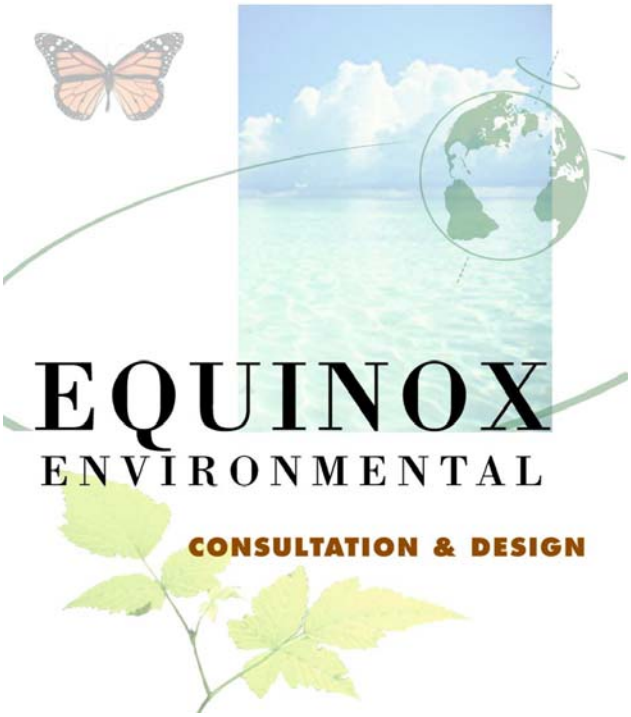
Dye Branch II
Stream Restoration
NCEEP Project Number: 92255
Monitoring Year 1
2011 Final Report

Submitted to
North Carolina Ecosystem Enhancement Program
North Carolina Department of Environment and Natural Resources
January 2012

1652 Mail Service Center
Raleigh, NC 27699

Monitoring Firm



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Dye Branch II Stream Restoration
2011 Monitoring Report (MY 1)

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Appendices

1.0 EXECUTIVE SUMMARY / PROJECT ABSTRACT

The goals and objectives stated in the Dye Branch Stream Restoration Plan (NCEEP 2005) are as follows:

- Provide a stable system of stream channels that neither aggrade nor degrade while maintaining dimension, pattern, and profile with the capacity to transport the watershed's water and sediment load;
- Improve the overall water quality and aquatic habitat by reducing sediment and waste inputs into the stream caused by bank erosion, mass-wasting, and stormwater runoff through stabilization of the stream channel and implementation of a stormwater wetland; and
- Improve the overall viability of the riparian vegetative communities through establishment of native species and elimination of invasive exotic species.

Between the baseline monitoring and monitoring year 1 (MY1) vegetation plot data collection efforts, two monitoring plots were impacted during the stream repair efforts in the summer of 2011. In VP7 a significant number of planted stems were damaged and VP8 was completely destroyed. Additionally, based on the MY1 vegetation plot data from plots 1 through 7 the project is not on track to meet the established criterion for planted stem density, which is a minimum survival of 320 planted stems per acre at the end of the year three monitoring period. Average stem density for planted stems in MY1 is approximately 272 stems per acre. Of the 76 planted stems recorded within VP1 – VP7 in MY0, 38% were reported as dead or missing in MY1. Of the seven remaining plots, four plots (~57%) will not meet the year three interim success criteria numbers per acre. These include VP 1, 4, 5, 6, and 7; which had 202, 243, 202, 162, and 283 stems per acre, respectively. However, when planted and natural stems are combined, the average stem density is 619 stems per acre, which is above the minimum established criterion. Problems with vegetation consist of approximately 29 currently isolated patches of high threat invasive plant species that span the project extent.

Stream longitudinal profiles within the Cemetery Branch reach have remained stable among monitoring years. The primary stream issues observed during MY1 along Dye Branch include structure degradation, bank erosion, and bed aggradation. The water level logger recorded three bankfull events during MY1.

Summary information/data related to the occurrence of items such as beaver or encroachment and statistics related to performance of various project and monitoring elements can be found in the tables and figures in the report appendices. Narrative background and supporting information formerly found in these reports can be found in the mitigation and restoration plan documents available on EEP's website. All raw data supporting tables and figures in the appendices is available from EEP upon request.

2.0 Methodology

The stream monitoring methodologies utilized in MY1 were intended to replicate those employed during the previous monitoring year and are based on standard guidance and procedures documents (Rosgen 1996 and USACE 2003). Vegetation monitoring data were collected following the standard CVS-EEP Protocol for Recording Vegetation, Level II (Lee et al. 2008).

3.0 References

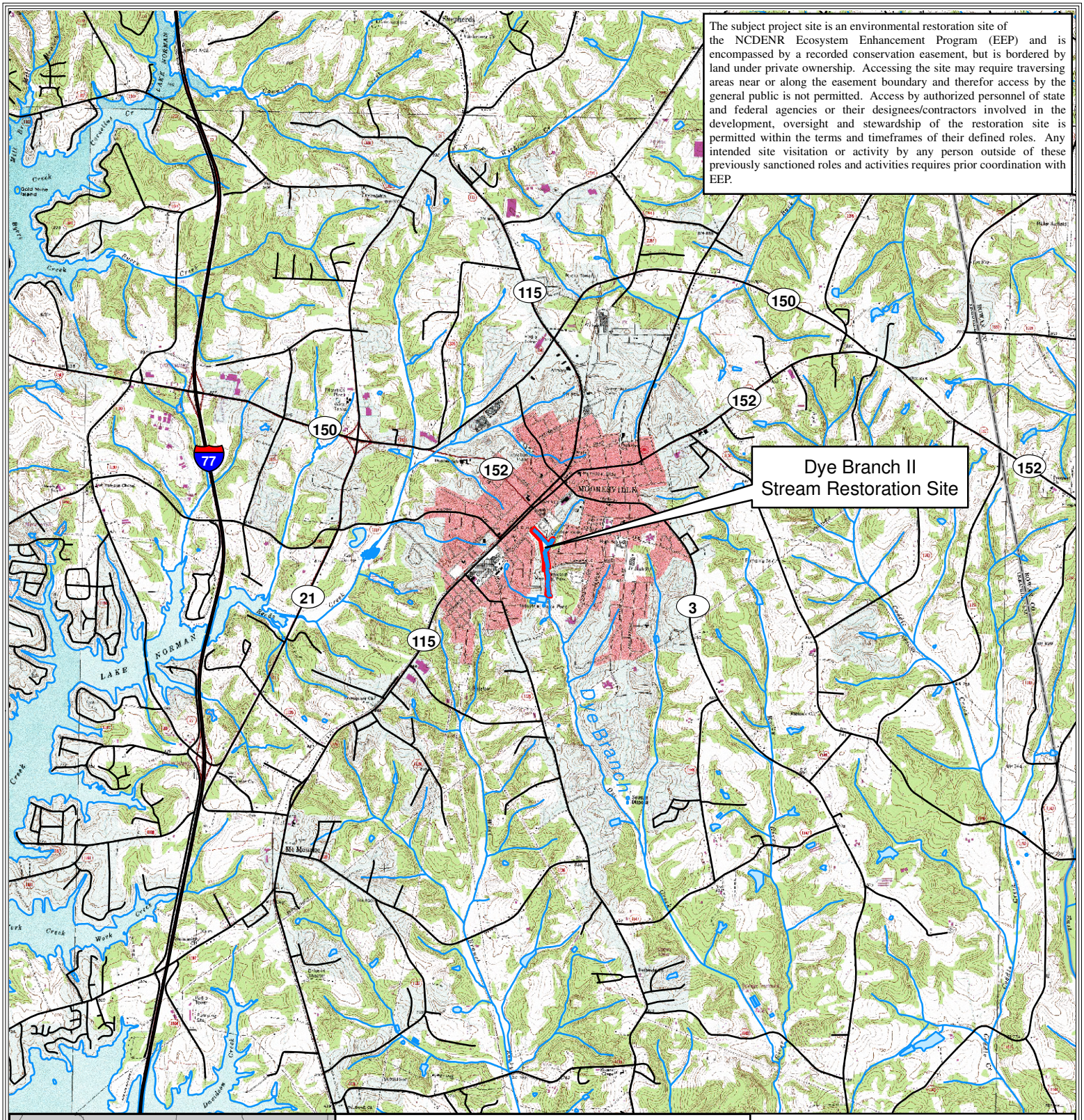
Lee, M.T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2008. CVS-EEP Protocol for Recording Vegetation. Version 4.2.

NCEEP (North Carolina Ecosystem Enhancement Program). October 2005. Dye Branch Stream Restoration Plan. Town of Mooresville Iredell County, North Carolina. Raleigh, NC.

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

USACE (U.S. Army Corps of Engineers). 2003. Stream Mitigation Guidelines. USACOE, USEPA, NCWRC, NCDENR-DWQ. Wilmington District.

Appendix A
Project Vicinity Map and Background Tables



The subject project site is an environmental restoration site of the NCDENR Ecosystem Enhancement Program (EEP) and is encompassed by a recorded conservation easement, but is bordered by land under private ownership. Accessing the site may require traversing areas near or along the easement boundary and therefor access by the general public is not permitted. Access by authorized personnel of state and federal agencies or their designees/contractors involved in the development, oversight and stewardship of the restoration site is permitted within the terms and timeframes of their defined roles. Any intended site visitation or activity by any person outside of these previously sanctioned roles and activities requires prior coordination with EEP.

Directions: From Raleigh, proceed west on I-40 towards Statesville. Take Exit 152 A (I-77S) towards Charlotte. Proceed on I-77S to Exit 36 (NC-150) towards Mooresville. From NC-150 turn slight right onto McLelland Avenue/NC-152 for approximately 1.2 miles. The site is located on the west side of McLelland Avenue/NC-152.

Figure 1 - Vicinity Map

Dye Branch II
Stream Restoration Site
Project No. 92255

Iredell County, North Carolina
August 2011

N

EQUINOX ENVIRONMENTAL CONSULTATION & DESIGN

Ecosystem Enhancement PROGRAM

0 0.5 1 2 Miles

7.5 Minute Series Mooresville Quadrangle

Table 1a. Project Components Dye Branch II / Project No. 92255								
Project Component or Reach ID	Existing Feet/Acres	Restoration Level	Approach	Footage or Acreage	Stationing	Buffer Acres	BMP Elements	Comment
Cemetery Branch	968 lf	R	P3	1,014 lf	0+00 - 10+14		Stormwater wetlands	
Dye Branch Upstream	1,772 lf	R	P2	1,500 lf	0+00 - 15+00		Stormwater wetlands	
Dye Branch Downstream	1,232 lf	R	P2	1,171 lf	16+00 - 27+71			

- Information unavailable
Non-Applicable

Table 1b. Component Summations Dye Branch II / Project No. 92255							
Restoration Level	Stream (lf)	Riparian Wetland (Ac)		Non-Riparian (Ac)	Upland (Ac)	Buffer (Ac)	BMP
		Riverine	Non-Riverine				
Restoration	3,685	0.0	0.0				
Enhancement		0.0	0.0				
Enhancement I	0						
Enhancement II	0						
Creation		0.0	0.0				
Preservation	0	0.0	0.0				
HQ Preservation	0	0.0	0.0				
		0.0	0.0				
Totals	**3,685**	**0**		**0**	**0**	**0**	**3**

Non-Applicable

Table 2. Project Activity & Reporting History Dye Branch II / Project No. 92255		
Activity or Report	Data Collection Complete	Actual Completion or Delivery
Restoration Plan	-	Oct 2005
Final Design - Construction Plans	-	April 2006
Final Design - Repair Plans	N/A	July 2010
Construction Repairs	N/A	Dec 2010
Temporary S&E mix applied	N/A	Summer 2010
Permanent seed mix applied	N/A	Summer 2010
Planting	N/A	Feb 2011
Mitigation Plan / As-built (Year 0 Monitoring - Baseline)	March 2011	Aug 2011
Year 1 Monitoring	Nov 2011	Jan 2012
Year 2 Monitoring		
Year 3 Monitoring		
Year 4 Monitoring		
Year 5 Monitoring		

- Information unavailable.
N/A - Item does not apply.

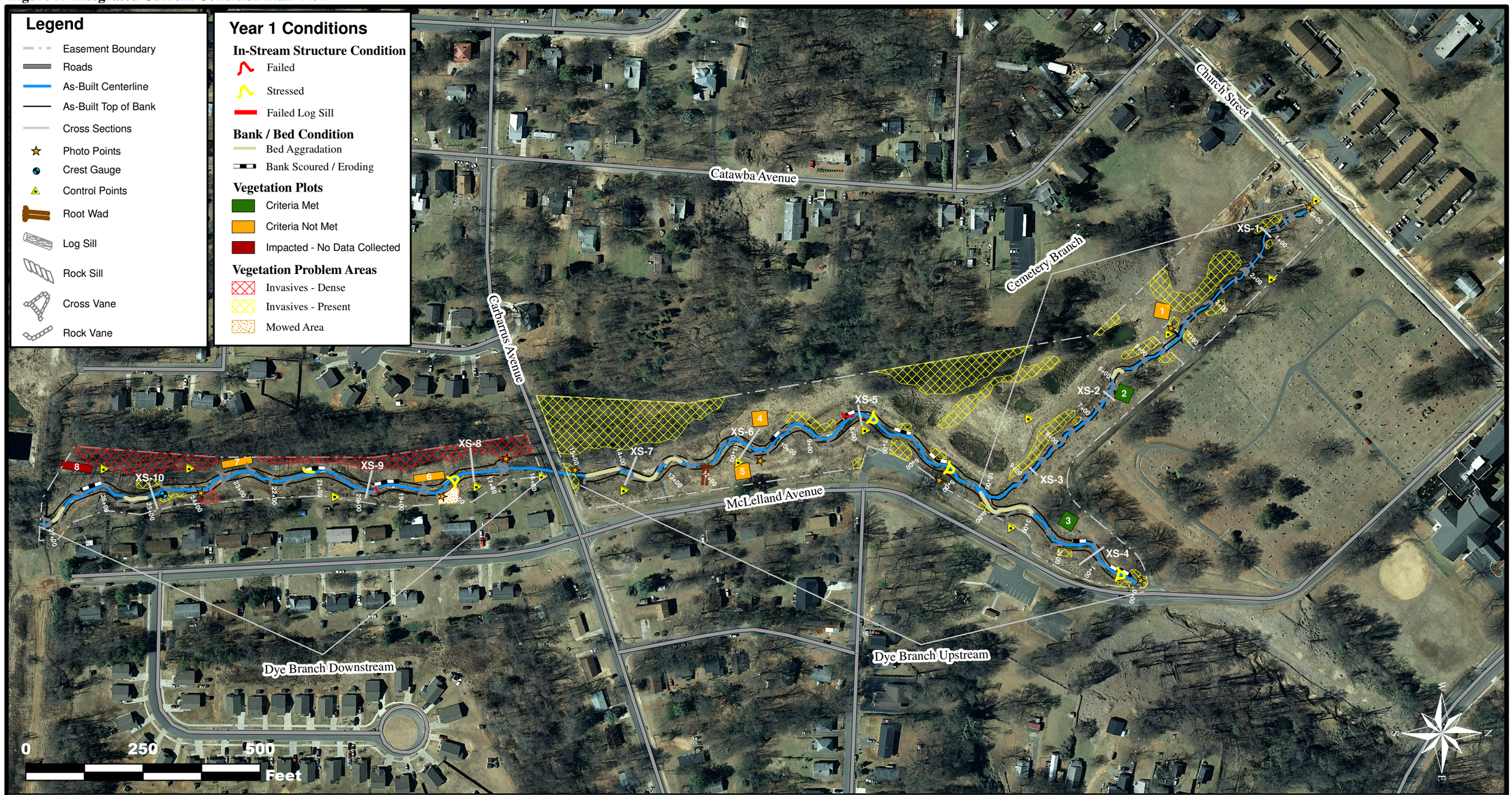
Table 3. Project Contacts Dye Branch II / Project No. 92255	
Designer Primary Project Design POC	Mulkey Engineers & Consultants 6750 Tryon Road Cary NC, 27518 Emmett Perdue (919) 858-1874
Construction Contractor Construction Contractor POC	Fluvial Solutions P.O. Box 28749 Raleigh, NC 27611 Peter Jelenevsky (919) 605-6134
Planting Contractor Planting Contractor POC	Fluvial Solutions P.O. Box 28749 Raleigh, NC 27611 Peter Jelenevsky (919) 605-6134
Seeding Contractor Seeding Contractor POC	Fluvial Solutions P.O. Box 28749 Raleigh, NC 27611 Peter Jelenevsky (919) 605-6134
Seed Mix Sources	Hanes Geo Components Winston-Salem, NC 27101
Nursery Stock Suppliers	North Carolina Forest Service Goldsboro, NC 27530
Monitoring Performers (Y0) - 2010	Equinox Environmental Consultation & Design, Inc. 37 Haywood Street, Suite 100 Asheville, North Carolina 28801
Stream Monitoring POC	Win Taylor (828) 253-6856
Vegetation Monitoring POC	Win Taylor (828) 253-6856
Monitoring Performers (Y1) - 2011	Equinox Environmental Consultation & Design, Inc. 37 Haywood Street, Suite 100 Asheville, North Carolina 28801
Stream Monitoring POC	Win Taylor (828) 253-6856
Vegetation Monitoring POC	Win Taylor (828) 253-6856
Monitoring Performers (Y2) - 2012	
Stream Monitoring POC	
Vegetation Monitoring POC	
Monitoring Performers (Y3) - 2013	
Stream Monitoring POC	
Vegetation Monitoring POC	
Monitoring Performers (Y4) - 2014	
Stream Monitoring POC	
Vegetation Monitoring POC	
Monitoring Performers (Y5) - 2015	
Stream Monitoring POC	
Vegetation Monitoring POC	

Table 4. Project Attributes Dye Branch II / Project No. 92255		
Project County	Iredell	
Physiographic Region	Piedmont	
Ecoregion	Southern Outer Piedmont	
River Basin	Yadkin - Pee Dee	
USGS HUC	03040105010010	
NCDWQ Sub-Basin	03-07-11	
Within Extent of EEP Watershed Plan	Upper Rocky River Local Watershed Plan	
WRC Class	Warm	
% of Project Easement Fenced or Demarcated	100%	
Beaver Activity Observed During Design Phase	No	
Restoration Component Attributes		
	Dye Branch	**Cemetery Branch**
Drainage Area (sq.mi.)	0.6	0.06
Stream Order	First / Second	First
Restored Length (feet)	2,671	1,014
Perennial or Intermittent	Perennial	Perennial
Watershed Type	Urban	
Watershed LULC Distribution		
Urban	85%	
Other	15%	
Watershed Impervious Cover	-	
NCDWQ AU/Index Number	13-17-2	
NCDWQ Classification	C	
303d Listed	Yes	
Upstream of 303d Listed Segment	Yes	
Reasons for 303d Listing or Stressor	Poor Bioclassification	
Total Acreage of Easement	12.0	
Total Vegetated Acreage within Easement	12.0	
Total Planted Acreage as Part of Restoration	8.9	
Rosgen Classification of Pre-Existing	E4 / G4c	E4
Rosgen Classification of As-Built	C	C
Valley Type	-	-
Valley Slope	0.0097 / 0.0125	0.0217
Valley Side Slope Range	-	-
Valley Toe Slope Range	-	-
Cowardin Classification	N/A	N/A
Trout Waters Designation	No	No
Species of Concern, Endangered, Etc.	None	
Dominant Soil Series and Characteristics		
Series	Chewacla / Cecil / Colfax	
Depth	-	-
Clay%	-	-
K	-	-
T	-	-

- Information unavailable.
N/A - Item does not apply.

Appendix B
Visual Assessment Data

Figure 2. Integrated Current Condition Plan View



Prepared for	**Project:** Dye Branch Stream Restoration Monitoring Year 1 - Integrated Current Condition Plan View Iredell County, North Carolina	Notes: 1) Base Map Data Provided by Mulkey Engineers & Consultants 2) 2010 Aerial Photo	Prepared by
	Sheet 1 of 1		
	Date	Project Number	
	November 2011	NCEEP # 92255	

Table 5. Visual Stream Morphology Stability Assessment
Dye Branch II / Project No. 92255 - Cemetery Branch
Assessed Length 1,014 feet

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	**1. Vertical Stability** (Riffle and Run Units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			0	0	100%			
		2. Degradation - Evidence of downcutting.			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate.	14	14			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6).	14	15			93%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	15	15			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	15	15			100%			
		2. Thalweg centering at downstream of meander bend (Glide).	14	14			100%			
2. Bank	**1. Scoured / Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	N/A	N/A	N/A
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A
				Totals	0	0	100%	N/A	N/A	N/A
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	32	32			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	28	28			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	28	28			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.	4	4			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	13	13			100%			

N/A - Item does not apply.

Table 5. Visual Stream Morphology Stability Assessment
Dye Branch II / Project No. 92255 - Dye Branch - Upstream
Assessed Length 1,500 feet

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	**1. Vertical Stability** (Riffle and Run Units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			4	183	88%			
		2. Degradation - Evidence of downcutting.			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate.	15	17			88%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6).	16	20			80%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	16	20			80%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	14	17			82%			
		2. Thalweg centering at downstream of meander bend (Glide).	14	16			88%			
2. Bank	**1. Scoured / Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			6	212	93%	0	0	93%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A
				Totals	6	212	93%	N/A	N/A	N/A
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	27	30			90%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	7	7			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	6	7			86%			
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.	20	23			87%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	5	5			100%			

N/A - Item does not apply.

Table 5. Visual Stream Morphology Stability Assessment
Dye Branch II / Project No. 92255 - Dye Branch - Downstream
Assessed Length 1,171 feet

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	**1. Vertical Stability** (Riffle and Run Units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars).			2	85	93%			
		2. Degradation - Evidence of downcutting.			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate.	11	11			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6).	10	10			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	10	10			100%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	9	10			90%			
		2. Thalweg centering at downstream of meander bend (Glide).	9	10			90%			
2. Bank	**1. Scoured / Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			3	146	94%	0	0	94%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A
				Totals	3	146	94%	N/A	N/A	N/A
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	22	22			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	8	8			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	5	8			63%			
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.	12	14			86%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	5	5			100%			

N/A - Item does not apply.

Table 6. Vegetation Condition Assessment Dye Branch II / Project No. 92255 Planted Acreage 9.0					
Vegetation Category	**Definitions**	**CCPV Depiction**	**Number of Polygons**	**Combined Acreage**	**% of Planted Acreage**
1. Bare Areas	Very limited cover of both woody and herbaceous material.	N/A	0	0	0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	N/A	0	0	0%
		Totals	0	0	0%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	N/A	0	0	0%
		Cumulative Totals	0	0	0%
Easement Acreage 12.01					
Vegetation Category	**Definitions**	**CCPV Depiction**	**Number of Polygons**	**Combined Acreage**	**% of Easement Acreage**
4. Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	Cross Hatch (Red - Dense/Yellow - Present)	29	2.44	20%
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	Stipple Orange Dots White Background	1	0.03	0.2%

N/A - Item does not apply.

