration area causing regeneration of trees.

There were three vegetation plots established by EcoScience in 2002. In addition, four new plots were established by JJG in 2006. The plots established by JJG were randomly selected and monitored per the 2006 CVS-EEP protocol (Lee et al., 2006). The three previously established plots were also monitored per the new protocol. Planted stems must represent 30% of the stems per acre total. Please refer to Appendix 1 for the vegetative survey data table and monitoring plot photos and Figure 2.1 for the location of the vegetation plots.

2.1.1 Soil Data

Lyle Creek is situated within a narrow ridge and valley within 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 disturbed the parent soil.

Review of the North Carolina Soil datamart indicates that three soil series are found within the project limits (Figure 2.1). These soil series consist of Chewacla (*Hydric Soil of the United States*), Cecil, and Hiawasee. Chewacla soils are generally found along stream corridors. These soils are formed from fine alluvial material and are somewhat poorly drained within the project area. Cecil soils are also found in areas adjacent to the stream. However, these soils are not as prevalent as Chewacla. The Cecil soils within the project area are formed from fine alluvial material and are somewhat poorly drained. The Hiawasee series is generally found on high stream terraces. The undisturbed forested slopes and the surrounding upland consist of this soil type.

2.1.2 Vegetative Current Condition

During the initial assessment conducted by JJG in March 2007 (Year 5) as well as the vegetative survey conducted in September 2007, it was noted that some areas of streambank suffered localized loss of vegetative cover. In these areas, it was evident that flood events may have caused the bank erosion and the resulting loss of vegetation. Problem areas associated with the riparian buffer zone were also observed. Most notable was the abundance of invasive species such as *Rubus argutus*, *Rosa multiflora*, *Ligustrum sinense*, and *Microstegium virmineum*. In comparison to monitoring year 2006, some problem areas noted in monitoring year 2007 have become worse. Please refer to Appendix 1 for more details on vegetative current condition and photos.

2.1.3 Vegetative Current Condition Plan View

Please refer to Appendix 3 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 vegetative assessment and vegetative plot analysis on September 24, 2007 and September 25, 2007 per the 2006 CVS-EEP protocol (Lee et al., 2006). Seven plots were surveyed, three of these were previously established by EcoScience in 2002 and four were newly established plots by JJG in 2006. The vegetative plots established on site were selected randomly and represent the riparian buffer zone.

Trees planted within the plots monitored include overcup oak species (*Quercus lyrata*), river birch (*Betula nigra*), American sycamore (*Platanus occidentalis*), green ash (*Fraxinus pennsylvanica*), black willow (*Salix nigra*), and silky dogwood (*Cornus amomum*). In addition, natural recruitment vegetation was also monitored within these plots. Species encountered were tulip poplar (*Liriodendron tulipifera*), sweet gum (*Liquidambar styraciflua*), tag alder (*Alnus serrulata*), black gum (*Nyssa sylvatica*), Eastern red cedar (*Juniperus virginana*), oak species (*Quercus* spp.), and species that were originally planted. Please refer to Appendix 1.1 for a summary of stem counts.

The survival rate for the woody vegetation monitored for 2007 is 90% which is up 3% from last year. This is most likely due to the resprouting of apparent dead saplings in 2006. At this stage in the project and vegetation development, JJG is unable to clearly determine which stems were planted and which stems could be natural recruitment. This is also true for the newly established plots (4, 5, 6, and 7). JJG decided to measure the largest trees as the planted specimens and recorded the smaller stems as natural recruitment. The monitoring data recorded an average of 14 planted stems per plot. The site density is approximately 560 planted stems per acre, which exceeds the year 4 goal of 260 planted stems per acre. Furthermore, the natural recruitment woody stems recorded substantially increases the number of live stems per plot. There is an average of approximately 40 recruitment stems per plot. In total, approximately 50 woody stems per plot were recorded. A review of the planted and natural recruits monitored indicates a current site density of approximately 2,000 stems per acre.

The site density was calculated by dividing the average number of stems by the plot size (0.025 ac). All plots for this project were NCEEP standard of 10m X 10m (100 sq. m).

In conclusion, the vegetation throughout the stream and riparian restoration project meets the success requirements. Although some loss of streambank vegetation has occurred, the overall growth of the riparian buffer is good. Per the success criterion for the 2007 monitoring year, the site has exceeded 260 stems per acre.

2.1.5 Vegetation Plot Photos

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

2.2 Stream Assessment

Stream dimension, pattern, profile and substrate were evaluated within 2,067 linear feet of the stream restoration site. The stream assessment included walking the entire stream reach and monitoring 1,800 linear feet of longitudinal profile and seven pre-established cross-sections. Please refer to Table 2.1 and Appendix 2 for the stability assessment, stream photographs, and raw data, Table 2.2 for the baseline morphology and hydraulic as-built summary, Table 2.3 for monitoring years 2003-2007 morphology and hydraulic summary, and Appendix 3 for the current condition plan view map.

2.2.1 Stream Current Condition Plan View

Please refer to Appendix 3 for the current condition plan view map.

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

The upstream section (Reach 1) of the project consists of Enhancement Level I. The overall pattern, profile, and dimensions of this section appear stable with some isolated signs of moderate erosion and heavy sediment deposition. The downstream section (Reach 2) of the project that was relocated (Restoration) is showing localized signs of instability. A general overview is provided below.

Due to the nature of the previous monitoring year's data provided by and to JJG, the longitudinal profile plot provided for the 2007 monitoring year overlays monitoring years 2004 (year 2 of 5) and 2007 (year 5 of 5). The 2004 monitoring survey was the only data provided that could be used in AutoCAD/LDD to accurately represent the changes in streambed morphology within the Lyle Creek stream restoration site.

Reach 1: Restored Channel In-Place: Restoration, P2

There are areas of moderate erosion associated with the outer bank of tight meander bends within Reach 1; however, these banks still appear to be stable. There are two areas of severe erosion, bank instability, and poor bank protection near the upstream (approximate stationing 0+25) and downstream (approximate stationing 5+75) end of this section. Some of the cross-vanes have moderate bank scour around the arms, where they tie into the bankfull elevation. There are two structures that have water piping through the structure (approximate stationing 3+25 and 5+60). The reach is experiencing a high sedimentation rate, which has deposited sediment in the majority of pools. Several lateral and mid channel bars are forming downstream of cross-vanes (approximate stationing 1+00, 1+60, 4+00, 4+45, and 7+45).

Cross-sections 1, 2 and 3 are located within Reach 1. Cross-section 1 is a pool that was previously filling in and then in the 2006 survey, it had scoured out the sediment and deepened. Since then, the pool has filled in with sediment; thereby, decreasing the max depth and increasing the width to depth ratio. Cross-section 2 is a riffle and cross-section 3 is a pool. Both have shown a slight decrease in bankfull width, which has decreased the width to depth ratio. The reach appears to be maintaining stability with stable structures and minimal bank erosion; however, both the d50 and d84 from the surveyed riffle cross-sections have fluctuated over the monitoring years. In comparison to the 2006 survey, the d50 appears to be increasing in substrate size, whereas the d84 has decreased. Overall, there appears to be an increase in sand deposition throughout Reach 1. The area immediately upstream of Reach 1 is showing signs of bank erosion and instability, which is most likely the source of the sedimentation and fining occurring within Reach 1.

Reach 1 is illustrating minor shifts in the longitudinal profile, but appears to be maintaining a stable pattern. Pool lengths are decreasing and pool to pool spacing is increasing; whereas, riffle lengths and slopes are both increasing. This shift in the profile could be a result from the high sediment deposition occurring within Reach 1. Although profile measurements indicate a shift in values, no significant changes were observed that indicate vertical or lateral instability is occurring within Reach 1.

Reach 2: Relocated Channel: Restoration, P1

Within the 5 year monitoring period, bed migration has occurred in several riffles, shifting the coarser material immediately upstream of the pool. Typically the bend immediately downstream of these areas has experienced either moderate or in some cases severe bank erosion at some point during the 5-year monitoring period. Approximately 12% of reach 2 includes areas that have experienced instances of severe erosion at some point, with 4% exhibiting more moderate

erosion. Based on visual observations over the last few years these areas have exhibited some advancement, but this has been minimal. The site includes a fair amount of existing mature vegetation such that a partial canopy exists and some of these mature trees are near the bank directly adjacent to these areas of instability. It appears that these prior adjustments that the channel has made have now slowed or equilibrated with the vegetation, because the advancement of the bank stability issues has been moderate. However, it is still possible that further adjustment or some chute cutoffs may occur in these areas, given the tight pattern that exists and some of the observed bed migration.

Severe shifts in bed features and structural failure are occurring primarily within the lower 200-300 linear feet of the reach. For most cross-vanes, the stress or failure is associated with only one vane arm. The riffle sill located approximately 150 feet above the downstream end of the project is stable. There are three cross-vanes upstream of the confluence with an unnamed tributary of Lyle Creek at the end of the project (approximate stationing 18+30, 18+60, and 19+25). The stress and failure level of these structures increase as the stream elevation decreases to meet the elevation of the confluence point. The most downstream structure has completely failed; the stream flows around the right arm as well as through the invert.

Reach 2 includes cross-sections 4, 5, 6, and 7. Cross-section 4 is a riffle, which appears to have overwidened and is continuing to build an innerberm bench. Cross-section 5 is a riffle, which appears to be shifting, becoming more narrow and deep. In comparison to the 2006 survey, the cross-section has increased it's maximum depth, therefore decreasing its width to depth ratio. Cross-section 6 is a pool that previously downcut and then aggraded in 2006. Since then, the cross-section has illustrated no significant changes in its channel dimensions. Cross-section 7 is a pool that previously had an undercut bank in the earlier monitoring years. This year's survey (MY-2007) indicates that the left bank has failed and the stream thalweg shifted to the left approximately 1.5 feet. This pool also shifted in 2005 approximately 3 feet from previous survey stations. The width to depth ratio has increased, which is likely due to the increase in bankfull width. Cross-Sections 5 and 6 illustrated the most significant changes in substrate composition within Reach 2. There was an increase in sand deposition, which decreased the d50 and d84 for both cross-sections. This is most likely due to in-stream bank erosion and bed feature shifting occurring within Reach 2.

Profile and pattern measurements illustrate a shift in values that indicate the channel's pattern has changed over the 5 year monitoring period. Pool lengths have increased and pool to pool spacing has decreased; whereas, riffle lengths have decreased and slopes have increased.

In summary, Reach 1 is functioning with no major stressors apparent, but has experienced some fines input from above the project. Reach 2 has experienced failure of structures at the very bottom, some bank instability and some bed migration at points, but the bed migration issues have not apparently advanced significantly over the last few years.

Please refer to Tables 2.1, 2.2, and 2.3, and Appendices 2 and 3 for detailed stream assessment results.

Table 2.1
Categorical Stream Feature Visual Stability Assessment
Lyle Creek/Project No. 423

Reach 1						
Feature	**As-Built (2002)**	**MY1 (2003)**	**MY2 (2004)**	**MY3 (2005)**	**MY4 (2006)**	**MY5 (2007)**
A. Riffles	-	-	-	36%	97.90%	75%
B. Pools	-	-	-	92%	87.50%	96%
C. Thalweg	-	-	-	92%	100%	100%
D. Meanders	-	-	-	67%	93.30%	88%
E. Bed General	-	-	-	86%	93.70%	93%
F. Vanes/J Hooks, etc	-	-	-	89%	94.50%	78%
G. Wads and Boulders	-	-	-	N/A	-	-
H. Bank Performance	-	-	-	-	88.60%	96%
Reach 2						
Feature	**As-Built (2002)**	**MY1 (2003)**	**MY2 (2004)**	**MY3 (2005)**	**MY4 (2006)**	**MY5 (2007)**
A. Riffles	-	-	-	36%	62.50%	75%
B. Pools	-	-	-	92%	91.65%	98%
C. Thalweg	-	-	-	92%	50%	100%
D. Meanders	-	-	-	67%	46.70%	71%
E. Bed General	-	-	-	86%	97.43%	95%
F. Vanes/J Hooks, etc	-	-	-	89%	35.80%	31%
G. Wads and Boulders	-	-	-	N/A	-	-
H. Bank Performance	-	-	-	-	72.60%	83%

(MY3 data represents data for the entire Reach, and cells noted with a (-), data was not provided).

2.2.6 Quantitative Measures Tables

Tables 2.2 and 2.3 display morphological summary data from all monitoring years. The as-built data provided in the previous monitoring reports was not accurately reported between years; therefore, JJG referenced regional curves to verify cross-sectional area to determine which data set to report. The as-built data provided in Table 2.2 is from the North Carolina State University 2003 monitoring report. Refer to Appendix 2 for morphological data and plots.

Table 2.2
Baseline Morphology and Hydraulic As-Built Summary
Lyle Creek/Project No. 423

																As-Built					
	USGS Gage Data			Regional Curve Interval			Pre-Existing Condition			Project Reference Stream			Design			Reach 1			Reach 2		
DIMENSION	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Bankfull Width (ft)																11.8	16.3	13.2	10.7	12.8	11.0
Floodprone Width (ft)																	-			-	
Bankfull Cross-sectional Area																15.6	20.8	16.5	15.2	19.6	17.2
Bankfull Mean Depth																1.2	1.4	1.3	1.4	1.6	1.6
Bankfull Max Depth		-			-			-			-			-		2.2	3.1	2.2	2.2	2.8	2.6
Width/Depth Ratio																9.8	11.6	10.2	7.6	8.0	7.1
Entrenchment Ratio																					
Wetted Perimeter (ft)																	-			-	
Hydraulic Radius (ft)																					
Bank Height Ratio																	1.0			1.0	
PATTERN																					
Channel Beltwidth (ft)																33	141	88			
Radius of Curvature (ft)		-			-			-			-			-		14.9	37.5	22.4		-	
Meander Wave Length (ft)																33	114	63			
Meander Width Ratio																	-				
PROFILE																					
Riffle Length (ft)																	-				
Riffle Slope (ft/ft)		-			-			-			-			-		0.0000	0.0364	0.0141		-	
Pool Length (ft)																14	64	27			
Pool to Pool Spacing (ft)																22	161	54			
SUBSTRATE																					
D50 (mm)		-			-			-			0			-			0.09 - 0.19			0.09 - 0.19	
D85 (mm)																	0.52 - 15.91			0.52 - 15.91	

ADDITIONAL REACH PARAMETERS	**USGS Gage Data**	**Regional Curve Interval**	**Pre-Existing Condition**	**Project Reference Stream**	**Design**	**As-Built**
Valley Length (ft)	-	-	-	-	-	-
Channel Length (ft)	-	-	-	-	-	-
Sinuosity	-	-	-	-	-	-
Water Surface Slope (ft/ft)	-	-	-	-	-	-
Bankfull Slope (ft/ft)	-	-	-	-	-	-
Rosgen Classification	-	-	-	-	-	-

Cells noted with a (-), data was not provided
*Ranges provided for the as-built dimension, pattern and profile were provided from the previous North Carolina State University monitoring reports from both pool and riffle cross-sections

Table 2.3
Morphology and Hydraulic Monitoring Summary
Lyle Creek/Project No. 423

	Reach 1 (In Place Restoration)														
DIMENSION	Cross-Section #1-Pool					Cross-Section #2-Riffle					Cross-Section #3-Pool				
	2003	**2004**	**2005**	**2006**	**2007**	**2003**	**2004**	**2005**	**2006**	**2007**	**2003**	**2004**	**2005**	**2006**	**2007**
Bankfull Width (ft)	16.50	13.70	18.16	17.60	18.39	18.60	18.60	12.79	19.83	14.68	16.20	17.10	14.28	17.60	15.73
Floodprone Width (ft)	N/A	N/A	50.00	N/A	N/A	N/A	N/A	50.00	>100	>100	N/A	N/A	50.00	N/A	N/A
Bankfull Cross-sectional Area	14.10	12.50	21.09	18.94	18.24	28.07	30.00	13.44	29.19	20.45	26.08	27.40	13.65	26.43	22.58
Bankfull Mean Depth	0.90	0.90	1.16	1.08	0.99	1.50	1.60	1.05	1.47	1.39	1.60	1.60	0.96	1.50	1.44
Bankfull Max Depth	1.70	1.40	1.97	2.44	2.04	2.40	2.40	1.45	2.65	2.55	2.00	2.00	1.63	2.55	2.43
Width/Depth Ratio	18.33	15.22	15.64	16.30	18.58	12.40	11.63	12.16	13.49	10.56	10.13	10.69	14.94	11.73	10.92
Entrenchment Ratio	N/A	N/A	2.75	N/A	N/A	-	-	3.91	>2.2	>2.2	N/A	N/A	3.50	N/A	>2.2
Wetted Perimeter (ft)	N/A	N/A	19.02	19.17	19.93	-	-	13.48	21.19	16.44	N/A	N/A	14.96	19.37	18.03
Hydraulic Radius (ft)	N/A	N/A	1.11	0.99	0.91	-	-	1.00	1.36	1.24	N/A	N/A	0.91	1.36	1.25
Bank Height Ratio	-	-	-	1.00	1.00	-	-	-	1.00	1.00	-	-	-	1.00	1.00
SUBSTRATE															
D50 (mm)	0.29	0.33	N/A	0.13	0.24	0.29	0.07	N/A	0.18	0.29	0.45	0.08	N/A	0.12	0.26
D84 (mm)	0.76	0.66	N/A	0.83	0.57	13.33	0.31	N/A	0.83	0.56	1.01	0.40	N/A	2.00	1.20
PROFILE															
Riffle Length (ft)	9	68	21	9	68	21	*	*	*	1.00	33.00	8.75	5.75	18.08	6.89
Riffle Slope (ft/ft)	0.0017	0.0474	0.0212	0.0017	0.0474	0.0212	*	*	*	0.00	0.08	0.01	0.0133	0.0841	0.0371
Pool Length (ft)	11	49	27	11	49	27	*	*	*	7.00	68.40	17.00	4.43	37.18	24.31
Pool to Pool Spacing (ft)	28	140	66	28	140	66	*	*	*	11.60	84.75	36.50	20.35	101.64	42.94

*2005 Survey did not break up stream into separate types of restoration reaches (Reach 1: Inplace Restoration and Reach 2: Relocated Restoration)
Cells noted with a (-), data was not provided
Cells noted with a (N/A), data was not applicable

Table 2.3 cont.
Morphology and Hydraulic Monitoring Summary
Lyle Creek/Project No. 423

	Reach 2 (Relocation Restoration)																			
DIMENSION	**Cross-Section #4-Riffle**					**Cross-Section #5-Riffle**					**Cross-Section #6-Pool**					**Cross-Section #7-Pool**				
	2003	**2004**	**2005**	**2006**	**2007**	**2003**	**2004**	**2005**	**2006**	**2007**	**2003**	**2004**	**2005**	**2006**	**2007**	**2003**	**2004**	**2005**	**2006**	**2007**
Bankfull Width (ft)	10.80	10.80	9.67	12.00	17.38	13.90	13.80	11.95	14.80	14.78	13.50	15.70	14.65	17.50	15.87	11.20	9.00	11.02	13.94	15.48
Floodprone Width (ft)	-	-	50.00	>100	>100	-	-	50.00	>100	>100	N/A	N/A	50.00	N/A	N/A	N/A	N/A	50.00	N/A	N/A
Bankfull Cross-sectional Area	17.76	17.00	13.51	16.38	19.39	20.73	25.20	13.77	20.45	21.26	27.31	28.50	21.65	25.72	24.54	16.20	18.90	13.66	22.70	20.09
Bankfull Mean Depth	1.60	1.60	1.40	1.36	1.12	1.50	1.80	1.15	1.40	1.44	2.00	1.80	1.48	1.47	1.55	1.40	2.10	1.24	1.63	1.3
Bankfull Max Depth	2.60	2.80	2.31	2.66	2.87	2.60	2.50	1.81	2.57	2.89	2.70	2.90	2.34	2.63	2.53	2.10	2.40	1.93	2.51	2.5
Width/Depth Ratio	6.75	6.75	6.92	8.82	15.52	9.27	7.67	10.37	10.72	10.26	6.75	8.72	9.91	11.90	10.24	8.00	4.29	8.89	8.55	11.91
Entrenchment Ratio	-	-	5.17	>2.2	>2.2	-	-	4.18	>2.2	>2.2	N/A	N/A	3.41	N/A	N/A	N/A	N/A	4.54	N/A	N/A
Wetted Perimeter (ft)	-	-	11.01	13.63	19.41	-	-	12.84	16.34	16.54	N/A	N/A	15.70	18.79	16.98	N/A	N/A	12.82	17.87	17.92
Hydraulic Radius (ft)	-	-	1.23	1.20	1.00	-	-	1.07	1.25	1.29	N/A	N/A	1.38	1.37	1.45	N/A	N/A	1.07	1.27	1.12
Bank Height Ratio	-	-	-	1.00	1.00	-	-	-	1.00	1.00	-	-	-	1.00	1.00	-	-	-	1.00	1.00
SUBSTRATE																				
D50 (mm)	0.11	0.33	-	0.12	0.23	0.33	1.05	-	28.64	0.23	0.71	0.26	N/A	14.43	1.00	0.34	0.41	N/A	0.10	0.29
D84 (mm)	3.11	79.40	-	38.50	27.30	17.52	8.64	-	64.00	17.10	31.78	19.80	N/A	54.50	38.50	3.00	0.71	N/A	0.23	0.76

	Reach 2 (Relocation Restoration)															
PROFILE																
Riffle Length (ft)	7	39	17	7	28	15	-	-	-	3	38	16	2	25	9	
Riffle Slope (ft/ft)	0.0056	0.0494	0.0171	0.0065	0.0480	0.0210	0.0000	0.1000	0.0300	0.0000	0.0572	0.0137	0.0066	0.0686	0.0324	
Pool Length (ft)	9	41	23	9	41	23	12	79	32	2	56	18	10	85	24	
Pool to Pool Spacing (ft)	27	176	46	31	92	43	12	153	70	17	211	56	14	150	59	

*2005 Survey did not break up stream into separate types of restoration reaches (Reach 1: Inplace Restoration and Reach 2: Relocated Restoration)
Cells noted with a (-), data was not provided
Cells noted with a (N/A), data was not applicable

Table 2.3 cont.
Morphology and Hydraulic Monitoring Summary
Lyle Creek/Project No. 423

ADDITIONAL REACH PARAMETERS	2003	2004	2005	2006		2007	
				Reach 1	Reach 2	Reach 1	Reach 2
Valley Length (ft)	N/A	N/A	1337	1337		1337	
Channel Length (ft)	N/A	N/A	1940	1940		1940	
Sinuosity	N/A	N/A	1.45	1.45		1.45	
Water Surface Slope (ft/ft)	N/A	N/A	Not Reported	0.0067	0.0081	0.0069	0.0091
Bankfull Slope (ft/ft)	N/A	N/A	0.01	0.0060	0.0075	0.0068	0.0081
Rosgen Classification	N/A	N/A	C4	C4		C4	

2.2.7 Hydrologic Criteria

A crest gauge was installed upstream of cross-section 4 in the 2006 monitoring year. The table below is verification that one bankfull or greater event occurred within the Lyle Creek restoration project in 2007. Other indicators such as old wrack lines and staining were observed at the bankfull and greater elevations within the restoration site as well. According to the NCEEP requirements listed in the monitoring template (Version 1.2, 11/16/2006), a project's monitoring is complete when at least two bankfull events or greater have occurred within two separate monitoring years. This project has met the minimum hydrologic requirements to conclude monitoring.

Table 2.4 Verification of Bankfull Events
Lyle Creek/Project No. 423

Date of Collection	Date of Occurrence	Method	Photo # (if available)
11/24/06	Unknown	Crest Gauge	N/A
8/22/2007	Unknown	Crest Gauge	N/A

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SECTION 3
METHODOLOGY

SECTION 3
METHODOLOGY

3.1 Methodology

Methods employed for the Lyle 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 performed following the Carolina Vegetation Survey-NCEEP Protocol (Lee et al., 2006). 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.

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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.