Cemetery Branch – Permanent Photo Station 1
Looking Downstream

Cemetery Branch – Permanent Photo Station 2
Looking Upstream

Cemetery Branch – Permanent Photo Station 2
Looking Downstream

Dye Branch – Permanent Photo Station 3
Looking Downstream

Dye Branch – Permanent Photo Station 4
Looking Upstream

Dye Branch – Permanent Photo Station 5
Looking Upstream

Dye Branch – Permanent Photo Station 6
Looking Upstream

Dye Branch – Permanent Photo Station 7
Looking Downstream

Dye Branch – Permanent Photo Station 8
Looking Upstream

Dye Branch – Permanent Photo Station 9
Looking Upstream

Appendix C
Vegetation Plot Data

Table 7. Vegetation Plot Criteria Attainment Dye Branch II / Project No. 92255		
Vegetation Plot ID	**Vegetation Survival Threshold Met?**	**Tract Mean**
1	No	29%
2	Yes	
3	Yes	
4	No	
5	No	
6	No	
7	No	

Vegetation Monitoring Plot 1
Monitoring Year 1 – September 22, 2011

Vegetation Monitoring Plot 2
Monitoring Year 1 – September 22, 2011

Vegetation Monitoring Plot 3
Monitoring Year 1 – September 22, 2011

Vegetation Monitoring Plot 4
Monitoring Year 1 – September 22, 2011

Vegetation Monitoring Plot 5
Monitoring Year 1 – September 22, 2011

Vegetation Monitoring Plot 6
Monitoring Year 1 – September 22, 2011

Vegetation Monitoring Plot 7
Monitoring Year 1 – September 22, 2011

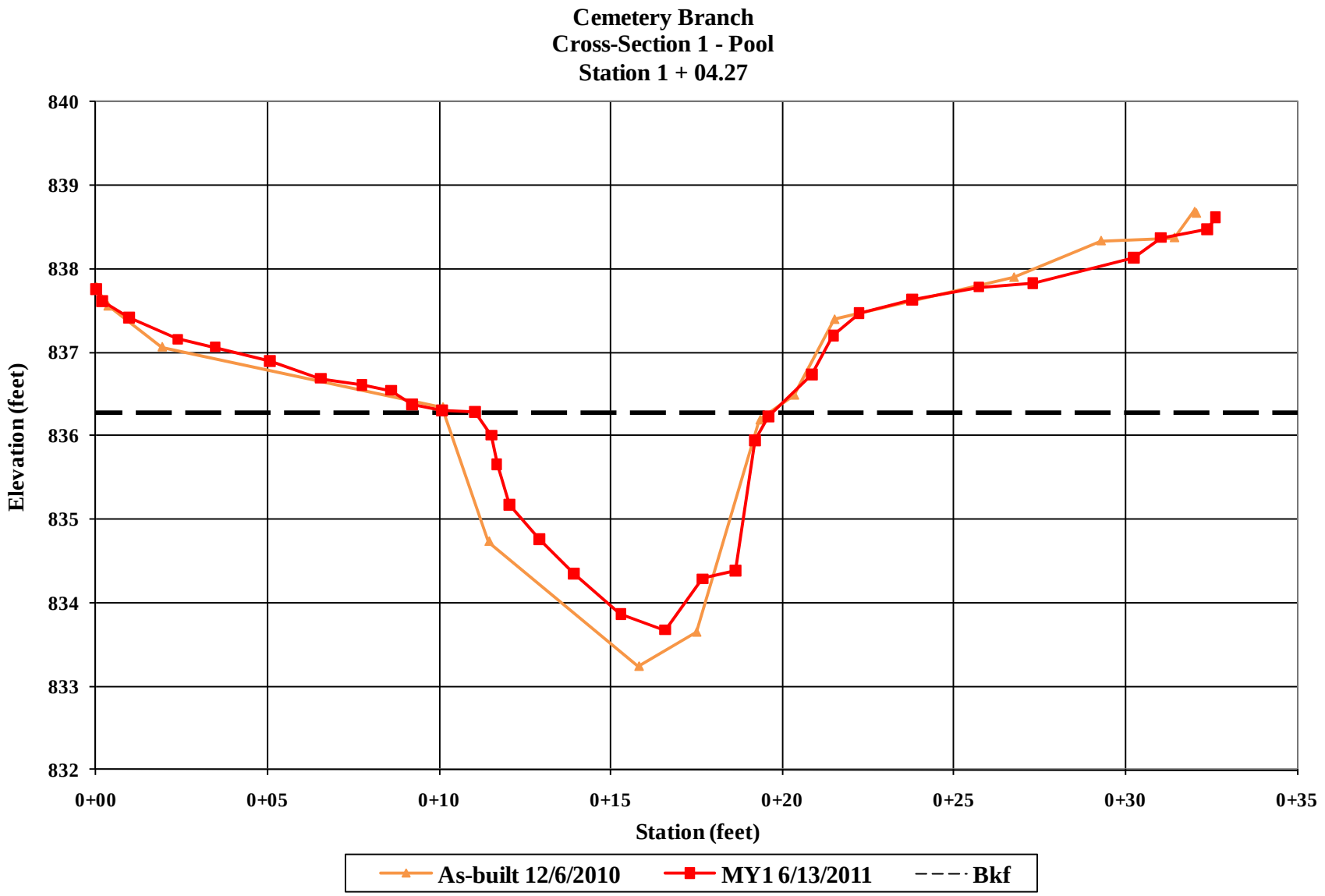
Table 8. CVS Vegetation Plot Metadata Dye Branch II / Project No. 92255	
Report Prepared By	William Carson
Date Prepared	9/29/2011 15:40
Database Name	Equinox-2011-B-DyeBranch.mdb
Database Location	\\FILESERVER\shared\ES\NRI&M\EEP Monitoring\Dye Branch\DB-MY1-2011\Data\Veg
Computer Name	D16TNK71
File Size	51068928
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Project Planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Project Total Stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Species	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 Species	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Species	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
ALL Stems by Plot and Species	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
PROJECT SUMMARY	
Project Code	92255
Project Name	Dye Branch
Description	
River Basin	Yadkin-Pee Dee
Length(ft)	
Stream-to-Edge Width (ft)	
Area (sq m)	
Required Plots (calculated)	
Sampled Plots	7

Table 9. Planted and Total Stem Counts (Species by Plot with Annual Means)
Dye Branch II / Project No. 92255

			Current Plot Data (MY1 2011)																						Annual Means					
			E92255-WT/OC-VP1			E92255-WT/OC-VP2			E92255-WT/OC-VP3			E92255-WT/OC-VP4			E92255-WT/OC-VP5			E92255-WT/OC-VP6			E92255-WT/OC-VP7			MY1 (2011)			MY0 (2011)		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Betula nigra	River birch	Tree				1	1	1																1	1	1			
Carya alba	Mockernut hickory	Tree																									1	1	1
Carya ovata	Shagbark hickory	Tree															1									1			
Cercis canadensis	Eastern redbud	Shrub Tree										1	1	1	1	1	1							2	2	2	2	2	2
Diospyros virginiana	Common persimmon	Tree																		1						1			
Fraxinus pennsylvanica	Green ash	Tree				3	3	3	1	1	1													4	4	4	4	4	4
Juglans nigra	Black walnut	Tree	1	1	1							1	1	1										2	2	2	1	1	1
Juniperus virginiana var. virginiana	Eastern redcedar	Tree										1	1	1	2	2	2							3	3	3	13	13	13
Liquidambar styraciflua	Sweetgum	Tree												4						4			9			17			
Liriodendron tulipifera var. tulipifera	Tulip-tree, Yellow poplar	Tree				2	2	2										1	1	1	1	1	27	4	4	30	8	8	8
Pinus virginiana	Virginia pine	Tree	3	3	3	3	3	3	2	2	2	1	1	1	2	2	2							11	11	11	19	19	19
Platanus occidentalis var. occidentalis	Sycamore, Plane-tree	Tree																					1			1	1	1	1
Prunus	Plum	Shrub Tree												4						1						5			
Pyrus calleryana	Callery pear	Tree																		1			1			2			
Quercus	Oak sp.	Shrub Tree	1	1	1				1	1	1	2	2	6				3	3	3	2	2	2	9	9	13	19	19	19
Quercus falcata	Southern red oak	Tree				2	2	2																2	2	2	2	2	2
Quercus nigra	Water oak	Tree							2	2	2													2	2	2	2	2	2
Quercus phellos	Willow oak	Tree				1	1	1	1	1	3									1	2	2	2	4	4	7	4	4	4
Unknown		Unknown							1	1	1										2	2	2	3	3	3	9	9	9
		Stem count	5	5	5	12	12	12	8	8	10	6	6	18	5	5	6	4	4	12	7	7	44	47	47	107	85	85	85
		size (ares)	1			1			1			1			1			1			1			7			8		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.17			0.20		
		Species count	3	3	3	6	6	6	6	6	6	5	5	7	3	3	4	2	2	7	4	4	7	12	12	18	13	13	13
		Stems per ACRE	202.34	202.34	202.34	485.62	485.62	485.62	323.75	323.75	404.69	242.81	242.81	728.43	202.34	202.34	242.81	161.87	161.87	485.62	283.28	283.28	1780.6	271.72	271.72	618.59	429.98	429.98	429.98

Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements by more than 10%

Appendix D
Stream Survey Data

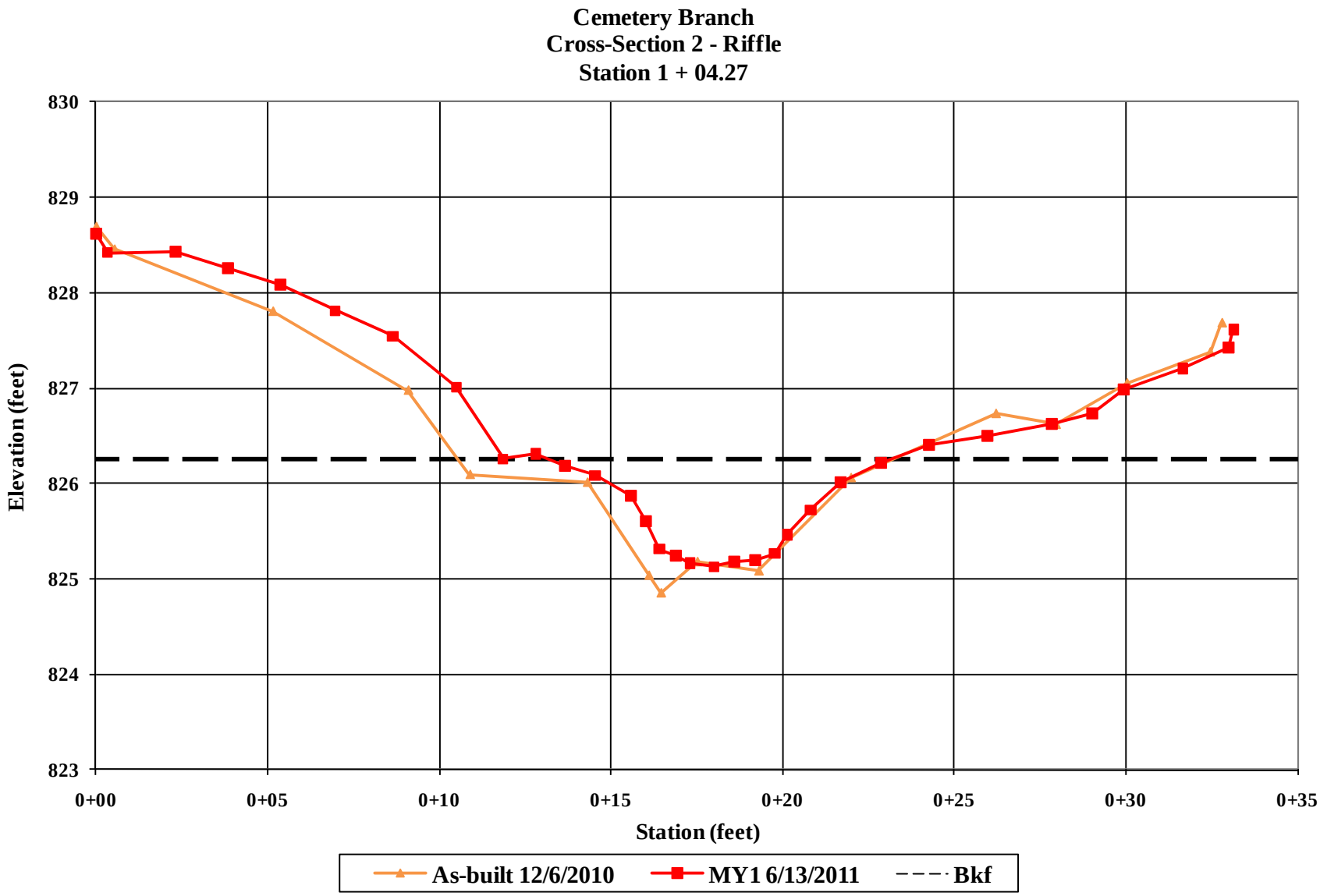

Cemetery Branch
Cross-Section 1 - Pool
Station 1 + 04.27
Elevation (feet)
840
839
838
837
836
835
834
833
832
0+00
0+05
0+10
0+15
0+20
0+25
0+30
0+35
Station (feet)
As-built 12/6/2010
MY1 6/13/2011
Bkf

Cemetery Branch – Cross-Section 1 – Pool
(Looking at Left Bank Descending)
Monitoring Year 1 – June 13, 2011

Cemetery Branch – Cross-Section 1 – Pool
(Looking at Right Bank Descending)
Monitoring Year 1 – June 13, 2011

Cemetery Branch – Cross-Section 1 – Pool
(Looking Downstream)
Monitoring Year 1 – June 13, 2011

Cemetery Branch – Cross-Section 1 – Pool
(Looking Upstream)
Monitoring Year 1 – June 13, 2011

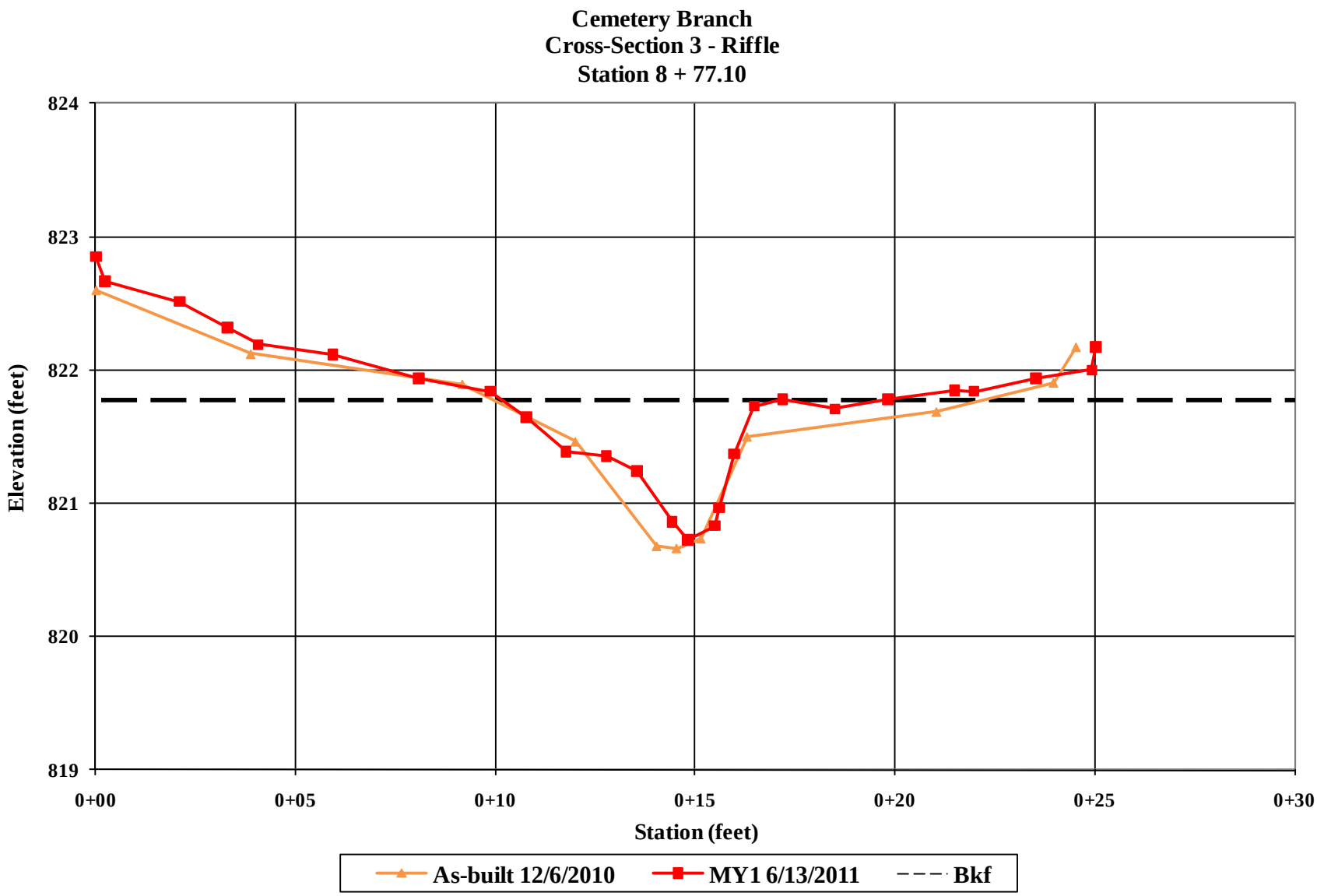

Cemetery Branch
Cross-Section 2 - Riffle
Station 1 + 04.27
Elevation (feet)
830
829
828
827
826
825
824
823
0+00
0+05
0+10
0+15
0+20
0+25
0+30
0+35
Station (feet)
As-built 12/6/2010
MY1 6/13/2011
Bkf

Cemetery Branch – Cross-Section 2 – Riffle
(Looking at Left Bank Descending)
Monitoring Year 1 – June 13, 2011

Cemetery Branch – Cross-Section 2 – Riffle
(Looking at Right Bank Descending)
Monitoring Year 1 – June 13, 2011

Cemetery Branch – Cross-Section 2 – Riffle
(Looking Downstream)
Monitoring Year 1 – June 13, 2011

Cemetery Branch – Cross-Section 2 – Riffle
(Looking Upstream)
Monitoring Year 1 – June 13, 2011

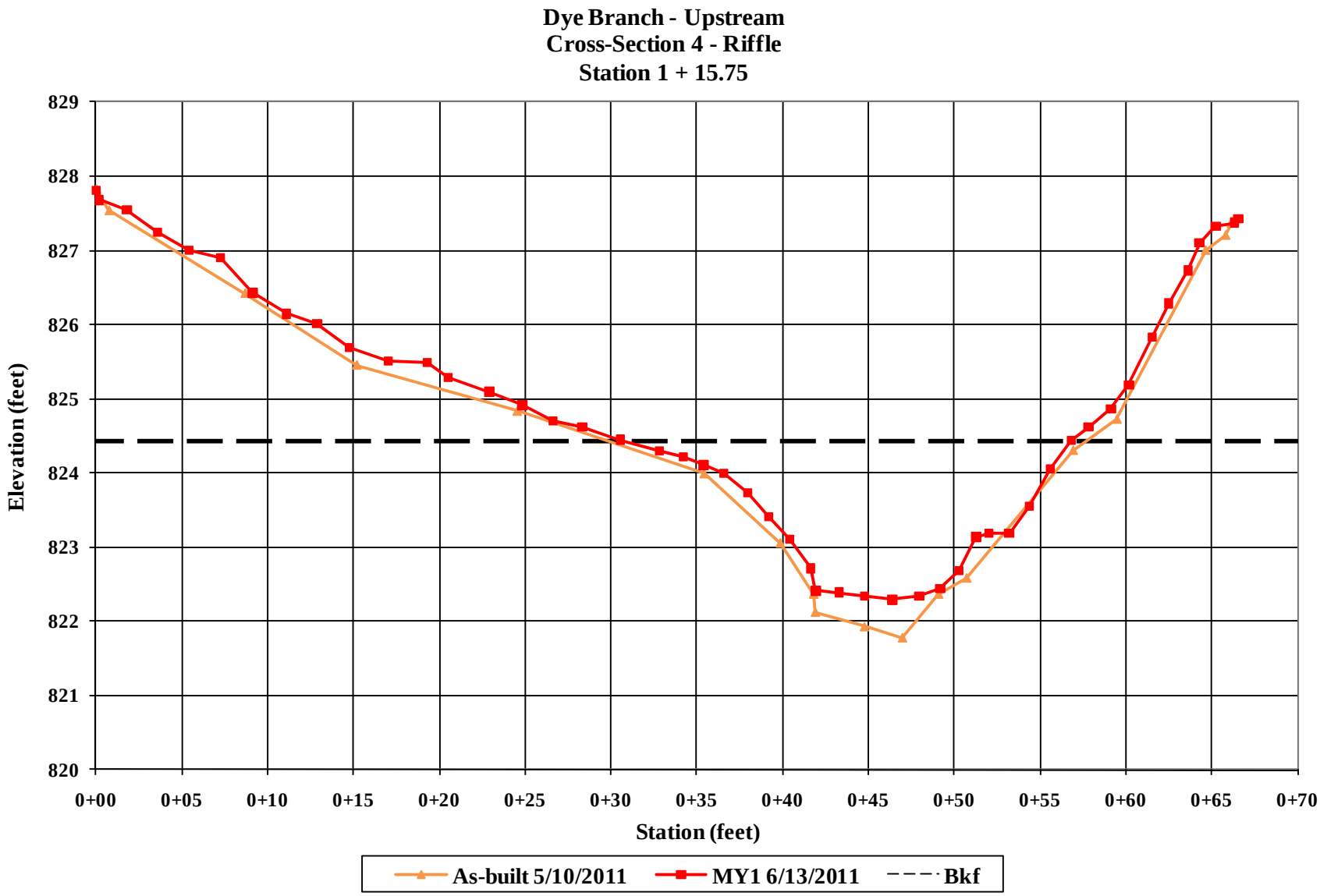

Cemetery Branch
Cross-Section 3 - Riffle
Station 8 + 77.10
824
823
822
821
820
819
Elevation (feet)
0+00
0+05
0+10
0+15
0+20
0+25
0+30
Station (feet)
As-built 12/6/2010
MY1 6/13/2011
Bkf

Cemetery Branch – Cross-Section 3 – Riffle
(Looking at Left Bank Descending)
Monitoring Year 1 – June 13, 2011

Cemetery Branch – Cross-Section 3 – Riffle
(Looking at Right Bank Descending)
Monitoring Year 1 – June 13, 2011

Cemetery Branch – Cross-Section 3 – Riffle
(Looking Downstream)
Monitoring Year 1 – June 13, 2011

Cemetery Branch – Cross-Section 3 – Riffle
(Looking Upstream)
Monitoring Year 1 – June 13, 2011

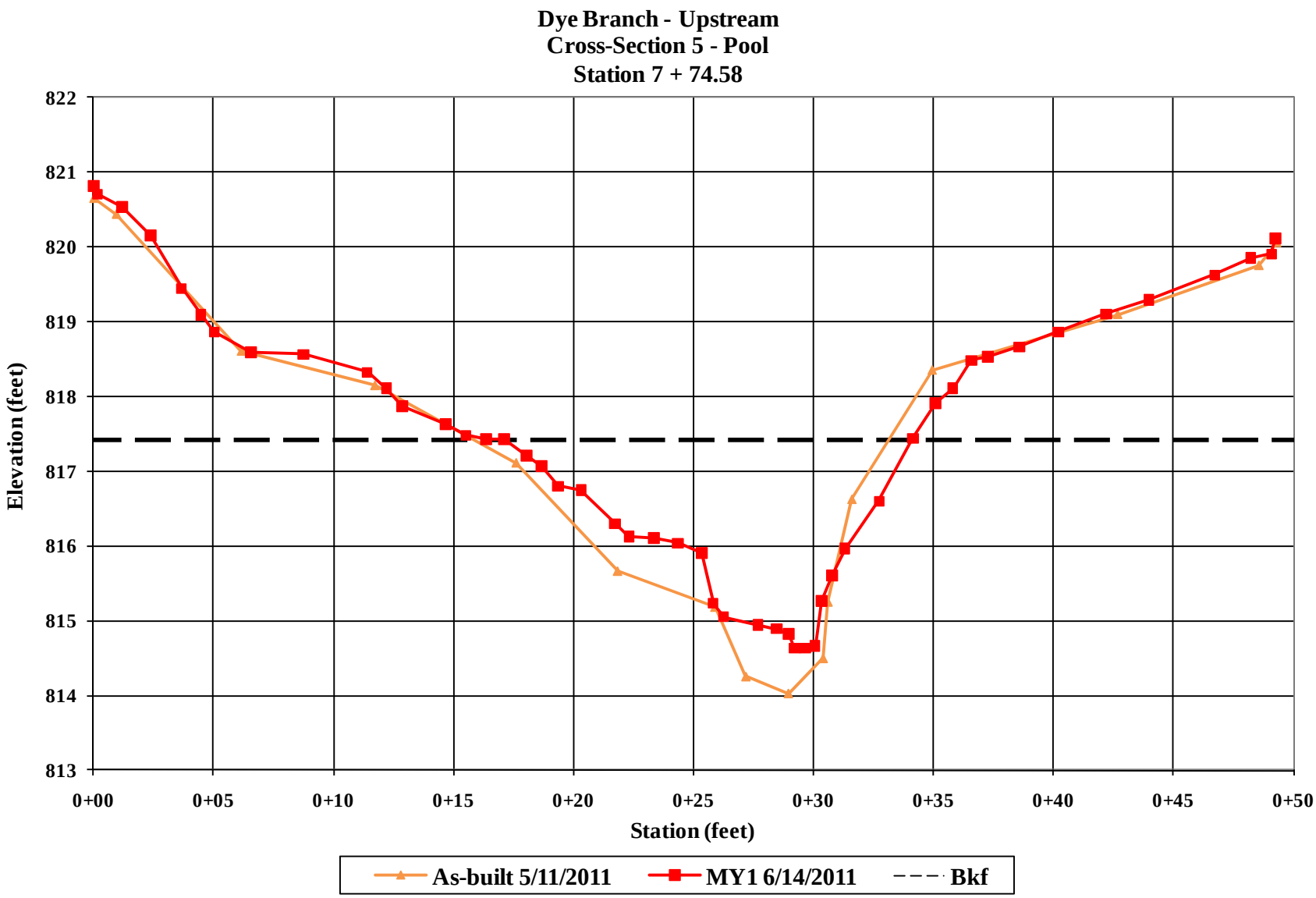

Dye Branch - Upstream
Cross-Section 4 - Riffle
Station 1 + 15.75
Elevation (feet)
829
828
827
826
825
824
823
822
821
820
0+00
0+05
0+10
0+15
0+20
0+25
0+30
0+35
0+40
0+45
0+50
0+55
0+60
0+65
0+70
Station (feet)
As-built 5/10/2011
MY1 6/13/2011
Bkf

Dye Branch Upstream – Cross-Section 4 – Riffle
(Looking at Left Bank Descending)
Monitoring Year 1 – June 13, 2011

Dye Branch Upstream – Cross-Section 4 – Riffle
(Looking at Right Bank Descending)
Monitoring Year 1 – June 13, 2011

Dye Branch Upstream – Cross-Section 4 – Riffle
(Looking Downstream)
Monitoring Year 1 – June 13, 2011

Dye Branch Upstream – Cross-Section 4 – Riffle
(Looking Upstream)
Monitoring Year 1 – June 13, 2011

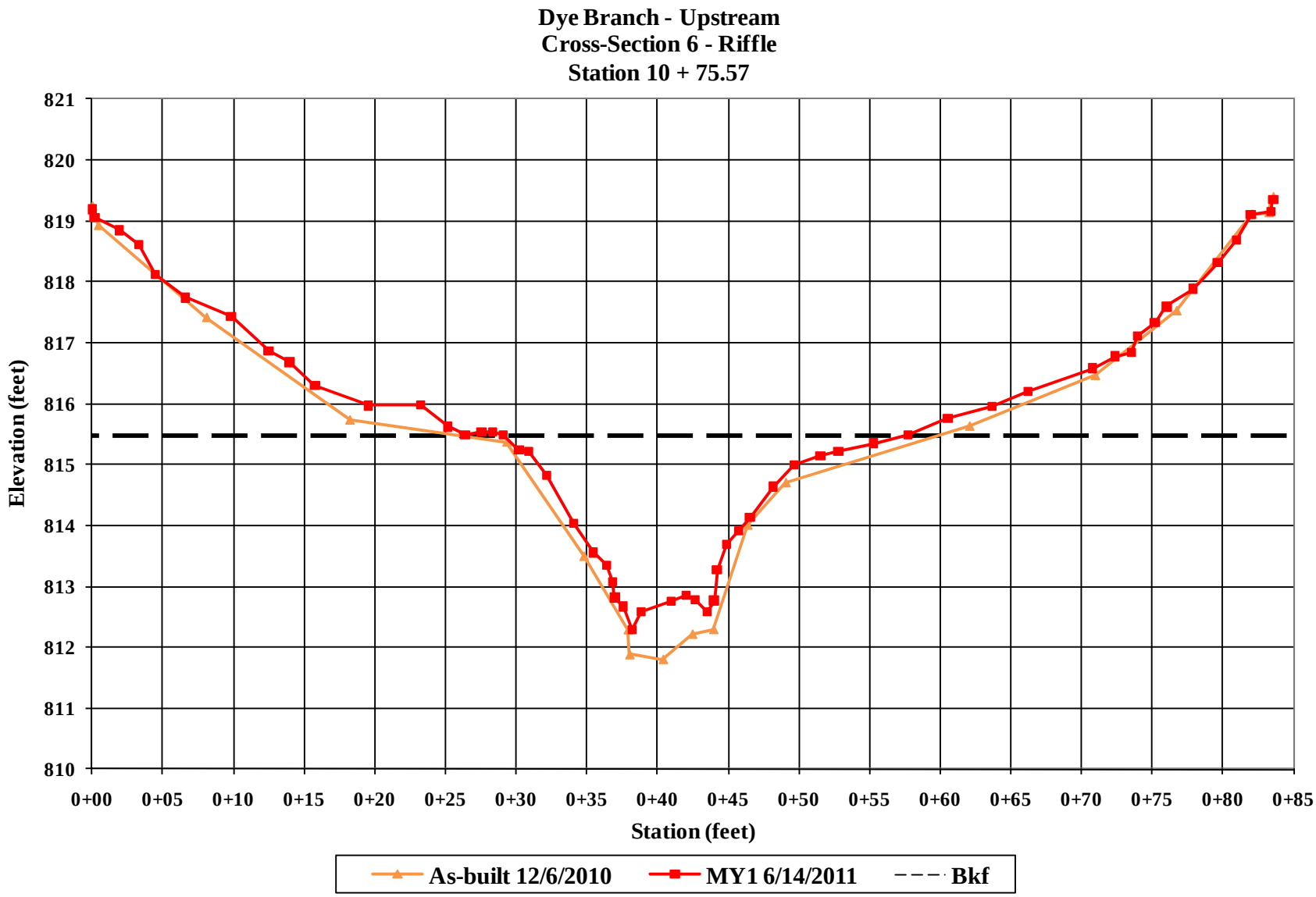

Dye Branch - Upstream
Cross-Section 5 - Pool
Station 7 + 74.58
Elevation (feet)
822
821
820
819
818
817
816
815
814
813
0+00
0+05
0+10
0+15
0+20
0+25
0+30
0+35
0+40
0+45
0+50
Station (feet)
As-built 5/11/2011
MY1 6/14/2011
Bkf

Dye Branch Upstream – Cross-Section 5 – Pool
(Looking at Left Bank Descending)
Monitoring Year 1 – June 14, 2011

Dye Branch Upstream – Cross-Section 5 – Pool
(Looking at Right Bank Descending)
Monitoring Year 1 – June 14, 2011

Dye Branch Upstream – Cross-Section 5 – Pool
(Looking Downstream)
Monitoring Year 1 – June 14, 2011

Dye Branch Upstream – Cross-Section 5 – Pool
(Looking Upstream)
Monitoring Year 1 – June 14, 2011

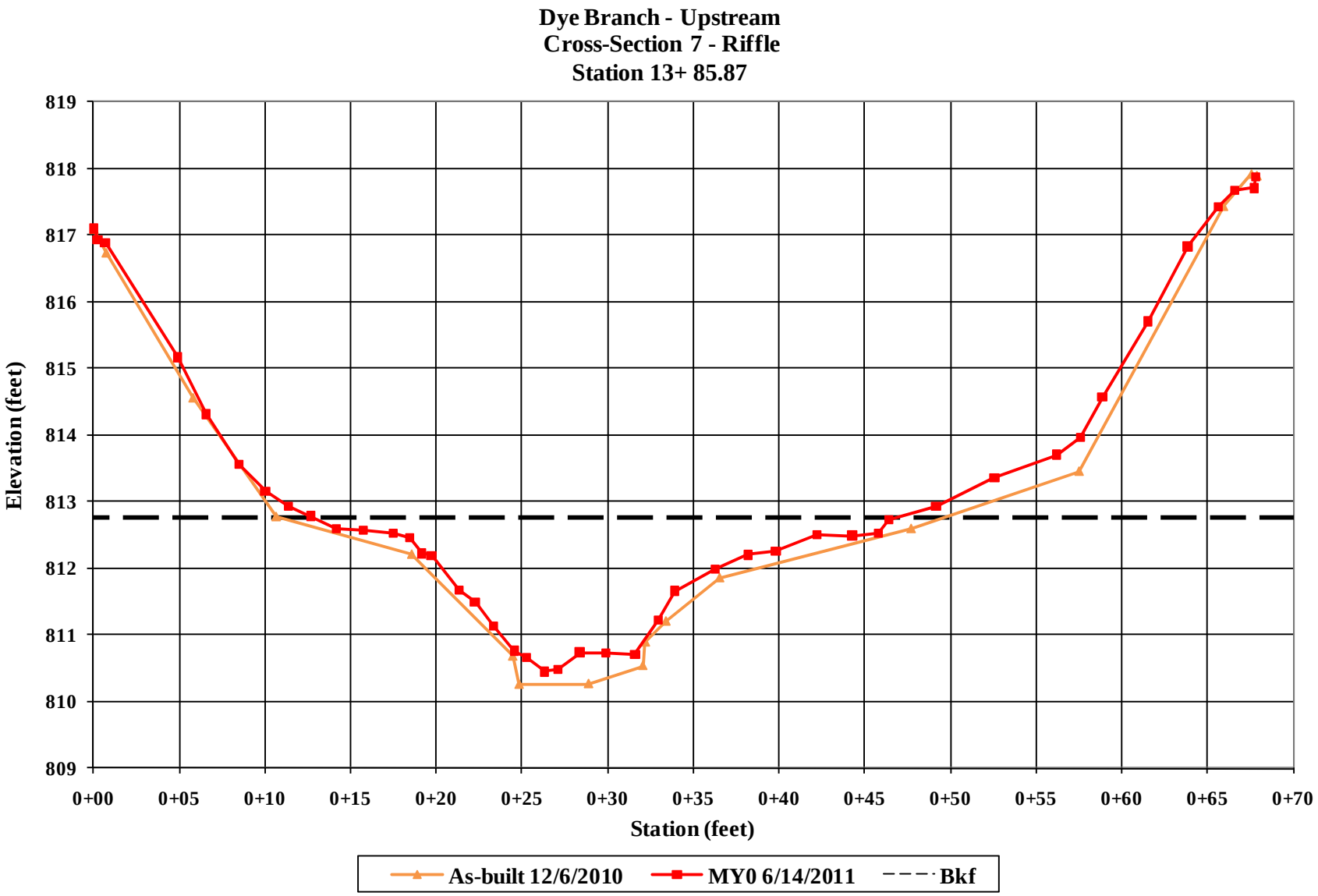

Dye Branch - Upstream
Cross-Section 6 - Riffle
Station 10 + 75.57
Elevation (feet)
821
820
819
818
817
816
815
814
813
812
811
810
0+00
0+05
0+10
0+15
0+20
0+25
0+30
0+35
0+40
0+45
0+50
0+55
0+60
0+65
0+70
0+75
0+80
0+85
Station (feet)
As-built 12/6/2010
MY1 6/14/2011
Bkf

Dye Branch Upstream – Cross-Section 6 – Riffle
(Looking at Left Bank Descending)
Monitoring Year 1 – June 14, 2011

Dye Branch Upstream – Cross-Section 6 – Riffle
(Looking at Right Bank Descending)
Monitoring Year 1 – June 14, 2011

Dye Branch Upstream – Cross-Section 6 – Riffle
(Looking Downstream)
Monitoring Year 1 – June 14, 2011

Dye Branch Upstream – Cross-Section 6 – Riffle
(Looking Upstream)
Monitoring Year 1 – June 14, 2011

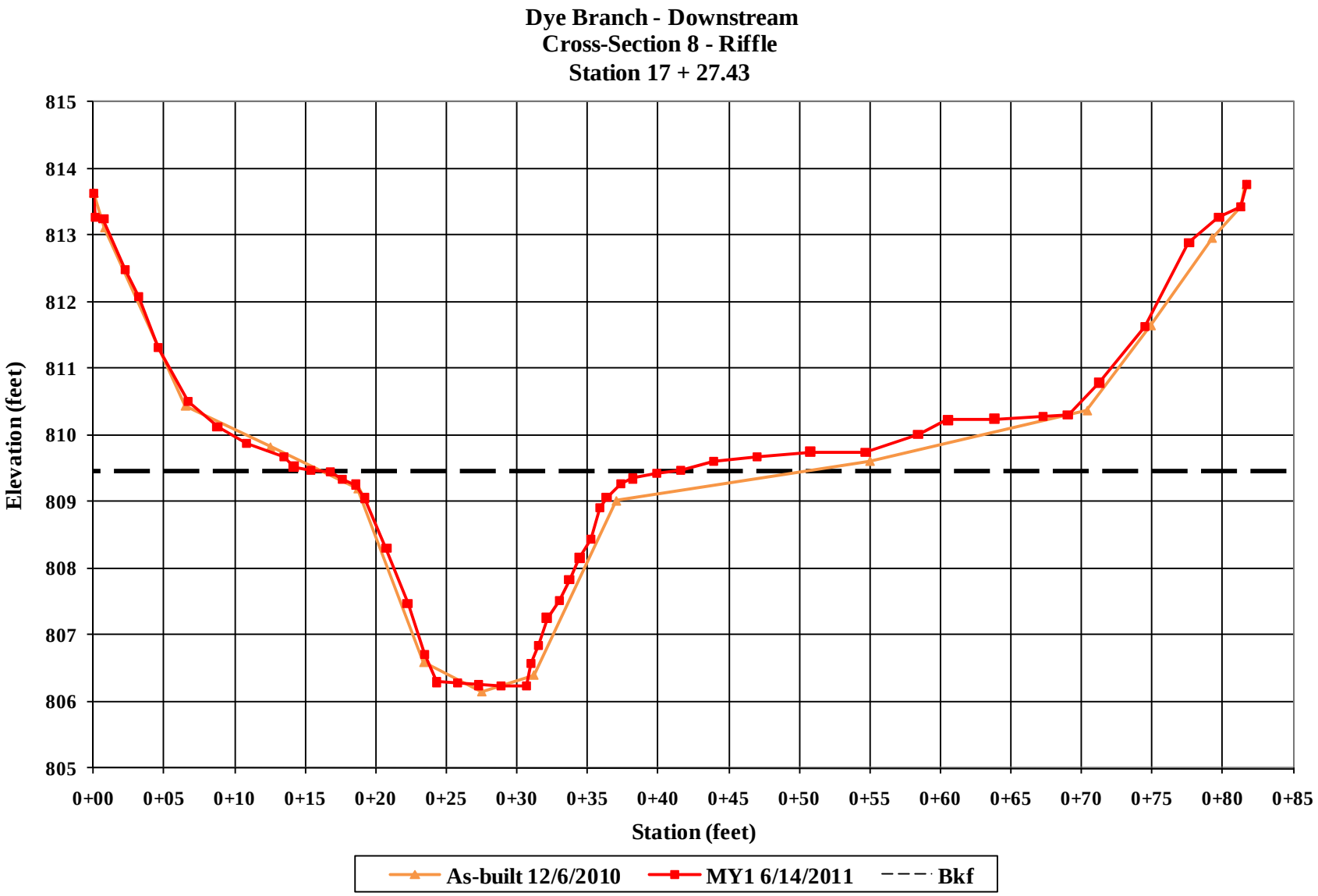

Dye Branch - Upstream
Cross-Section 7 - Riffle
Station 13+ 85.87
Elevation (feet)
819
818
817
816
815
814
813
812
811
810
809
0+00
0+05
0+10
0+15
0+20
0+25
0+30
0+35
0+40
0+45
0+50
0+55
0+60
0+65
0+70
Station (feet)
As-built 12/6/2010
MY0 6/14/2011
Bkf

Dye Branch Upstream – Cross-Section 7 – Riffle
(Looking at Left Bank Descending)
Monitoring Year 1 – June 14, 2011

Dye Branch Upstream – Cross-Section 7 – Riffle
(Looking at Right Bank Descending)
Monitoring Year 1 – June 14, 2011

Dye Branch Upstream – Cross-Section 7 – Riffle
(Looking Downstream)
Monitoring Year 1 – June 14, 2011

Dye Branch Upstream – Cross-Section 7 – Riffle
(Looking Upstream)
Monitoring Year 1 – June 14, 2011

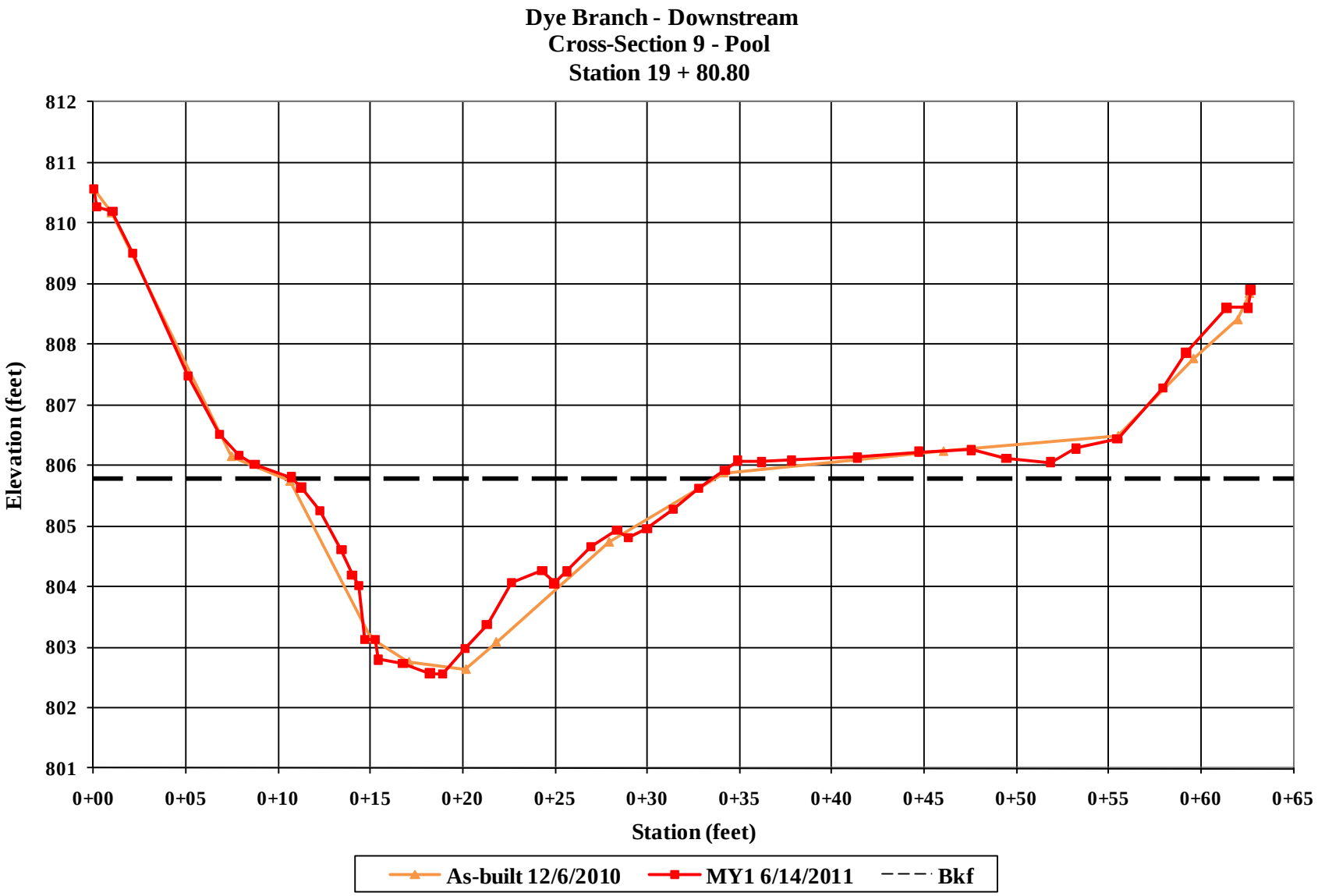

Dye Branch - Downstream
Cross-Section 8 - Riffle
Station 17 + 27.43
Elevation (feet)
815
814
813
812
811
810
809
808
807
806
805
0+00
0+05
0+10
0+15
0+20
0+25
0+30
0+35
0+40
0+45
0+50
0+55
0+60
0+65
0+70
0+75
0+80
0+85
Station (feet)
As-built 12/6/2010
MY1 6/14/2011
Bkf

Dye Branch Downstream – Cross-Section 8 – Riffle
(Looking at Left Bank Descending)
Monitoring Year 1 – June 14, 2011

Dye Branch Downstream – Cross-Section 8 – Riffle
(Looking at Right Bank Descending)
Monitoring Year 1 – June 14, 2011

Dye Branch Downstream – Cross-Section 8 – Riffle
(Looking Downstream)
Monitoring Year 1 – June 14, 2011

Dye Branch Downstream – Cross-Section 8 – Riffle
(Looking Upstream)
Monitoring Year 1 – June 14, 2011

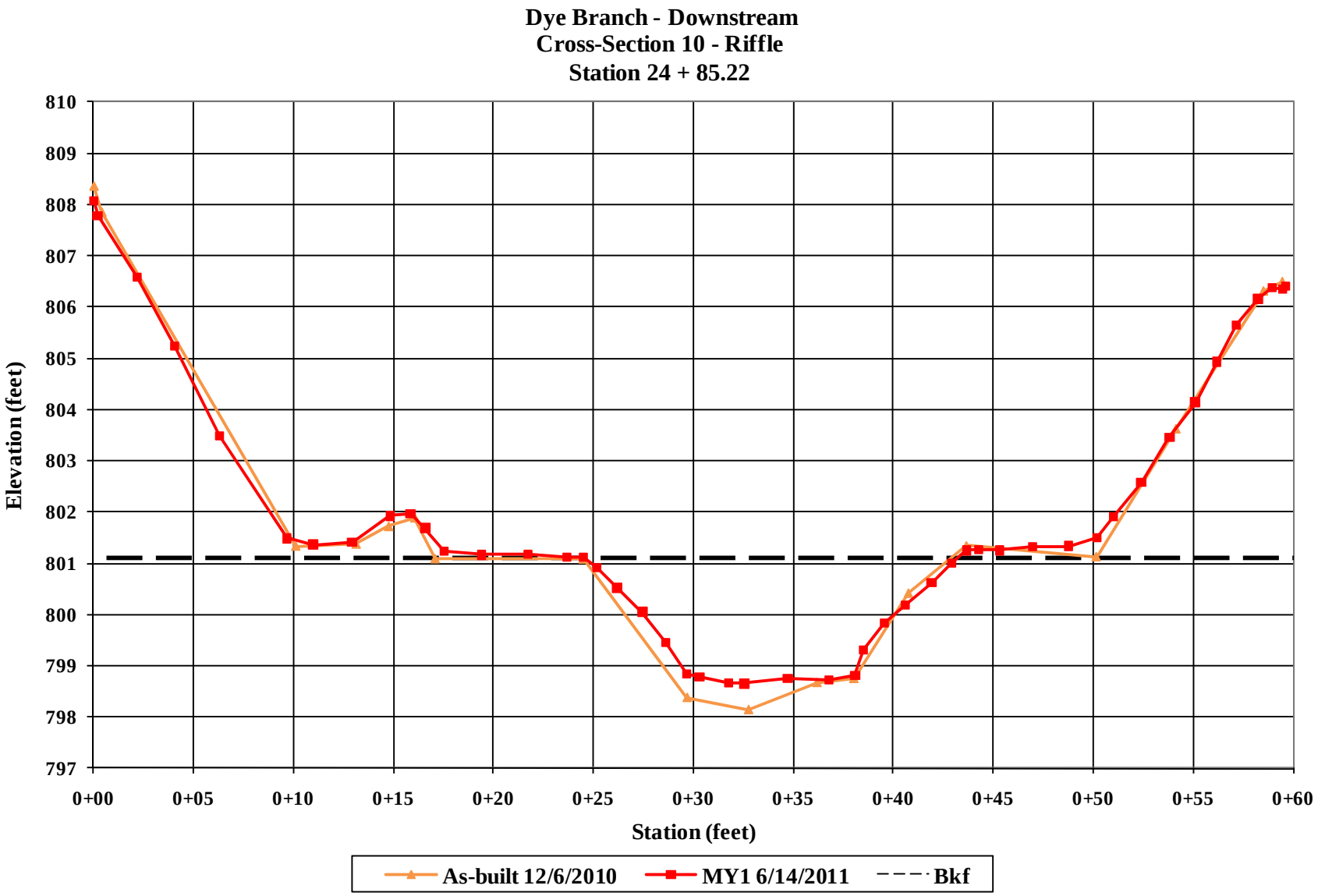

Dye Branch - Downstream
Cross-Section 9 - Pool
Station 19 + 80.80
Elevation (feet)
812
811
810
809
808
807
806
805
804
803
802
801
0+00
0+05
0+10
0+15
0+20
0+25
0+30
0+35
0+40
0+45
0+50
0+55
0+60
0+65
Station (feet)
As-built 12/6/2010
MY1 6/14/2011
Bkf

Dye Branch Downstream– Cross-Section 9 – Pool
(Looking at Left Bank Descending)
Monitoring Year 1 – June 14, 2011

Dye Branch Downstream– Cross-Section 9 – Pool
(Looking at Right Bank Descending)
Monitoring Year 1 – June 14, 2011

Dye Branch Downstream– Cross-Section 9 – Pool
(Looking Downstream)
Monitoring Year 1 – June 14, 2011