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

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

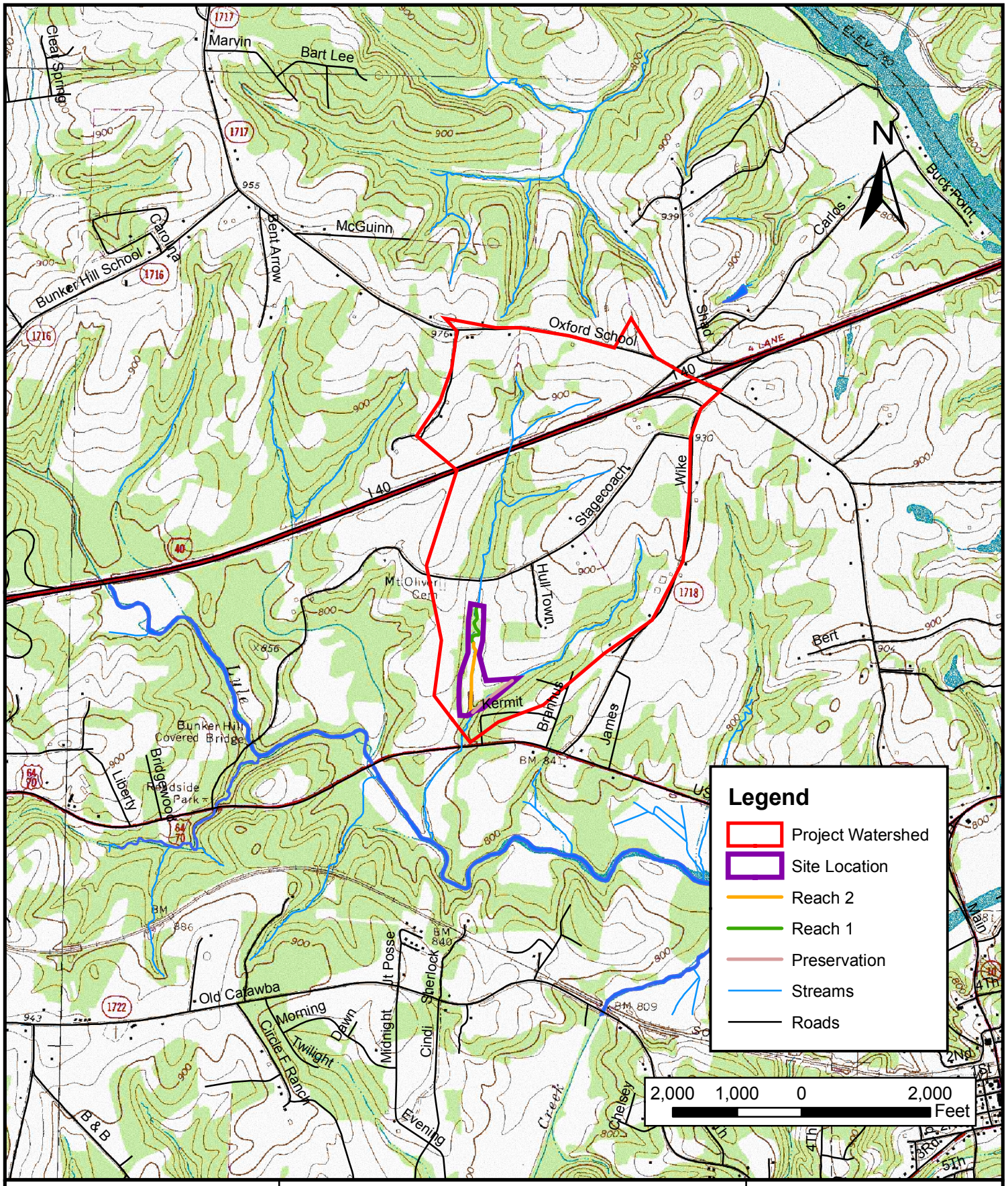
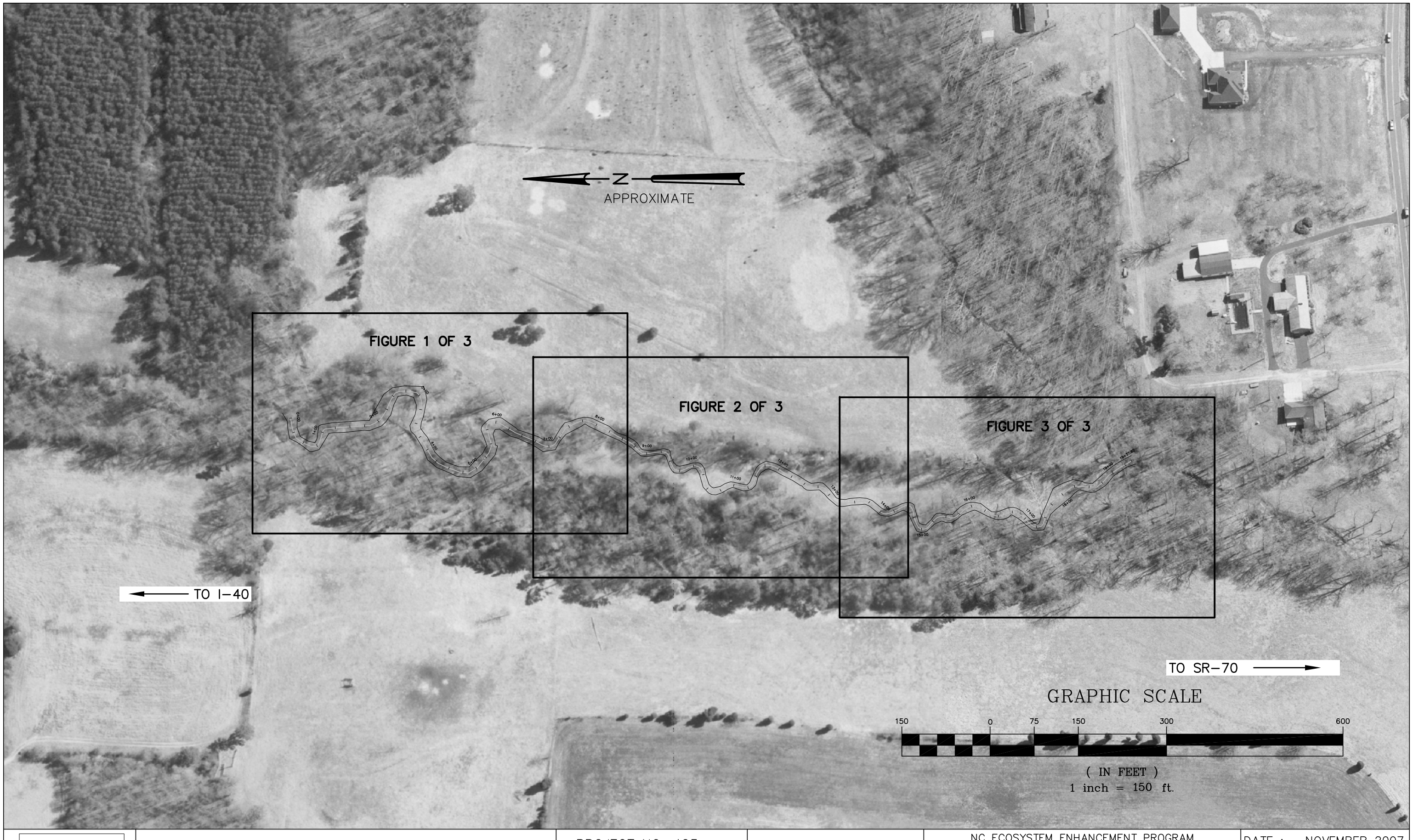


Figure 1.1 Project Location and Watershed Map
Lyle Creek Stream Restoration
Catawba County, NC
Monitoring Report Year 5 of 5

Project No. 423
February 2008



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

PROJECT NO. 423
CATAWBA COUNTY
NORTH CAROLINA
MONITORING
YEAR 5 of 5

JORDAN JONES & GOULDING

NC ECOSYSTEM ENHANCEMENT PROGRAM
LYLE CREEK STREAM RESTORATION

FIGURE 1.2
MONITORING PLAN VIEW MAP

DATE : NOVEMBER 2007
SCALE : 1"=150'
JOB NO.: 03060-001

FIGURE KEY

P:\03\03060\001\DWG\2006-11-16 Plan View\NC1001CSP4.dwg, 10/25/2007 8:55:13 AM

N
APPROXIMATE

LEGEND

CHANNEL CENTERLINE

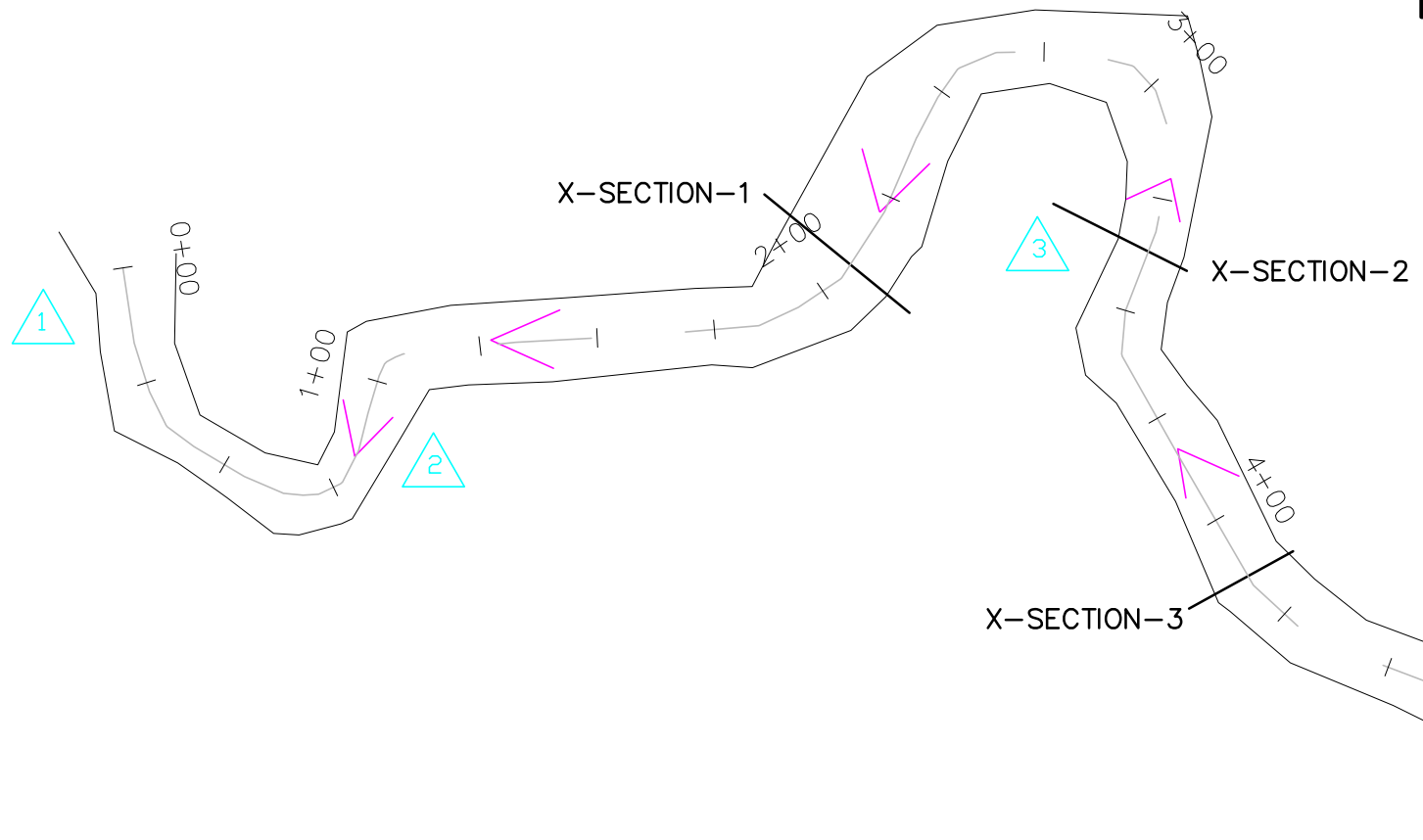
BANK FULL

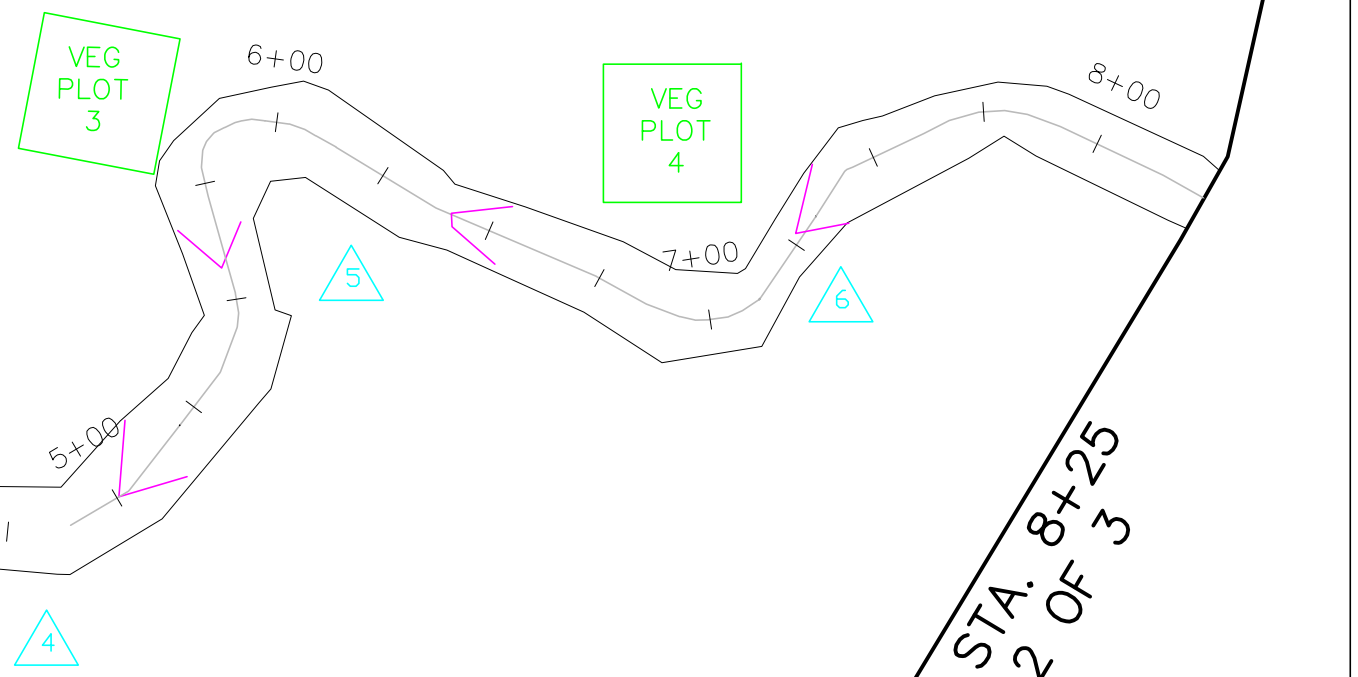
PHOTO POINT

CROSS VANE (CRSV)

J-HOOK VANE (JHV)

VEGETATION PLOT





MATCHLINE STA. 8+25
SEE FIGURE 2 OF 3

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. 423
CATAWBA COUNTY
NORTH CAROLINA
MONITORING
YEAR 5 of 5

JORDAN JONES & GOULDING

NC ECOSYSTEM ENHANCEMENT PROGRAM
LYLE CREEK STREAM RESTORATION

FIGURE 1.2
MONITORING PLAN VIEW MAP

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

FIGURE 1 OF 3

P:\03\03060\001\DWG\20006-11-16 Plan View\NC1001CS01.dwg, 10/25/2007 8:51:13 AM

N
APPROXIMATE

LEGEND

- CHANNEL CENTERLINE
- BANK FULL
- PHOTO POINT (#)
- CROSS VANE (CRSV)
- J-HOOK VANE (JHV)
- VEGETATION PLOT (VEG PLOT #)

VEG PLOT 5

VEG PLOT 2

9+00

10+00

7

12+00

X-SECTION-4
11+00

X-SECTION-6

8

X-SECTION-5

13+00

9

MATCHLINE STA. 8+25
SEE FIGURE 1 OF 3

MATCHLINE STA. 13+75
SEE FIGURE 3 OF 3

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. 423
CATAWBA COUNTY
NORTH CAROLINA
MONITORING
YEAR 5 of 5

JORDAN JONES & GOULDING

NC ECOSYSTEM ENHANCEMENT PROGRAM
LYLE CREEK STREAM RESTORATION

FIGURE 1.2
MONITORING PLAN VIEW MAP

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

FIGURE 2 OF 3

MATCHLINE STA. 13+75 SEE FIGURE 2 OF 3

N
APPROXIMATE

X-SECTION-7

14+00

VEG PLOT 1

16+00

10

15+00

17+00

11

18+00

VEG PLOT 6

VEG PLOT 7

12

19+00

19+37.82

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

LEGEND

- CHANNEL CENTERLINE
- BANK FULL
- # PHOTO POINT
- CROSS VANE (CRSV)
- J-HOOK VANE (JHV)
- VEG PLOT # VEGITATION PLOT

Ecosystem Enhancement PROGRAM

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

PROJECT NO. 423
CATAWBA COUNTY
NORTH CAROLINA
MONITORING
YEAR 5 of 5

JORDAN JONES & GOULDING

NC ECOSYSTEM ENHANCEMENT PROGRAM
LYLE CREEK STREAM RESTORATION

FIGURE 1.2
MONITORING PLAN VIEW MAP

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

FIGURE 3 OF 3

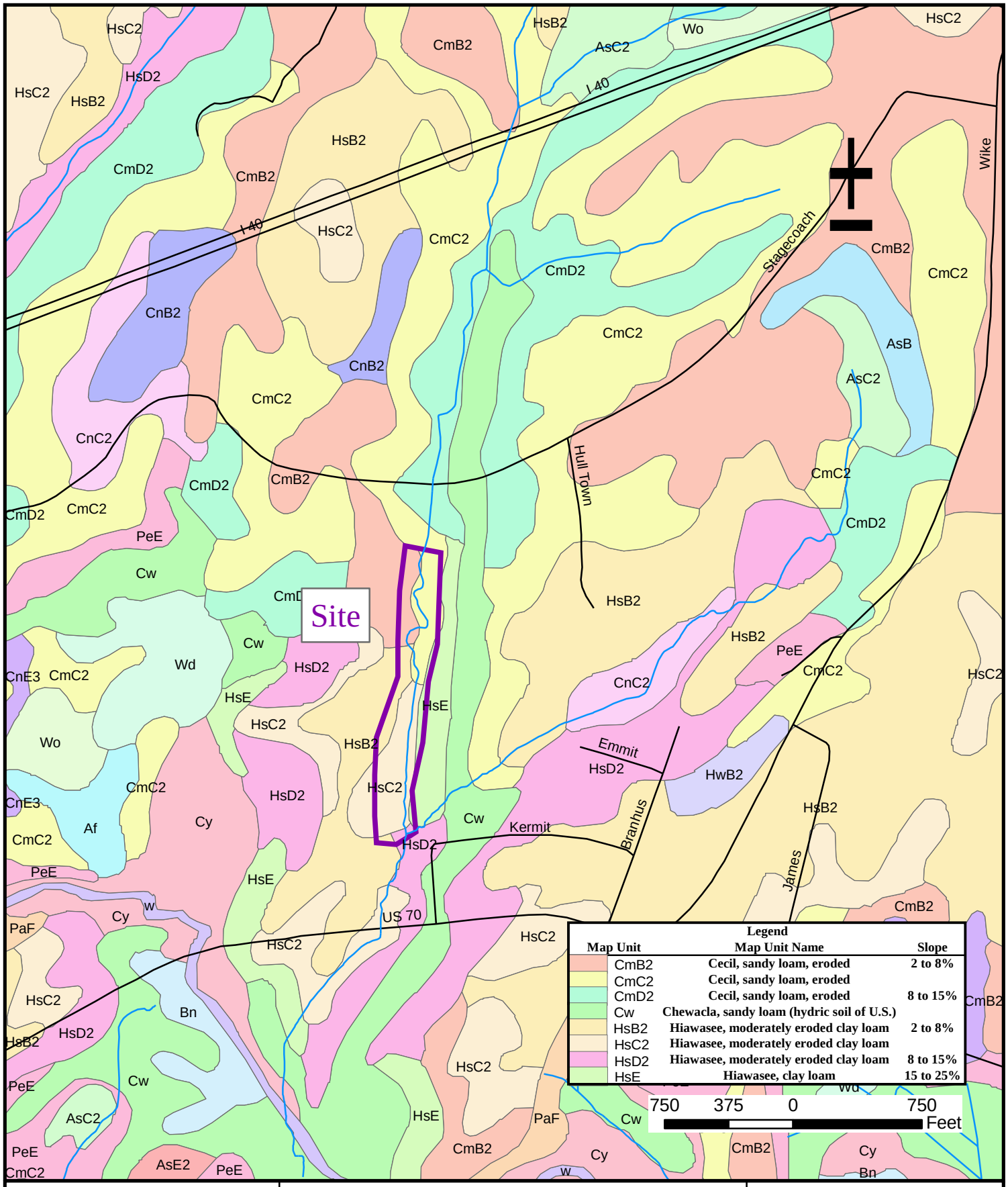


Figure 2.1 Soil Map
Lyle Creek Stream Restoration
Catawba County, NC
Monitoring Report Year 5 of 5

Project No.423
November 2007

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SECTION 6
APPENDICES

Appendix 1 - Vegetation Raw Data

Appendix 2 - Geomorphic and Stream Stability Data

Appendix 3 – Integrated Current Condition Plan View

Click on the Desired Link Below

Appendix 1
(Veg. Data & Photos)

Appendix 2
(Stream Data & Photos)

Appendix 3
(Problem Area 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.

Table 1. Vegetation Metadata

Report Prepared By	Rhett Baggett and Ben Fox
Date Prepared	9/28/2007 11:42
database name	JJG-2007-A-LyleCreek-VMD-v201.mdb
database location	P:\03\03060\001\Lyle Creek\Report-DRAFT\MY-2007\CVS-EEP Veg Monitoring
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	This worksheet, which is a summary of the project and the project data.
Plots	List of plots surveyed.
Vigor	Frequency distribution of vigor classes.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Stem Count by Plot and Spp	Count of living stems of each species for each plot; dead and missing stems are excluded.
PROJECT SUMMARY----------	
Project Code	102
project Name	Lyle Creek
Description	Stream and Riparian Zone Restoration
length(ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	14

Table 2. Vegetation Vigor by Species

	Species	4	3	2	1	0	Missing
	Alnus serrulata						
	Betula nigra	38	1	7			
	Cornus amomum						
	Cornus florida						
	Diospyros virginiana						
	Fraxinus pennsylvanica	7	1				
	Liquidambar styraciflua						
	Nyssa aquatica						
	Nyssa sylvatica	1	2				
	Quercus falcata						
	Quercus lyrata	1					
	Salix nigra	7	1	1			
	Sambucus canadensis						
	Ulmus alata						
	Juniperus virginiana						
	Carya						
	Carya glabra						
	Liriodendron tulipifera						
	Platanus occidentalis	13	1	2			
	Populus deltoides						
	Acer negundo						
	Acer rubrum	2	1	2	1		
	Ulmus americana	1	1				
TOTAL:	**23**	**70**	**8**	**12**	**1**		

Table 3. Vegetation Damage by Species

	Species	All Damage Categories	(no damage)	Diseased	(other damage)
	Acer negundo	2	2		
	Acer rubrum	15	11		4
	Alnus serrulata	2	2		
	Betula nigra	100	91	2	7
	Carya	1	1		
	Carya glabra	1	1		
	Cornus amomum	1	1		
	Cornus florida	2	2		
	Diospyros virginiana	3	3		
	Fraxinus pennsylvanica	18	18		
	Juniperus virginiana	1	1		
	Liquidambar styraciflua	3	3		
	Liriodendron tulipifera	7	7		
	Nyssa aquatica	1	1		
	Nyssa sylvatica	6	5		1
	Platanus occidentalis	36	33	1	2
	Populus deltoides	1	1		
	Quercus falcata	2	2		
	Quercus lyrata	2	2		
	Salix nigra	21	17	1	3
	Sambucus canadensis	2	2		
	Ulmus alata	3	3		
	Ulmus americana	4	2		2
TOTAL:	**23**	**234**	**211**	**4**	**19**

Table 4. Vegetation Damage by Plot

	plot	All Damage Categories	(no damage)	Diseased	(other damage)
	00102-JJG-0001-year:2	16	12		4
	00102-JJG-0001-year:1	7	7		
	00102-JJG-0002-year:2	22	22		
	00102-JJG-0002-year:1	14	14		
	00102-JJG-0003-year:2	20	20		
	00102-JJG-0003-year:1	16	16		
	00102-JJG-0004-year:2	8	8		
	00102-JJG-0004-year:1	5	5		
	00102-JJG-0005-year:2	20	20		
	00102-JJG-0005-year:1	14	14		
	00102-JJG-0006-year:2	27	27		
	00102-JJG-0006-year:1	20	20		
	00102-JJG-0007-year:2	26	7	4	15
	00102-JJG-0007-year:1	19	19		
TOTAL:	**14**	**234**	**211**	**4**	**19**

Table 5. Stem Count by Plot and Species

	Species	Total Stems	# plots	avg# stems	plot 00102-JJG-0001	plot 00102-JJG-0002	plot 00102-JJG-0003	plot 00102-JJG-0004	plot 00102-JJG-0005	plot 00102-JJG-0006	plot 00102-JJG-0007
	Acer rubrum	6	2	3		2					4
	Betula nigra	46	7	6.57	1	11	11	2	9	6	6
	Fraxinus pennsylvanica	8	5	1.6		1	3	2	1	1	
	Nyssa sylvatica	3	3	1				1	1		1
	Platanus occidentalis	16	4	4	1				2	11	2
	Quercus lyrata	1	1	1					1		
	Salix nigra	9	4	2.25	3		2			2	2
	Ulmus americana	2	1	2	2						
TOTAL:	**8**	**91**	**8**		**7**	**14**	**16**	**5**	**14**	**20**	**15**

Table 6. Vegetation Problem Areas Table
(Please refer to Appendix 1.2 for Problem Area Photos)

Feature Issue		Station Numbers	Suspected Cause	Photo ID
Bank erosion - moderate	Reach 1	1+98 - 2+00	Scour under matting, loose matting -RB	1
		4+00 - 4+50	Moderate bank slumping due to excess shear stress - LB	
		5+40 - 5+50	Scour under vegetation - RB	
		6+95 - 7+00	Point bar scouring	
	Reach 2	8+65 - 8+75	Moderate scour: lack of vegetation -RB	
		9+62 - 9+68	Moderate scour: lack of vegetation -RB	
		11+15 - 11+40	Moderate bank erosion due to insufficient channel capacity - clay bank - RB	
		12+70 - 12+90	Bank undercutting due to excess shear stress - LB	
		17+80 - 18+00	Moderate erosion due to excess shear stress - LB	
		18+45 - 18+65	Moderate erosion due to shifting of upstream pool to RB	
Bank erosion - severe	Reach 1	0+25 - 0+45	Erosion under tree root due to excess shear stress -RB	2
		5+75 - 6+05	No bank protection on downstream end of bend resulting in severe erosion - LB	
	Reach 2	9+20 - 9+40	Severe bank erosion and failure due to insufficient channel capacity and high shear stress - LB	
		10+00 - 10+25	Severe bank erosion and failure due to insufficient channel capacity and excess shear stress - LB	
		11+60 - 11+95	Severe bank erosion and failure due to channel migration and excess shear stress LB	
		12+50 - 12+62	Severe bank erosion and failure due to high shear stress - LB	
		13+55 - 13+85	Bank undercut and failed due to excess shear stress - LB	
		14+35 - 14+70	Bank undercut and failed due to channel migration, downcutting, and excess shear stress - LB	
		14+75 - 14+90	Bank undercutting due to excess shear stress - RB	
		15+25 - 15+45	Bank undercutting due to excess shear stress - LB	
		16+00 - 16+30	Stream downcut and channel shifted resulting in severe erosion and tree fall - LB	
		16+70 - 17+10	Severe bank erosion and failure due to upstream structure failure - LB	
		18+75 - 19+05	Severe bank erosion and failure due to upstream structure failure - RB	
		19+10 - 19+40	Severe bank erosion and bank failure below right arm of failed cross vane - BB	
Invasive Population	N/A	Plot 2	existing seed source, storm flows, and land disturbance	3
		Plot 3	existing seed source, storm flows, and land disturbance	
		Plot 5	existing seed source, storm flows, and land disturbance	
		Plot 6	existing seed source, storm flows, and land disturbance	
		Plot 7	existing seed source, storm flows, and land disturbance	
Vegetation Cover - Poor	Reach 2	11+40 - 11+48	Bare bank	4

LB - Left bank facing downstream, RB - Right bank facing downstream, BB - Both Banks, TOB - Top of Bank

1. Moderate Bank Erosion-3/22/2007

2. Severe Bank Erosion-3/22/2007

3. Invasive Population-9/24/2007

4. Vegetation Cover Poor-3/22/2007

Prepared For: Ecosystem Enhancement Program	Lyle Creek Stream Restoration Year 5 of 5	Date: November 2007 Project No.: 423
	Appendix 1.2 Representative Vegetation Current Condition Photos	JORDAN JONES & GOULDING

1. Monitoring Plot 1-9/24/2007

2. Monitoring Plot 2-9/24/2007

3. Monitoring Plot 3-9/24/2007

4. Monitoring Plot 4-9/24/2007

Prepared For: Ecosystem Enhancement Program	Lyle Creek Stream Restoration Year 5 of 5	Date: November 2007 Project No.: 423
	Appendix 1.3 Vegetation Monitoring Plot Photos	JORDAN JONES & GOULDING

5. Monitoring Plot 5-9/24/2007

6. Monitoring Plot 6-9/24/2007

7. Monitoring Plot 7-9/24/2007

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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.