Dye Branch Downstream– Cross-Section 9 – Pool
(Looking Upstream)
Monitoring Year 1 – June 14, 2011


Dye Branch - Downstream
Cross-Section 10 - Riffle
Station 24 + 85.22
Elevation (feet)
810
809
808
807
806
805
804
803
802
801
800
799
798
797
0+00
0+05
0+10
0+15
0+20
0+25
0+30
0+35
0+40
0+45
0+50
0+55
0+60
Station (feet)
As-built 12/6/2010
MY1 6/14/2011
Bkf

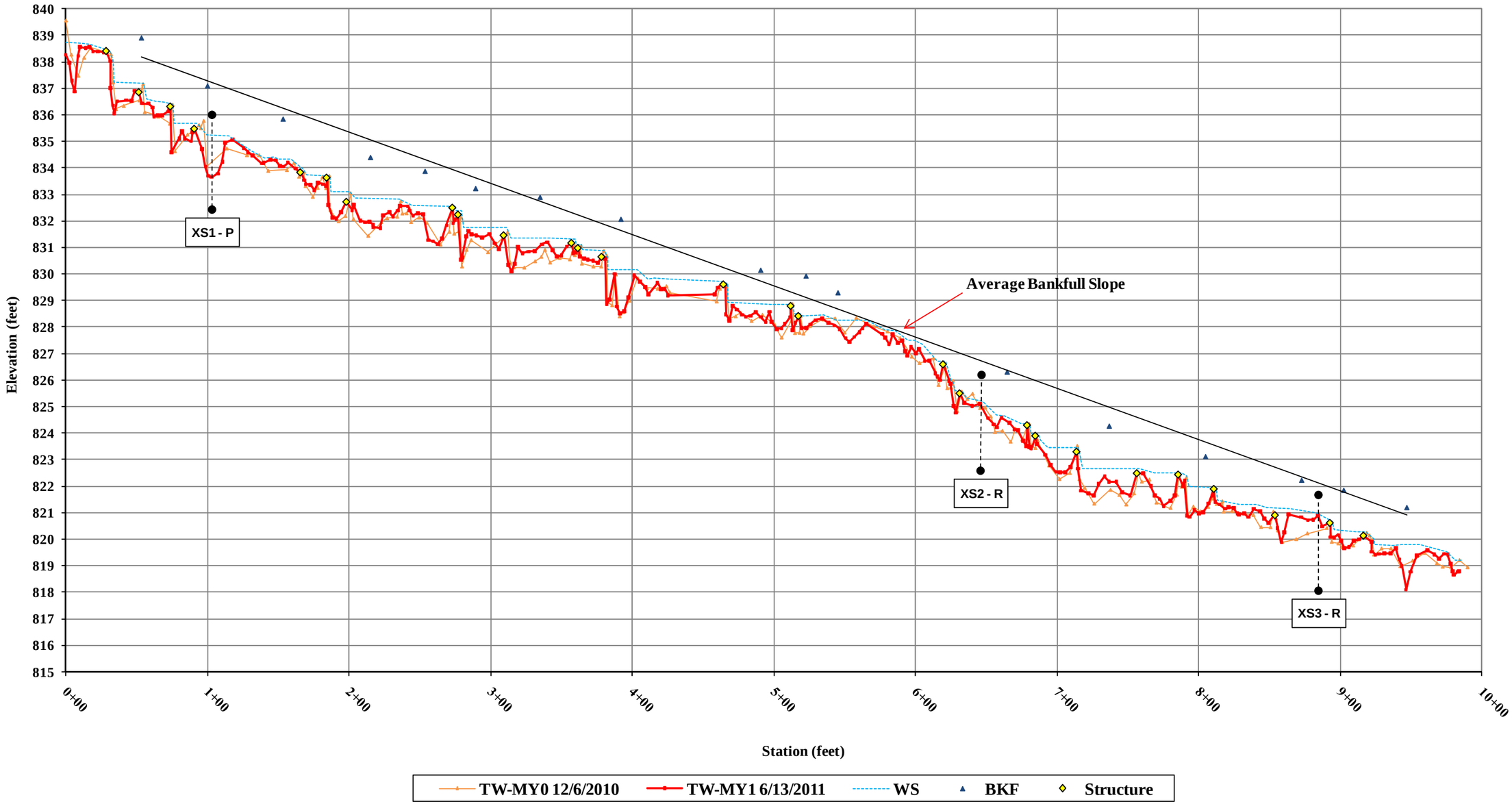
Dye Branch Downstream – Cross-Section 10 – Riffle
(Looking at Left Bank Descending)
Monitoring Year 1 – June 14, 2011

Dye Branch Downstream – Cross-Section 10 – Riffle
(Looking at Right Bank Descending)
Monitoring Year 1 – June 14, 2011

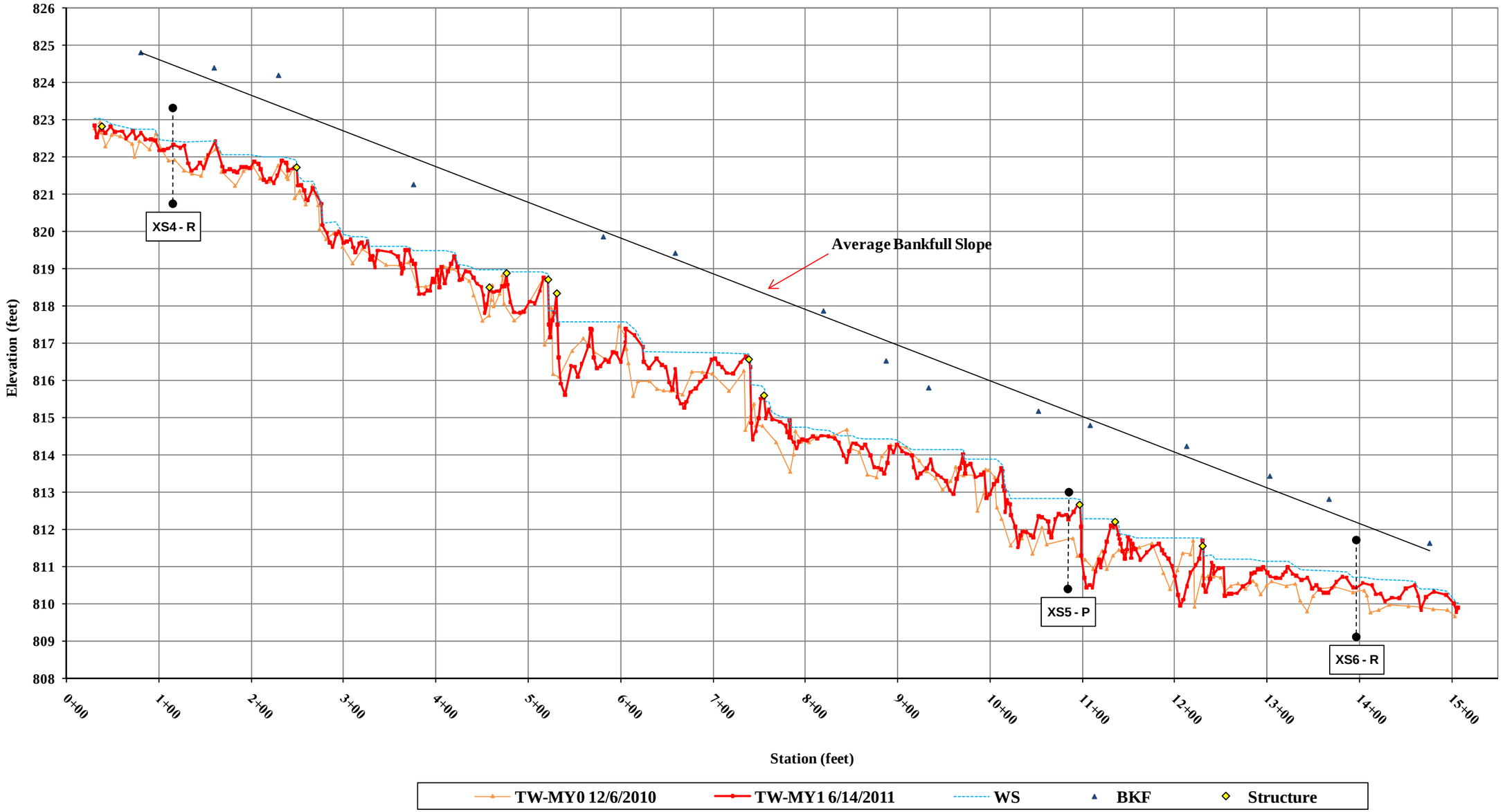
Dye Branch Downstream – Cross-Section 10 – Riffle
(Looking Downstream)
Monitoring Year 1 – June 14, 2011

Dye Branch Downstream – Cross-Section 10 – Riffle
(Looking Upstream)
Monitoring Year 1 – June 14, 2011

Cemetary Branch
Longitudinal Profile
0+00 to 9+89.93



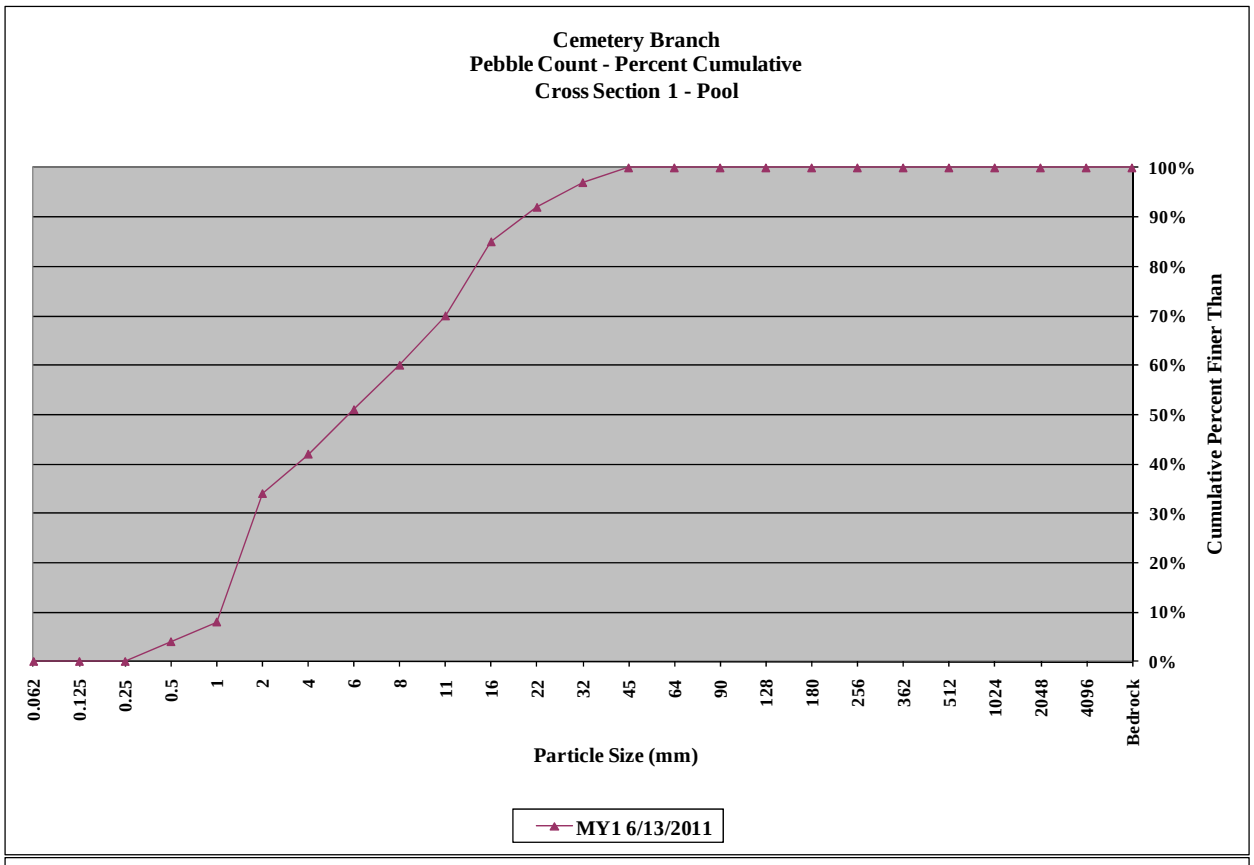
Dye Branch - Upstream
Longitudinal Profile
0+30.36 to 15+03.3

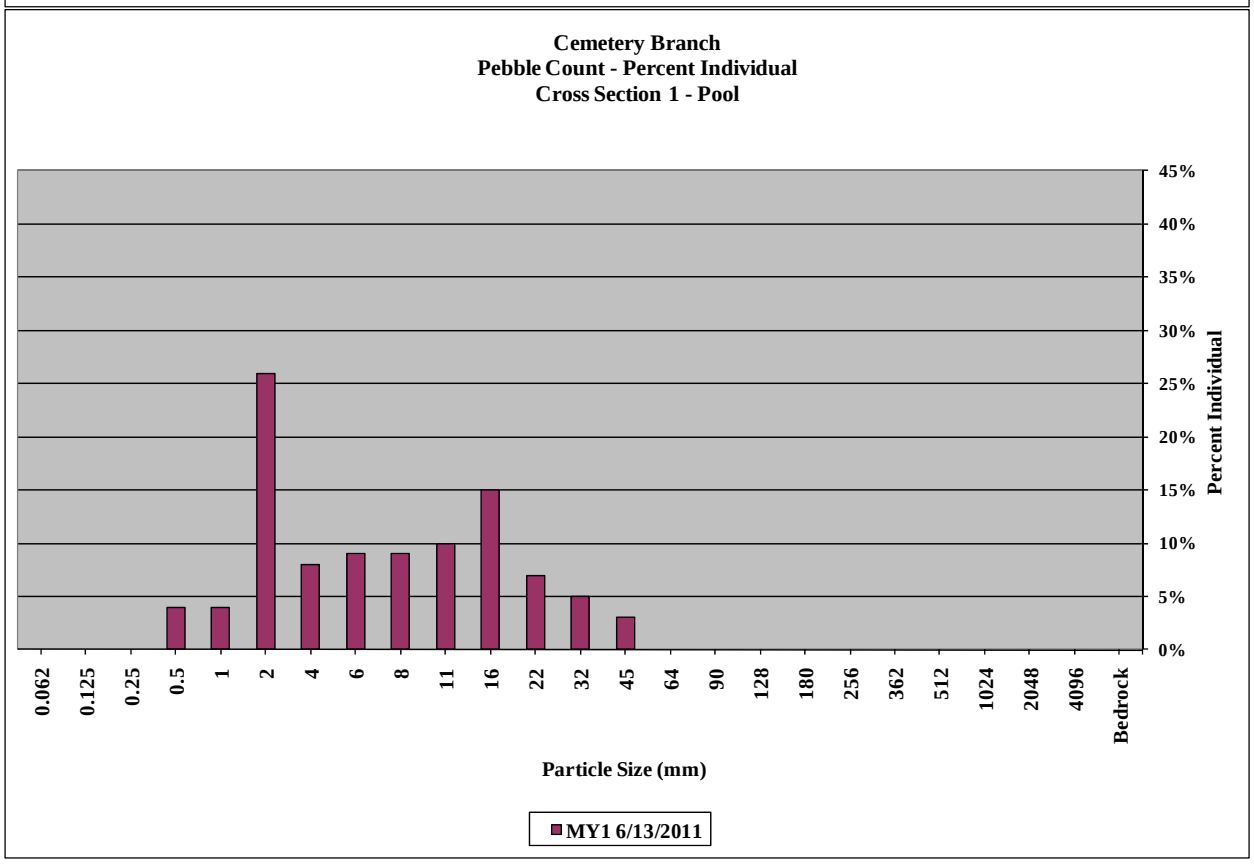


Dye Branch - Downstream
Longitudinal Profile
16+52.72 to 25+34.71

Dye Branch II / Project No. 92255 Cemetery Branch - Cross-Section 1 - Pool Pebble Count Summary					
			Monitoring Year 1		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	0	0%	0%
Sand	very fine sand	0.125	0	0%	0%
	fine sand	0.25	0	0%	0%
	medium sand	0.50	4	4%	4%
	coarse sand	1.00	4	4%	8%
	very coarse sand	2.00	26	26%	34%
Gravel	very fine gravel	4.0	8	8%	42%
	fine gravel	5.7	9	9%	51%
	fine gravel	8.0	9	9%	60%
	medium gravel	11.3	10	10%	70%
	medium gravel	16.0	15	15%	85%
	coarse gravel	22.3	7	7%	92%
	coarse gravel	32	5	5%	97%
	very coarse gravel	45	3	3%	100%
	very coarse gravel	64	0	0%	100%
Cobble	small cobble	90	0	0%	100%
	medium cobble	128	0	0%	100%
	large cobble	180	0	0%	100%
	very large cobble	256	0	0%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
	very large boulder	4096	0	0%	100%
Bedrock	bedrock	>4096	0	0%	100%
TOTALS			100	100%	100%

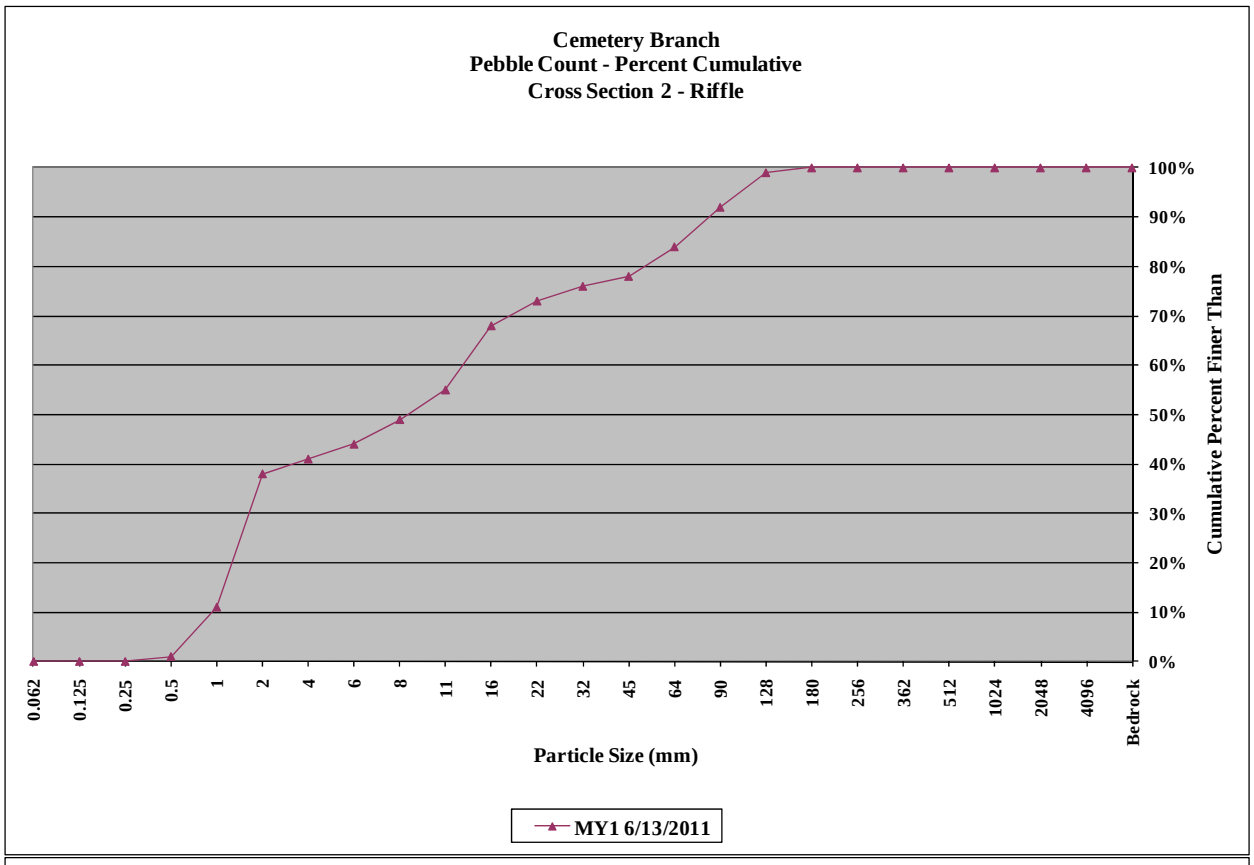
Summary Data	
D50	5.7
D84	16
D95	28

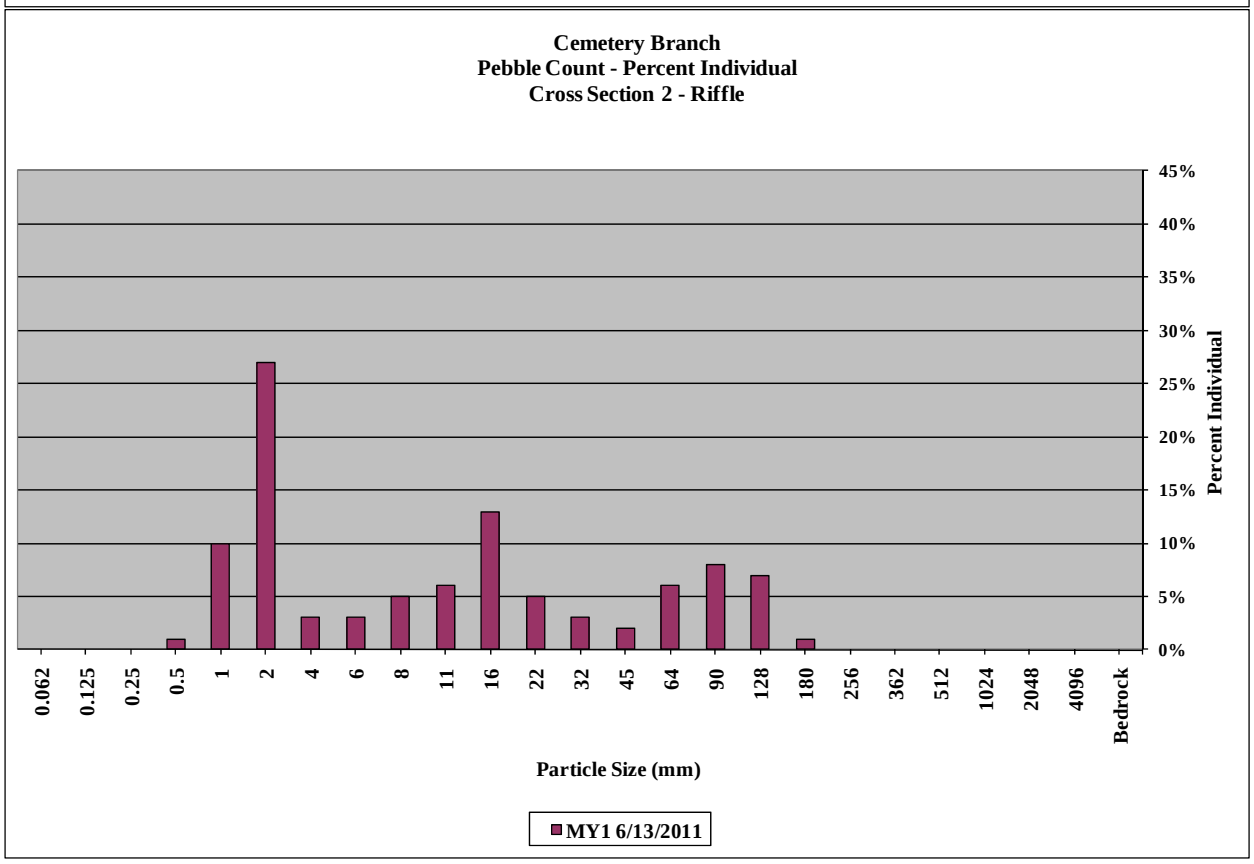

Cemetery Branch
Pebble Count - Percent Cumulative
Cross Section 1 - Pool
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Cumulative Percent Finer Than
0.062
0.125
0.25
0.5
1
2
4
6
8
11
16
22
32
45
64
90
128
180
256
362
512
1024
2048
4096
Bedrock
Particle Size (mm)
MY1 6/13/2011


Cemetery Branch
Pebble Count - Percent Individual
Cross Section 1 - Pool
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Percent Individual
0.062
0.125
0.25
0.5
1
2
4
6
8
11
16
22
32
45
64
90
128
180
256
362
512
1024
2048
4096
Bedrock
Particle Size (mm)
MY1 6/13/2011

Dye Branch II / Project No. 92255 Cemetery Branch - Cross-Section 2 - Riffle Pebble Count Summary					
			Monitoring Year 1		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	0	0%	0%
Sand	very fine sand	0.125	0	0%	0%
	fine sand	0.25	0	0%	0%
	medium sand	0.50	1	1%	1%
	coarse sand	1.00	10	10%	11%
	very coarse sand	2.00	27	27%	38%
Gravel	very fine gravel	4.0	3	3%	41%
	fine gravel	5.7	3	3%	44%
	fine gravel	8.0	5	5%	49%
	medium gravel	11.3	6	6%	55%
	medium gravel	16.0	13	13%	68%
	coarse gravel	22.3	5	5%	73%
	coarse gravel	32	3	3%	76%
	very coarse gravel	45	2	2%	78%
	very coarse gravel	64	6	6%	84%
Cobble	small cobble	90	8	8%	92%
	medium cobble	128	7	7%	99%
	large cobble	180	1	1%	100%
	very large cobble	256	0	0%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
	very large boulder	4096	0	0%	100%
Bedrock	bedrock	>4096	0	0%	100%
TOTALS			100	100%	100%

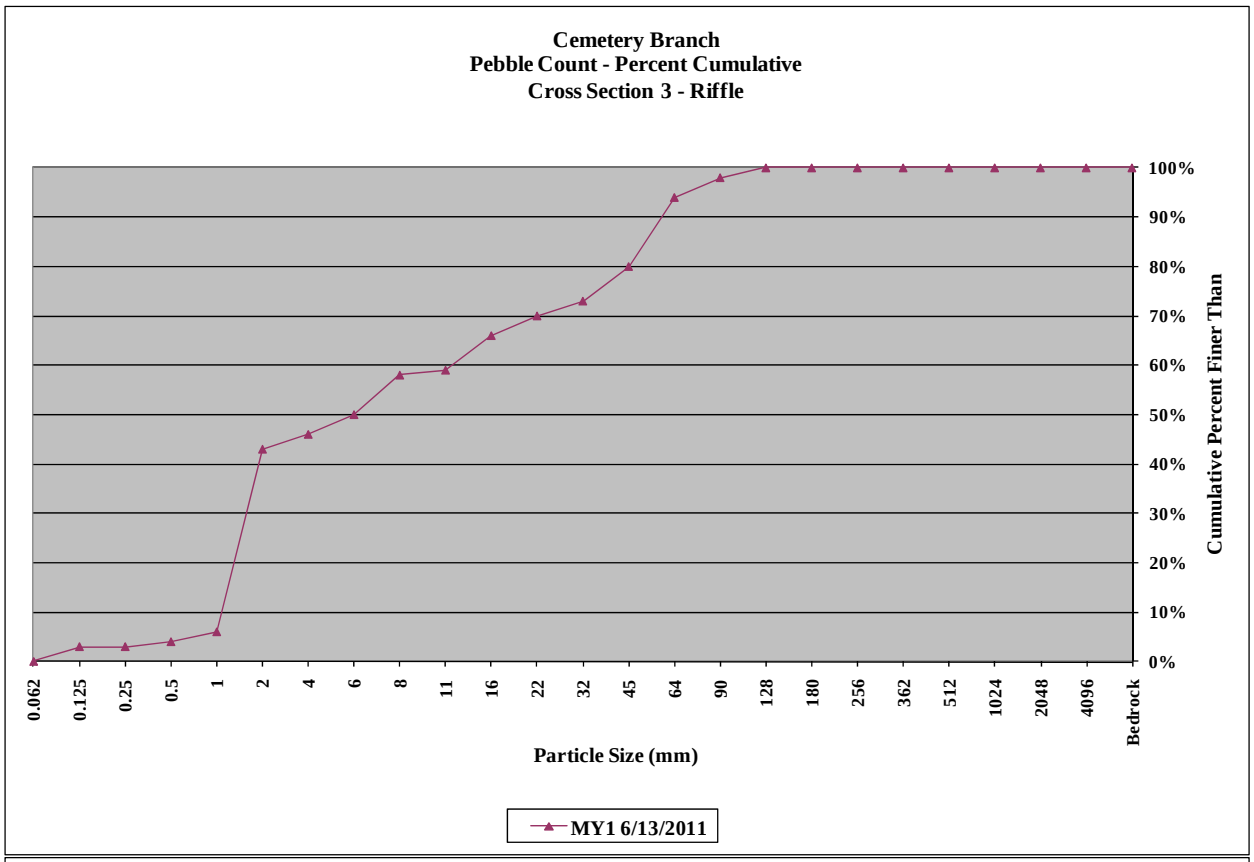
Summary Data	
D50	8.4
D84	64
D95	100

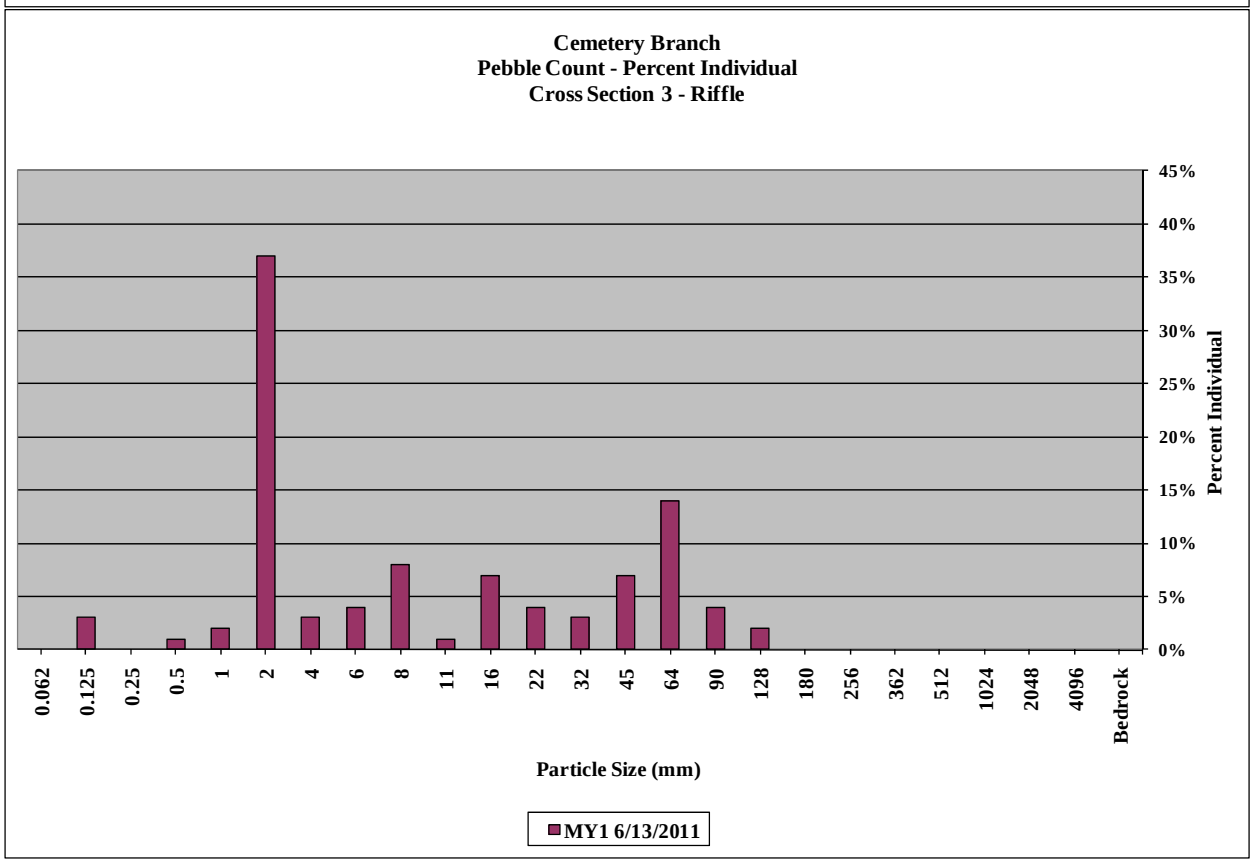

Cemetery Branch
Pebble Count - Percent Cumulative
Cross Section 2 - Riffle
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Cumulative Percent Finer Than
0.062
0.125
0.25
0.5
1
2
4
6
8
11
16
22
32
45
64
90
128
180
256
362
512
1024
2048
4096
Bedrock
Particle Size (mm)
MY1 6/13/2011


Cemetery Branch
Pebble Count - Percent Individual
Cross Section 2 - Riffle
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Percent Individual
0.062
0.125
0.25
0.5
1
2
4
6
8
11
16
22
32
45
64
90
128
180
256
362
512
1024
2048
4096
Bedrock
Particle Size (mm)
MY1 6/13/2011

Dye Branch II / Project No. 92255 Cemetery Branch - Cross-Section 3 - Riffle Pebble Count Summary					
			Monitoring Year 1		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	0	0%	0%
Sand	very fine sand	0.125	3	3%	3%
	fine sand	0.25	0	0%	3%
	medium sand	0.50	1	1%	4%
	coarse sand	1.00	2	2%	6%
	very coarse sand	2.00	37	37%	43%
Gravel	very fine gravel	4.0	3	3%	46%
	fine gravel	5.7	4	4%	50%
	fine gravel	8.0	8	8%	58%
	medium gravel	11.3	1	1%	59%
	medium gravel	16.0	7	7%	66%
	coarse gravel	22.3	4	4%	70%
	coarse gravel	32	3	3%	73%
	very coarse gravel	45	7	7%	80%
	very coarse gravel	64	14	14%	94%
Cobble	small cobble	90	4	4%	98%
	medium cobble	128	2	2%	100%
	large cobble	180	0	0%	100%
	very large cobble	256	0	0%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
	very large boulder	4096	0	0%	100%
Bedrock	bedrock	>4096	0	0%	100%
TOTALS			100	100%	100%

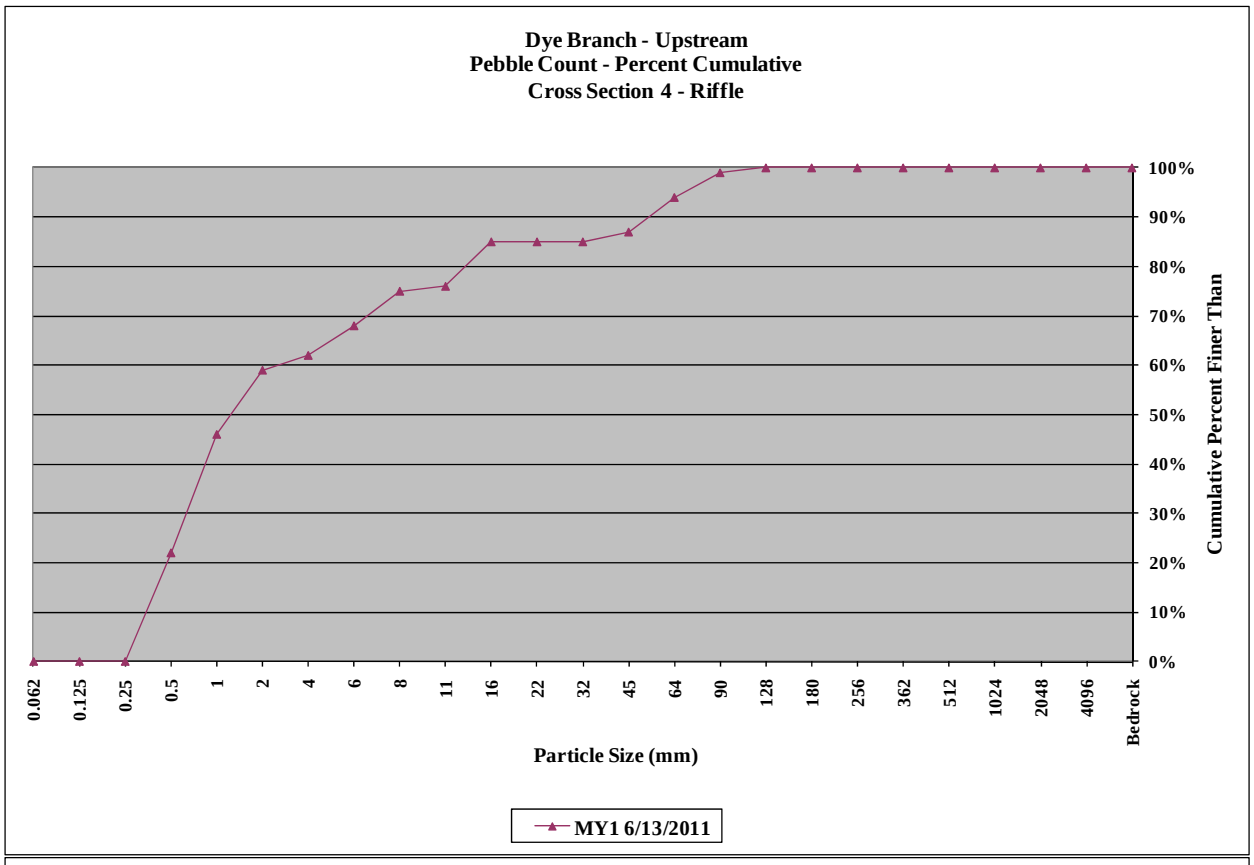
Summary Data	
D50	6
D84	50
D95	70

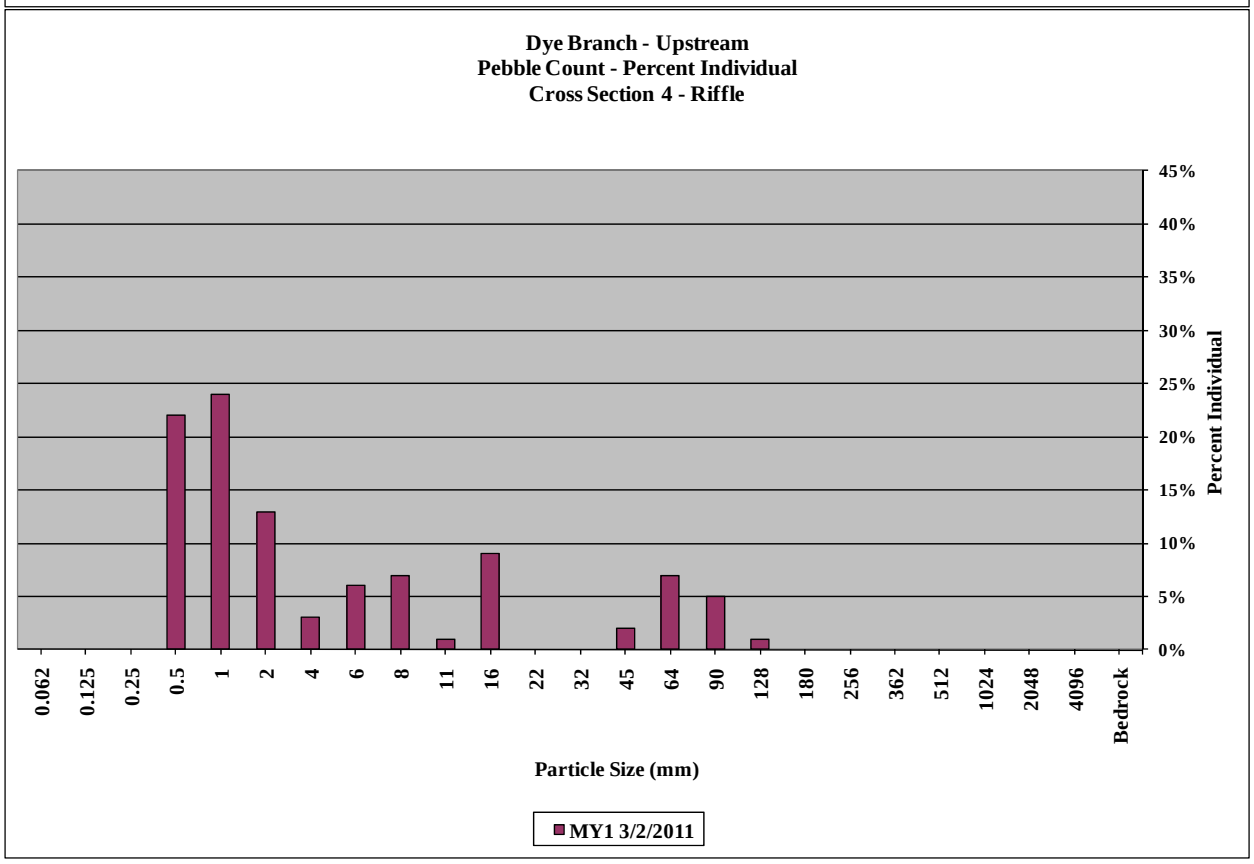

Cemetery Branch
Pebble Count - Percent Cumulative
Cross Section 3 - Riffle
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Cumulative Percent Finer Than
0.062
0.125
0.25
0.5
1
2
4
6
8
11
16
22
32
45
64
90
128
180
256
362
512
1024
2048
4096
Bedrock
Particle Size (mm)
MY1 6/13/2011


Cemetery Branch
Pebble Count - Percent Individual
Cross Section 3 - Riffle
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Percent Individual
0.062
0.125
0.25
0.5
1
2
4
6
8
11
16
22
32
45
64
90
128
180
256
362
512
1024
2048
4096
Bedrock
Particle Size (mm)
MY1 6/13/2011

Dye Branch II / Project No. 92255 Dye Branch - Upstream - Cross-Section 4 - Riffle Pebble Count Summary					
			Monitoring Year 1		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	0	0%	0%
Sand	very fine sand	0.125	0	0%	0%
	fine sand	0.25	0	0%	0%
	medium sand	0.50	22	22%	22%
	coarse sand	1.00	24	24%	46%
	very coarse sand	2.00	13	13%	59%
Gravel	very fine gravel	4.0	3	3%	62%
	fine gravel	5.7	6	6%	68%
	fine gravel	8.0	7	7%	75%
	medium gravel	11.3	1	1%	76%
	medium gravel	16.0	9	9%	85%
	coarse gravel	22.3	0	0%	85%
	coarse gravel	32	0	0%	85%
	very coarse gravel	45	2	2%	87%
	very coarse gravel	64	7	7%	94%
Cobble	small cobble	90	5	5%	99%
	medium cobble	128	1	1%	100%
	large cobble	180	0	0%	100%
	very large cobble	256	0	0%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
	very large boulder	4096	0	0%	100%
Bedrock	bedrock	>4096	0	0%	100%
TOTALS			100	100%	100%

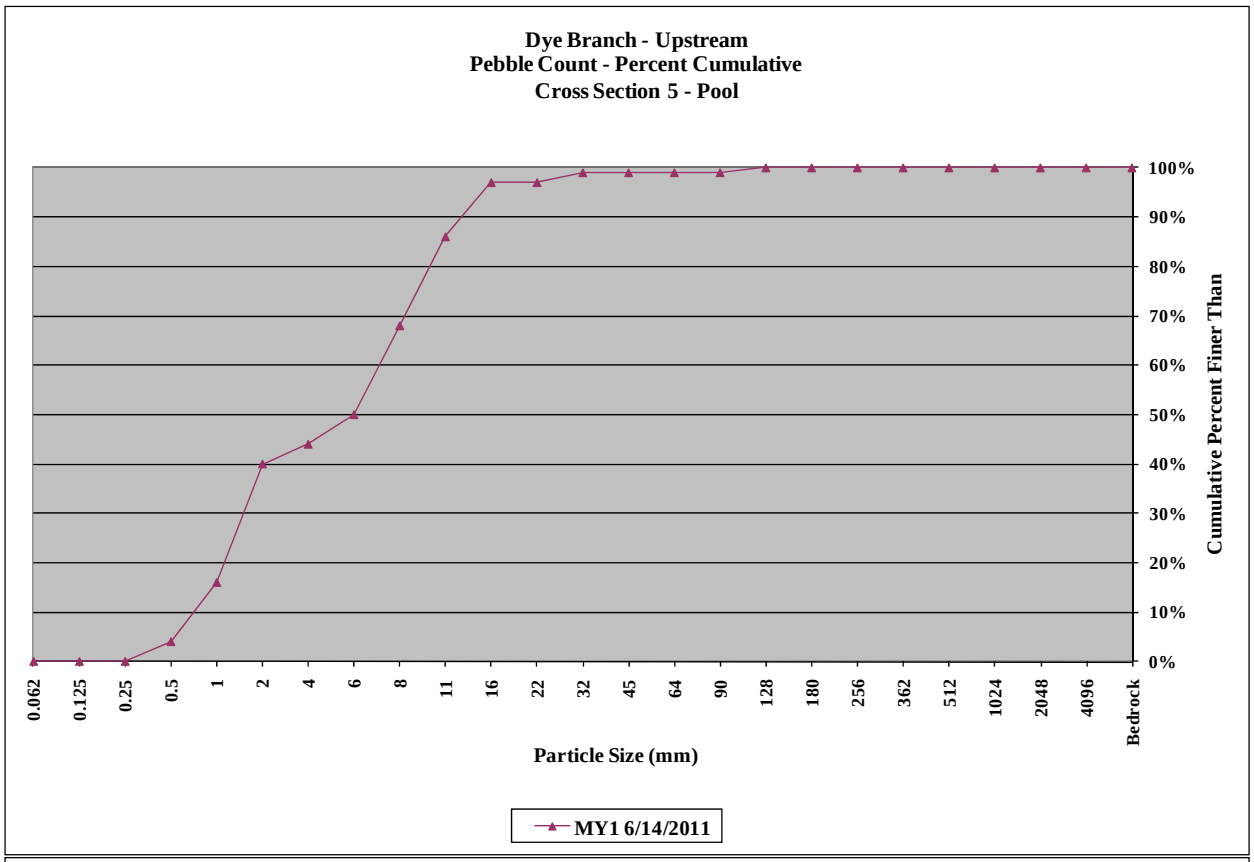
Summary Data	
D50	1.2
D84	15
D95	69

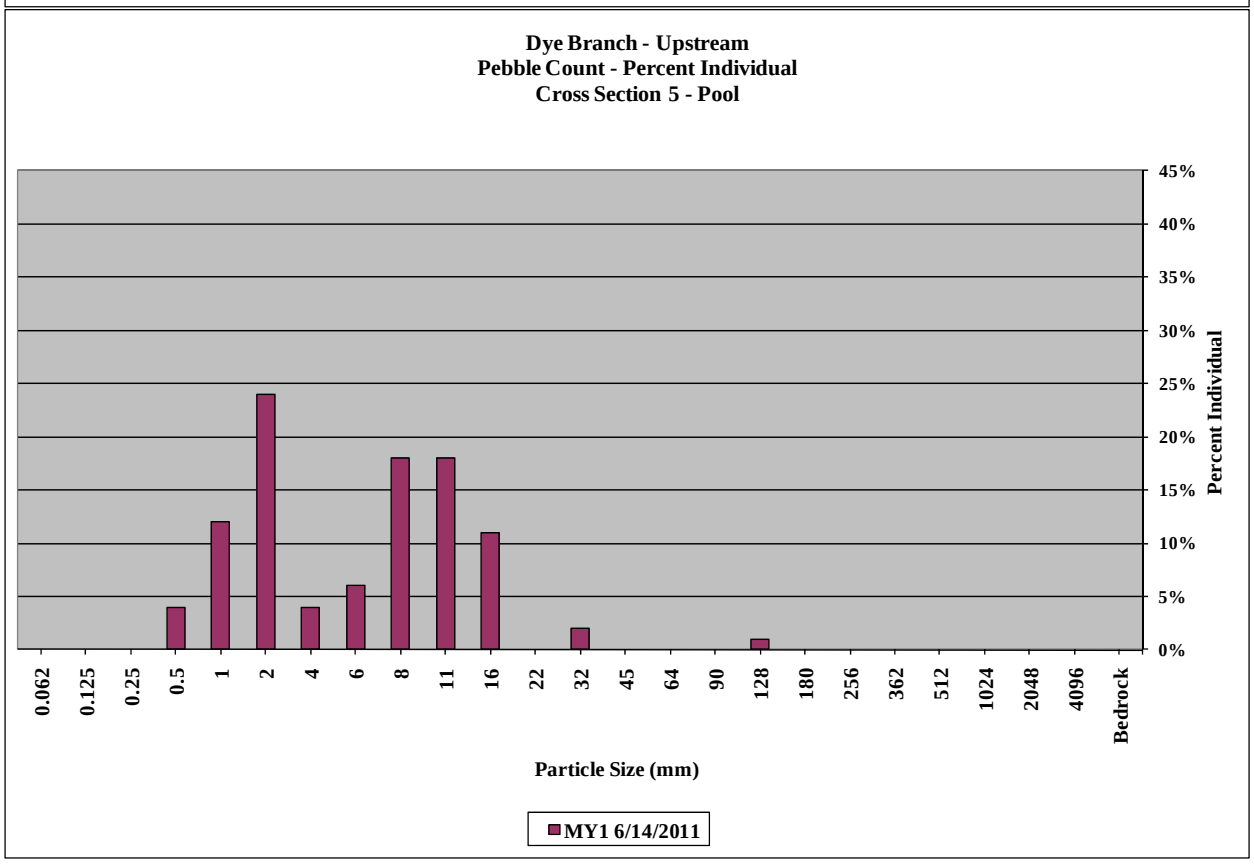

Dye Branch - Upstream
Pebble Count - Percent Cumulative
Cross Section 4 - Riffle
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Cumulative Percent Finer Than
0.062
0.125
0.25
0.5
1
2
4
6
8
11
16
22
32
45
64
90
128
180
256
362
512
1024
2048
4096
Bedrock
Particle Size (mm)
MY1 6/13/2011