Table 1. Stream Current Conditions Table
(Please refer to Appendix 2.2 for Problem Area Photos)

Feature Issue		Station Numbers	Suspected Cause	Photo ID
Bank erosion - moderate	Reach 1	1+98 - 2+00	Scour under matting, loose matting -RE	1
		4+00 - 4+50	Moderate bank slumping due to excess shear stress - LB	
		5+40 - 5+50	Scour under vegetation - RE	
		6+95 - 7+00	Point bar scouring	10
	Reach 2	8+65 - 8+75	Moderate scour: lack of vegetation -RE	1
		9+62 - 9+68	Moderate scour: lack of vegetation -RE	
		11+15 - 11+40	Moderate bank erosion due to insufficient channel capacity - clay bank - RB	
		12+70 - 12+90	Bank undercutting due to excess shear stress - LE	
		17+80 - 18+00	Moderate erosion due to excess shear stress - LE	
		18+45 - 18+65	Moderate erosion due to shifting of upstream pool to RE	
Bank erosion - severe	Reach 1	0+25 - 0+45	Erosion under tree root due to excess shear stress -RE	2
		5+75 - 6+05	No bank protection on downstream end of bend resulting in severe erosion - LB	
	Reach 2	9+20 - 9+40	Severe bank erosion and failure due to insufficient channel capacity and high shear stress - LB	
		10+00 - 10+25	Severe bank erosion and failure due to insufficient channel capacity and excess shear stress - LB	
		11+60 - 11+95	Severe bank erosion and failure due to channel migration and excess shear stress - LB	
		12+50 - 12+62	Severe bank erosion and failure due to high shear stress - LB	
		13+55 - 13+85	Bank undercut and failed due to excess shear stress - LE	
		14+35 - 14+70	Bank undercut and failed due to channel migration, downcutting, and excess shear stress - LB	
		14+75 - 14+90	Bank undercutting due to excess shear stress - RE	
		15+25 - 15+45	Bank undercutting due to excess shear stress - LE	
		16+00 - 16+30	Stream downcut and channel shifted resulting in severe erosion and tree fall - LB	
		16+70 - 17+10	Severe bank erosion and failure due to upstream structure failure - LB	
		18+75 - 19+05	Severe bank erosion and failure due to upstream structure failure - RB	
		19+10 - 19+40	Severe bank erosion and bank failure below right arm of failed cross vane - BB	
Bank Slump	Reach 2	7+92 - 8+08	Bank slump around constructed riffle	3
Vegetation cover - Poor	Reach 2	11+40 - 11+48	Bare bank	9
Aggradation	Reach 1	0+25 - 0+75	Heavy sedimentation, pools filling in	4
		0+90 - 1+10	Lateral bar forming/excess sediment deposition	
		4+00		
		1+00 - 1+05	Mid-channel bar	
		1+60 - 1+65		
		4+45 - 4+53		
	Reach 2	7+45 - 7+51	Mid-channel bar	
		13+00 - 13+02		
		14+70 - 14+75		
		6+60 - 6+80	Heavy sedimentation, pools filling in	
		12+50	Transverse bar	6
		14+35		
		16+00		
		16+25	High sediment deposition-stream over widened	4
Downcut/lost riffle	Reach 2	8+85 - 9+00	Insufficient channel capacity shifting riffle downstrear	5
		10+90 - 11+15	Insufficient channel capacity shifting riffle downstrear	
		11+95 - 12+20	Insufficient channel capacity shifting riffle downstrear	
		14+10 - 14+30	Insufficient channel capacity shifting riffle downstream into poc	
		15+10 - 15+20	Insufficient channel capacity shifting riffle downstream into poc	
		15+75 - 16+00	Insufficient channel capacity shifting riffle downstream into poc	
		16+40	Insufficient channel capacity shifting riffle downstream into poc	
Structure - stressed	Reach 1	0+85	Scour around right arm	7
		3+25	Scour around right arm and water piping between rock	
		3+85	Scour around left arm	
		5+00	Erosion at top right vane arm due to insufficient channel capacit	
		5+60	Water piping through right arm of vane	
	Reach 2	17+50	Erosion under invert & footer rock and stressing right arn	
		18+30	Erosion behind left vane arm due to insufficient channel capacit	
		18+60	Erosion under invert and footer rock	
Structure - failed	Reach 2	14+95	Log vane structure detached from bank and blocking channel due channe erosion under log.	8
		16+70	Right vane arm collapsed due to shifting channel and excess shear stress	
		19+25	Complete structure failures, water flows around cross-vane	

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

*Note Bank stability was based on existing severity of erosion and not hoe the bank has change over the monitoring perio

1. Moderate Bank Erosion-3/22/2007

2. Severe Bank Erosion-3/22/2007

3. Bank Slump-3/22/2007

4. Aggradation-3/22/2007

5. Lost/Downcut Riffle-3/22/2007

6. Transverse Bar-3/22/2007

7. Structure Stressed-3/22/2007

8. Structure Failed-3/22/2007

9. Vegtetation Cover Poor-3/22/2007

10. Point Bar Erosion-3/22/2007

Photo Point 1: Upstream-8/27/2007

Photo Point 1: Downstream-8/27/2007

Photo Point 2: Upstream-8/27/2007

Photo Point 2: Downstream-8/27/2007

Prepared For: Ecosystem Enhancement Program	Lyle Creek Stream Restoration Year 5 of 5	Date: November 2007 Project No.: 423
	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-8/27/2007

Photo Point 6: Downstream-8/27/2007

Prepared For: Ecosystem Enhancement Program	Lyle Creek Stream Restoration Year 5 of 5	Date: November 2007 Project No.: 423
	Appendix 2.3 Stream Photo Station Photos	JORDAN JONES & GOULDING

Photo Point 7: Upstream-8/27/2007

Photo Point 7: Downstream-8/27/2007

Photo Point 8: Upstream-8/27/2007

Photo Point 8: Downstream-8/27/2007

Prepared For: Ecosystem Enhancement Program	Lyle Creek Stream Restoration Year 5 of 5	Date: November 2007 Project No.: 423
	Appendix 2.3 Stream Photo Station Photos	JORDAN JONES & GOULDING

Photo Point 9: Upstream-8/27/2007

Photo Point 9: Downstream-8/27/2007

Photo Point 10: Upstream-8/27/2007

Photo Point 10: Downstream-8/27/2007

Photo Point 11: Upstream-8/27/2007

Photo Point 11: Downstream-8/27/2007

Photo Point 12: Upstream-8/27/2007

Photo Point 12: Downstream-8/27/2007

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

Prepared For: Ecosystem Enhancement Program	Lyle Creek Stream Restoration Year 5 of 5	Date: November 2007 Project No.: 423
	Appendix 2.4 Stream Cross-Section Photos	JORDAN JONES & GOULDING

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

Prepared For: Ecosystem Enhancement Program	Lyle Creek Stream Restoration Year 5 of 5	Date: November 2007 Project No.: 423
	Appendix 2.4 Stream Cross-Section Photos	JORDAN JONES & GOULDING

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

Reach 1: Enhancement Level I (700 ft)

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?	6	6	N/A	100%	**75%**
	2. Armor Stable?	6			100%	
	3. Facet grade appears stable?	6			100%	
	4. Minimal evidence of embedding/fining?	0			0%	
	5. Length appropriate?	-			-	
B. Pools	1. Present?	13	13	N/A	100%	**96%**
	2. Sufficiently deep?	12			92%	
	3. Length Appropriate?	-			-	
C. Thalweg	1. Upstream of meander bend centering?	8	8	N/A	100%	**100%**
	2. Downstream of meander centering?	8			100%	
D. Meanders	1. Outer bend in state of limited/controlled erosion?	6	8	N/A	75%	**88%**
	2. Of those eroding, # w/concomitant point bar formation?	8			N/A	
	3. Apparent Rc within spec?	-			-	
	4. Sufficient floodplain access and relief?	8			100%	
E. Bed General	1. General channel bed aggradation areas (bar formation)?	N/A		7/108	85%	**93%**
	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		2/50	96%	**96%**
G. Vanes	1. Free of back or arm scour?	4	9	N/A	44%	**78%**
	2. Height appropriate?	-			-	
	3. Angle and geometry appear appropriate?	9			100%	
	4. Free of piping or other structural failures?	8			89%	
H. Wads/ Boulders	1. Free of scour?	N/A				
	2. Footing stable?					

*Note Bank stability was based on existing severity of erosion and not hoe the bank has change over the monitoring period

Reach 2: Relocation Restoration (1240 ft)

Feature Category		(# Stable) Number Performing as Intended	Total Number assessed per 2006 survey	Total Number/ feet in unstable state	% Perform in Stable Condition	Feature Perform Mean or Total
A. Riffles	1. Present?	20	20	N/A	100%	**75%**
	2. Armor Stable?	20			100%	
	3. Facet grade appears stable?	20			100%	
	4. Minimal evidence of embedding/fining?	0			0%	
	5. Length appropriate?	-			-	
B. Pools	1. Present?	20	20	N/A	100%	**98%**
	2. Sufficiently deep?	19			95%	
	3. Length Appropriate?	-			-	
C. Thalweg	1. Upstream of meander bend centering?	25	25	N/A	100%	**100%**
	2. Downstream of meander centering?	25			100%	
D. Meanders	1. Outer bend in state of limited/controlled erosion?	14	25	N/A	56%	**71%**
	2. Of those eroding, # w/concomitant point bar formation?	14			56%	
	3. Apparent Rc within spec?	-			-	
	4. Sufficient floodplain access and relief?	25			100%	
E. Bed General	1. General channel bed aggradation areas (bar formation)?	N/A		7/13	99%	**95%**
	2. Channel bed degradation - areas of increasing down-cutting or head cutting?			7/110	91%	
F. Bank	1. Actively eroding, wasting, or slumping bank	N/A		18/413	83%	**83%**
G. Vanes	1. Free of back or arm scour?	3	8	N/A	38%	**32%**
	2. Height appropriate?	-			-	
	3. Angle and geometry appear appropriate?	-			-	
	4. Free of piping or other structural failures?	2			25%	
H. Wads/ Boulders	1. Free of scour?	N/A				
	2. Footing stable?					

*Note Bank stability was based on existing severity of erosion and not hoe the bank has change over the monitoring period

Project Name: Lyle Creek
Cross-Section: 1
Feature: Pool

As Built-2002			2003			2004			2005			2006			2007		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
1.00	816.76		0.00	816.81		19.64	814.25	LP	19.60	814.15	x1 lp	17.60	814.79		22.82	814.07	LPG
5.93	815.11		4.32	815.44		19.75	814.14		19.85	813.98	x1	22.10	814.10		24.65	813.89	
9.77	814.73		13.76	814.80		23.44	813.76		26.20	813.35	x1	28.60	813.55		27.48	813.59	
17.99	814.53		16.98	814.86		28.17	813.47		34.95	813.29	x1	32.60	813.57		31.38	813.72	
20.45	813.86		30.11	813.45		34.70	813.32	BKF	38.00	812.82	x1	35.60	813.43		35.94	813.56	LBKF
26.75	813.32		34.70	813.10		38.13	812.87		41.64	812.47	x1	36.60	813.47	BKF/tob	39.28	813.48	
31.96	813.08		40.82	812.28		39.21	812.56		43.02	811.97	x1	37.60	813.27		41.84	813.34	
35.79	812.99		43.22	811.80		43.43	811.98		44.25	811.60	x1 lew	41.70	813.23		43.40	813.24	
37.44	812.65		44.95	811.47		43.93	811.73		45.02	811.34	x1	42.60	813.09		43.89	812.71	
38.81	812.65		46.45	811.17		45.68	811.37		47.38	811.31	x1	43.60	812.66		44.32	811.76	LEW
41.00	812.21		47.47	811.06		47.39	811.50		49.74	811.36	x1	44.60	811.72		45.88	811.66	
42.64	811.78		48.31	811.22		48.40	811.53		51.00	811.54	x1 rew	45.60	811.77	lew-ws	48.18	811.52	TW
43.47	811.73		49.84	811.25		49.34	811.37		53.04	813.18	x1	45.60	811.64		49.00	811.66	
44.01	811.29		50.21	811.82		50.74	811.58		54.81	814.50	x1	46.60	811.08		49.88	811.74	REW
45.93	810.42		52.43	812.14		51.67	812.12		57.98	814.24	x1	47.60	811.09		50.85	811.98	
48.40	809.70		54.22	814.46		52.94	812.90		59.56	814.28	x1 rp	48.60	811.03		52.23	811.83	
51.96	812.07		57.40	814.30		54.15	814.42					50.60	811.59	rew	53.75	813.08	
53.88	813.08		66.43	813.48		54.20	814.46	RP				50.60	811.77	ws	54.15	813.34	
54.15	814.44		71.96	812.96		59.69	814.37					51.60	812.36		54.33	813.56	RBKF
57.99	814.24		80.76	812.94								52.60	812.60		54.87	814.27	
60.73	813.95		91.07	812.96								53.60	813.47	BKF/tob	55.66	814.68	
75.79	813.81											54.60	814.34		57.06	814.68	
85.93	814.20											56.60	814.64		58.99	814.39	
98.81	814.63											58.60	814.42		60.01	814.34	RPG
102.92	813.66											60.10	814.30	rpin-grd			
109.77	811.29											60.10	814.46	rpin-top-bm			
117.99	811.82											60.90	814.15	wood stake			
125.93	814.82											67.90	813.58				
133.60	815.84																

Project Name: Lyle Creek
Cross-Section: 2
Feature: Riffle

As Built-2002			2003			2004			2005			2006			2007		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
-28.00	812.58		0.23	813.59		17.11	812.83	LP	17.10	812.88		14.11	813.06		10.47	813.87	
-13.08	813.46		5.54	813.87		17.20	812.73	BKF	18.41	812.57		17.21	812.83	BKF	12.62	813.20	
5.04	814.63		17.92	812.88		19.38	811.84		21.41	810.96		18.41	812.63	ltob-	14.70	812.84	
8.06	813.46		20.01	811.75		22.57	810.31		22.27	810.59		20.11	811.75		17.15	812.87	LPG
12.32	813.14		21.76	810.53		24.57	810.37		28.73	810.42		21.11	811.58		18.63	812.51	LBKF
16.94	812.96		23.53	810.33		26.26	810.11		29.90	810.54		22.11	811.18		19.30	811.90	
18.00	812.87		25.64	810.34		26.51	810.13		30.91	811.40		23.11	810.47	LEW	21.62	811.66	
19.96	812.20		26.77	810.43		27.26	810.20		36.19	812.96		23.11	810.39		22.88	811.18	
21.20	810.97		28.46	810.52		28.89	810.34		40.10	813.58		24.11	810.42		23.11	810.27	LEW
22.44	810.44		29.20	810.51		30.21	810.52		45.47	813.26		25.11	810.25		24.03	809.94	
25.46	810.94		30.07	810.67		32.60	811.49		49.35	813.31		26.11	810.27		25.97	809.88	TW
27.59	810.77		31.12	811.12		34.95	812.27					27.61	810.32		27.00	810.06	
28.66	811.18		31.56	811.43		37.00	813.25					29.01	810.56		27.18	810.15	
29.37	812.40		34.77	811.95		40.76	813.15					29.01	810.47	REW	28.54	810.32	REW
30.97	812.81		36.99	813.25		48.85	812.99					30.11	810.98		29.57	810.63	
32.92	813.84		48.26	813.24		49.01	813.05	RP				31.11	811.67		30.30	811.31	
33.99	814.04		55.11	813.37								32.11	812.06		30.89	811.95	
37.90	813.57		59.50	813.34								33.61	812.18		33.82	812.51	RBKF
40.92	813.34											35.71	812.32		35.81	812.32	
44.47	813.31											37.11	812.83	BKF/tob	38.61	813.38	
59.03	813.31											38.61	813.36				
												40.11	813.34				
												42.11	813.07				
												44.11	813.01				
												46.11	812.97				
												48.11	813.00				
												50.01	812.93				

Project Name: Lyle Creek
Cross-Section: 3
Feature: Pool

As Built-2002			2003			2004			2005			2006			2007		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
-48.40	812.54		0.00	812.35		9.10	812.20	LP	9.10	812.29		-2.40	812.30		3.61	812.34	
-34.35	812.15		9.07	812.21		10.16	810.76		10.52	812.30		0.60	812.32		9.74	812.29	
0.43	812.07		9.75	812.20		11.55	810.75		11.26	811.43		4.60	812.34		11.45	812.23	
6.12	812.20		11.33	810.44		12.86	810.33		15.24	810.33		8.60	812.27	wood stake-ground	11.51	811.85	LBKF
9.46	812.20		13.02	810.31		16.84	810.18		17.73	810.43		10.60	812.42	BKF/tob	11.63	810.80	
11.47	811.94		15.38	810.04		20.19	810.14		20.17	810.18		11.60	810.87	back of point bar	15.03	810.60	
12.47	811.68		18.91	810.07		21.41	810.04		20.75	809.89		13.40	810.66		16.96	810.82	
13.47	811.29		21.63	810.25		21.51	810.04		21.38	809.84		15.60	810.77		17.53	810.51	
14.48	810.73		22.80	810.48		22.29	810.03		22.86	810.00		18.30	810.58		18.71	810.42	
15.81	810.09		24.42	810.79		22.88	810.29		23.95	810.86		19.10	810.38	lew	19.65	810.30	
17.15	809.87		25.95	812.17		23.87	810.49		26.99	812.05		19.10	810.38	lew-ws	20.77	810.18	LEW
19.16	810.22		28.46	812.78		25.15	810.95		31.87	812.90		20.60	809.87		21.23	809.86	
20.16	810.17		33.55	813.24		26.15	812.09	BKF	34.10	813.38		22.30	810.04		21.33	809.84	TW
21.17	811.03		36.80	813.17		26.96	812.35					22.30	810.38	rew-ws	21.69	809.83	
23.51	812.07		41.87	814.14		30.02	812.84					23.60	811.04		21.71	809.80	
25.51	812.84		53.17	815.21		33.71	813.14					25.00	811.54		21.93	809.82	
31.20	813.23					34.00	813.36	RP				26.60	812.06		22.22	810.11	REW
34.54	813.36											28.20	812.42	BKF/tob	22.34	810.65	
38.56	814.43											30.60	812.70		24.62	811.39	
												32.60	812.86		25.92	811.85	RBKF
												34.00	813.12	rpin-ground	27.78	812.41	
												34.00	813.38	rpin-top	30.40	812.70	
															32.29	812.87	
															34.01	813.06	RPG
															37.61	813.34	
															39.31	813.61	
															39.31	813.61	

Project Name: Lyle Creek
Cross-Section: 4
Feature: Riffle

As Built-2002			2003			2004			2005			2006			2007		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
-90.40	808.12		0.00	805.16		9.28	804.97	LP	9.28	805.18	x4 lp	2.48	805.18		3.02	805.23	
-85.58	806.93		9.56	805.00		10.81	804.78		11.69	804.79	x4	4.48	805.17		8.37	805.14	
-80.45	806.16		11.04	804.98		11.67	804.41		13.77	803.41	x4	6.48	805.05		11.02	805.05	
-58.44	805.61		11.53	804.87		12.98	804.00		16.21	802.87	x4	10.23	804.97	lpin-ground	12.17	805.03	LBKF
-34.62	805.65		12.38	804.43		14.45	803.06		17.19	802.44	x4	10.48	804.8	BKF/tob	13.23	804.48	
-26.48	804.84		12.85	804.06		15.75	802.63		17.88	802.24	x4 lew	12.48	804.31		15.18	803.67	
-9.60	804.84		14.44	802.97		16.30	802.35		18.85	802.18	x4	13.48	803.73		16.47	803.51	
-2.36	805.48		15.26	803.07		17.75	802.03		19.63	802.50	x4	15.48	803.60		18.61	802.70	
4.88	805.23		16.02	802.62		19.17	802.35		22.28	804.92	x4	16.28	803.20		19.02	802.46	LEW
8.49	805.40		17.73	802.29		19.83	802.68		23.73	805.13	x4	16.88	802.84		19.68	802.19	
11.51	805.01		18.82	802.23		20.63	803.80		24.88	805.05	x4 rp	17.48	802.37	lew-ws	20.34	802.16	TW
12.41	804.59		19.55	802.51		22.90	804.92	BKF				17.78	802.24		20.80	802.18	
13.62	804.12		19.82	802.75		23.98	804.90					18.48	802.17		21.20	802.44	REW
14.52	803.57		20.52	803.13		24.50	804.67	RP				19.18	802.14	tw	22.01	803.21	
15.73	802.63		21.61	803.92								19.98	802.37	rew-ws	22.79	804.19	
17.84	802.50		22.36	804.35								20.28	802.75		23.61	804.29	
19.35	802.08		22.94	804.92								21.48	803.91		23.99	804.92	
20.55	802.29		24.88	804.89								22.65	804.80	BKF/tob	26.11	805.03	RBKF
20.86	803.23		28.18	804.93								23.48	804.97		28.88	805.02	
22.06	804.03		36.98	804.69								26.48	804.94	wd stake	33.08	804.81	
22.97	804.89											29.48	804.83		33.08	804.81	
28.70	805.14											31.98	804.80				
42.56	805.82											25.18	804.93				
67.59	808.21																

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

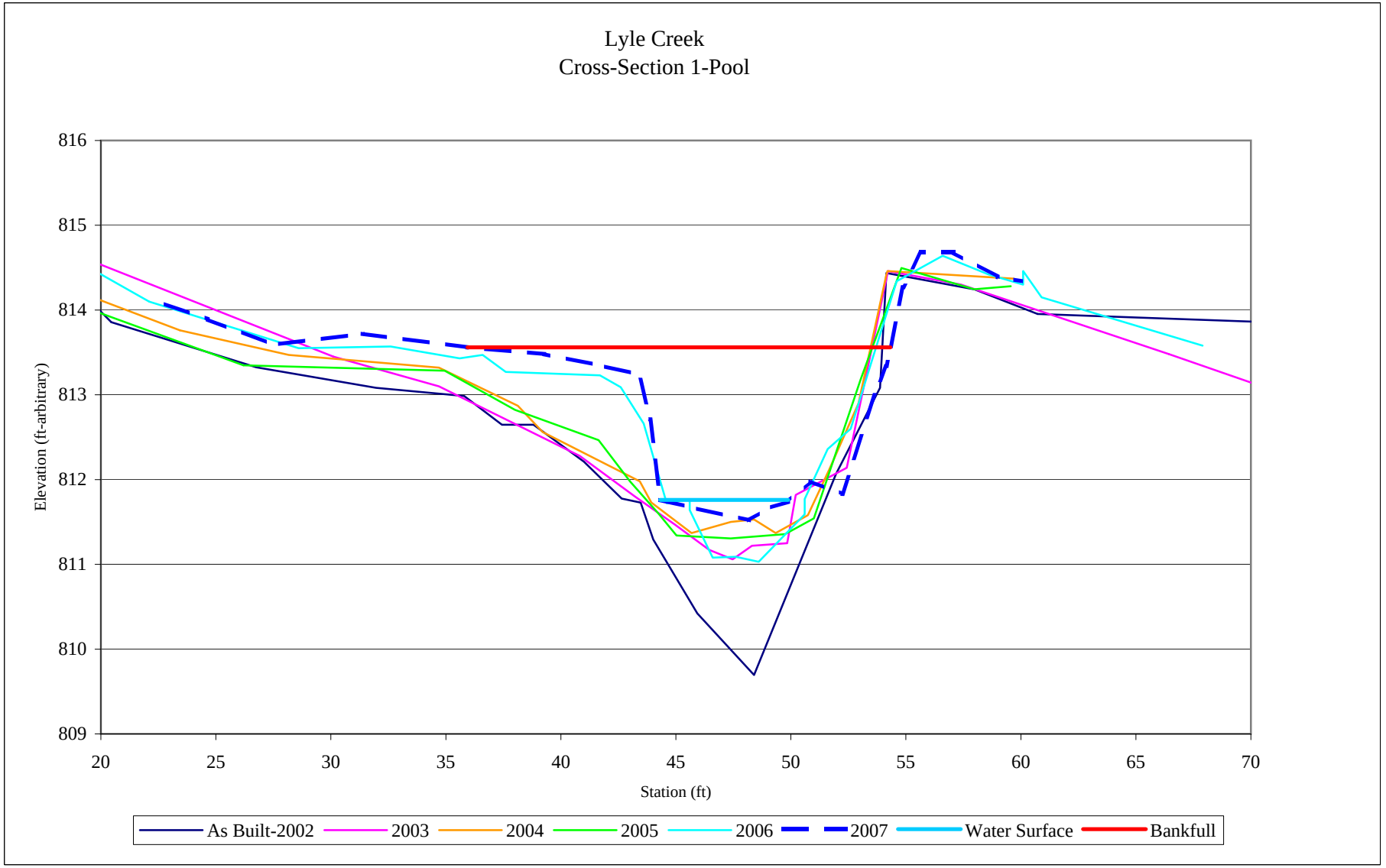
As Built-2002			2003			2004			2005			2006			2007		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
-82.00	807.34		0.00	804.51		11.57	804.52	LP	11.57	804.36	x5 lp	9.65	804.52		5.47	804.64	
-77.91	806.24		9.43	804.54		15.46	804.50		16.52	804.23	x5	13.55	804.48	lpin-top	13.45	804.43	LPG
-70.01	805.47		14.94	804.48		18.02	804.16	BKF	18.72	804.07	x5	14.39	804.50	lpin-ground	17.74	804.34	LBKF
-52.02	804.85		18.90	804.35		20.18	803.07		20.34	803.03	x5	16.71	804.36	BKF/tob	18.65	804.24	
-38.93	805.09		19.75	804.37		22.13	802.25		21.14	802.08	x5 lew	18.60	804.09	ltob	20.11	803.33	
-29.94	804.70		21.32	803.59		23.33	801.93		22.34	801.78	x5	20.13	803.20		22.07	802.77	
-16.04	804.66		23.11	802.61		24.21	801.83		24.43	801.94	x5	21.62	802.46		22.64	801.90	LEW
1.13	804.46		23.78	802.09		25.78	802.03		26.85	802.12	x5 rew	22.32	802.14	lew-ws	22.86	801.65	
14.22	804.32		24.59	801.68		27.64	802.08		28.88	802.81	x5	23.70	801.96		23.38	801.48	TW
22.12	804.27		26.30	801.95		29.14	801.94		31.21	803.49	x5	25.10	801.80		24.47	801.56	
24.03	803.08		27.90	802.01		29.89	802.63		33.46	804.55	x5	26.10	801.79	tw	25.64	801.78	
25.67	802.07		28.64	802.14		31.79	803.42		36.87	804.71	x5	27.10	801.86		26.91	801.92	REW
28.12	801.98		29.68	802.45		33.70	804.45		39.40	805.02	x5 rp	28.40	801.94		27.34	801.96	
28.39	801.78		30.93	803.27		39.53	804.65					28.40	802.14	rew-ws	27.98	802.95	
29.48	801.98		31.70	803.45		44.41	804.64					29.00	802.69		29.07	803.34	
30.03	802.31		33.68	804.45		44.91	804.91	RP				31.10	803.38		30.28	803.73	
31.66	803.32		39.08	804.72								32.10	803.79		31.32	803.86	
33.03	804.56		45.92	805.10								33.60	804.36	BKF/tob	32.52	804.34	RBKF
37.11	804.70											37.10	804.62		32.79	804.48	
39.02	804.85											39.40	804.91	rpin-top	36.43	804.62	
49.11	805.33														40.72	804.81	
59.19	809.16														40.72	804.81	