Dye Branch - Upstream
Pebble Count - Percent Individual
Cross Section 4 - Riffle
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Percent Individual
0.062
0.125
0.25
0.5
1
2
4
6
8
11
16
22
32
45
64
90
128
180
256
362
512
1024
2048
4096
Bedrock
Particle Size (mm)
MY1 3/2/2011

Dye Branch II / Project No. 92255 Dye Branch - Upstream - Cross-Section 5 - Pool Pebble Count Summary					
			Monitoring Year 1		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	0	0%	0%
Sand	very fine sand	0.125	0	0%	0%
	fine sand	0.25	0	0%	0%
	medium sand	0.50	4	4%	4%
	coarse sand	1.00	12	12%	16%
	very coarse sand	2.00	24	24%	40%
Gravel	very fine gravel	4.0	4	4%	44%
	fine gravel	5.7	6	6%	50%
	fine gravel	8.0	18	18%	68%
	medium gravel	11.3	18	18%	86%
	medium gravel	16.0	11	11%	97%
	coarse gravel	22.3	0	0%	97%
	coarse gravel	32	2	2%	99%
	very coarse gravel	45	0	0%	99%
	very coarse gravel	64	0	0%	99%
Cobble	small cobble	90	0	0%	99%
	medium cobble	128	1	1%	100%
	large cobble	180	0	0%	100%
	very large cobble	256	0	0%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
	very large boulder	4096	0	0%	100%
Bedrock	bedrock	>4096	0	0%	100%
TOTALS			100	100%	100%

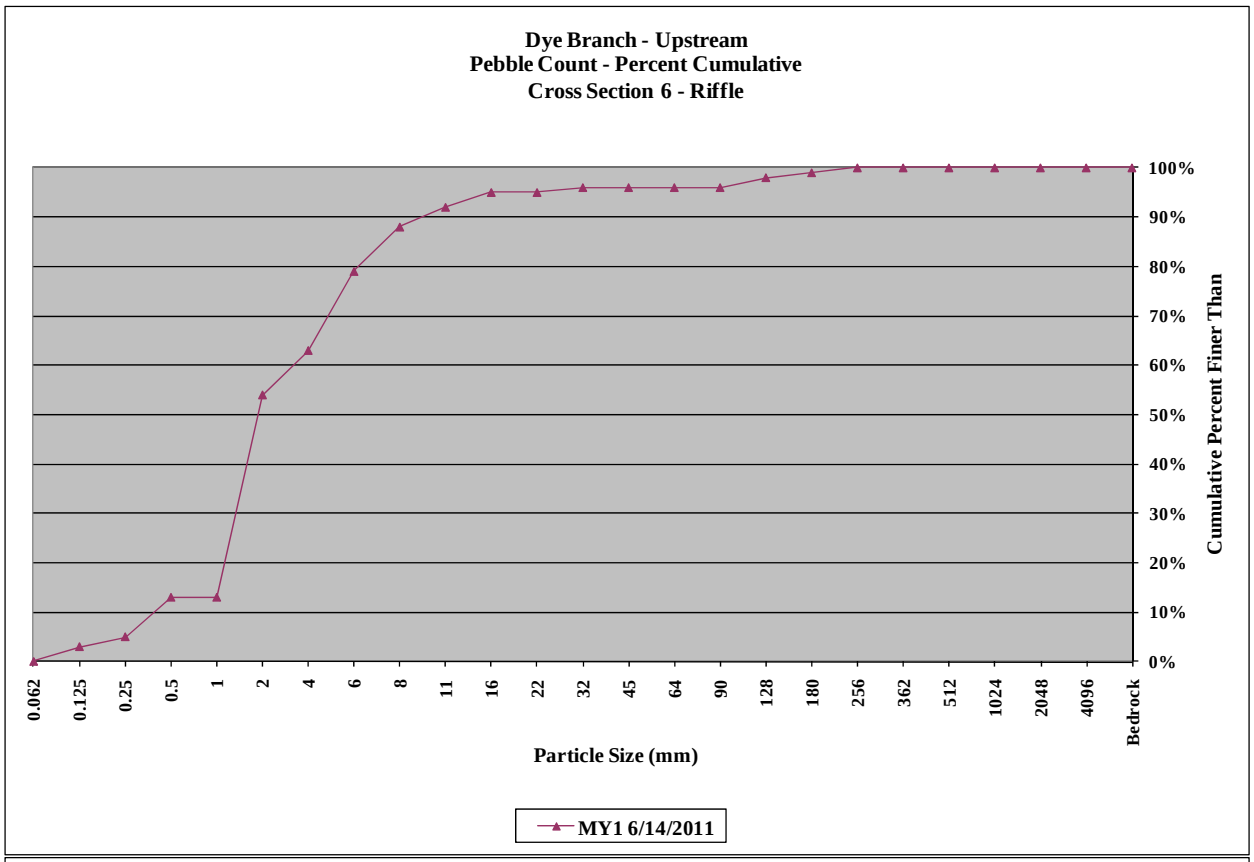
Summary Data	
D50	6
D84	11
D95	15

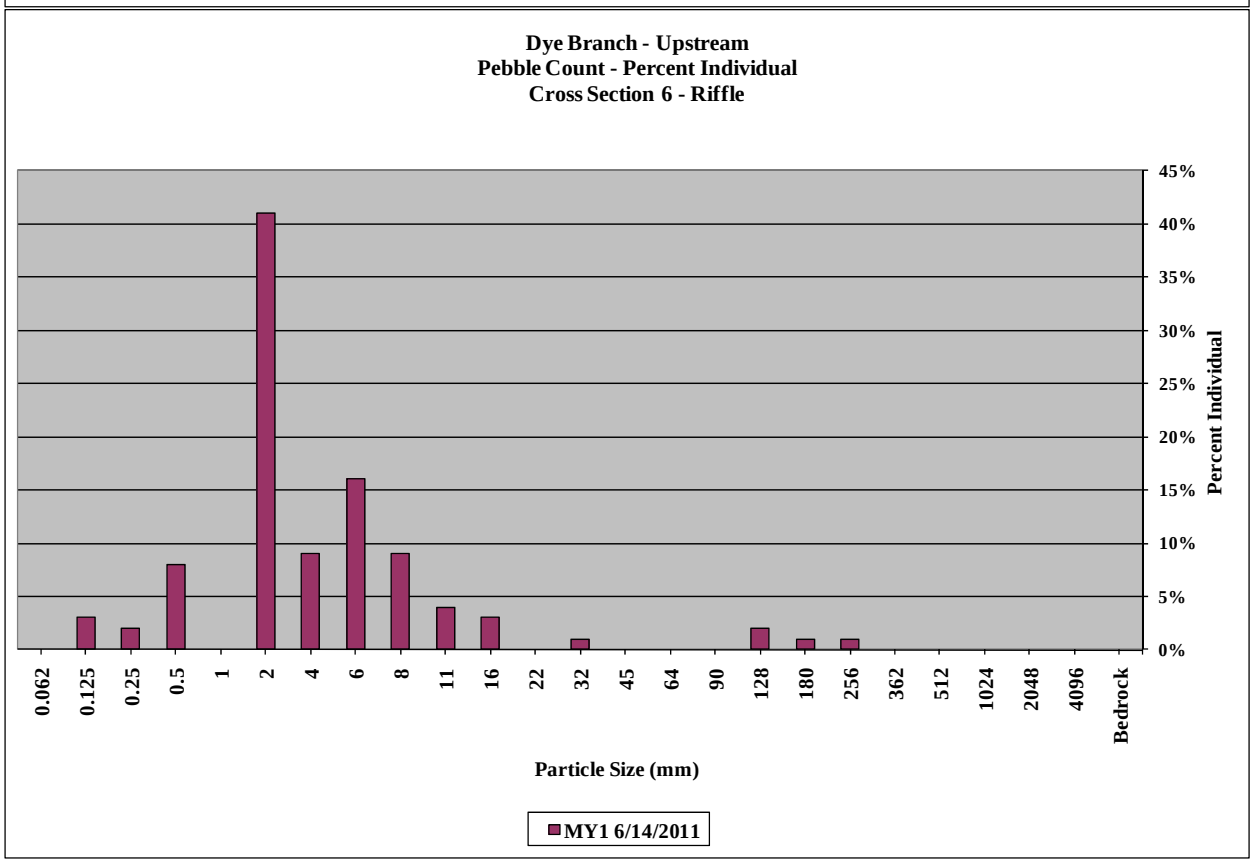

Dye Branch - Upstream
Pebble Count - Percent Cumulative
Cross Section 5 - Pool
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Cumulative Percent Finer Than
0.062
0.125
0.25
0.5
1
2
4
6
8
11
16
22
32
45
64
90
128
180
256
362
512
1024
2048
4096
Bedrock
Particle Size (mm)
MY1 6/14/2011


Dye Branch - Upstream
Pebble Count - Percent Individual
Cross Section 5 - Pool
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Percent Individual
0.062
0.125
0.25
0.5
1
2
4
6
8
11
16
22
32
45
64
90
128
180
256
362
512
1024
2048
4096
Bedrock
Particle Size (mm)
MY1 6/14/2011

Dye Branch II / Project No. 92255 Dye Branch - Upstream - Cross-Section 6 - Riffle Pebble Count Summary					
			Monitoring Year 1		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	0	0%	0%
Sand	very fine sand	0.125	3	3%	3%
	fine sand	0.25	2	2%	5%
	medium sand	0.50	8	8%	13%
	coarse sand	1.00	0	0%	13%
	very coarse sand	2.00	41	41%	54%
Gravel	very fine gravel	4.0	9	9%	63%
	fine gravel	5.7	16	16%	79%
	fine gravel	8.0	9	9%	88%
	medium gravel	11.3	4	4%	92%
	medium gravel	16.0	3	3%	95%
	coarse gravel	22.3	0	0%	95%
	coarse gravel	32	1	1%	96%
	very coarse gravel	45	0	0%	96%
	very coarse gravel	64	0	0%	96%
Cobble	small cobble	90	0	0%	96%
	medium cobble	128	2	2%	98%
	large cobble	180	1	1%	99%
	very large cobble	256	1	1%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
	very large boulder	4096	0	0%	100%
Bedrock	bedrock	>4096	0	0%	100%
TOTALS			100	100%	100%

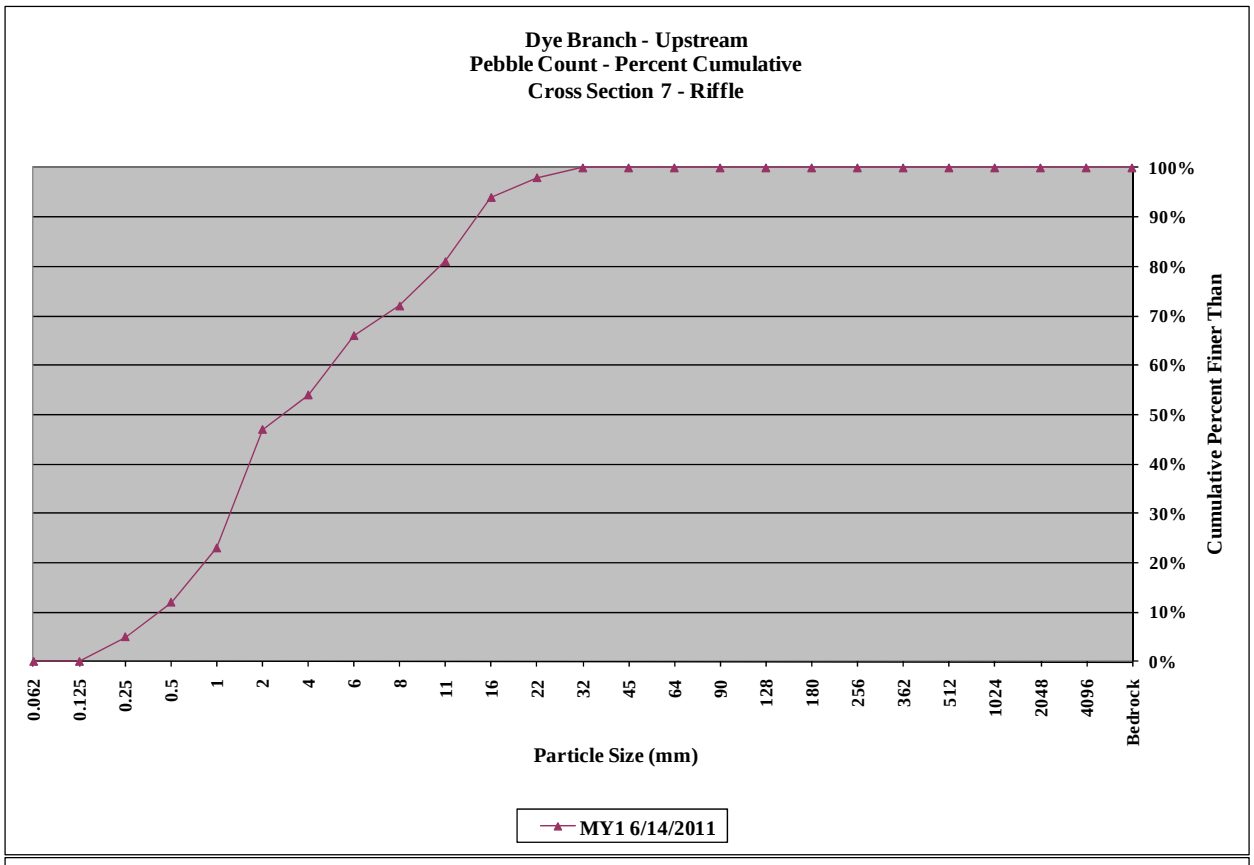
Summary Data	
D50	1.9
D84	7
D95	22

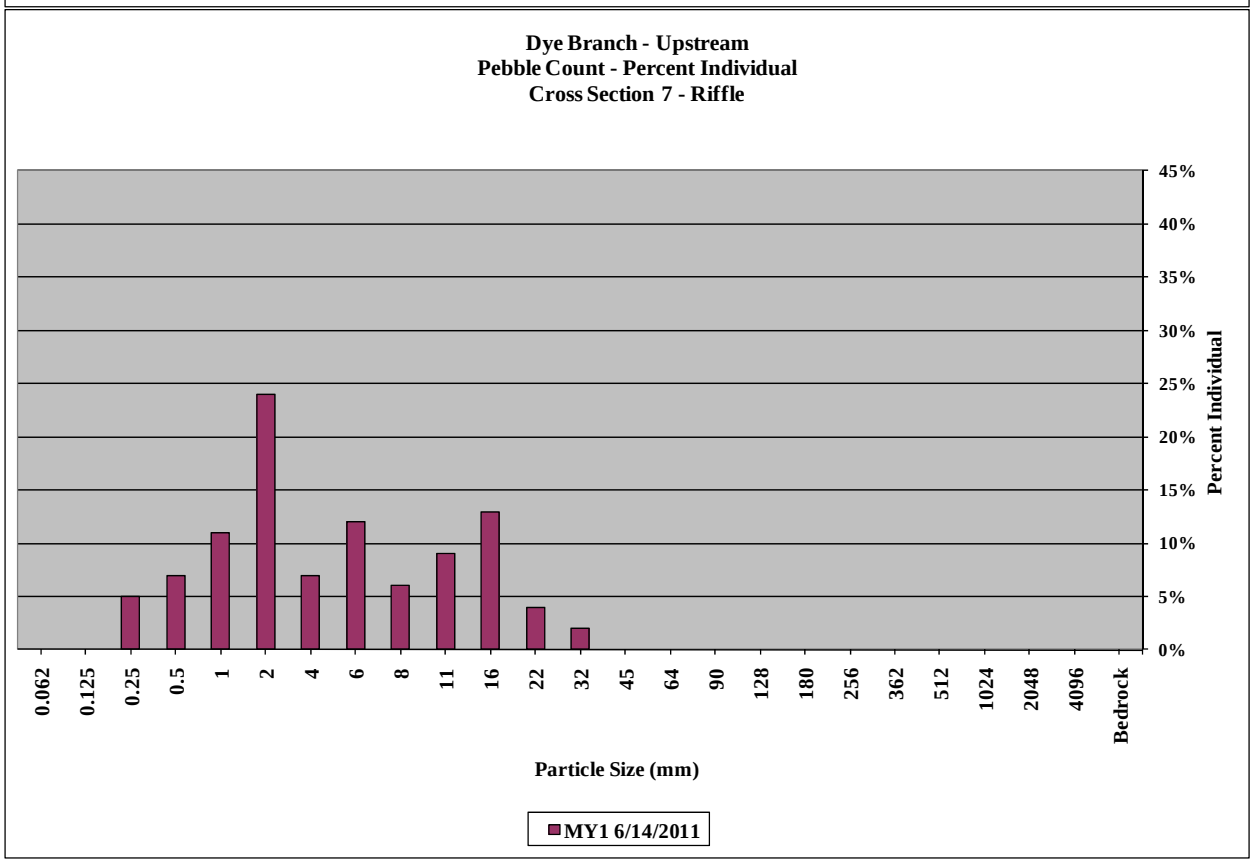

Dye Branch - Upstream
Pebble Count - Percent Cumulative
Cross Section 6 - Riffle
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Cumulative Percent Finer Than
0.062
0.125
0.25
0.5
1
2
4
6
8
11
16
22
32
45
64
90
128
180
256
362
512
1024
2048
4096
Bedrock
Particle Size (mm)
MY1 6/14/2011


Dye Branch - Upstream
Pebble Count - Percent Individual
Cross Section 6 - Riffle
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Percent Individual
0.062
0.125
0.25
0.5
1
2
4
6
8
11
16
22
32
45
64
90
128
180
256
362
512
1024
2048
4096
Bedrock
Particle Size (mm)
MY1 6/14/2011

Dye Branch II / Project No. 92255 Dye Branch - Upstream - Cross-Section 7 - Riffle Pebble Count Summary					
			Monitoring Year 1		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	0	0%	0%
Sand	very fine sand	0.125	0	0%	0%
	fine sand	0.25	5	5%	5%
	medium sand	0.50	7	7%	12%
	coarse sand	1.00	11	11%	23%
	very coarse sand	2.00	24	24%	47%
Gravel	very fine gravel	4.0	7	7%	54%
	fine gravel	5.7	12	12%	66%
	fine gravel	8.0	6	6%	72%
	medium gravel	11.3	9	9%	81%
	medium gravel	16.0	13	13%	94%
	coarse gravel	22.3	4	4%	98%
	coarse gravel	32	2	2%	100%
	very coarse gravel	45	0	0%	100%
	very coarse gravel	64	0	0%	100%
Cobble	small cobble	90	0	0%	100%
	medium cobble	128	0	0%	100%
	large cobble	180	0	0%	100%
	very large cobble	256	0	0%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
	very large boulder	4096	0	0%	100%
Bedrock	bedrock	>4096	0	0%	100%
TOTALS			100	100%	100%

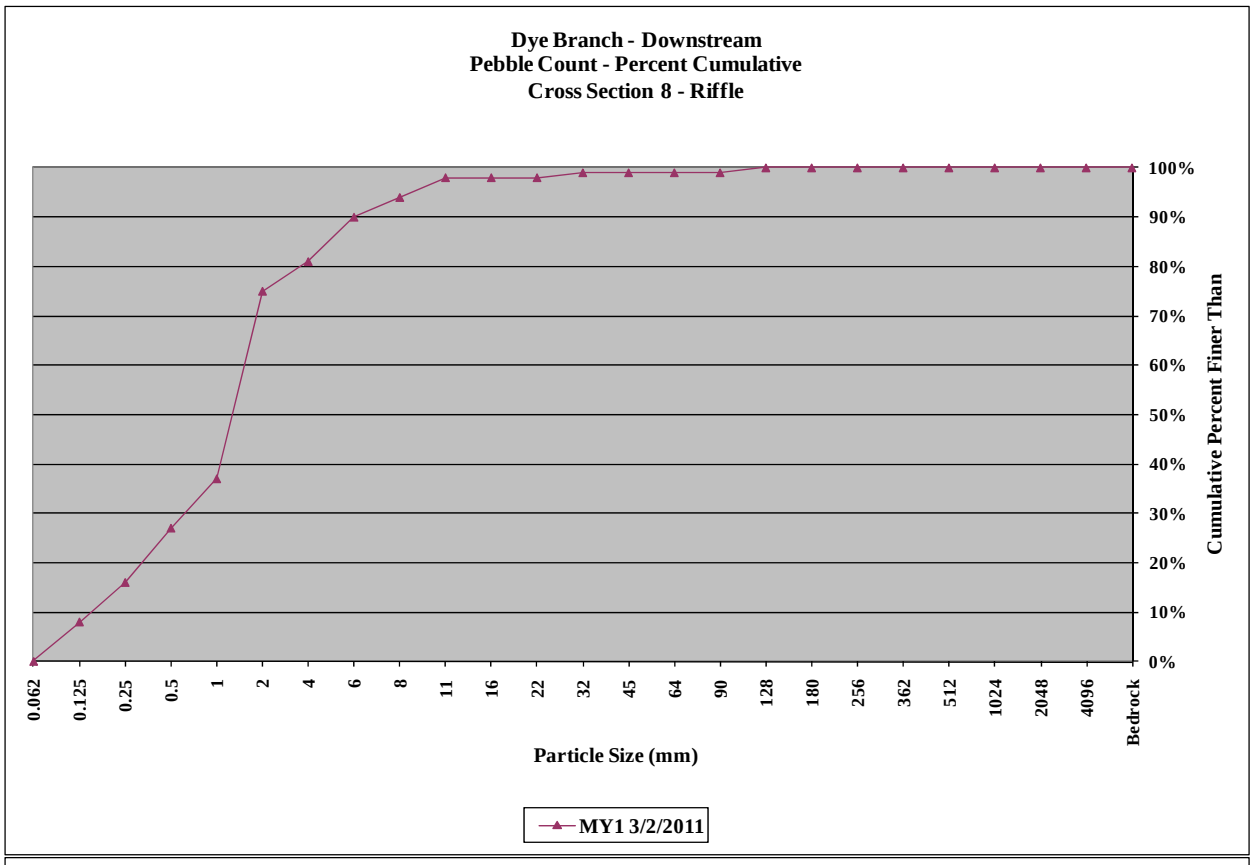
Summary Data	
D50	2.7
D84	12
D95	17

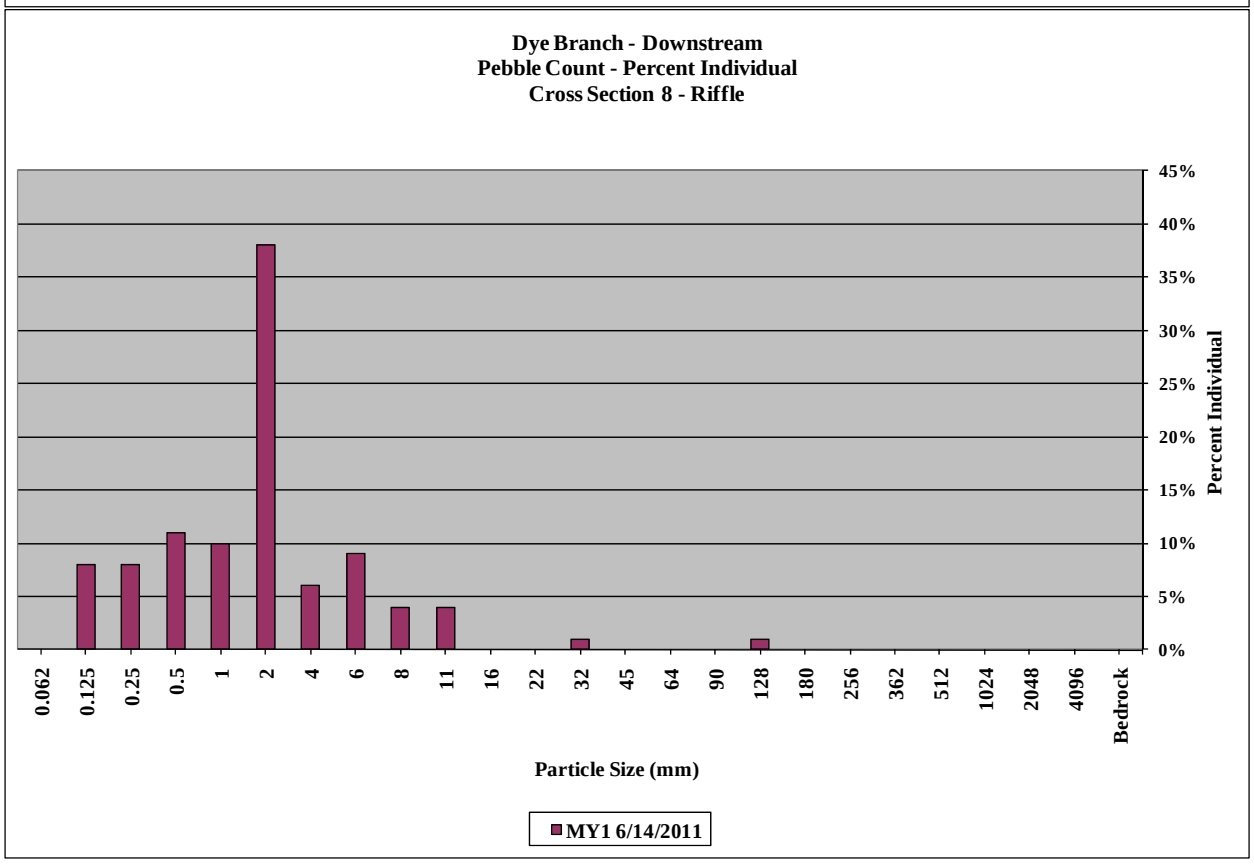

Dye Branch - Upstream
Pebble Count - Percent Cumulative
Cross Section 7 - Riffle
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Cumulative Percent Finer Than
0.062
0.125
0.25
0.5
1
2
4
6
8
11
16
22
32
45
64
90
128
180
256
362
512
1024
2048
4096
Bedrock
Particle Size (mm)
MY1 6/14/2011