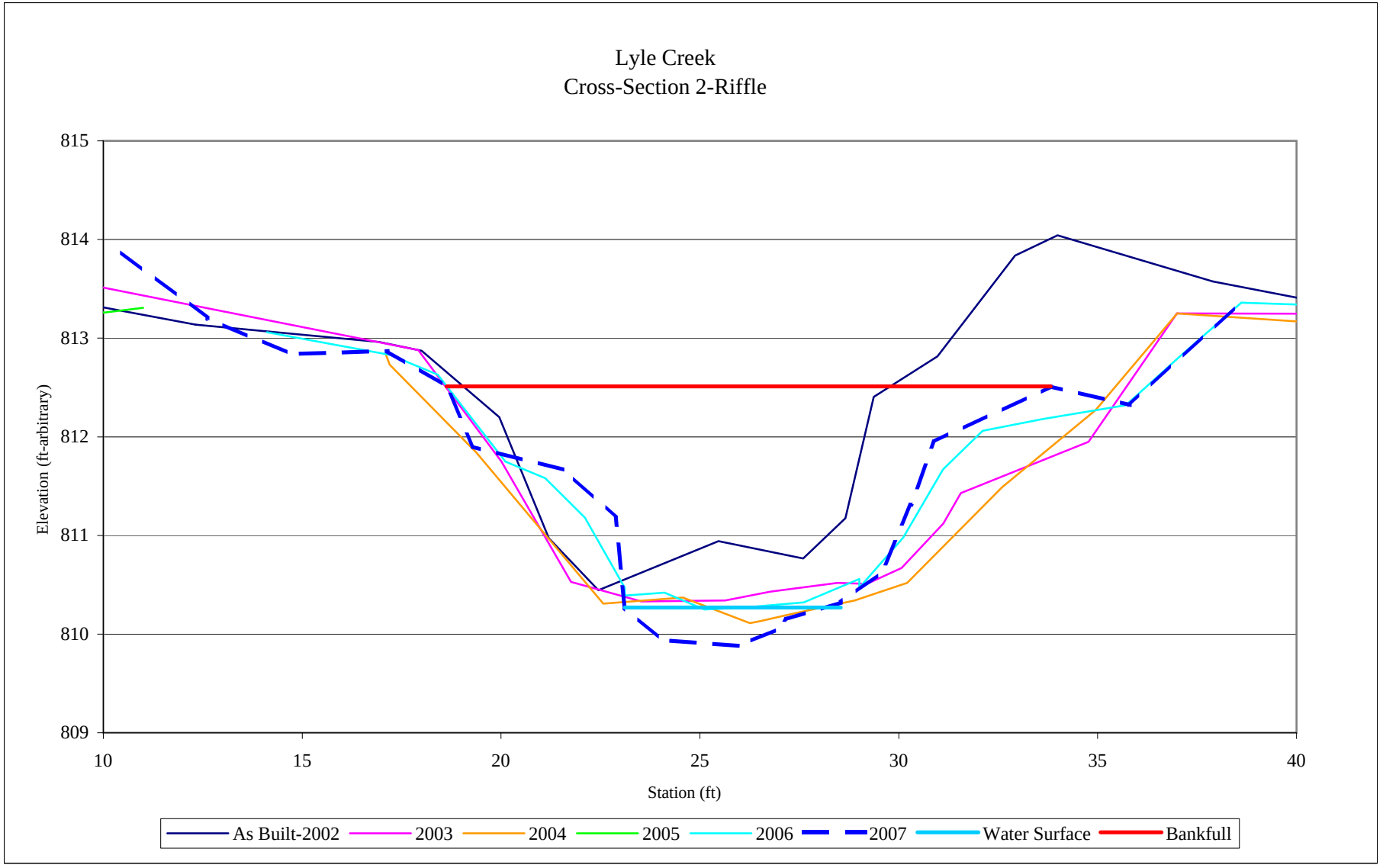
Project Name: Lyle Creek
Cross-Section: 6
Feature: Pool

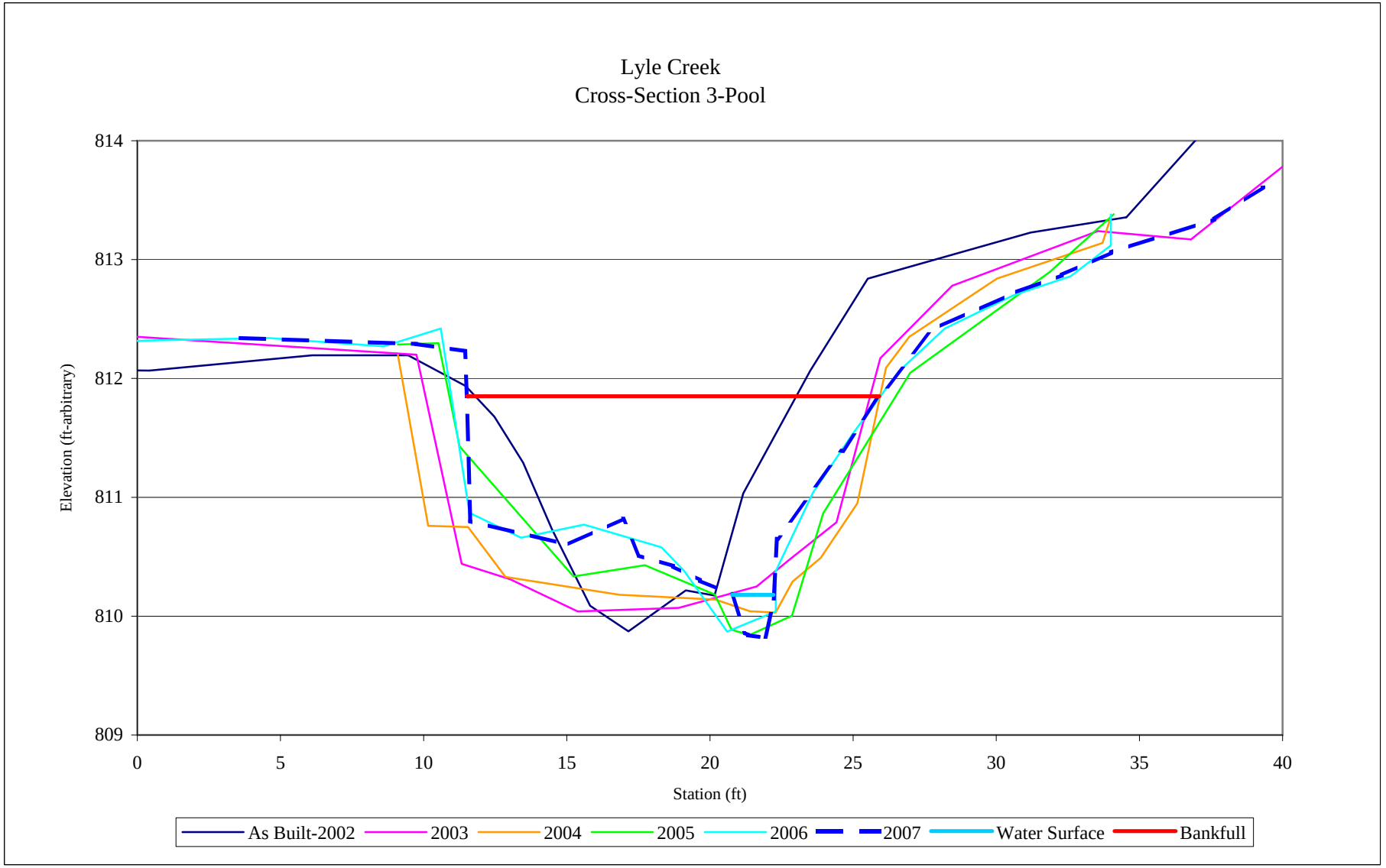
As Built-2002			2003			2004			2005			2006			2007		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
-81.33	807.30		0.15	804.51		17.33	804.51	LP	17.33	804.34	x6lp	13.33	804.39		10.98	804.30	
-77.33	806.22		12.94	804.29		17.68	804.42		17.42	804.17	x6	17.33	804.27	lpin-ground	14.35	804.36	
-69.31	805.48		17.50	804.17		17.89	804.28		20.90	804.14	x6	17.33	804.31	lpin-top	17.36	804.25	LPG
-51.13	804.83		20.50	804.18		22.16	804.06	BKF	22.32	804.06	x6	20.33	804.34	ltob-bkf	21.45	804.27	LBKF
-38.18	805.09		22.58	804.06		24.22	803.22		24.21	803.09	x6	22.43	804.03		24.25	803.42	
-29.24	804.70		23.38	803.35		27.06	802.18		25.36	802.77	x6	24.03	803.51		26.51	802.87	
-15.07	804.61		24.47	803.17		27.97	801.83		27.14	802.37	x6	25.23	803.10		28.43	802.22	
1.89	804.43		25.29	802.31		29.18	801.64		28.06	801.95	x6	26.33	802.82		29.29	801.99	LEW
13.91	804.13		26.95	802.03		30.71	801.46		29.01	801.92	x6lew	27.33	802.36		30.70	801.89	
16.99	804.22		28.18	801.81		32.80	801.31		30.89	801.65	x6	29.33	802.07	lew-ws	31.66	801.79	TW
23.77	804.35		29.18	801.86		34.01	801.36		31.50	801.52	x6	29.33	802.03		32.15	801.75	
25.93	803.61		31.06	801.84		35.07	802.33		32.29	801.63	x6	30.03	801.94		33.64	801.89	REW
26.85	803.22		33.45	801.48		37.89	804.42		34.16	801.81	x6rew	30.43	801.95		34.78	802.33	
27.78	802.83		33.81	801.50		40.58	804.78		35.16	802.60	x6	31.23	801.85		35.95	803.18	
29.93	802.26		34.67	801.92		45.30	805.09		37.02	803.50	x6	32.03	801.71	tw	36.83	803.86	
31.17	801.70		34.85	802.03		49.46	805.51	RP	37.77	804.29	x6	33.13	801.77		37.41	804.42	RBKF
33.32	801.39		36.11	803.14					41.04	804.88	x6	33.73	801.88		39.45	804.65	
34.25	801.70		37.89	804.42					41.13	805.04	x6rp	33.73	802.07	rew-ws	40.60	804.84	
35.79	803.13		40.58	804.78								34.73	802.27		49.83	805.63	
37.95	804.57		45.30	805.09								35.63	803.14				
42.88	805.13		49.46	805.51								36.33	803.51				
47.81	805.43											37.83	804.34	BKF			
58.91	806.57											40.93	804.98				
												43.33	805.15				

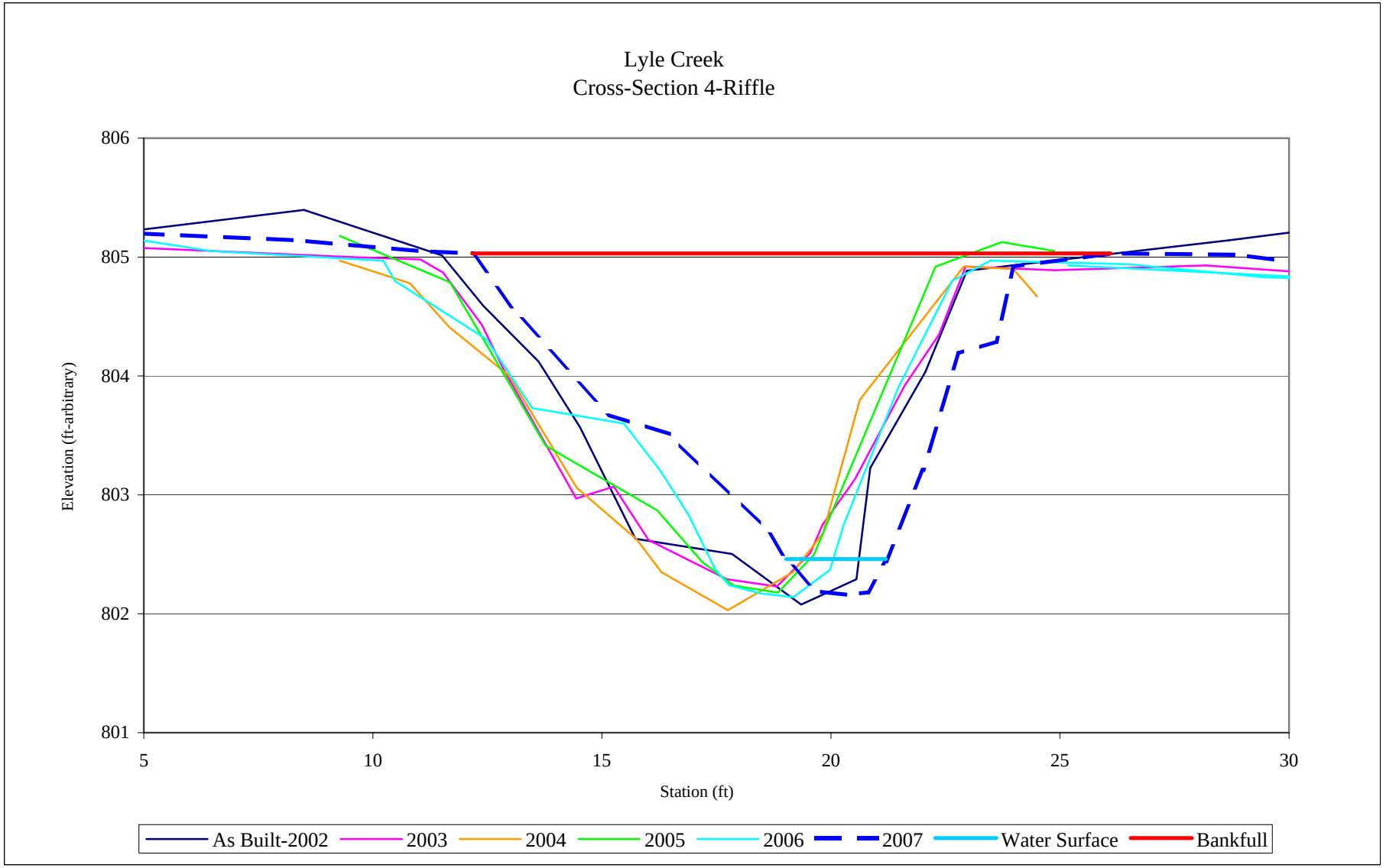
Project Name: Lyle Creek
Cross-Section: 7
Feature: Pool

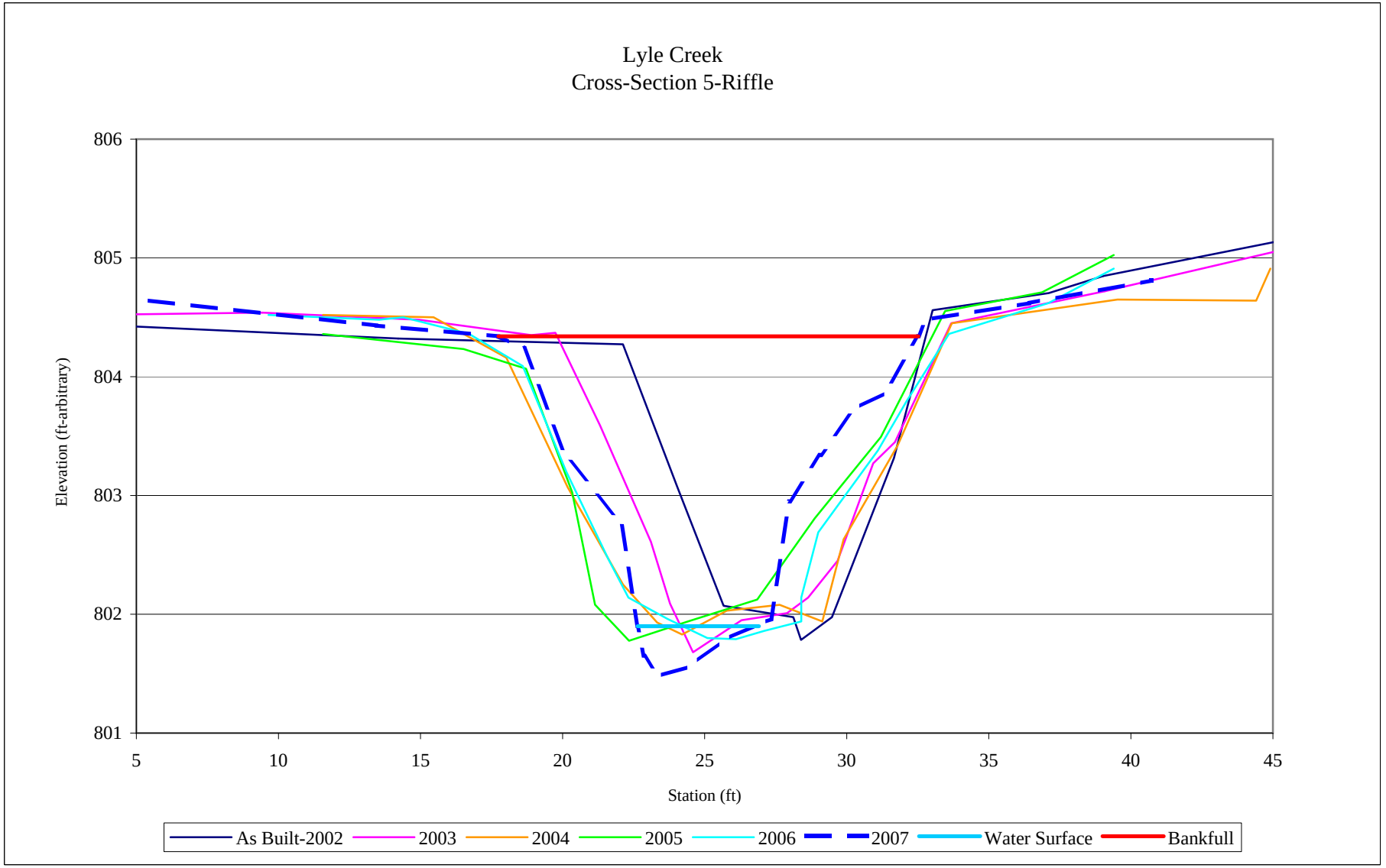
As Built			2003			2004			2005			2006			2007		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
5.37	803.18		0.00	803.14		0.12	803.16		7.50	803.32	LP				3.13	803.31	
13.51	803.35		8.62	803.22		0.14	803.13	LP	7.57	803.14		0.00	803.02		5.63	803.32	
15.65	803.24		15.09	803.39		5.81	803.11	LP	11.29	803.23		4.00	803.32		8.94	803.37	
16.50	802.97		16.45	802.91		11.98	803.28		13.25	803.19		6.00	803.28		11.24	803.36	
18.64	801.89		17.50	801.99		14.22	803.41		13.88	800.45		8.00	803.35		11.32	801.18	LEW
19.07	801.03		18.10	801.38		15.22	803.30		16.61	800.50		10.00	803.34		11.42	800.86	
19.50	800.82		18.16	801.12		16.37	802.69		17.05	800.40		13.04	803.01	BKF	12.29	800.68	
21.64	801.20		19.01	801.03		16.48	801.23	W	18.05	800.55		11.40	801.19		12.88	800.52	TW
23.35	801.09		20.42	800.95		17.90	800.90		19.00	800.92	REW	13.00	801.23	LEW	13.50	800.76	
24.21	801.14		22.31	801.07		22.16	800.60	T	21.61	801.66		13.00	800.88	WS	14.66	800.89	
25.06	801.68		24.22	801.28		24.45	801.18	EW	23.31	802.14		13.70	800.66		16.01	801.19	REW
26.78	802.49		25.08	801.44		25.41	801.94		27.22	802.96		14.30	800.53		17.48	801.42	
27.63	803.02		25.57	801.77		27.16	802.78	BKF	32.49	802.75		14.90	800.49		18.62	801.41	
36.19	802.97		26.70	802.65		30.80	803.20		35.06	803.02		16.00	800.49		20.53	801.97	
41.76	803.51		27.91	803.05		34.71	802.99		35.24	803.22	RP	17.00	800.62		22.03	802.64	
53.75	804.31		29.76	803.12		35.10	803.03					18.47	800.88	REW	23.86	802.52	
68.73	804.42		36.22	803.00		35.15	803.22	RP				19.08	801.02		25.87	802.69	
76.86	804.47		42.75	803.64								19.60	801.20		26.73	803.02	RBKF
86.71	805.39											20.83	801.54		28.20	803.22	
												21.81	801.88		30.09	803.03	
												23.40	802.26		35.00	802.95	
												26.00	802.69				
												27.00	803.01	BKF			
												30.00	803.00				
												33.00	802.97				
												35.20	802.98	RPG			
												35.20	803.22	RPT			

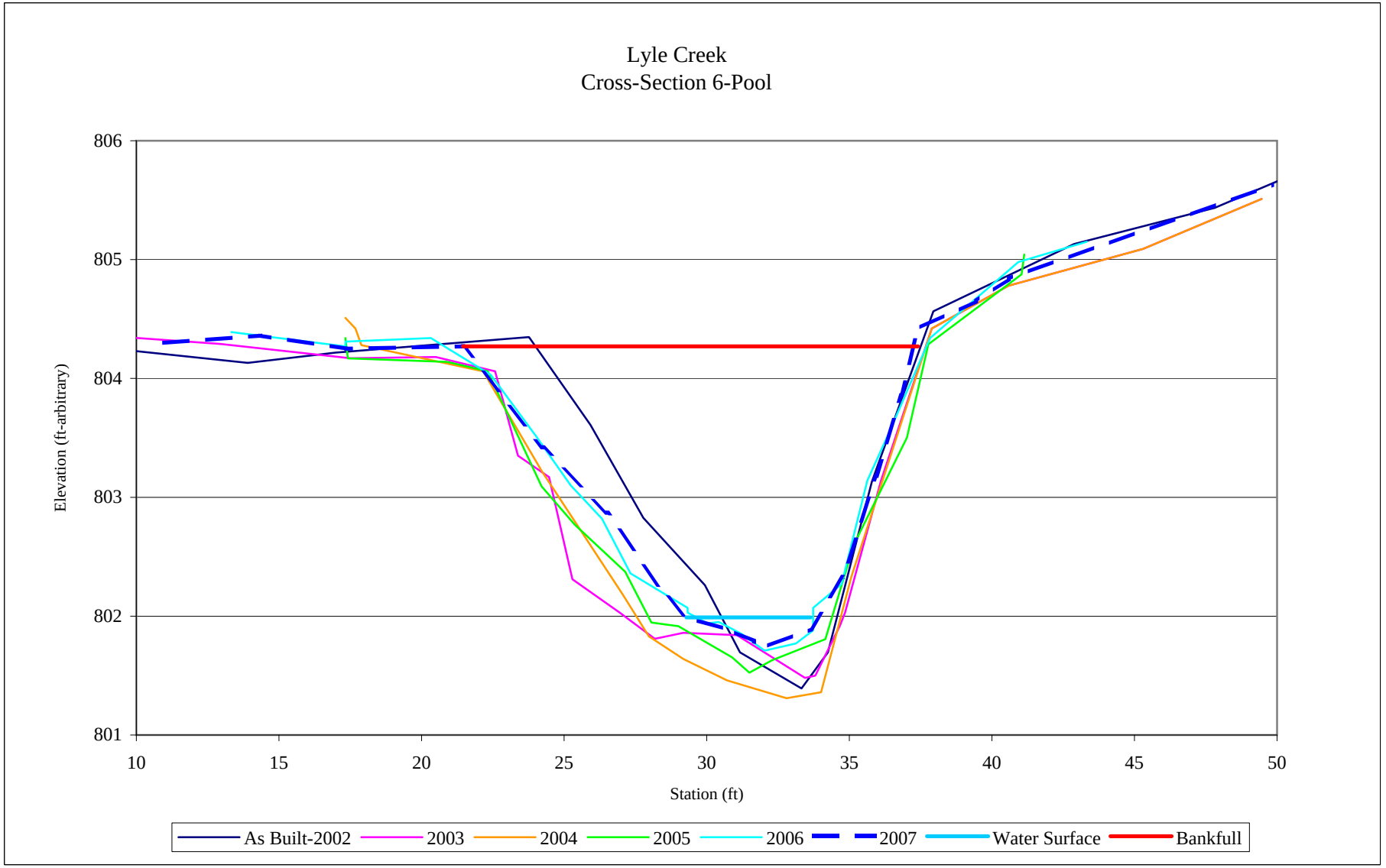

Lyle Creek
Cross-Section 1-Pool
Elevation (ft-arbitrary)
816
815
814
813
812
811
810
809
20
25
30
35
40
45
50
55
60
65
70
Station (ft)
As Built-2002
2003
2004
2005
2006
2007
Water Surface
Bankfull

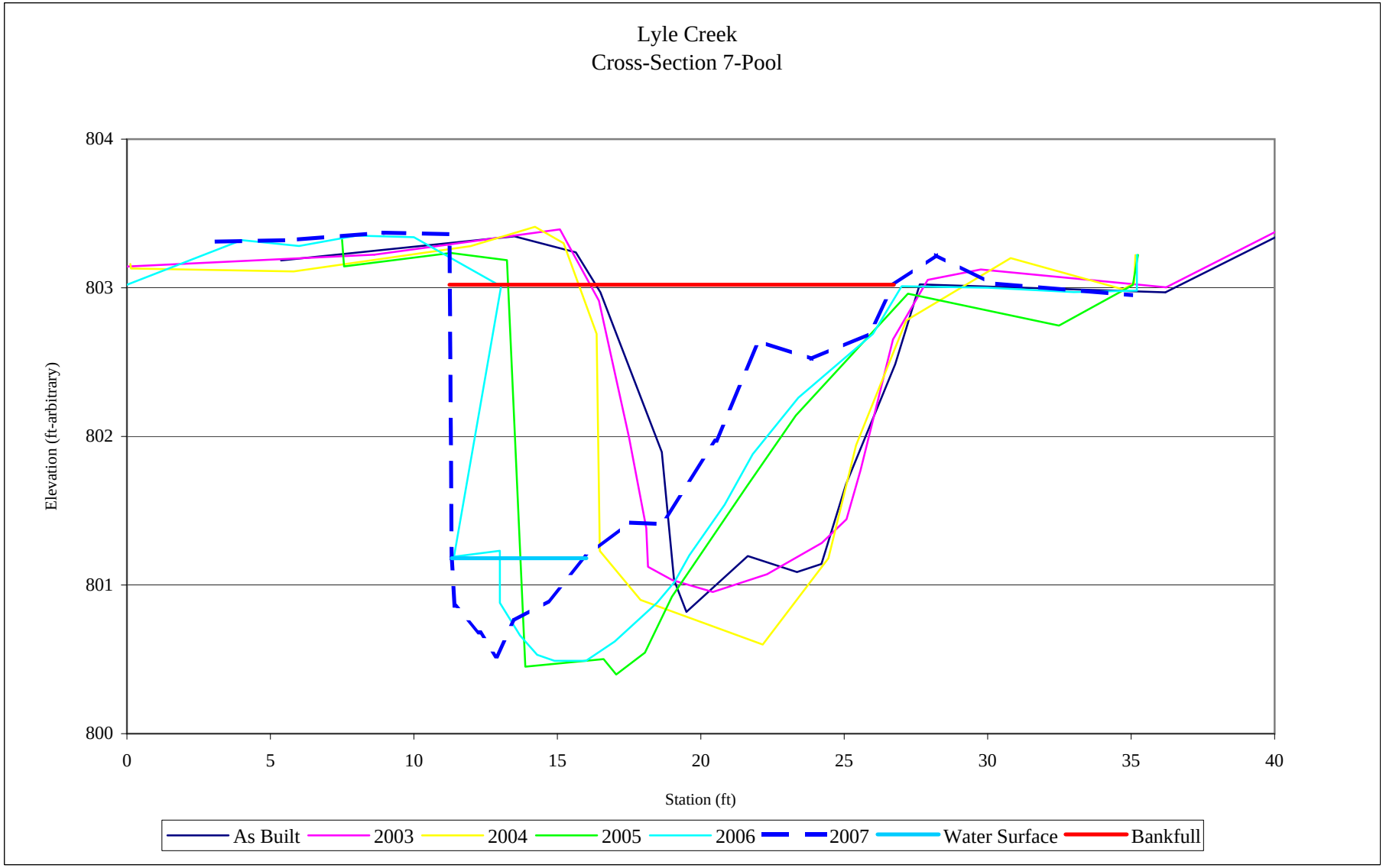

Lyle Creek
Cross-Section 2-Riffle
Elevation (ft-arbitrary)
815
814
813
812
811
810
809
10
15
20
25
30
35
40
Station (ft)
As Built-2002
2003
2004
2005
2006
2007
Water Surface
Bankfull


Lyle Creek
Cross-Section 3-Pool
Elevation (ft-arbitrary)
814
813
812
811
810
809
0
5
10
15
20
25
30
35
40
Station (ft)
As Built-2002
2003
2004
2005
2006
2007
Water Surface
Bankfull


Lyle Creek
Cross-Section 4-Riffle
Elevation (ft-arbitrary)
806
805
804
803
802
801
5
10
15
20
25
30
Station (ft)
As Built-2002
2003
2004
2005
2006
2007
Water Surface
Bankfull


Lyle Creek
Cross-Section 5-Riffle
Elevation (ft-arbitrary)
806
805
804
803
802
801
5
10
15
20
25
30
35
40
45
Station (ft)
As Built-2002
2003
2004
2005
2006
2007
Water Surface
Bankfull


Lyle Creek
Cross-Section 6-Pool
Elevation (ft-arbitrary)
806
805
804
803
802
801
10
15
20
25
30
35
40
45
50
Station (ft)
As Built-2002
2003
2004
2005
2006
2007
Water Surface
Bankfull


Lyle Creek
Cross-Section 7-Pool
804
803
802
801
800
Elevation (ft-arbitrary)
0
5
10
15
20
25
30
35
40
Station (ft)
As Built
2003
2004
2005
2006
2007
Water Surface
Bankfull

Lyle Creek
MY-2004 Longitudinal Profile

TW-2004		
Station	**Elevation**	**Notes**
-10.37	995.51	T
-0.61	995.33	T
5.29	995.59	T
17.57	995.19	T
20.99	995.58	T
31.91	995.90	R
39.53	995.16	P
48.93	995.35	T
60.17	995.49	T
70.11	994.67	T
77.51	995.38	T
90.78	995.40	T
97.44	994.63	T
108.92	995.49	T
113.14	995.57	T
114.74	995.01	P
121.03	994.51	T
131.56	995.32	T
148.55	995.42	R
186.66	994.92	T
204.07	995.11	T
211.91	995.16	RV
214.47	995.00	T
206.90	994.99	T
225.05	994.57	T
241.95	994.85	T
290.73	993.91	T
294.05	994.06	T
304.88	994.28	T
315.34	994.07	T
321.90	993.71	T
326.90	994.18	RV
331.43	993.34	T
335.95	991.90	M
343.35	993.64	T
352.21	994.20	R
372.98	993.90	T
377.87	992.97	M
384.25	993.59	T
407.36	993.69	T
418.53	992.97	T
425.27	992.27	RV
432.36	992.61	T
436.19	993.60	M
444.66	993.54	T
454.86	993.19	T
462.91	993.14	T
468.56	993.50	T
492.84	993.49	T
510.90	993.34	T
517.13	992.71	T
522.60	992.52	T
531.70	993.75	T
533.28	993.37	T
534.70	990.74	RV
544.18	991.80	RV
549.40	992.80	M
554.92	992.62	T
562.12	992.86	T
570.08	992.47	T
579.61	991.73	R
587.46	991.29	T
593.93	992.32	T
595.40	992.49	T
607.07	990.23	T
614.48	991.39	RV
624.63	991.56	M
623.77	991.25	T
640.60	991.06	T
649.79	990.78	T
661.91	991.58	T
680.10	991.42	T
697.37	991.63	T
699.81	990.52	T
705.41	989.83	RV
709.15	990.81	T
713.55	991.30	M
717.26	991.40	T
737.35	991.02	T
752.56	991.04	R
785.32	990.64	T
787.39	990.72	T
797.31	990.42	T
800.99	989.55	P
809.56	990.36	T

Lyle Creek
MY-2007 Longitudinal Profile

2007						
Station	**TW-2007**	**Notes**	**Station**	**WS-2007**	**Station**	**BKF/TOB-2007**
0.00	995.72	U	0.00	995.85	0.00	998.06
23.92	995.65	R	1.00	995.77	30.70	997.48
30.44	995.47	U	11.98	995.75	73.74	997.15
52.12	995.50	P	16.80	995.80	112.29	999.41
61.44	995.25	MP	35.72	995.67	237.11	996.61
63.90	995.57	CV	46.38	995.68	360.67	996.35
66.13	995.51	U	53.49	995.67	421.91	995.38
71.43	995.39	U	61.36	995.67	500.28	995.33
85.27	995.57	U	69.55	995.66	552.54	995.58
103.33	995.43	U	74.87	995.61	665.19	993.30
111.05	995.38	U	88.47	995.50	701.03	993.41
112.24	995.39	CV	106.83	995.51	740.14	992.75
112.60	995.11	MP	112.82	995.51	817.36	992.69
116.67	995.43	U	157.91	995.31	887.24	991.99
133.22	995.39	U	174.31	995.08	889.48	992.69
145.98	995.33	R	182.07	995.08	891.66	992.67
156.86	995.16	R	184.67	995.00	932.31	992.55
164.06	995.09	U	190.66	995.09	973.62	992.13
188.43	995.01	U	205.59	995.07	1017.11	991.24
202.27	994.98	U	211.16	995.03	1055.87	990.83
211.91	995.07	CV	230.25	994.91	1128.22	990.05
214.24	994.57	MP	240.37	994.77	1188.99	989.33
222.96	994.76	U	246.34	994.78	1232.64	989.00
230.96	994.83	R	251.81	994.69	1305.69	988.63
237.95	994.61	U	285.89	994.68	1354.30	988.14
247.13	994.54	U	294.52	994.72	1393.95	987.67
280.48	994.40	U	303.52	994.59	1447.86	987.38
307.49	994.41	P	307.27	994.65	1515.36	986.68
310.01	993.97	P	310.39	994.64	1589.77	986.71
312.51	993.69	MP	310.50	994.53	1601.80	986.44
326.90	994.09	CV	347.69	994.19	1619.83	986.00
344.21	992.47	MP	355.03	994.11	1669.38	985.96
348.30	993.20	P	360.09	994.07	1703.06	985.82
364.08	994.03	R	371.04	993.95	1752.57	986.16
370.86	993.74	P	373.88	994.03	1789.86	984.72
380.05	993.40	P	379.85	993.88	1871.20	984.05
390.81	993.17	MP	394.86	993.92	1931.85	984.49
403.91	993.28	P	402.96	993.98	1931.85	984.49
406.57	993.69	CV	413.69	993.72		
411.16	992.95	MP	430.71	993.72		
419.26	992.96	P	447.31	993.46		
430.88	993.51	U	466.39	993.49		
436.41	993.49	U	475.31	993.45		
455.31	993.43	U	511.44	993.36		
462.47	993.31	U	517.38	993.58		
478.47	993.19	U	524.29	993.60		
492.20	993.29	P	547.12	992.67		
498.89	993.12	P	560.21	992.70		
506.09	992.94	P	566.81	992.49		
510.31	992.86	MP	576.60	992.46		
527.58	993.60	CV	585.72	992.50		
531.70	993.60	P	594.01	992.42		
540.77	991.55	MP	600.33	991.94		
559.16	992.66	R	622.34	991.40		
568.08	991.91	P	624.98	991.56		
575.66	991.11	MP	641.26	991.66		
585.03	991.58	P	652.57	991.51		
594.09	991.74	P	662.51	991.52		
596.62	992.33	CV	682.32	991.64		
598.06	990.39	MP	686.62	991.63		
607.22	991.65	U	688.13	991.63		
619.25	991.60	R	696.63	991.28		
625.00	991.17	P	706.71	991.28		
629.74	991.04	P	708.75	991.28		
637.34	990.41	MP	711.46	991.29		
649.79	991.28	U	717.56	991.33		
661.32	991.19	U	726.48	991.30		
666.62	991.33	U	729.37	991.27		
678.80	991.48	U	731.30	991.19		
692.61	991.67	CV	732.33	991.31		
697.59	990.36	MP	733.69	991.18		
705.02	990.85	P	734.24	991.18		
710.42	991.14	U	734.74	991.14		
723.58	991.08	U	737.22	991.16		
728.51	991.04	U	737.96	991.10		
730.96	991.15	R	747.77	991.11		
733.26	991.01	P	759.81	991.04		
734.73	990.80	MP	762.31	991.10		
743.75	990.97	U	768.77	991.02		
755.51	990.77	U	769.14	991.02		
769.28	990.86	U	775.59	990.84		
773.29	990.77	U	785.99	990.79		
784.85	990.79	U	796.68	990.79		
787.67	990.63	CV	800.52	990.75		
793.61	989.92	MP	829.67	990.68		

2007	
Station	**Elevation**
99.00	811.90
127.38	811.80
237.75	811.48
361.57	810.10
510.43	810.01
630.13	808.08
734.49	807.04
859.18	806.42
1254.24	801.90
1483.40	799.20
1649.64	799.00
1727.45	798.08
1789.25	797.58

Lyle Creek
MY-2004 Longitudinal Profile

TW-2004		
Station	**Elevation**	**Notes**
825.68	990.74	T
838.18	990.52	T
844.38	990.24	M
848.80	989.79	T
854.83	990.43	R
861.65	990.62	T
878.72	990.13	T
894.21	989.82	T
896.77	989.90	T
914.60	989.89	T
929.30	989.13	T
933.64	990.12	T
939.14	990.17	T
943.54	989.01	T
957.85	988.21	T
964.40	988.87	R
969.30	989.44	RV
987.80	988.74	P
997.76	988.39	M
1008.72	988.93	T
1017.43	988.88	R
1018.18	988.32	P
1028.16	988.00	M
1031.61	988.61	T
1049.64	988.60	R
1053.53	988.16	P
1062.01	987.49	M
1072.23	988.17	R
1078.26	988.52	T
1088.25	988.09	T
1102.04	987.48	M
1111.86	986.75	T
1123.31	987.24	R
1131.38	987.17	T
1144.04	987.29	P
1149.24	986.70	M
1155.02	986.39	T
1174.03	986.63	R
1181.42	986.29	T
1186.90	986.40	M
1187.76	986.74	R
1194.43	986.90	T
1195.08	986.07	T
1210.18	986.07	T
1216.10	986.10	T
1228.76	985.75	R
1239.95	985.70	R
1250.69	985.58	T
1253.04	985.87	T
1264.56	985.76	T
1273.38	985.58	T
1283.52	984.57	MP
1301.15	984.55	R
1310.73	984.68	T
1362.14	985.49	T
1363.24	985.16	T
1368.57	984.71	T
1371.99	985.31	R
1376.55	983.95	RV
1385.09	985.01	T
1390.43	984.98	MP
1398.24	985.46	P
1418.31	985.06	MP
1424.14	984.41	T
1429.29	984.79	T
1437.25	984.88	R
1447.25	985.09	P
1462.27	984.55	MP
1468.63	983.98	T
1477.47	984.03	T
1486.28	984.67	R
1497.81	984.96	P
1505.95	984.37	T
1513.40	984.44	MP
1516.42	984.14	T
1523.80	984.49	R
1542.75	984.38	T
1551.79	984.36	P
1559.15	984.31	MP
1563.03	983.39	T
1568.29	983.51	T
1573.15	983.74	T
1579.07	984.58	P
1603.90	983.43	T
1607.97	982.68	MP

Lyle Creek
MY-2007 Longitudinal Profile

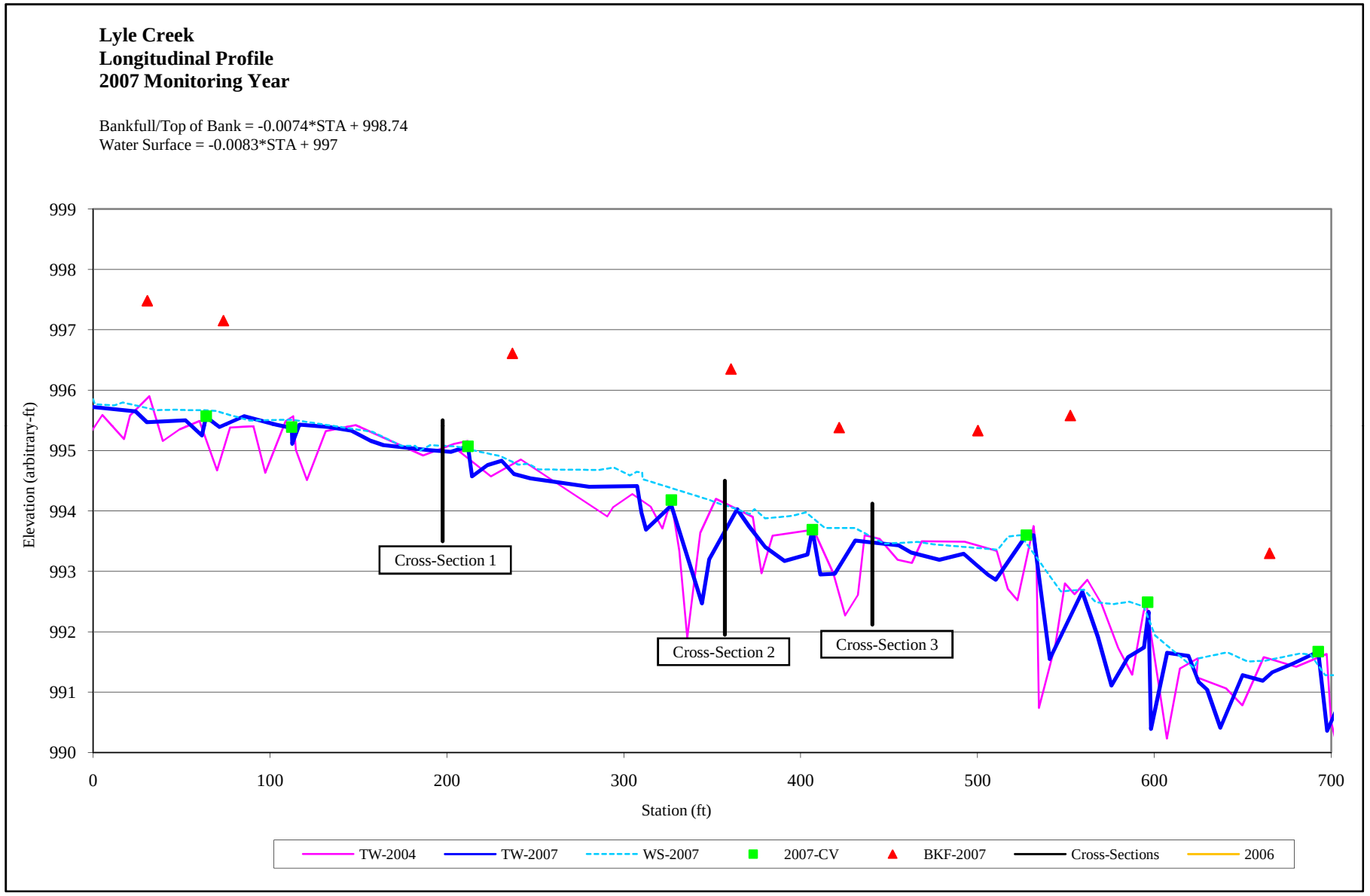
2007						
Station	**TW-2007**	**Notes**	**Station**	**WS-2007**	**Station**	**BKF/TOB-2007**
798.18	990.37	P	832.23	990.61		
801.33	990.60	U	836.70	990.67		
815.63	990.59	U	842.42	990.61		
821.47	990.63	R	842.75	990.65		
828.65	990.49	U	852.99	990.65		
850.04	990.53	U	859.87	990.43		
855.29	990.56	R	876.80	990.29		
860.76	990.43	R	887.23	990.24		
865.47	990.01	R	904.34	990.15		
868.63	989.93	U	907.88	990.12		
874.12	990.01	U	918.26	990.08		
884.88	990.00	U	925.07	990.05		
895.10	990.16	R	929.90	989.97		
898.85	989.99	U	936.77	989.75		
915.49	989.91	U	946.60	989.43		
923.30	989.83	U	955.02	989.37		
937.91	990.01	CV	961.82	989.41		
939.57	989.34	P	963.12	989.40		
943.83	989.00	MP	974.90	989.33		
955.17	989.28	U	986.87	989.16		
970.67	989.18	U	991.25	988.96		
980.84	989.22	R	999.18	988.85		
982.52	989.11	R	1007.09	988.82		
991.42	988.79	R	1016.97	988.89		
998.81	988.60	U	1019.32	988.89		
1007.31	988.72	P	1023.58	988.84		
1017.26	987.34	MP	1028.03	988.86		
1023.29	988.61	U	1029.93	988.79		
1035.50	988.58	U	1041.58	988.83		
1040.78	988.76	R	1046.98	988.63		
1052.53	988.09	R	1055.08	988.26		
1055.76	988.08	U	1067.27	988.22		
1062.42	988.02	U	1091.06	988.10		
1070.65	988.13	R	1097.82	988.10		
1080.66	987.93	U	1097.92	988.16		
1086.78	987.97	R	1128.66	987.93		
1092.52	987.73	P	1142.32	987.32		
1096.03	987.26	MP	1147.90	987.31		
1103.56	987.70	P	1152.68	987.24		
1115.99	987.76	P	1162.91	987.31		
1119.88	987.80	R	1190.04	986.47		
1135.89	987.33	P	1197.27	986.44		
1147.58	986.46	P	1208.89	986.26		
1154.80	986.36	MP	1223.75	986.20		
1163.47	986.71	P	1232.27	986.18		
1167.63	986.75	U	1249.54	986.00		
1177.76	987.01	R	1264.51	985.71		
1189.43	986.21	P	1269.58	985.69		
1193.47	986.06	MP	1269.91	985.68		
1195.54	986.26	P	1279.17	985.65		
1197.20	985.99	P	1289.36	985.66		
1203.08	985.81	P	1294.07	985.70		
1217.35	986.18	R	1294.85	985.65		
1223.42	985.95	P	1320.18	985.65		
1231.75	985.60	MP	1324.99	985.66		
1239.01	986.03	R	1345.91	985.61		
1250.63	985.81	R	1353.69	985.61		
1264.04	985.52	P	1361.86	985.57		
1270.45	984.64	P	1371.77	985.54		
1278.89	984.44	P	1376.00	985.62		
1289.08	985.06	P	1385.82	985.50		
1293.27	984.81	P	1387.96	985.57		
1298.75	984.72	P	1395.05	985.51		
1308.90	984.70	P	1395.49	985.51		
1319.31	984.89	P	1411.84	985.27		
1330.07	985.19	P	1422.76	985.05		
1345.66	985.52	U	1424.72	985.03		
1362.14	985.49	CV	1431.29	985.14		
1365.07	984.12	MP	1445.64	985.03		
1384.91	984.16	P	1459.27	984.84		
1402.29	985.39	R	1468.60	984.72		
1417.80	985.03	P	1475.16	984.77		
1422.73	984.40	P	1481.12	984.72		
1430.97	984.35	MP	1495.14	984.85		
1439.23	984.58	P	1502.67	984.81		
1452.00	984.94	P	1504.61	984.82		
1466.34	983.91	P	1506.30	984.59		
1500.98	984.72	R	1508.29	984.80		
1507.63	984.62	P	1508.63	984.51		
1514.22	983.86	P	1512.34	984.32		
1520.02	983.86	P	1512.36	984.27		
1522.56	983.95	P	1516.88	984.34		
1555.11	984.15	R	1524.70	984.32		
1560.17	983.98	P	1528.03	984.34		
1562.43	983.54	P	1537.40	984.33		

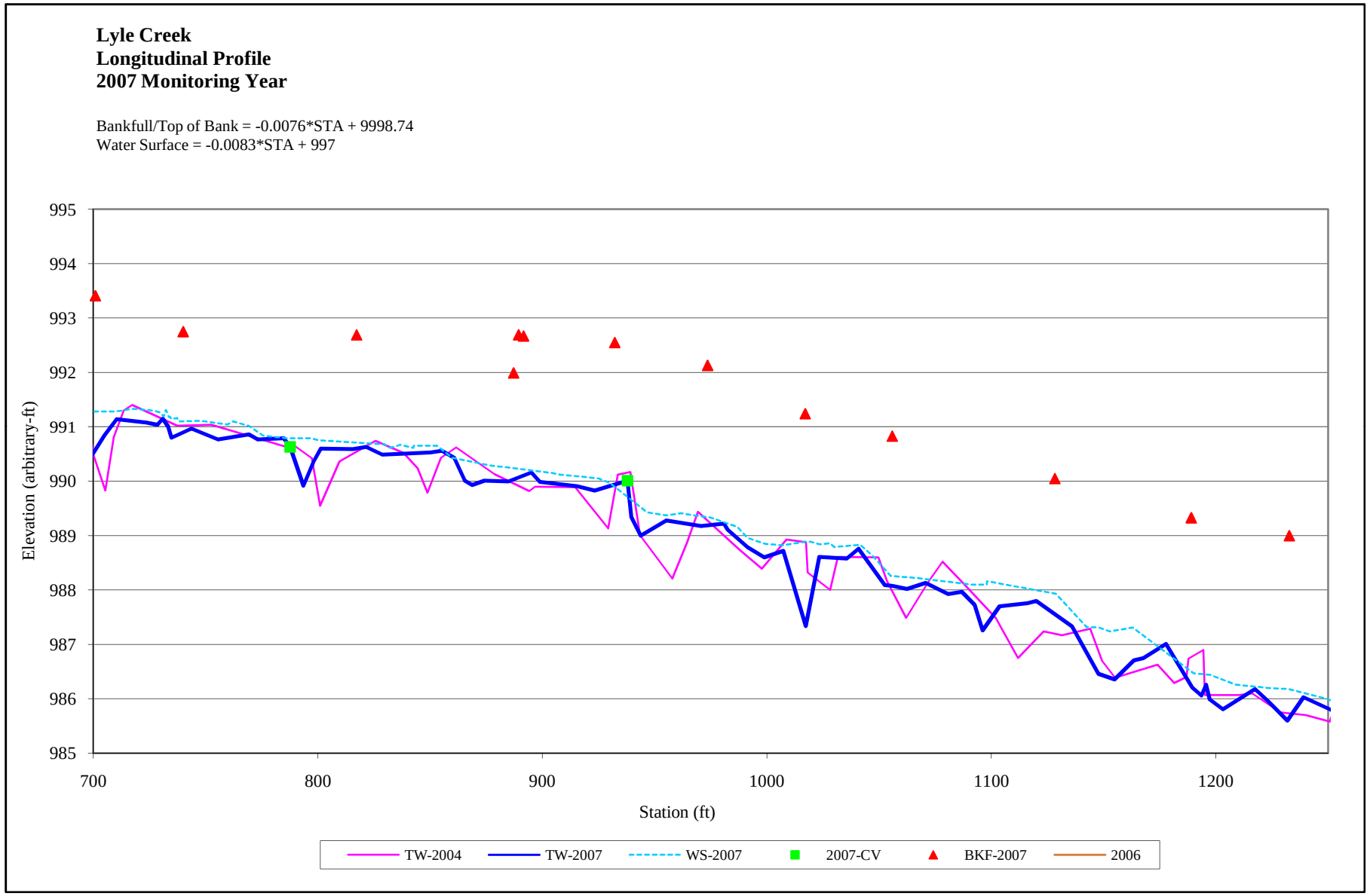
Lyle Creek
MY-2004 Longitudinal Profile

TW-2004		
Station	**Elevation**	**Notes**
1611.98	983.28	G
1625.60	983.26	R
1636.30	983.65	P
1646.25	983.00	MP
1658.26	982.58	T
1679.60	982.46	T
1690.54	982.68	R
1699.39	982.85	P
1703.87	982.68	MP
1715.51	982.20	T
1721.94	982.63	T
1729.75	981.57	R
1740.41	982.51	R
1753.05	982.60	T
1772.30	982.07	P
1777.42	981.36	MP
1786.76	982.79	T
1790.79	981.91	R
1799.67	981.83	P
1811.52	981.48	MP
1827.50	981.60	RV
1837.41	981.58	T
1853.88	981.77	T
1869.98	980.96	T
1877.18	981.67	T
1878.02	980.36	T
1883.94	979.61	T
1892.05	979.90	MP
1899.12	980.65	RV
1908.88	980.19	T
1928.04	980.47	T
1931.60	980.70	MP
1936.78	981.00	T
1941.42	979.55	MP
1954.11	979.25	T
1959.13	978.43	R
1971.54	980.15	RV
1972.76	979.62	T
1980.23	978.34	P
1987.30	978.39	T
1992.37	979.15	RV
2001.66	980.08	P
2011.05	979.20	T
2016.41	979.72	MP