Dye Branch - Upstream
Pebble Count - Percent Individual
Cross Section 7 - Riffle
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Percent Individual
0.062
0.125
0.25
0.5
1
2
4
6
8
11
16
22
32
45
64
90
128
180
256
362
512
1024
2048
4096
Bedrock
Particle Size (mm)
MY1 6/14/2011

Dye Branch II / Project No. 92255 Dye Branch - Downstream - Cross-Section 8 - Riffle Pebble Count Summary					
			Monitoring Year 1		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	0	0%	0%
Sand	very fine sand	0.125	8	8%	8%
	fine sand	0.25	8	8%	16%
	medium sand	0.50	11	11%	27%
	coarse sand	1.00	10	10%	37%
	very coarse sand	2.00	38	38%	75%
Gravel	very fine gravel	4.0	6	6%	81%
	fine gravel	5.7	9	9%	90%
	fine gravel	8.0	4	4%	94%
	medium gravel	11.3	4	4%	98%
	medium gravel	16.0	0	0%	98%
	coarse gravel	22.3	0	0%	98%
	coarse gravel	32	1	1%	99%
	very coarse gravel	45	0	0%	99%
	very coarse gravel	64	0	0%	99%
Cobble	small cobble	90	0	0%	99%
	medium cobble	128	1	1%	100%
	large cobble	180	0	0%	100%
	very large cobble	256	0	0%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
	very large boulder	4096	0	0%	100%
Bedrock	bedrock	>4096	0	0%	100%
TOTALS			100	100%	100%

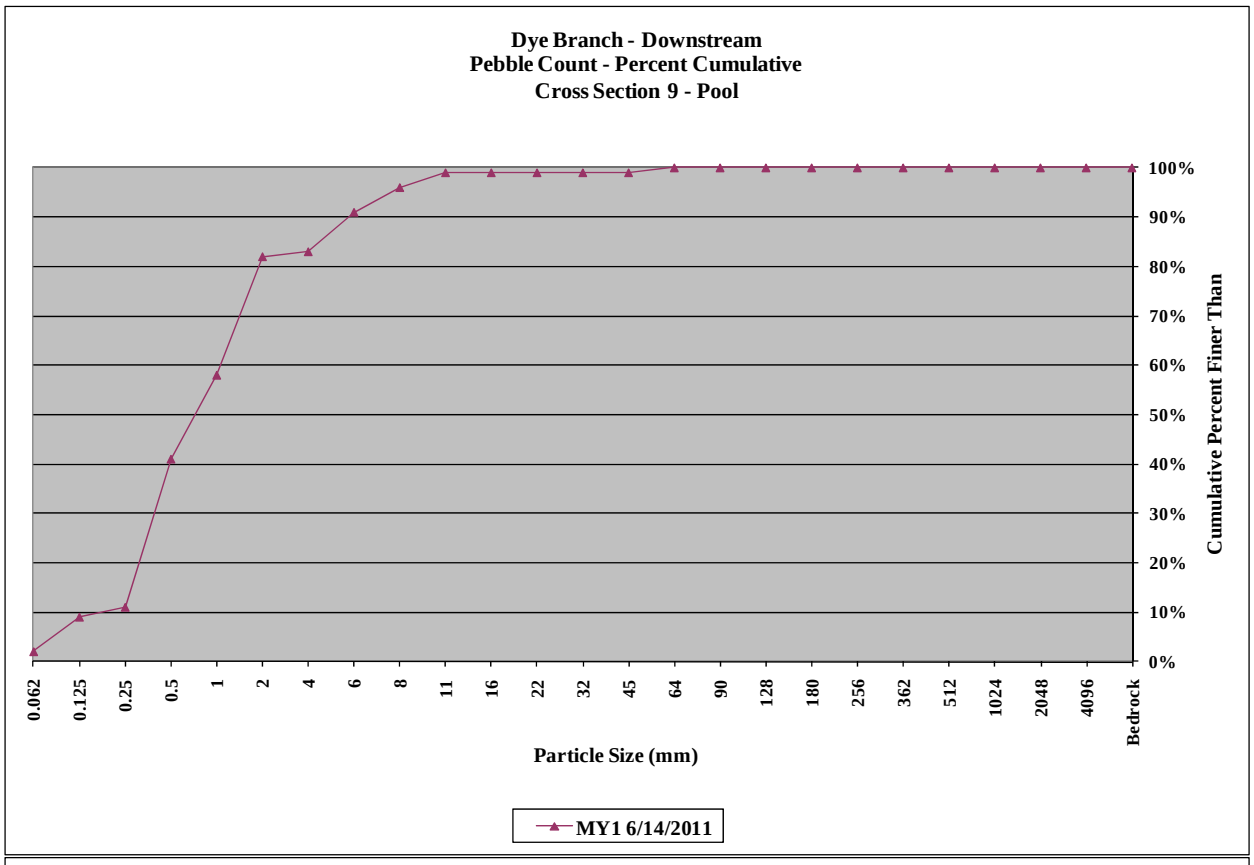
Summary Data	
D50	1.3
D84	4.6
D95	8.7

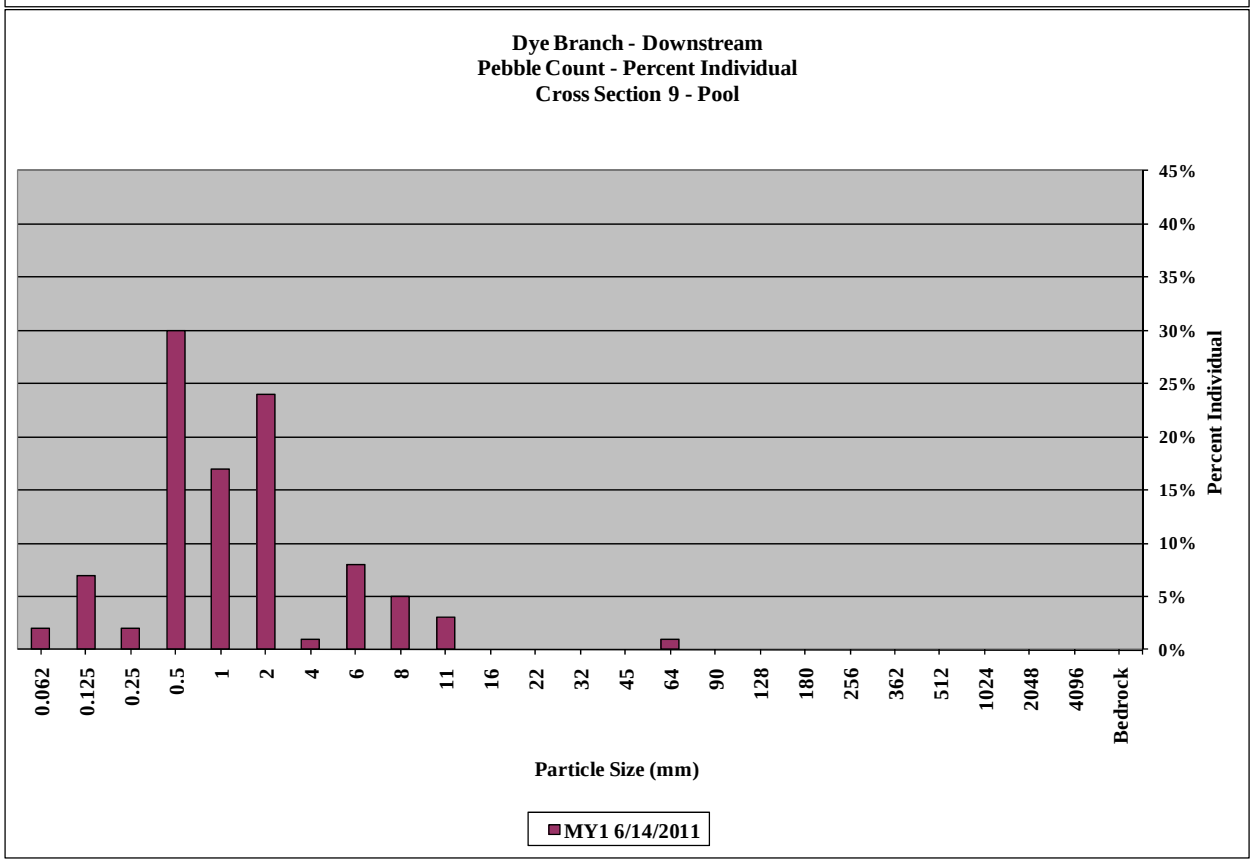

Dye Branch - Downstream
Pebble Count - Percent Cumulative
Cross Section 8 - Riffle
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Cumulative Percent Finer Than
0.062
0.125
0.25
0.5
1
2
4
6
8
11
16
22
32
45
64
90
128
180
256
362
512
1024
2048
4096
Bedrock
Particle Size (mm)
MY1 3/2/2011


Dye Branch - Downstream
Pebble Count - Percent Individual
Cross Section 8 - Riffle
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Percent Individual
0.062
0.125
0.25
0.5
1
2
4
6
8
11
16
22
32
45
64
90
128
180
256
362
512
1024
2048
4096
Bedrock
Particle Size (mm)
MY1 6/14/2011

Dye Branch II / Project No. 92255 Dye Branch - Downstream - Cross-Section 9 - Pool Pebble Count Summary					
			Monitoring Year 1		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	2	2%	2%
Sand	very fine sand	0.125	7	7%	9%
	fine sand	0.25	2	2%	11%
	medium sand	0.50	30	30%	41%
	coarse sand	1.00	17	17%	58%
	very coarse sand	2.00	24	24%	82%
Gravel	very fine gravel	4.0	1	1%	83%
	fine gravel	5.7	8	8%	91%
	fine gravel	8.0	5	5%	96%
	medium gravel	11.3	3	3%	99%
	medium gravel	16.0	0	0%	99%
	coarse gravel	22.3	0	0%	99%
	coarse gravel	32	0	0%	99%
	very coarse gravel	45	0	0%	99%
	very coarse gravel	64	1	1%	100%
Cobble	small cobble	90	0	0%	100%
	medium cobble	128	0	0%	100%
	large cobble	180	0	0%	100%
	very large cobble	256	0	0%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
	very large boulder	4096	0	0%	100%
Bedrock	bedrock	>4096	0	0%	100%
TOTALS			100	100%	100%

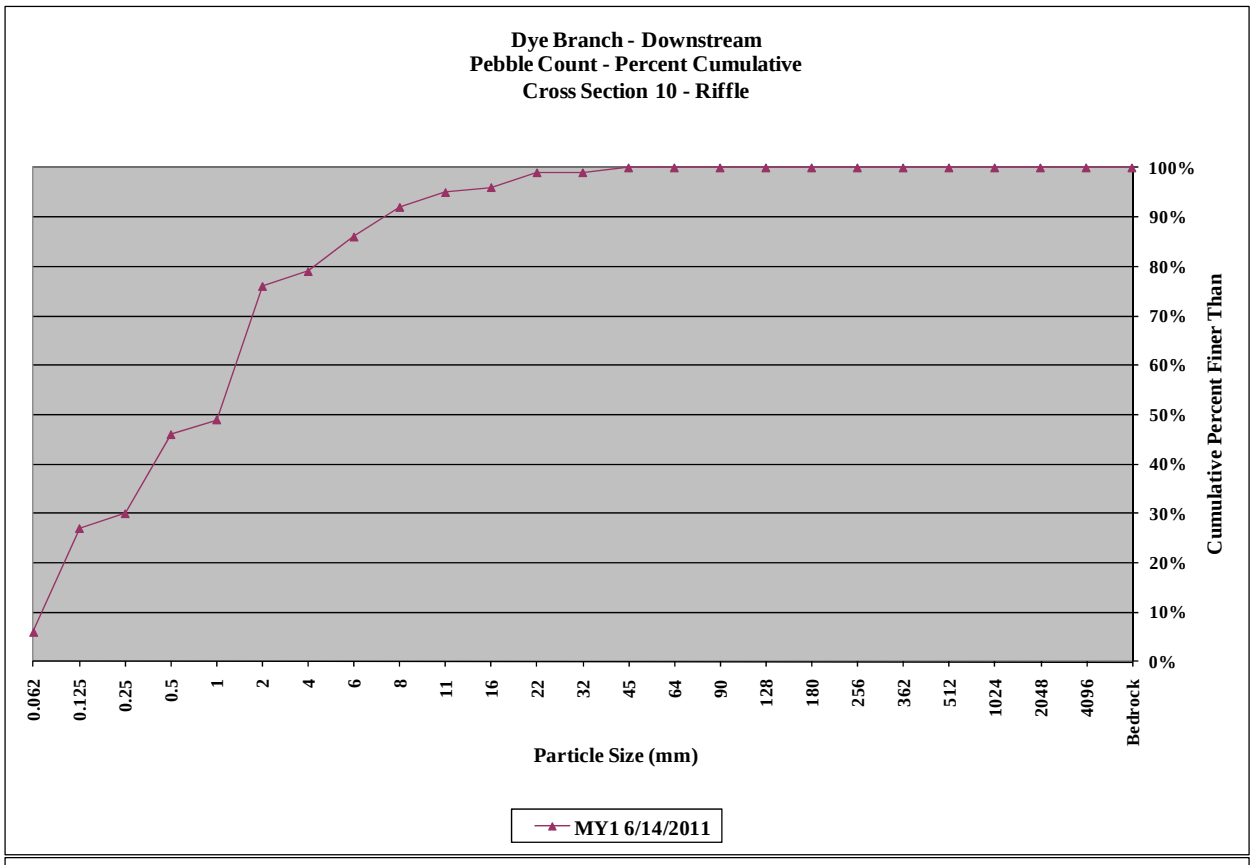
Summary Data	
D50	0.72
D84	4.2
D95	7.6


Dye Branch - Downstream
Pebble Count - Percent Cumulative
Cross Section 9 - Pool
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Cumulative Percent Finer Than
0.062
0.125
0.25
0.5
1
2
4
6
8
11
16
22
32
45
64
90
128
180
256
362
512
1024
2048
4096
Bedrock
Particle Size (mm)
MY1 6/14/2011


Dye Branch - Downstream
Pebble Count - Percent Individual
Cross Section 9 - Pool
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Percent Individual
0.062
0.125
0.25
0.5
1
2
4
6
8
11
16
22
32
45
64
90
128
180
256
362
512
1024
2048
4096
Bedrock
Particle Size (mm)
MY1 6/14/2011

Dye Branch II / Project No. 92255 Dye Branch - Downstream - Cross-Section 10 - Riffle Pebble Count Summary					
			Monitoring Year 1		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	6	6%	6%
Sand	very fine sand	0.125	21	21%	27%
	fine sand	0.25	3	3%	30%
	medium sand	0.50	16	16%	46%
	coarse sand	1.00	3	3%	49%
	very coarse sand	2.00	27	27%	76%
Gravel	very fine gravel	4.0	3	3%	79%
	fine gravel	5.7	7	7%	86%
	fine gravel	8.0	6	6%	92%
	medium gravel	11.3	3	3%	95%
	medium gravel	16.0	1	1%	96%
	coarse gravel	22.3	3	3%	99%
	coarse gravel	32	0	0%	99%
	very coarse gravel	45	1	1%	100%
	very coarse gravel	64	0	0%	100%
Cobble	small cobble	90	0	0%	100%
	medium cobble	128	0	0%	100%
	large cobble	180	0	0%	100%
	very large cobble	256	0	0%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
	very large boulder	4096	0	0%	100%
Bedrock	bedrock	>4096	0	0%	100%
TOTALS			100	100%	100%

Summary Data	
D50	1
D84	5.3
D95	11


Dye Branch - Downstream
Pebble Count - Percent Cumulative
Cross Section 10 - Riffle
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Cumulative Percent Finer Than
0.062
0.125
0.25
0.5
1
2
4
6
8
11
16
22
32
45
64
90
128
180
256
362
512
1024
2048
4096
Bedrock
Particle Size (mm)
MY1 6/14/2011

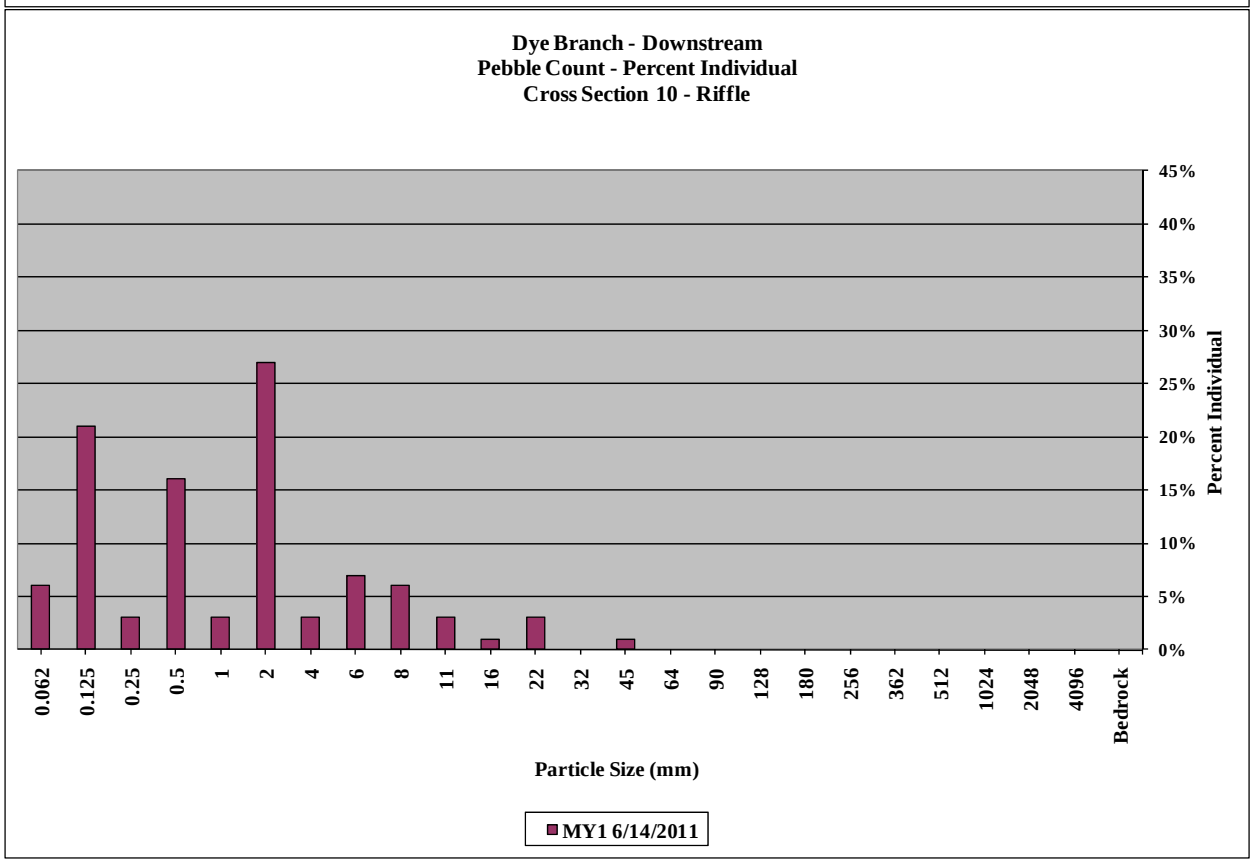

Dye Branch - Downstream
Pebble Count - Percent Individual
Cross Section 10 - Riffle
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Percent Individual
0.062
0.125
0.25
0.5
1
2
4
6
8
11
16
22
32
45
64
90
128
180
256
362
512
1024
2048
4096
Bedrock
Particle Size (mm)
MY1 6/14/2011

Table 10a. Baseline Stream Data Summary
Dye Branch II / Project No. 92255 - Cemetery Branch (977 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data						Design			Monitoring Baseline					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
Bankfull Width (ft)	-	-	-	7.0	7.0	7.0	7.0	N/A	1	8.9	11.1	11.3	14.1	1.8	7	-	10.0	-	5.5	7.2	7.2	8.9	N/A	2
Floodprone Width (ft)				14.2	14.2	14.2	14.2	N/A	1	19.0	54.0	36.0	100.0	38.1	5	-	28.0	-	>30	>30	>30	>30	N/A	2
Bankfull Mean Depth (ft)	-	-	-	1.0	1.0	1.0	1.0	N/A	1	0.7	0.9	0.8	1.6	0.3	7	-	0.7	-	0.5	0.7	0.7	0.8	N/A	2
Bankfull Max Depth (ft)				1.5	1.5	1.5	1.5	N/A	1	1.0	1.5	1.3	2.4	0.5	7	0.8	1.1	1.6	1.0	1.2	1.2	1.4	N/A	2
Bankfull Cross Sectional Area (ft^2)	-			6.8	6.8	6.8	6.8	N/A	1	6.8	9.6	8.4	18.4	3.9	7	-	7.0	-	3.0	5.0	5.0	7.0	N/A	2
Width/Depth Ratio				7.2	7.2	7.2	7.2	N/A	1	6.9	11.2	11.7	15.0	NA	3	-	14.3	-	10.3	10.8	10.8	11.2	N/A	2
Entrenchment Ratio				2.0	2.0	2.0	2.0	N/A	1	3.8	6.8	7.7	8.9	NA	3	-	2.8	-	>3.4	>4.4	>4.4	>5.4	N/A	2
Bank Height Ratio				1.5	1.5	1.5	1.5	N/A	1	1.0	1.1	1.0	1.2	NA	3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	N/A	2
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.8	23.4	19.5	53.9	14.84	14
Riffle Slope (ft/ft)				0.012	0.034	-	0.088	-	-	0.006	0.027	0.026	0.052	0.016	6	-	0.048	-	0.004	0.023	0.022	0.049	0.01	14
Pool Length (ft)				4.7	8.2	-	11.9	-	-	3.5	19.3	19.6	32.8	11.5	6	13.8	20.7	27.6	5.8	16.2	16.9	39.1	7.17	24
Pool Max Depth (ft)				-	2.6	-		-	-	1.8	2.6	2.9	3.2	0.5	7	-	2.0	-	1.8	3.0	2.9	3.7	0.48	18
Pool Spacing (ft)				22.8	86.0	-	228.2	-	-	18.0	52.7	40.2	140.8	41.7	7	18.4	27.6	32.2	4.5	38.7	36.4	111.0	24.40	24
Pattern																								
Channel Belt Width (ft)				5.3	10.8	-	22.6	-	-	26.0	49.1	40.0	119.0	29.8	9	23.0	32.2	41.4	11.3	30.6	37.0	46.7	12.3	16
Radius of Curvature (ft)				3.9	19.6	-	37.0	-	-	5.0	23.8	22.0	48.0	14.6	9	18.4	27.6	36.8	8.3	13.7	12.0	29.9	5.7	16
Rc: Bankfull Width (ft/ft)				0.6	2.8	-	5.3	-	-	0.6	2.1	1.8	4.3	1.3	9	1.8	2.8	3.7	2.4	2.4	2.4	2.4	N/A	1
Meander Wavelength (ft)				13.6	42.0	-	71.0	-	-	26.0	72.9	69.0	155.0	47.6	9	46.0	55.2	64.4	38.8	77.4	79.1	167.0	36.1	11
Meander Width Ratio				0.8	1.5	-	3.2	-	-	2.5	4.7	3.6	10.1	2.7	7	2.3	3.2	4.1	4.9	6.6	6.6	8.2	N/A	2
Transport Parameters																								
Reach Shear Stress (Competency) lb/ft^2				-						-						-			-					
Max Part Size (mm) Mobilized at Bankfull				45 - 180						-						-			-					
Stream Power (Transport Capacity) W/m^2				-						-						-								
Additional Reach Parameters																								
Rosgen Classification				E4						E4 / C4 / C5						C4			C					
Bankfull Velocity (fps)				6.6 - 7.8						4.1 - 7.0						5.5 - 6.7								
Bankfull Discharge (cfs)				44.3 - 52.8						35.0 - 128.1						38.4 - 46.6								
Valley Length (ft)				-						-						-								
Channel Thalweg Length (ft)				-						-						-			977					
Sinuosity				1.14						1.15 - 2.22						1.14			1.08					
Water Surface Slope (ft/ft)				0.0190						0.0057 - 0.0130						0.0190			-					
Bankfull Slope (ft/ft)				-						-						-			0.0191					
Bankfull Floodplain Area (acres)				-						-						-								
% of Reach with Eroding Banks				-						-														
Channel Stability or Habitat Metric				-						-														
Biological or Other				-						-														

- Information unavailable.
N/A - Item does not apply.
Non-Applicable.