Lyle Creek
MY-2007 Longitudinal Profile

2007						
Station	**TW-2007**	**Notes**	**Station**	**WS-2007**	**Station**	**BKF/TOB-2007**
1571.77	982.97	MP	1551.79	984.31		
1576.71	983.03	P	1564.98	984.04		
1580.92	983.96	R	1565.63	983.99		
1586.73	983.78	P	1567.87	984.03		
1593.38	983.28	MP	1568.52	984.06		
1597.99	983.62	R	1571.69	983.98		
1604.84	983.32	P	1576.21	983.97		
1607.73	982.79	MP-LV	1577.80	983.97		
1612.72	983.14	P	1580.18	983.97		
1617.95	982.89	P	1580.39	984.07		
1624.51	983.07	P	1580.71	984.01		
1637.52	983.00	P	1581.32	983.98		
1650.13	982.92	P	1587.86	983.73		
1655.99	983.14	P	1588.60	983.75		
1661.76	982.18	P	1591.43	983.76		
1664.50	982.04	P	1595.66	983.73		
1671.64	981.91	MP	1601.88	983.57		
1676.17	982.62	P	1603.89	983.42		
1678.47	982.52	P	1605.39	983.27		
1685.63	982.49	P	1608.45	983.31		
1689.64	982.75	R	1612.61	983.26		
1708.66	982.60	P	1617.40	983.27		
1711.50	982.32	P	1618.96	983.30		
1718.45	982.18	P	1619.43	983.29		
1724.02	982.01	P	1621.38	983.27		
1739.11	981.94	MP	1623.79	983.26		
1745.50	982.45	P	1629.79	983.27		
1763.81	982.66	P	1643.83	983.26		
1770.04	982.70	R	1646.91	983.25		
1786.76	982.59	CV	1651.93	983.27		
1788.23	981.67	P	1654.47	983.19		
1795.00	981.47	MP	1655.83	983.05		
1800.48	981.75	R	1662.39	982.89		
1808.66	981.49	P	1664.02	982.87		
1812.55	980.98	MP	1670.47	982.90		
1821.17	981.48	U	1680.85	982.88		
1833.04	981.47	U	1685.98	982.90		
1842.16	981.33	U	1690.46	982.85		
1865.06	981.03	P	1690.78	982.83		
1871.20	980.44	MP	1693.56	982.83		
1877.18	981.67	CV	1697.98	982.76		
1884.26	980.23	P	1712.16	982.73		
1896.95	979.83	MP	1719.66	982.76		
1901.31	980.30	P	1724.96	982.74		
1905.66	980.86	P	1726.21	982.70		
1930.67	980.10	P	1736.90	982.71		
1936.78	981.17	CV	1740.22	982.70		
1804.50	796.62	P	1748.77	982.75		
1825.50	797.40	P	1753.74	982.81		
			1768.84	982.73		
			1773.69	982.24		
			1782.95	981.94		
			1793.97	981.75		
			1794.71	981.69		
			1799.13	981.85		
			1801.93	981.79		
			1805.05	981.67		
			1805.17	981.68		
			1809.27	981.67		
			1809.67	981.63		
			1816.52	981.66		
			1825.03	981.64		
			1827.76	981.52		
			1842.20	981.41		
			1851.02	981.30		
			1852.96	981.30		
			1860.26	981.20		
			1862.89	981.19		
			1863.46	981.20		
			1866.62	981.21		
			1871.44	981.12		
			1874.31	981.26		
			1893.24	981.21		
			1904.98	981.21		
			1910.94	981.13		
			1912.48	981.15		
			1919.01	981.15		
			1930.79	981.14		
			1939.00	981.15		

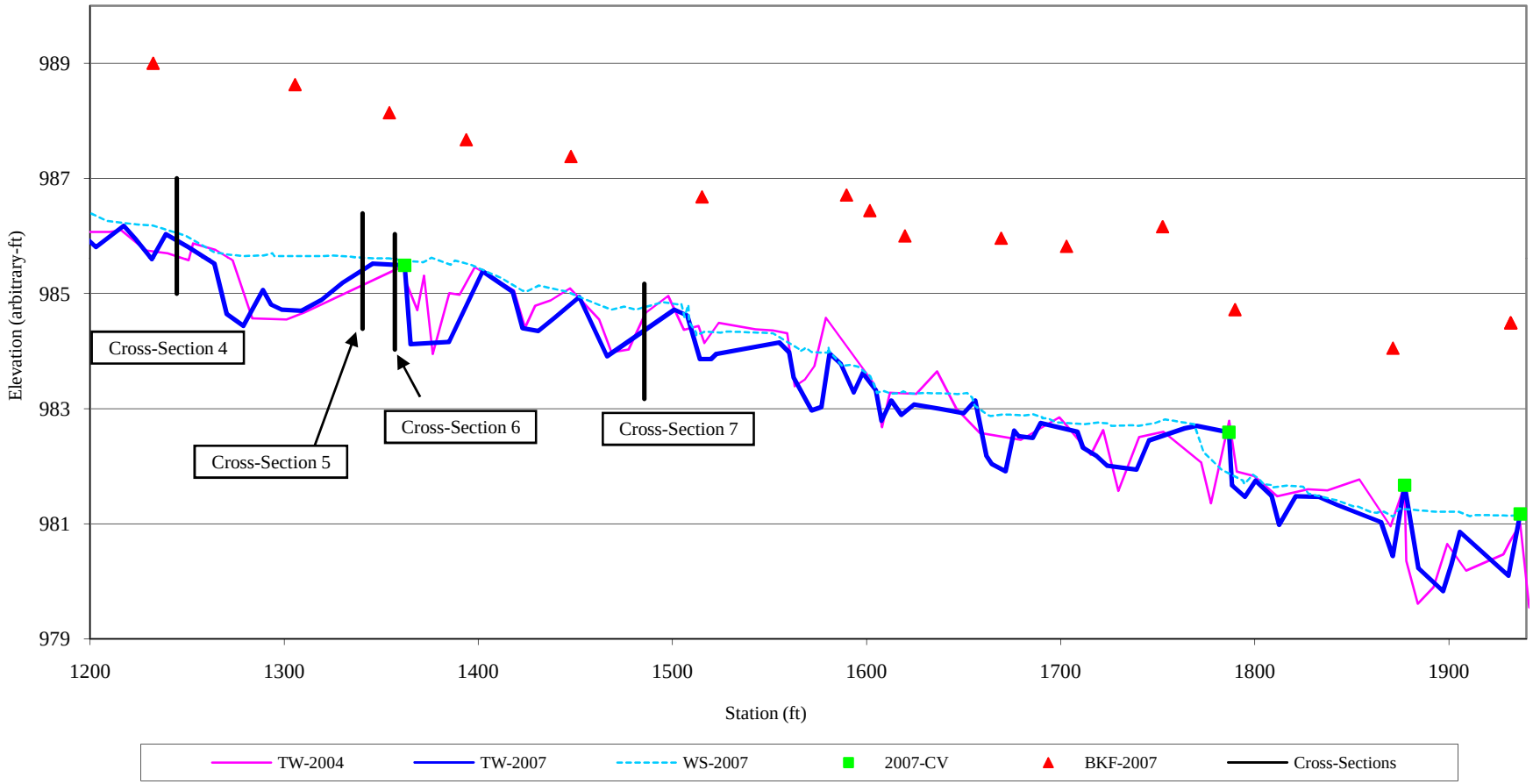

Lyle Creek
Longitudinal Profile
2007 Monitoring Year
Bankfull/Top of Bank = -0.0074*STA + 998.74
Water Surface = -0.0083*STA + 997
Elevation (arbitrary-ft)
999
998
997
996
995
994
993
992
991
990
0
100
200
300
400
500
600
700
Station (ft)
Cross-Section 1
Cross-Section 2
Cross-Section 3
TW-2004
TW-2007
WS-2007
2007-CV
BKF-2007
Cross-Sections
2006



Appendix 2.7 Longitudinal Plots and Raw Data Tables
Lyle Creek Stream Restoration
Year 5 of 5

Lyle Creek
Longitudinal Profile
2007 Monitoring Year

Bankfull/Top of Bank = -0.0076*STA + 998.74
Water Surface = -0.0083*STA + 997



Project Name: Lyle Creek
Cross-Section: 1
Feature: Pool

			As Built			2003			2006			2007		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	9	24%	24%	14	14%	14%	26	26%	26%	22	22%	22%
Sand	very fine sand	0.125	10	26%	50%	14	14%	28%	24	24%	50%	6	6%	28%
	fine sand	0.250	6	16%	66%	9	9%	37%	16	16%	66%	24	24%	52%
	medium sand	0.50	5	13%	79%	22	22%	60%	14	14%	80%	31	31%	83%
	coarse sand	1.00	5	13%	92%	24	24%	84%	6	6%	86%	7	7%	90%
	very coarse sand	2.0	0	0%	92%	10	10%	94%	6	6%	92%	7	7%	97%
Gravel	very fine gravel	4.0	2	5%	97%	2	2%	96%	0	0%	92%	2	2%	99%
	fine gravel	5.7	0	0%	97%	1	1%	97%	1	1%	93%	0	0%	99%
	fine gravel	8.0	0	0%	97%	0	0%	97%	2	2%	95%	0	0%	99%
	medium gravel	11.3	0	0%	97%	1	1%	98%	3	3%	98%	0	0%	99%
	medium gravel	16.0	0	0%	97%	0	0%	98%	0	0%	98%	1	1%	100%
	course gravel	22.3	0	0%	97%	0	0%	98%	2	2%	100%	0	0%	100%
	course gravel	32.0	0	0%	97%	1	1%	99%	0	0%	100%	0	0%	100%
	very coarse gravel	45	0	0%	97%	0	0%	99%	0	0%	100%	0	0%	100%
	very coarse gravel	64	1	3%	100%	0	0%	99%	0	0%	100%	0	0%	100%
Cobble	small cobble	90	0	0%	100%	1	1%	100%	0	0%	100%	0	0%	100%
	medium cobble	128	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	large cobble	180	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	very large cobble	256	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
Boulder	small boulder	362	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	small boulder	512	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	medium boulder	1024	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	large boulder	2048	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	TOTAL/%of whole count		38	100%	100%	99	100%	100%	100	100%	100%	100	100%	100%

Project Name: Lyle Creek
Cross-Section: 2
Feature: Riffle

			As Built			2003			2006			2007		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0-0.062	9	15%	15%	14	14%	14%	10	10%	10%	9	9%	9%
Sand	very fine sand	0.062-0.125	9	15%	30%	17	17%	30%	36	36%	46%	6	6%	15%
	fine sand	0.125-0.25	12	20%	50%	11	11%	41%	10	10%	56%	29	29%	44%
	medium sand	0.25-0.50	2	3%	53%	17	17%	58%	20	20%	76%	38	38%	82%
	coarse sand	0.50-1.0	4	7%	60%	7	7%	65%	12	12%	88%	16	16%	98%
	very coarse sand	1.0-2.0	0	0%	60%	8	8%	73%	12	12%	100%	0	0%	98%
G r a v e l	very fine gravel	2.0-4.0	3	5%	65%	3	3%	75%	0	0%	100%	0	0%	98%
	fine gravel	4.0-5.7	1	2%	67%	3	3%	78%	0	0%	100%	0	0%	98%
	fine gravel	5.7-8.0	3	5%	72%	2	2%	80%	0	0%	100%	0	0%	98%
	medium gravel	8.0-11.3	2	3%	75%	0	0%	80%	0	0%	100%	0	0%	98%
	medium gravel	11.3-16.0	3	5%	80%	4	4%	84%	0	0%	100%	0	0%	98%
	course gravel	16.0-22.6	6	10%	90%	3	3%	87%	0	0%	100%	1	1%	99%
	course gravel	22.6-32.0	1	2%	92%	5	5%	92%	0	0%	100%	1	1%	100%
	very coarse gravel	32-45	4	7%	98%	5	5%	97%	0	0%	100%	0	0%	100%
	very coarse gravel	45-64	1	2%	100%	1	1%	98%	0	0%	100%	0	0%	100%
Cobble	small cobble	64-90	0	0%	100%	2	2%	100%	0	0%	100%	0	0%	100%
	medium cobble	90-128	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	large cobble	128-180	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	very large cobble	180-256	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
Boulder	small boulder	256-362	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	small boulder	362-512	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	medium boulder	512-1024	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	large boulder	1024-2048	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	TOTAL/%of whole count		60	100%	100%	102	100%	100%	100	100%	100%	100	100%	100%

Project Name: Lyle Creek
Cross-Section: 3
Feature: Pool

			As Built			2003			2006			2007		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0-0.062	9	15%	15%	18	18%	18%	28	28%	28%	13	13%	13%
Sand	very fine sand	0.062-0.125	9	15%	30%	14	14%	32%	25	25%	53%	17	17%	30%
	fine sand	0.125-0.25	12	20%	50%	1	1%	33%	20	20%	73%	19	19%	49%
	medium sand	0.25-0.50	2	3%	53%	10	10%	43%	5	5%	78%	26	26%	75%
	coarse sand	0.50-1.0	4	7%	60%	37	37%	79%	2	2%	80%	7	7%	82%
	very coarse sand	1.0-2.0	0	0%	60%	14	14%	93%	4	4%	84%	10	10%	92%
G r a v e l	very fine gravel	2.0-4.0	3	5%	65%	3	3%	96%	2	2%	86%	2	2%	94%
	fine gravel	4.0-5.7	1	2%	67%	1	1%	97%	4	4%	90%	1	1%	95%
	fine gravel	5.7-8.0	3	5%	72%	0	0%	97%	3	3%	93%	0	0%	95%
	medium gravel	8.0-11.3	2	3%	75%	0	0%	97%	3	3%	96%	0	0%	95%
	medium gravel	11.3-16.0	3	5%	80%	3	3%	100%	4	4%	100%	0	0%	95%
	course gravel	16.0-22.6	6	10%	90%	0	0%	100%	0	0%	100%	3	3%	98%
	course gravel	22.6-32.0	1	2%	92%	0	0%	100%	0	0%	100%	0	0%	98%
	very coarse gravel	32-45	4	7%	98%	0	0%	100%	0	0%	100%	1	1%	99%
	very coarse gravel	45-64	1	2%	100%	0	0%	100%	0	0%	100%	0	0%	99%
Cobble	small cobble	64-90	0	0%	100%	0	0%	100%	0	0%	100%	1	1%	100%
	medium cobble	90-128	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	large cobble	128-180	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	very large cobble	180-256	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
Boulder	small boulder	256-362	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	small boulder	362-512	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	medium boulder	512-1024	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	large boulder	1024-2048	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	TOTAL/%of whole count		60	100%	100%	101	100%	100%	100	100%	100%	100	100%	100%

Project Name: Lyle Creek
Cross-Section: 4
Feature: Riffle

			As Built			2003			2006			2007		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0-0.062	9	15%	15%	34	37%	37%	21	21%	21%	27	27%	27%
Sand	very fine sand	0.062-0.125	9	15%	30%	12	13%	49%	33	33%	54%	7	7%	34%
	fine sand	0.125-0.25	12	20%	50%	4	4%	54%	20	20%	74%	19	19%	53%
	medium sand	0.25-0.50	2	3%	53%	8	9%	62%	0	0%	74%	14	14%	67%
	coarse sand	0.50-1.0	4	7%	60%	17	18%	81%	0	0%	74%	5	5%	72%
	very coarse sand	1.0-2.0	0	0%	60%	1	1%	82%	0	0%	74%	2	2%	74%
Gravel	very fine gravel	2.0-4.0	3	5%	65%	2	2%	84%	0	0%	74%	0	0%	74%
	fine gravel	4.0-5.7	1	2%	67%	2	2%	86%	0	0%	74%	0	0%	74%
	fine gravel	5.7-8.0	3	5%	72%	3	3%	89%	0	0%	74%	1	1%	75%
	medium gravel	8.0-11.3	2	3%	75%	1	1%	90%	0	0%	74%	0	0%	75%
	medium gravel	11.3-16.0	3	5%	80%	0	0%	90%	4	4%	78%	2	2%	77%
	course gravel	16.0-22.6	6	10%	90%	0	0%	90%	0	0%	78%	3	3%	80%
	course gravel	22.6-32.0	1	2%	92%	4	4%	95%	5	5%	83%	8	8%	88%
	very coarse gravel	32-45	4	7%	98%	1	1%	96%	2	2%	85%	4	4%	92%
	very coarse gravel	45-64	1	2%	100%	2	2%	98%	5	5%	90%	3	3%	95%
Cobble	small cobble	64-90	0	0%	100%	0	0%	98%	6	6%	96%	3	3%	98%
	medium cobble	90-128	0	0%	100%	1	1%	99%	4	4%	100%	2	2%	100%
	large cobble	128-180	0	0%	100%	1	1%	100%	0	0%	100%	0	0%	100%
	very large cobble	180-256	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
Boulder	small boulder	256-362	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	small boulder	362-512	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	medium boulder	512-1024	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	large boulder	1024-2048	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	TOTAL/%of whole count		60	100%	100.00%	93	100%	100%	100	100%	100%	100	100%	100%

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

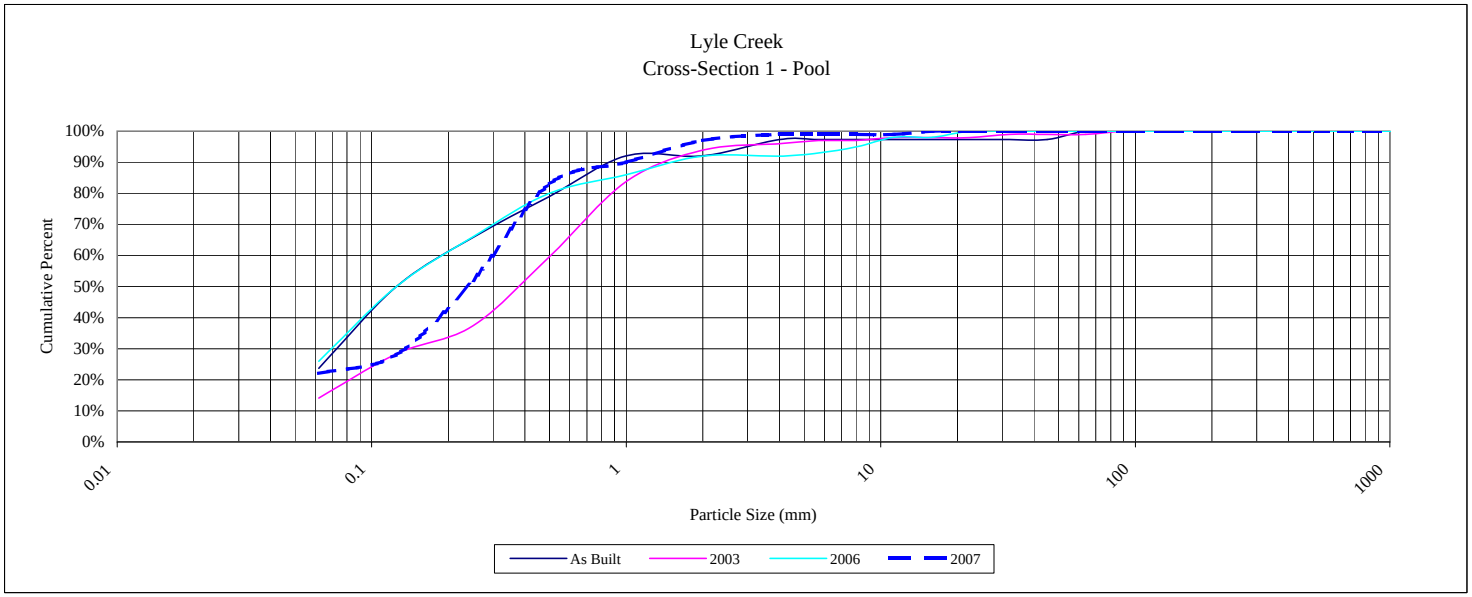
			As Built			2003			2006			2007		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0-0.062	9	15%	15%	13	13%	13%	13	13%	13%	6	6%	6%
Sand	very fine sand	0.062-0.125	9	15%	30%	16	16%	29%	0	0%	13%	24	24%	30%
	fine sand	0.125-0.25	12	20%	50%	16	16%	45%	8	8%	21%	25	25%	55%
	medium sand	0.25-0.50	2	3%	53%	6	6%	52%	2	2%	23%	11	11%	66%
	coarse sand	0.50-1.0	4	7%	60%	6	6%	58%	10	10%	33%	13	13%	79%
	very coarse sand	1.0-2.0	0	0%	60%	3	3%	61%	0	0%	33%	1	1%	80%
Gravel	very fine gravel	2.0-4.0	3	5%	65%	1	1%	62%	0	0%	33%	0	0%	80%
	fine gravel	4.0-5.7	1	2%	67%	2	2%	64%	0	0%	33%	0	0%	80%
	fine gravel	5.7-8.0	3	5%	72%	6	6%	70%	0	0%	33%	0	0%	80%
	medium gravel	8.0-11.3	2	3%	75%	4	4%	74%	0	0%	33%	0	0%	80%
	medium gravel	11.3-16.0	3	5%	80%	4	4%	78%	0	0%	33%	3	3%	83%
	course gravel	16.0-22.6	6	10%	90%	9	9%	87%	8	8%	41%	6	6%	89%
	course gravel	22.6-32.0	1	2%	92%	7	7%	94%	14	14%	55%	5	5%	94%
	very coarse gravel	32-45	4	7%	98%	4	4%	98%	14	14%	69%	4	4%	98%
	very coarse gravel	45-64	1	2%	100%	2	2%	100%	15	15%	84%	1	1%	99%
Cobble	small cobble	64-90	0	0%	100%	0	0%	100%	8	8%	92%	0	0%	99%
	medium cobble	90-128	0	0%	100%	0	0%	100%	4	4%	96%	0	0%	99%
	large cobble	128-180	0	0%	100%	0	0%	100%	4	4%	100%	1	1%	100%
	very large cobble	180-256	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
Boulder	small boulder	256-362	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	small boulder	362-512	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	medium boulder	512-1024	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	large boulder	1024-2048	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	TOTAL/%of whole count		60	100%	100%	99	100%	100%	100	100%	100%	100	100%	100%

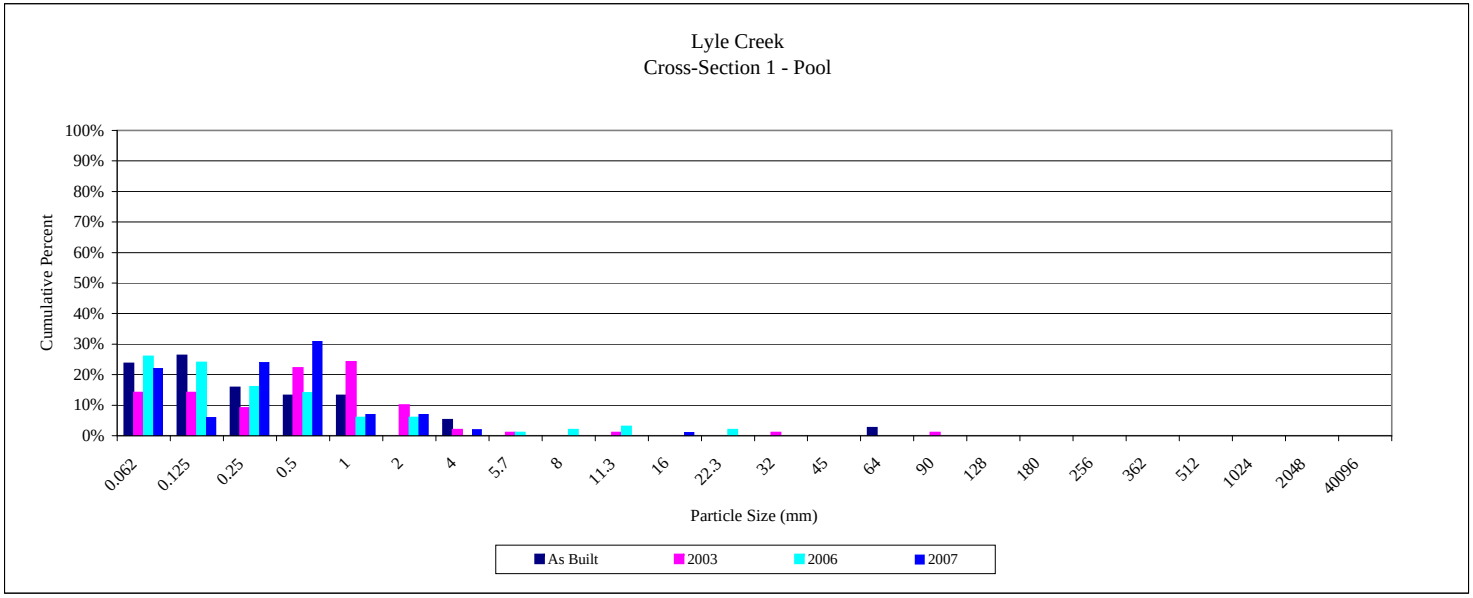
Project Name: Lyle Creek
Cross-Section: 6
Feature: Pool

			As Built			2003			2006			2007		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0-0.062	9	23%	23%	13	13%	13%	20	20%	20%	13	13%	13%
Sand	very fine sand	0.062-0.125	10	25%	48%	25	25%	38%	2	2%	22%	12	12%	25%
	fine sand	0.125-0.25	6	15%	63%	2	2%	40%	10	10%	32%	17	17%	42%
	medium sand	0.25-0.50	5	13%	75%	2	2%	42%	5	5%	37%	7	7%	49%
	coarse sand	0.50-1.0	5	13%	88%	9	9%	51%	9	9%	46%	1	1%	50%
	very coarse sand	1.0-2.0	0	0%	88%	4	4%	55%	0	0%	46%	4	4%	54%
G r a v e l	very fine gravel	2.0-4.0	2	5%	93%	3	3%	58%	0	0%	46%	2	2%	56%
	fine gravel	4.0-5.7	0	0%	93%	1	1%	59%	0	0%	46%	0	0%	56%
	fine gravel	5.7-8.0	0	0%	93%	1	1%	60%	0	0%	46%	3	3%	59%
	medium gravel	8.0-11.3	0	0%	93%	0	0%	60%	0	0%	46%	0	0%	59%
	medium gravel	11.3-16.0	2	5%	98%	6	6%	66%	6	6%	52%	3	3%	62%
	course gravel	16.0-22.6	0	0%	98%	4	4%	70%	12	12%	64%	3	3%	65%
	course gravel	22.6-32.0	0	0%	98%	8	8%	78%	6	6%	70%	11	11%	76%
	very coarse gravel	32-45	0	0%	98%	15	15%	93%	13	13%	83%	16	16%	92%
	very coarse gravel	45-64	1	3%	100%	7	7%	100%	2	2%	85%	5	5%	97%
Cobble	small cobble	64-90	0	0%	100%	0	0%	100%	6	6%	91%	2	2%	99%
	medium cobble	90-128	0	0%	100%	0	0%	100%	1	1%	92%	0	0%	99%
	large cobble	128-180	0	0%	100%	0	0%	100%	3	3%	95%	1	1%	100%
	very large cobble	180-256	0	0%	100%	0	0%	100%	5	5%	100%	0	0%	100%
Boulder	small boulder	256-362	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	small boulder	362-512	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	medium boulder	512-1024	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	large boulder	1024-2048	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
TOTAL/%of whole count			40	100%	100.00%	100	100%	100%	100	100%	100%	100	100%	100%

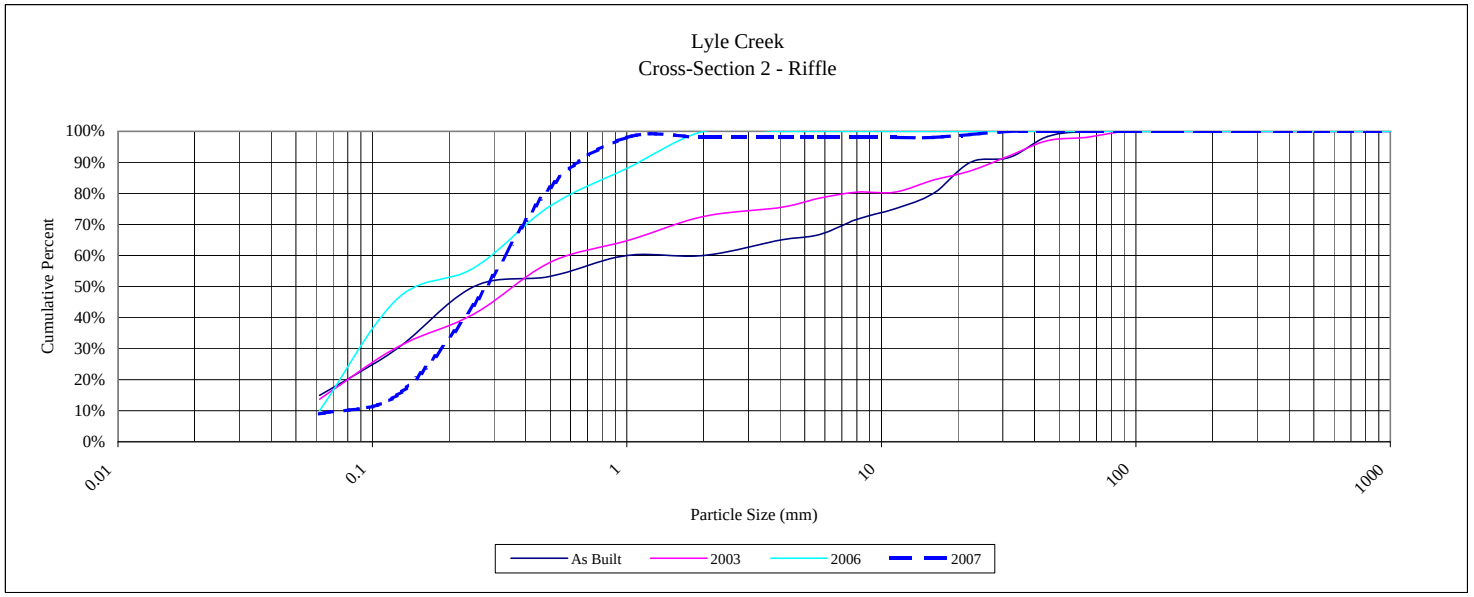
Project Name: Lyle Creek
Cross-Section: 7
Feature: Pool

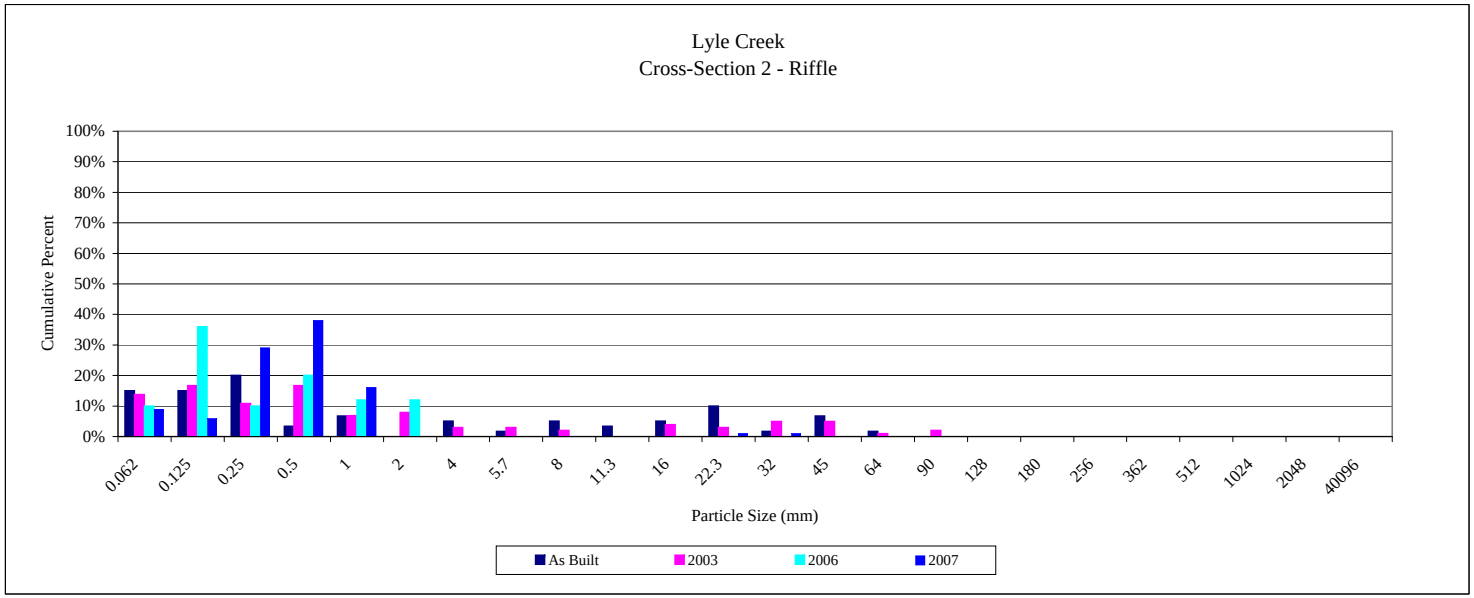
			As Built			2003			2006			2007		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0-0.062	9	15%	15%	11	11%	11%	37	37%	37%	20	20%	20%
Sand	very fine sand	0.062-0.125	9	15%	30%	19	19%	30%	20	20%	57%	13	13%	33%
	fine sand	0.125-0.25	12	20%	50%	12	12%	42%	33	33%	90%	12	12%	45%
	medium sand	0.25-0.50	2	3%	53%	10	10%	52%	8	8%	98%	30	30%	75%
	coarse sand	0.50-1.0	4	7%	60%	25	25%	77%	2	2%	100%	17	17%	92%
	very coarse sand	1.0-2.0	0	0%	60%	5	5%	82%	0	0%	100%	5	5%	97%
G r a v e l	very fine gravel	2.0-4.0	3	5%	65%	2	2%	84%	0	0%	100%	0	0%	97%
	fine gravel	4.0-5.7	1	2%	67%	1	1%	85%	0	0%	100%	1	1%	98%
	fine gravel	5.7-8.0	3	5%	72%	1	1%	86%	0	0%	100%	0	0%	98%
	medium gravel	8.0-11.3	2	3%	75%	1	1%	87%	0	0%	100%	2	2%	100%
	medium gravel	11.3-16.0	3	5%	80%	0	0%	87%	0	0%	100%	0	0%	100%
	course gravel	16.0-22.6	6	10%	90%	5	5%	92%	0	0%	100%	0	0%	100%
	course gravel	22.6-32.0	1	2%	92%	4	4%	96%	0	0%	100%	0	0%	100%
	very coarse gravel	32-45	4	7%	98%	4	4%	100%	0	0%	100%	0	0%	100%
	very coarse gravel	45-64	1	2%	100%	0	0%	100%	0	0%	100%	0	0%	100%
Cobble	small cobble	64-90	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	medium cobble	90-128	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	large cobble	128-180	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	very large cobble	180-256	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
Boulder	small boulder	256-362	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	small boulder	362-512	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	medium boulder	512-1024	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	large boulder	1024-2048	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%	0	0%	100%	0	0%	100%	0	0%	100%
	TOTAL/%of whole count		60	100%	100%	100	100%	100%	100	100%	100%	100	100%	100%

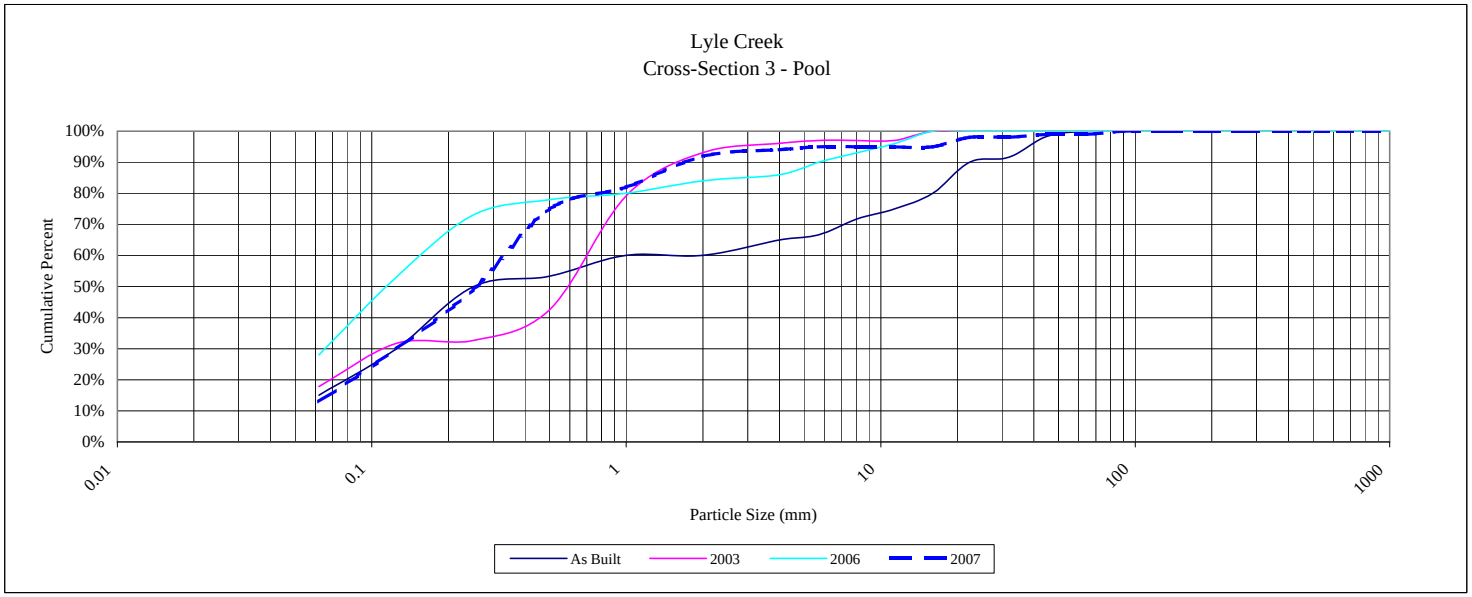


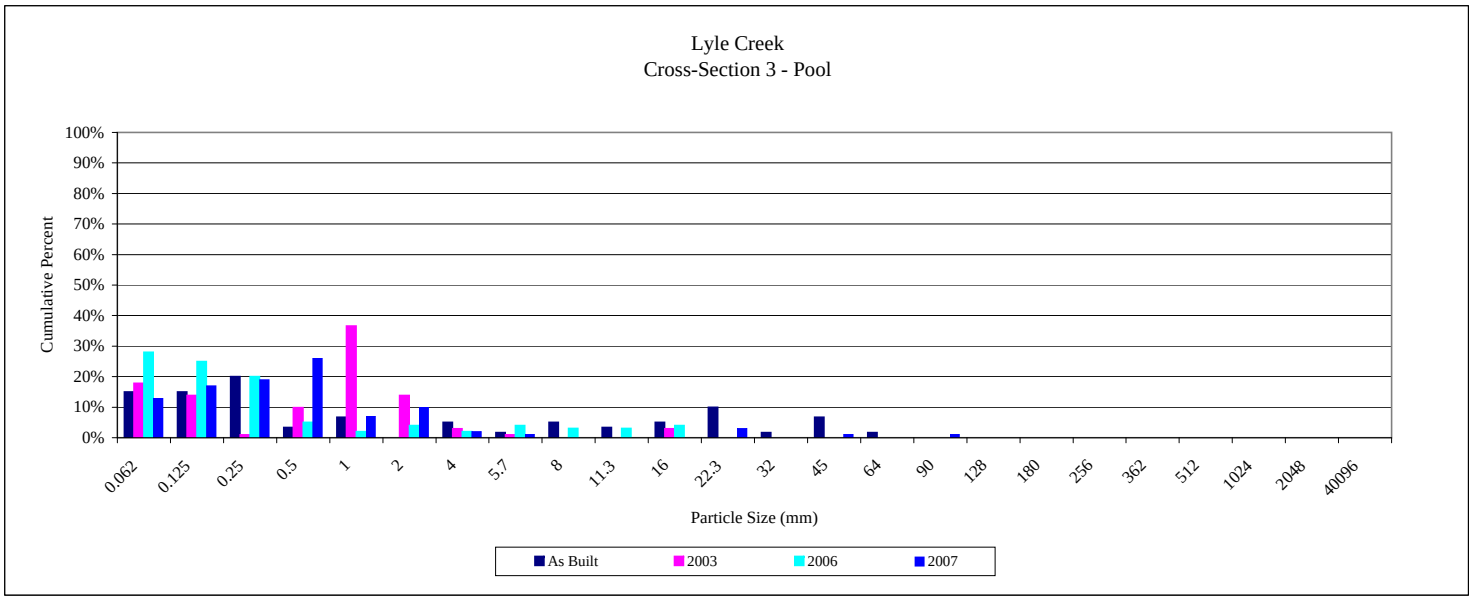


Appendix 2.8 Pebble Count Plots and Raw Data Tables
Lyle Creek Stream Restoration
Year 5 of 5

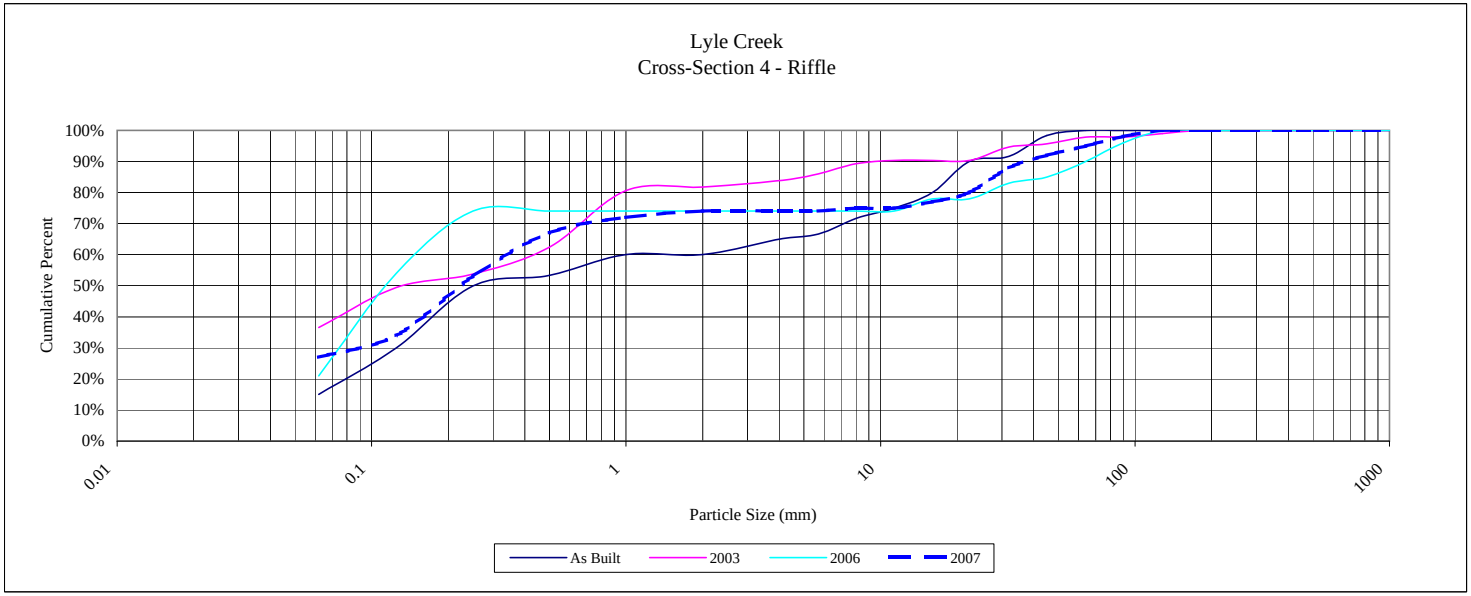

Lyle Creek
Cross-Section 2 - Riffle
Cumulative Percent
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.01
0.1
1
10
100
1000
Particle Size (mm)
As Built
2003
2006
2007

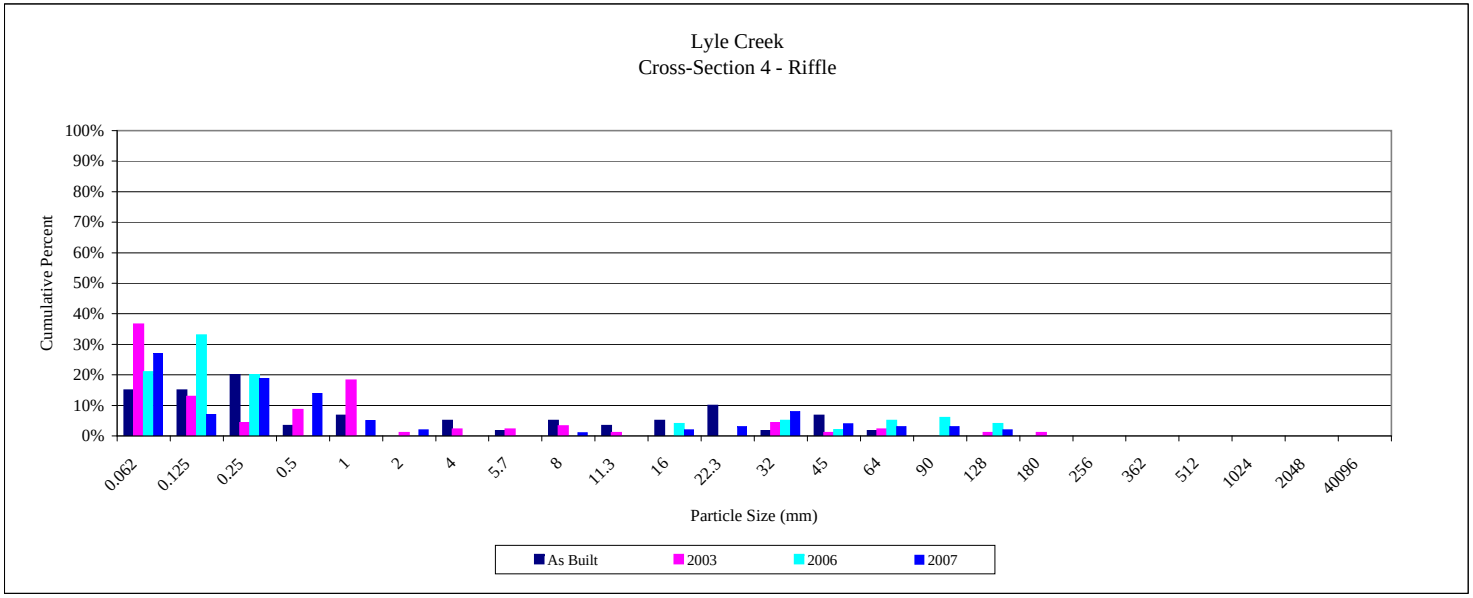

Lyle Creek
Cross-Section 2 - Riffle
Cumulative Percent
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.062
0.125
0.25
0.5
1
2
4
5.7
8
11.3
16
22.3
32
45
64
90
128
180
256
362
512
1024
2048
40096
Particle Size (mm)
As Built
2003
2006
2007



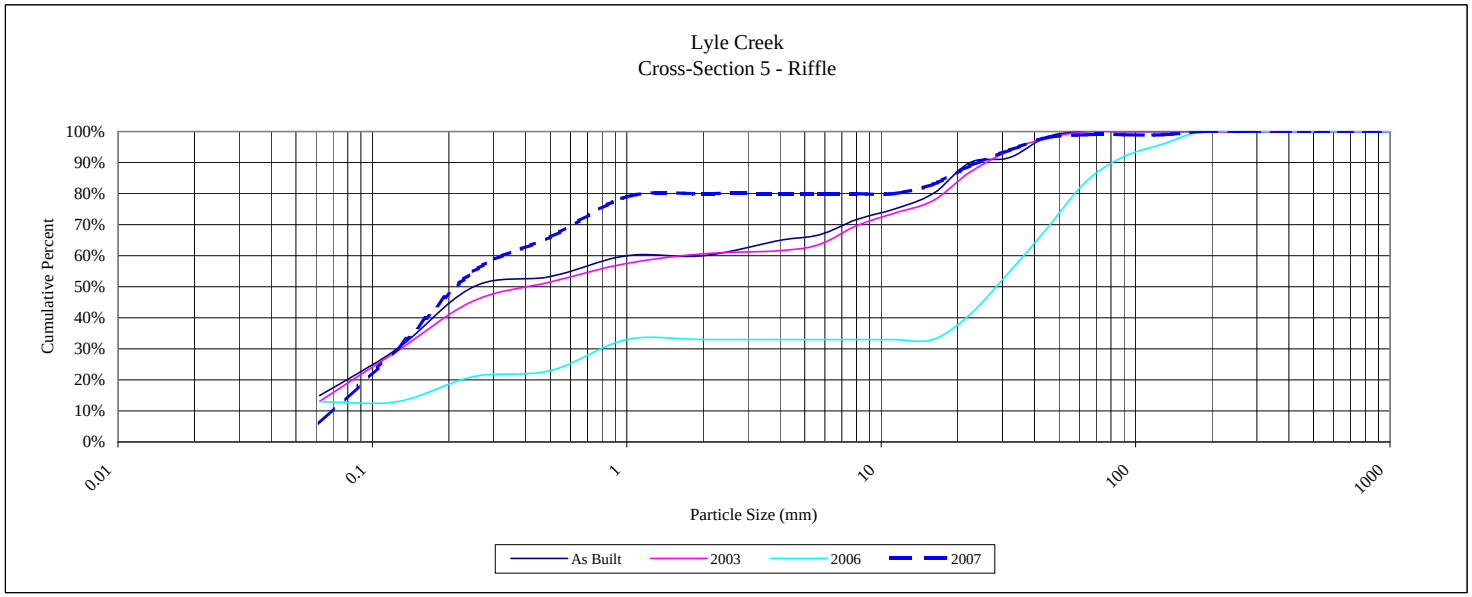


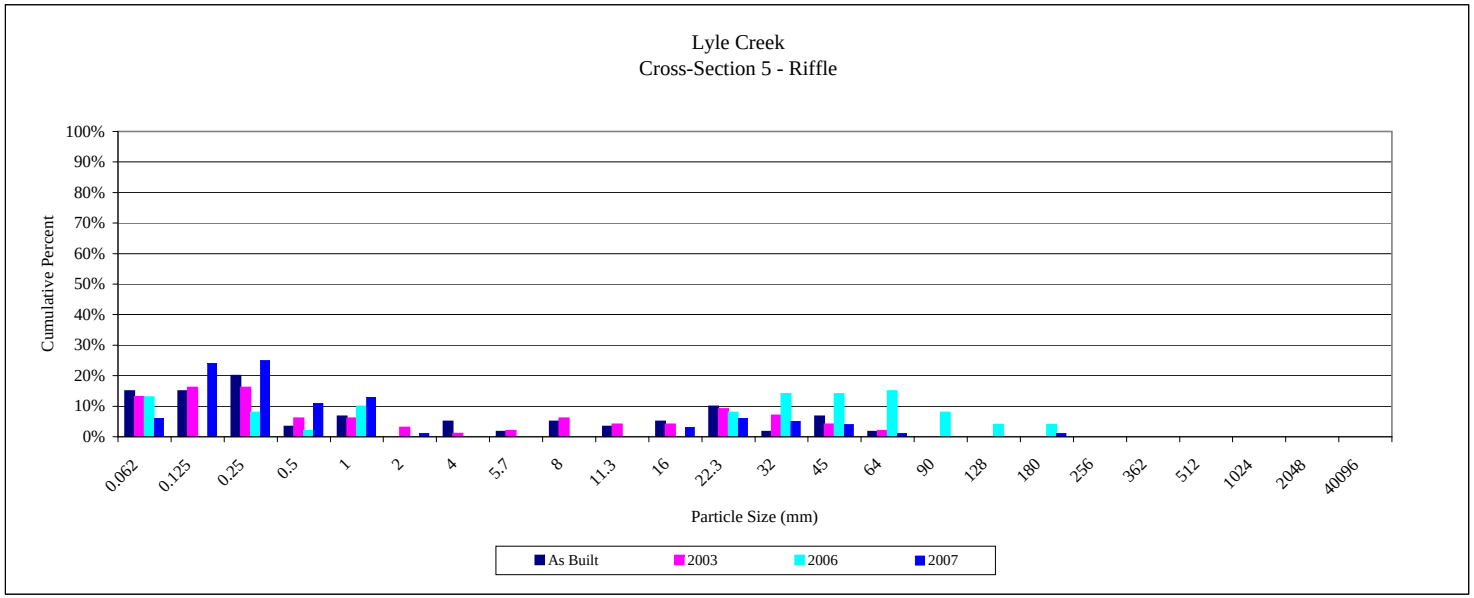
Appendix 2.8 Pebble Count Plots and Raw Data Tables
Lyle Creek Stream Restoration
Year 5 of 5



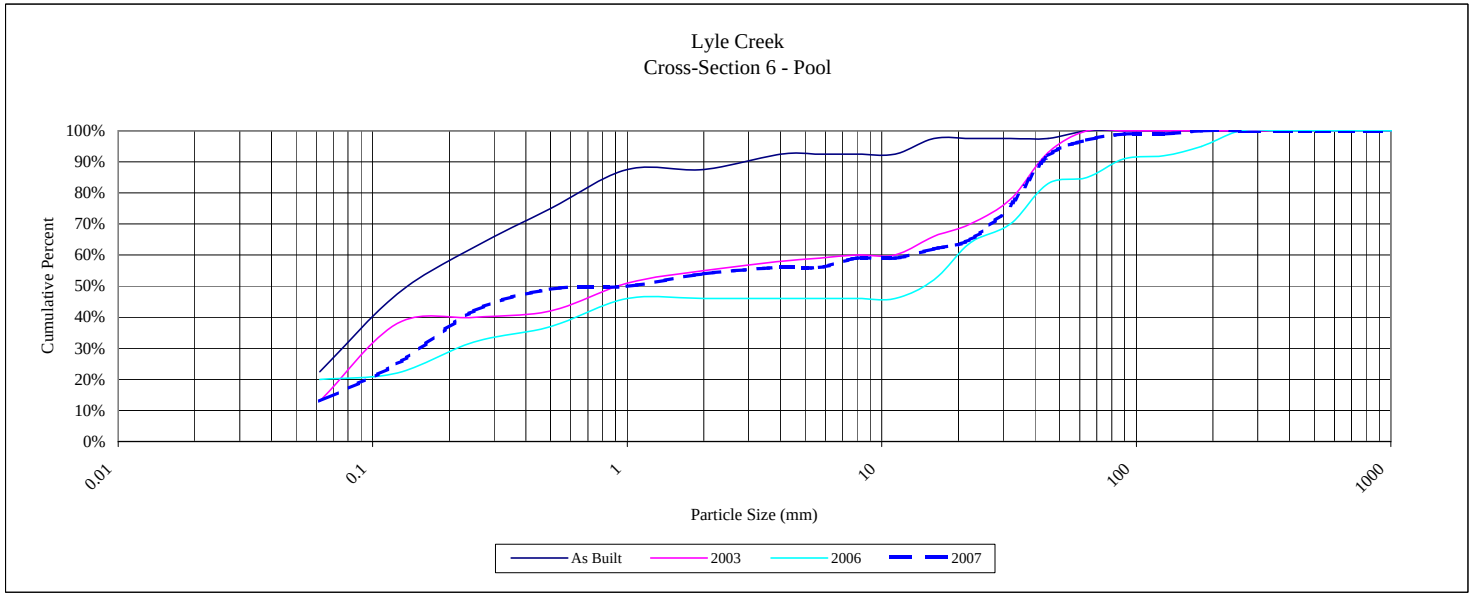


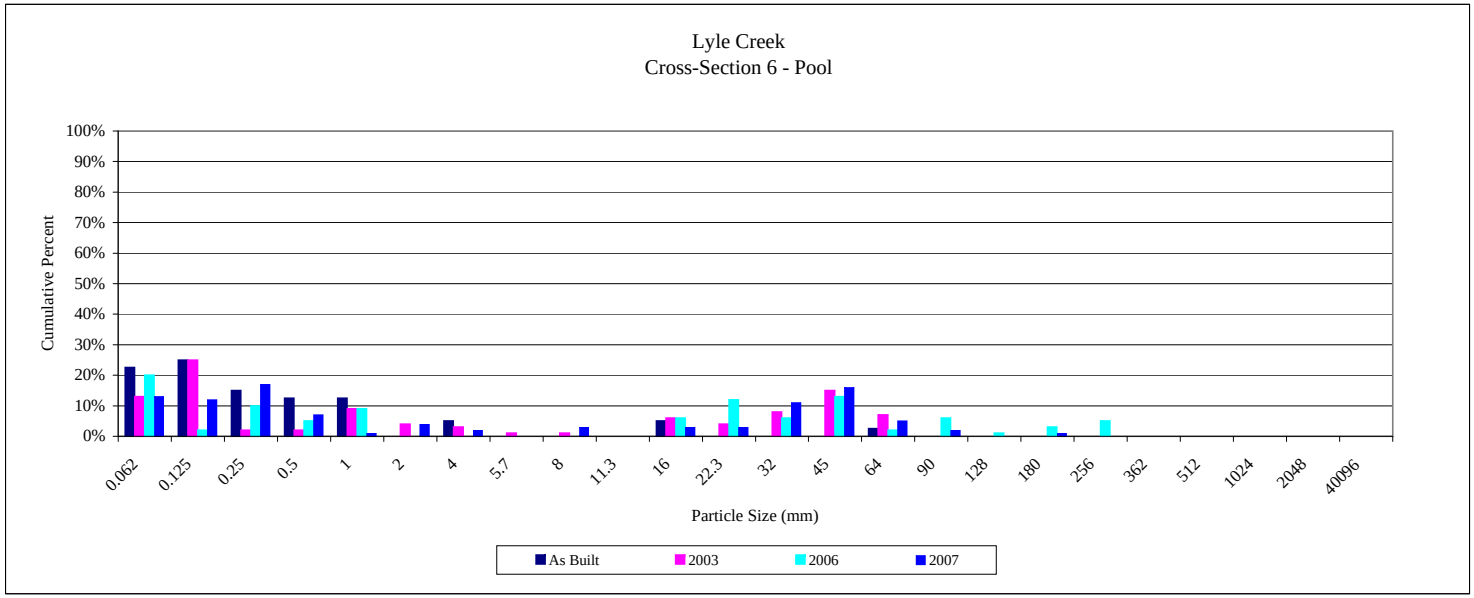
Appendix 2.8 Pebble Count Plots and Raw Data Tables
Lyle Creek Stream Restoration
Year 5 of 5



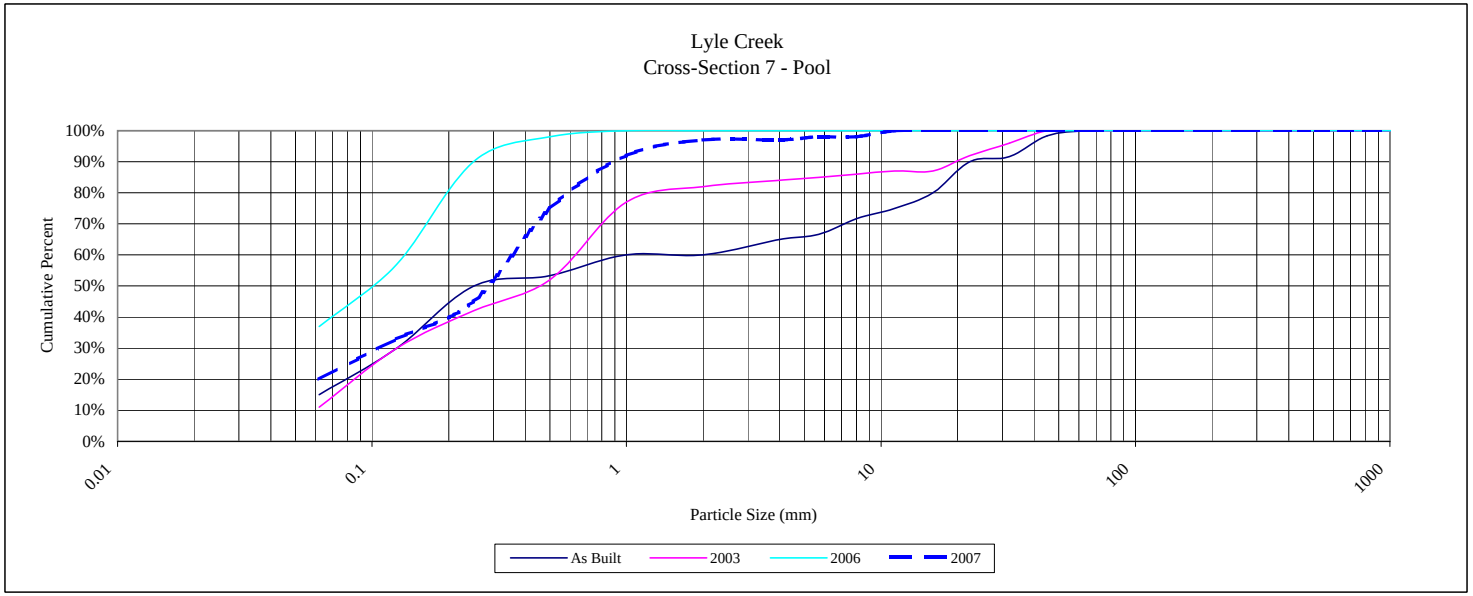


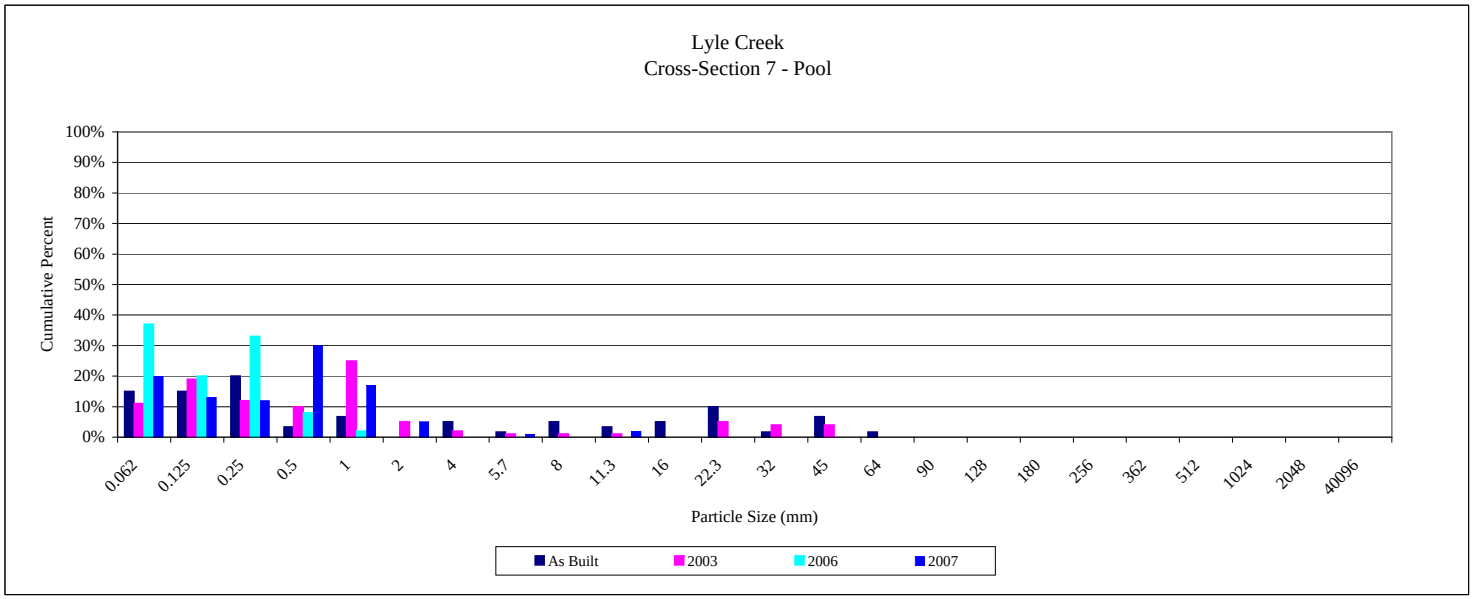
Appendix 2.8 Pebble Count Plots and Raw Data Tables
Lyle Creek Stream Restoration
Year 5 of 5





Appendix 2.8 Pebble Count Plots and Raw Data Tables
Lyle Creek Stream Restoration
Year 5 of 5





Appendix 2.8 Pebble Count Plots and Raw Data Tables
Lyle Creek Stream Restoration
Year 5 of 5

Jordan Jones & Goulding

APPENDIX 3
INTEGRATED CURRENT CONDITION PLAN VIEW

1. Current Condition Plan View Map (Integrated)

N

APPROXIMATE

FIGURE 1 OF 3

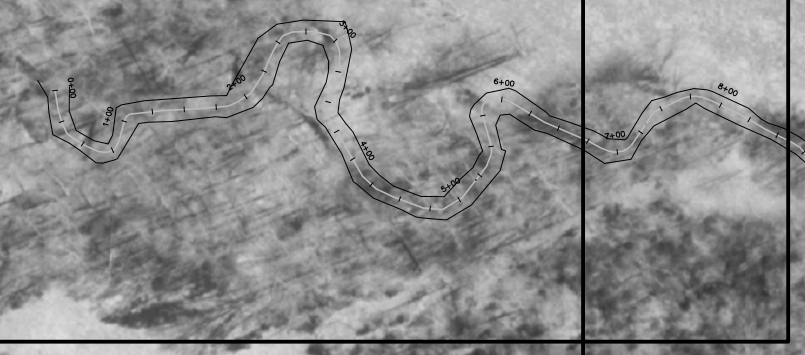


FIGURE 2 OF 3

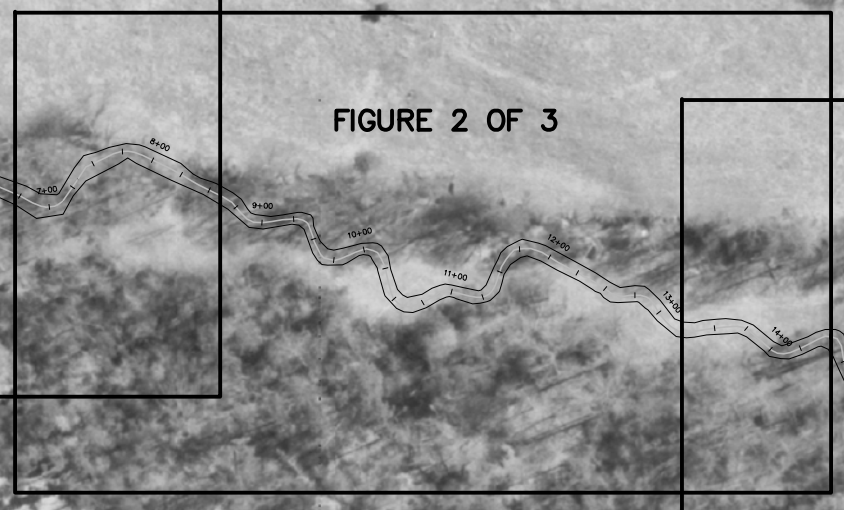


FIGURE 3 OF 3

TO I-40

TO SR-70

GRAPHIC SCALE

150 0 75 150 300 600

(IN FEET)

1 inch = 150 ft.

Ecosystem Enhancement PROGRAM

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

PROJECT NO. 423
CATAWBA COUNTY
NORTH CAROLINA
MONITORING
YEAR 5 of 5

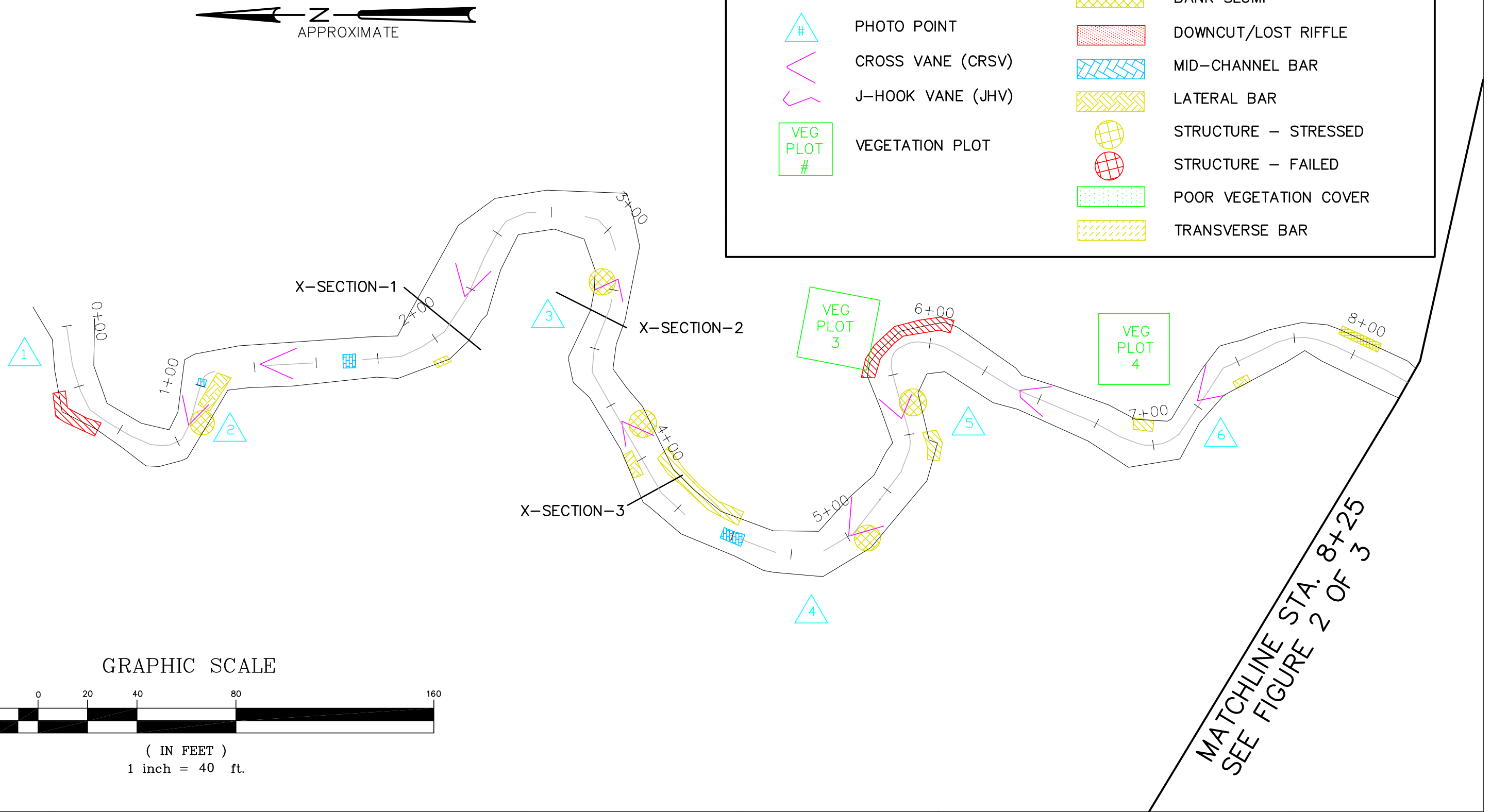
JORDAN JONES & GOULDING

NC ECOSYSTEM ENHANCEMENT PROGRAM
LYLE CREEK STREAM RESTORATION

APPENDIX 3
CURRENT CONDITION PLAN VIEW MAP

DATE : NOVEMBER 2007
SCALE : 1"=150'
JOB NO.: 03060-001

APPENDIX 3 KEY



GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

NOTES:
1. GENERAL SITE DATA PROVIDED BY NCEEP.
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PROJECT NO. 423
CATAWBA COUNTY
NORTH CAROLINA
MONITORING
YEAR 5 of 5

JORDAN JONES & GOULDING

NC ECOSYSTEM ENHANCEMENT PROGRAM
LYLE CREEK STREAM RESTORATION

APPENDIX 3
CURRENT CONDITION PLAN VIEW

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

FIGURE 1 OF 3

N
APPROXIMATE

LEGEND

- CHANNEL CENTERLINE
- BANK FULL
- # PHOTO POINT
- CROSS VANE (CRSV)
- J-HOOK VANE (JHV)
- VEG PLOT # VEGETATION PLOT
- BANK EROSION – MODERATE
- BANK EROSION – SEVERE
- BANK SLUMP
- DOWNCUT/LOST RIFFLE
- MID-CHANNEL BAR
- LATERAL BAR
- STRUCTURE – STRESSED
- STRUCTURE – FAILED
- POOR VEGETATION COVER
- TRANSVERSE BAR

VEG PLOT 5

VEG PLOT 2

9+00

10+00

7

MATCHLINE STA. 8+25
SEE FIGURE 1 OF 3

X-SECTION-4

11+00

12+00

X-SECTION-6

8

X-SECTION-5

13+00

9

MATCHLINE STA. 13+75
SEE FIGURE 3 OF 3

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

Ecosystem Enhancement PROGRAM

NOTES:
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PROJECT NO. 423
CATAWBA COUNTY
NORTH CAROLINA
MONITORING
YEAR 5 of 5

JORDAN JONES & GOULDING

NC ECOSYSTEM ENHANCEMENT PROGRAM
LYLE CREEK STREAM RESTORATION

APPENDIX 3
CURRENT CONDITION PLAN VIEW

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

FIGURE 2 OF 3

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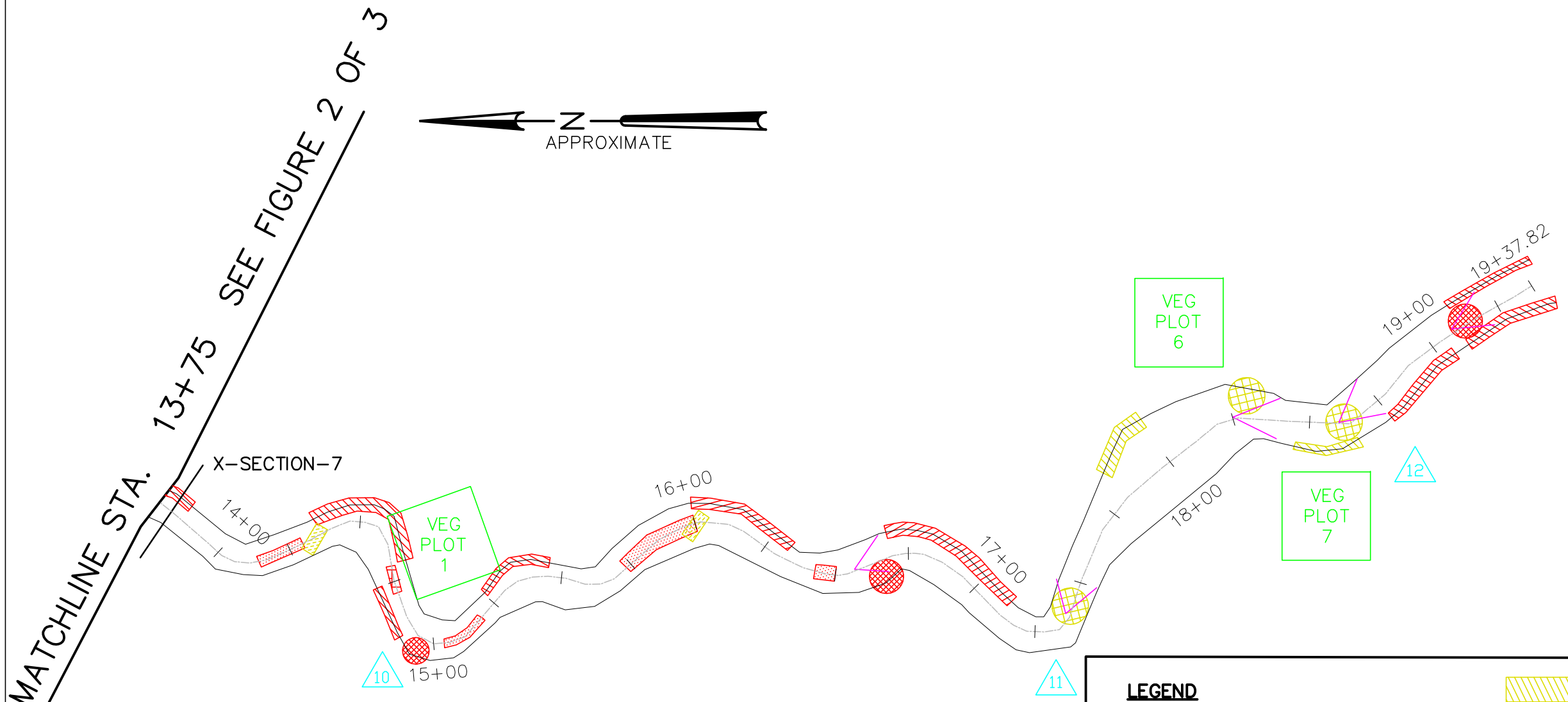

LEGEND

- CHANNEL CENTERLINE
- BANK FULL
- PHOTO POINT (#)
- CROSS VANE (CRSV)
- J-HOOK VANE (JHV)
- VEGETATION PLOT (VEG PLOT #)
- BANK EROSION – MODERATE
- BANK EROSION – SEVERE
- BANK SLUMP
- DOWNCUT/LOST RIFFLE
- MID-CHANNEL BAR
- LATERAL BAR
- STRUCTURE – STRESSED
- STRUCTURE – FAILED
- POOR VEGETATION COVER
- TRANSVERSE BAR

GRAPHIC SCALE

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(IN FEET)

1 inch = 40 ft.

NOTES:
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2. ALL LOCATIONS ARE APPROXIMATE.

PROJECT NO. 423
CATAWBA COUNTY
NORTH CAROLINA
MONITORING
YEAR 5 of 5

JORDAN JONES & GOULDING

NC ECOSYSTEM ENHANCEMENT PROGRAM
LYLE CREEK STREAM RESTORATION

APPENDIX 3
CURRENT CONDITION PLAN VIEW

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

FIGURE 3 OF 3

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