Table 10a. Baseline Stream Data Summary
Dye Branch II / Project No. 92255 - Dye Branch-Upstream (1,465 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data UT to Ostin Creek						Design			Monitoring Baseline					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
Bankfull Width (ft)	-	-	-	-	11.2	-	-	-	-	16.0	18.5	-	20.6	-	-	-	20.1	-	25.7	28.4	26.9	32.7	N/A	3
Floodprone Width (ft)				-	89.5	-	-	-	-	67.2	70.2	-	72.8	-	-	70.9	76.9	88.8	54.4	64.9	58.6	81.8	N/A	3
Bankfull Mean Depth (ft)	-	-	-	-	1.6	-	-	-	-	1.6	1.6	-	1.7	-	-		1.5		1.1	1.3	1.3	1.4	N/A	3
Bankfull Max Depth (ft)				-	2.8	-	-	-	-	1.5	1.9	-	2.4	-	-	1.5	1.8	2.2	2.2	2.8	2.5	3.6	N/A	3
Bankfull Cross Sectional Area (ft^2)	-			18.1	20.2	19.7	22.9	NA	3	27.4	30.3	-	33.4	-	-		31.0		29.5	36.3	32.5	46.9	N/A	3
Width/Depth Ratio				6.2	7.0	7.0	7.9	NA	3	9.3	11.4	-	12.7	-	-		13.0		20.3	22.6	22.8	24.6	N/A	3
Entrenchment Ratio				>3.2	>4.4	>5.0	>5.0	NA	3	3.5	3.8	-	4.4	-	-	3.5	3.8	4.4	2.0	2.3	2.3	2.5	N/A	3
Bank Height Ratio				-	1.0	-	-	-	-	1.0	1.2	-	1.4	-	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	N/A	3
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	6.1	17.6	-	30.2	-	-	6.6	19.1	32.7	20.1	51.6	47.1	97	29.5	8
Riffle Slope (ft/ft)				0.002	0.014	-	0.042	-	-	0.006	0.028	-	0.066	-	-	0.007	0.030	0.070	0.002	0.006	0.005	0.016	0.005	8
Pool Length (ft)				-	-	-	-	-	-	18.3	35.1	-	62.9	-	-	19.9	38.1	68.1	8.76	24.6	22.4	66.4	13	20
Pool Max Depth (ft)				-	-	-	-	-	-	2.2	2.9	-	3.3	-	-	2.1	2.7	3.1	2.1	3.44	3.61	4.48	0.67	20
Pool Spacing (ft)				-	-	-	-	-	-	50.3	78.9	-	105.8	-	-	54.5	85.5	114.7	24.1	66.8	65.3	125	28.6	19
Pattern																								
Channel Belt Width (ft)				6.6	24.3	-	56.9	-	-	36.0	67.0	-	150.0	-	-	39.0	72.6	162.6	28.5	45.0	48.4	54.1	8.34	17
Radius of Curvature (ft)				14.5	52.4	-	148.8	-	-	19.0	49.0	-	115.0	-	-	20.6	53.1	124.6	23.6	31.3	31.2	39.6	4.75	14
Rc: Bankfull Width (ft/ft)				1.3	4.7	-	13.3	-	-	1.0	2.7	-	6.2	-	-	1.0	2.7	6.2	2.3	2.3	2.3	2.3	N/A	1
Meander Wavelength (ft)				40.1	79.7	-	172.7	-	-	33.0	94.0	-	155.0	-	-	35.8	102	168.0	100.5	130.0	138.2	153.3	18.2	12
Meander Width Ratio				0.6	2.2	-	5.1	-	-	1.9	3.6	-	8.1	-	-	1.9	3.6	8.1	1.7	1.9	1.9	2.1	0.21	3
Transport Parameters																								
Reach Shear Stress (Competency) lb/ft^2							-						-				-				-			
Max Part Size (mm) Mobilized at Bankfull							30 - 100						-				-				-			
Stream Power (Transport Capacity) W/m^2							-						-				-							
Additional Reach Parameters																								
Rosgen Classification							E4						C4				C5				C			
Bankfull Velocity (fps)		-					6.2 - 6.9						4.2				3.5							
Bankfull Discharge (cfs)		-					112.2 - 124.8						128				110							
Valley Length (ft)							-						-				-							
Channel Thalweg Length (ft)							2,086						1,034				2,405				2,455			
Sinuosity							1.04						1.20				1.20				1.21			
Water Surface Slope (Channel) (ft/ft)							0.0090						0.0088				0.0080				0.0080			
Bankfull Slope (ft/ft)							-						-				-				0.0083			
Bankfull Floodplain Area (acres)							-						-				-							
% of Reach with Eroding Banks							-						-											
Channel Stability or Habitat Metric							-						-											
Channel Stability or Habitat Metric							-						-											
Biological or Other							-						-											

- Information unavailable.
N/A - Item does not apply.
Non-Applicable.

Table 10a. Baseline Stream Data Summary
Dye Branch II / Project No. 92255 - Dye Branch-Downstream (870 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach Data UT to Ostin Creek						Design			Monitoring Baseline					
Dimension & Substrate - Riffle	**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Med**	**Max**	**SD**	**N**
Bankfull Width (ft)	-	-	-	14.8	14.8	14.8	14.8	NA	1	16.0	18.5	-	20.6	-	-	-	20.1	-	18.4	18.6	18.6	18.8	N/A	3
Floodprone Width (ft)				22.0	22.0	22.0	22.0	NA	1	67.2	70.2	-	72.8	-	-	70.9	76.9	88.8	48.7	61.8	61.8	74.8	N/A	3
Bankfull Mean Depth (ft)	-	-	-	1.2	1.2	1.2	1.2	NA	1	1.6	1.6	-	1.7	-	-		1.5		1.9	2.0	2.0	2.0	N/A	3
Bankfull Max Depth (ft)				2.4	2.4	2.4	2.4	NA	1	1.5	1.9	-	2.4	-	-	1.5	1.8	2.2	2.9	3.0	3.0	3.1	N/A	3
Bankfull Cross Sectional Area (ft^2)		-		17.4	17.4	17.4	2.4	NA	1	27.4	30.3	-	33.4	-	-		31.0		34.0	36.1	36.1	38.1	N/A	3
Width/Depth Ratio				12.5	12.5	12.5	2.4	NA	1	9.3	11.4	-	12.7	-	-		13.0		9.3	9.6	9.6	9.9	N/A	3
Entrenchment Ratio				1.5	1.5	1.5	2.4	NA	1	3.5	3.8	-	4.4	-	-	3.5	3.8	4.4	2.7	3.4	3.4	4.0	N/A	3
Bank Height Ratio				4.9	4.9	4.9	2.4	NA	1	1.0	1.2	-	1.4	-	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	N/A	3
Profile																								
Riffle Length (ft)				-	-	-	-	-	-	6.1	17.6	-	30.2	-	-	6.6	19.1	32.7	15.7	50.3	55.7	79.3	20.2	7
Riffle Slope (ft/ft)				0.003	0.021	-	0.121	-	-	0.006	0.028	-	0.066	-	-	0.007	0.030	0.070	0.001	0.006	0.006	0.014	0.004	7
Pool Length (ft)				2.9	24.8	-	120	-	-	18.3	35.1	-	62.9	-	-	19.9	38.1	68.1	10.1	19.9	15.9	39.6	8.91	14
Pool Max Depth (ft)				-	3.1	-	-	-	-	2.2	2.9	-	3.3	-	-	2.1	2.7	3.1	3.3	3.91	3.77	5.05	0.59	12
Pool Spacing (ft)				79.0	162.0	-	261.0	-	-	50.3	78.9	-	105.8	-	-	54.5	85.5	114.7	15.3	57.5	38.8	130	41.5	14
Pattern																								
Channel Belt Width (ft)				15.6	30.6	-	67.7	-	-	36.0	67.0	-	150.0	-	-	39.0	72.6	162.6	28.3	49.2	57.5	65.4	15.4	9
Radius of Curvature (ft)				11.0	42.1	-	81.9	-	-	19.0	49.0	-	115.0	-	-	20.6	53.1	124.6	32.7	40.7	42.2	50.1	5.6	7
Rc: Bankfull Width (ft/ft)				0.7	2.9	-	5.6	-	-	1.0	2.7	-	6.2	-	-	1.0	2.7	6.2	1.7	1.7	1.7	1.7	N/A	1
Meander Wavelength (ft)				62.0	103.0	-	157	-	-	33.0	94.0	-	155.0	-	-	35.8	102	168.0	138.9	162.2	157.3	210.5	27.2	6
Meander Width Ratio				1.1	2.1	-	4.6	-	-	1.9	3.6	-	8.1	-	-	1.9	3.6	8.1	2.4	2.8	2.8	3.1	0.51	2
Transport Parameters																								
Reach Shear Stress (Competency) lb/ft^2						-						-					-				-			
Max Part Size (mm) Mobilized at Bankfull						30 - 100						-					-				-			
Stream Power (Transport Capacity) W/m^2						-						-					-							
Additional Reach Parameters																								
Rosgen Classification						G4c						C4					C5				C			
Bankfull Velocity (fps)		-				6.1 - 7.2						4.2					3.5							
Bankfull Discharge (cfs)		-				105.4 - 126.0						128					110							
Valley Length (ft)						-						-					-							
Channel Thalweg Length (ft)						-						-					-				870			
Sinuosity						1.14						1.46					1.09				1.10			
Water Surface Slope (ft/ft)						0.0110						0.0090					0.0095				-			
Bankfull Slope (ft/ft)						-						-					-				0.0106			
Bankfull Floodplain Area (acres)						-						-					-							
% of Reach with Eroding Banks						-						-												
Channel Stability or Habitat Metric						-						-												
Biological or Other						-						-												

- Information unavailable.
N/A - Item does not apply.
Non-Applicable.

Table 10b. Baseline Stream Data Summary
(Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Dye Branch II / Project No. 92255 - Cemetery Branch (977 feet)

Parameter	Pre-Existing Condition							Reference Reach Data							Design							Monitoring Baseline						
Ri% / Ru% / P% / G% / S%	-	-	-	-	-			-	-	-	-	-			-	-	-	-	-			35%	4%	42%	13%	7%		
SC% / Sa% / G% / C% / B% / Be%	-	-	-	-	-	-		-	-	-	-	-	-															
d16 / D35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)	0.9	1.2	2.0	8.0	10.1	88.9	-	0.21	0.5	3.5	13.9	26.6	45.0	-														
Entrenchment Class <1.5 / 1.5 - 1.99 / 2 - 4.9 / 5.0 - 9.9 / >10	-	-	-	-	-			-	-	-	-	-																
Incision Class <1.2 / 1.2 - 1.49 / 1.5 - 1.99 / >2.0	-	-	-	-				-	-	-	-																	

- Information unavailable.
N/A - Item does not apply.
Non-Applicable.

Table 10b. Baseline Stream Data Summary
(Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Dye Branch II / Project No. 92255 - Dye Branch-Upstream (1,465 feet)

Parameter	Pre-Existing Condition							Reference Reach Data							Design							Monitoring Baseline						
Ri% / Ru% / P% / G% / S%	-	-	-	-	-			-	-	-	-	-			-	-	-	-	-	-	-	28%	15%	34%	20%	3%		
SC% / Sa% / G% / C% / B% / Be%	-	-	-	-	-	-		-	-	-	-	-	-															
d16 / D35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)	0.15	0.4	3.3	10.3	13.7	45.7	-	-	-	-	-	-	-	-														
Entrenchment Class <1.5 / 1.5 - 1.99 / 2 - 4.9 / 5.0 - 9.9 / >10	-	-	-	-	-			-	-	-	-	-																
Incision Class <1.2 / 1.2 - 1.49 / 1.5 - 1.99 / >2.0	-	-	-	-				-	-	-	-																	

- Information unavailable.
Non-Applicable.

Table 10b. Baseline Stream Data Summary
(Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Dye Branch II / Project No. 92255 - Dye Branch-Downstream (870 feet)

Parameter	Pre-Existing Condition							Reference Reach Data							Design							Monitoring Baseline						
Ri% / Ru% / P% / G% / S%	-	-	-	-	-			-	-	-	-	-			-	-	-	-	-	-	-	43%	6%	34%	13%	3%		
SC% / Sa% / G% / C% / B% / Be%	-	-	-	-	-	-		-	-	-	-	-	-															
d16 / D35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)	0.15	0.28	0.56	10.7	13.0	45.7	-	-	-	-	-	-	-	-														
Entrenchment Class <1.5 / 1.5 - 1.99 / 2 - 4.9 / 5.0 - 9.9 / >10	-	-	-	-	-			-	-	-	-	-																
Incision Class <1.2 / 1.2 - 1.49 / 1.5 - 1.99 / >2.0	-	-	-	-				-	-	-	-																	

- Information unavailable.
N/A - Item does not apply.
Non-Applicable.

Table 11a. Baseline Morphology & Hydraulic Monitoring Summary Dye Branch II / Project No. 92255 - Cemetery Branch (971 Feet)																		
Parameter	**Cross Section 1 Pool**						**Cross Section 2 Riffle**						**Cross Section 3 Riffle**					
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
Record Elevation (datum) Used	836.3	836.3					826.3	826.3					821.7	821.7				
Bankfull Width (ft)	9.7	10.2					8.9	10.6					5.5	6.0				
Floodprone Width (ft)	>50	>50					>30	>30					>30	>30				
Bankfull Mean Depth (ft)	1.9	1.5					0.8	0.6					0.5	0.5				
Bankfull Max Depth (ft)	3.1	2.7					1.4	1.2					1.0	1.0				
Bankfull Cross Sectional Area (ft^2)	18.9	15.2					7.0	6.3					3.0	2.8				
Bankfull Width/Depth Ratio	5.0	6.8					11.2	18.1					10.3	12.7				
Bankfull Entrenchment Ratio	>5.1	>4.9					>3.4	>2.8					>5.4	>5.0				
Bankfull Bank Height Ratio	1.0	1.0					1.0	1.0					1.0	1.0				
Cross Sectional Area between End Pins (ft^2)	18.9	15.2					7.0	6.3					3.0	2.8				
d50 (mm)	N/A	5.7					N/A	8.4					N/A	6.0				

N/A - Item does not apply.

Table 11a. Baseline Morphology & Hydraulic Monitoring Summary Dye Branch II / Project No. 92255 - Dye Branch-Upstream (1,471 Feet)																								
Parameter	**Cross Section 4 Riffle**						**Cross Section 5 Pool**						**Cross Section 6 Riffle**						**Cross Section 7 Riffle**					
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
Record Elevation (datum) Used	824.3	824.3					817.4	817.4					815.5	815.5					812.5	812.5				
Bankfull Width (ft)	25.7	23.8					17.1	17.0					32.7	28.7					26.9	24.1				
Floodprone Width (ft)	58.6	52.8					50	47.1					81.8	78.2					54.4	52.6				
Bankfull Mean Depth (ft)	1.3	1.1					1.7	1.4					1.4	1.3					1.1	1.0				
Bankfull Max Depth (ft)	2.5	2.0					3.4	2.8					3.6	3.2					2.2	2.0				
Bankfull Cross Sectional Area (ft^2)	32.5	27.1					28.8	23.7					46.9	37.5					29.5	24.2				
Bankfull Width/Depth Ratio	20.3	20.9					10.2	12.2					22.8	22.0					24.6	24.0				
Bankfull Entrenchment Ratio	2.3	2.2					2.9	2.8					2.5	2.7					2.0	2.2				
Bankfull Bank Height Ratio	1.0	1.0					1.0	1.0					1.0	1.0					1.0	1.0				
Cross Sectional Area between End Pins (ft^2)	32.5	27.1					28.8	23.7					46.9	37.5					29.5	24.2				
d50 (mm)	N/A	1.2					N/A	6.0					N/A	1.9					N/A	2.7				

N/A - Item does not apply.

Table 11a. Baseline Morphology & Hydraulic Monitoring Summary Dye Branch II / Project No. 92255 - Dye Branch-Downstream (869 Feet)																		
Parameter	**Cross Section 8 Riffle**						**Cross Section 9 Pool**						**Cross Section 10 Riffle**					
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
Record Elevation (datum) Used	809.3	809.3					806.1	806.1					801.1	801.1				
Bankfull Width (ft)	18.8	18.8					26.3	26.3					18.4	18.5				
Floodprone Width (ft)	74.8	73.5					>70	>70					48.7	47.6				
Bankfull Mean Depth (ft)	2.0	1.9					1.8	1.7					1.9	1.6				
Bankfull Max Depth (ft)	3.1	3.0					3.5	3.5					2.9	2.4				
Bankfull Cross Sectional Area (ft^2)	38.1	35.9					48.4	43.6					34.0	29.5				
Bankfull Width/Depth Ratio	9.3	9.9					14.3	15.9					9.9	11.7				
Bankfull Entrenchment Ratio	4.0	3.9					>2.7	>2.7					2.7	2.6				
Bankfull Bank Height Ratio	1.0	1.0					1.0	1.0					1.0	1.0				
Cross Sectional Area between End Pins (ft^2)	38.1	35.9					48.4	43.6					34.0	29.5				
d50 (mm)	N/A	1.3					N/A	0.72					N/A	1.0				

N/A - Item does not apply.

Table 11b. Monitoring Data - Stream Reach Data Summary
Dye Branch II / Project No. 92255 - Cemetery Branch (971 feet)

Parameter	Baseline						MY - 1						MY - 2						MY - 3						MY - 4						MY - 5					
Dimension & Substrate - Riffle	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**
Bankfull Width (ft)	5.5	7.2	7.2	8.9	N/A	2	6.0	8.3	8.3	10.6	N/A	2																								
Floodprone Width (ft)	>30	>30	>30	>30	N/A	2	>30	>30	>30	>30	N/A	2																								
Bankfull Mean Depth (ft)	0.5	0.7	0.7	0.8	N/A	2	0.5	0.6	0.6	0.6	N/A	2																								
Bankfull Max Depth (ft)	1.0	1.2	1.2	1.4	N/A	2	1.0	1.1	1.1	1.2	N/A	2																								
Bankfull Cross-Sectional Area (ft^2)	3.0	5.0	5.0	7.0	N/A	2	2.8	4.6	4.6	6.3	N/A	2																								
Width/Depth Ratio	10.3	10.8	10.8	11.2	N/A	2	12.7	15.4	15.4	18.1	N/A	2																								
Entrenchment Ratio	>3.4	>4.4	>4.4	>5.4	N/A	2	>2.8	>3.9	>3.9	>5.0	N/A	2																								
Bank Height Ratio	1.0	1.0	1.0	1.0	N/A	2	1.0	1.0	1.0	1.0	N/A	2																								
Profile																																				
Riffle Length (ft)	6.8	23.4	19.5	53.9	14.8	14	6.9	22.9	22.7	50.3	13.3	17																								
Riffle Slope (ft/ft)	0.004	0.023	0.022	0.049	0.013	14	0.002	0.020	0.018	0.052	0.015	17																								
Pool Length (ft)	5.8	16.2	16.9	39.1	7.2	24	4.9	13.0	12.5	38.9	6.8	25																								
Pool Max Depth (ft)	1.8	3.0	2.9	3.7	0.5	18	1.0	2.8	2.9	3.4	0.6	19																								
Pool Spacing (ft)	4.5	38.7	36.4	111.0	24.4	24	12.0	39.1	33.3	110.2	24.0	24																								
Pattern																																				
Channel Belt Width (ft)	11.3	30.6	37.0	46.7	12.26	16																														
Radius of Curvature (ft)	8.3	13.7	12.0	29.9	5.70	16																														
Rc: Bankfull Width (ft/ft)	2.4	2.4	2.4	2.4	N/A	1																														
Meander Wavelength (ft)	38.8	77.4	79.1	167.0	36.08	11																														
Meander Width Ratio	4.2	5.4	5.4	6.7	N/A	2																														
Additional Reach Parameters																																				
Rosgen Classification	C						C4																													
Channel Thalweg Length (ft)	977						971																													
Sinuosity (ft)	1.08						1.08																													
Water Surface Slope (Channel) (ft/ft)	-						0.0200																													
Bankfull Slope (ft/ft)	0.0191						0.0195																													
Ri% / Ru% / P% / G% / S%	35%	4%	42%	13%	7%		42%	6%	34%	13%	6%																									
SC% / SA% / G% / C% / B% / Be%*							0%	38%	54%	7%	0%	0%																								
d16 / d35 / d50 / d84 / d95 (mm)																																				
% of Reach with Eroding Banks	0%						0%																													
Channel Stability or Habitat Metric	N/A						N/A																													
Biological or Other	N/A						N/A																													

N/A - Information does not apply.
Ri = Riffle / Ru = Run / P = Pool / G = Glide / S = Step
SC = Silt-Clay / SA = Sand / G = Gravel / C = Cobble / B = Boulder / Be = Bedrock
*Percentages based on riffle and pool pebble counts.

Table 11b. Monitoring Data - Stream Reach Data Summary
Dye Branch II / Project No. 92255 - Dye Branch-Upstream (1,471 feet)

Parameter	Baseline						MY - 1						MY - 2						MY - 3						MY - 4						MY - 5					
Dimension & Substrate - Riffle	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**
Bankfull Width (ft)	25.7	28.4	26.9	32.7	N/A	3	23.8	25.5	24.1	28.7	N/A	3																								
Floodprone Width (ft)	54.4	64.9	58.6	81.8	N/A	3	52.6	61.2	52.8	78.2	N/A	3																								
Bankfull Mean Depth (ft)	1.1	1.3	1.3	1.4	N/A	3	1.0	1.1	1.1	1.3	N/A	3																								
Bankfull Max Depth (ft)	2.2	2.8	2.5	3.6	N/A	3	2.0	2.4	2.0	3.2	N/A	3																								
Bankfull Cross-Sectional Area (ft^2)	29.5	36.3	32.5	46.9	N/A	3	24.2	29.6	27.1	37.5	N/A	3																								
Width/Depth Ratio	20.3	22.6	22.8	24.6	N/A	3	20.9	22.3	22.0	24.0	N/A	3																								
Entrenchment Ratio	2.0	2.3	2.3	2.5	N/A	3	2.2	2.4	2.2	2.7	N/A	3																								
Bank Height Ratio	1.0	1.0	1.0	1.0	N/A	3	1.0	1.0	1.0	1.0	N/A	3																								
Profile																																				
Riffle Length (ft)	20.1	51.6	47.1	97.0	29.5	8	17.5	40.6	33.3	75.1	19.0	11																								
Riffle Slope (ft/ft)	0.002	0.006	0.005	0.016	0.005	8	0.002	0.007	0.005	0.019	0.005	11																								
Pool Length (ft)	8.8	24.6	22.4	66.4	13.0	20	10.7	29.8	27.3	75.6	15.9	20																								
Pool Max Depth (ft)	2.1	3.4	3.6	4.5	0.7	20	1.8	3.3	3.4	4.7	0.8	20																								
Pool Spacing (ft)	24.1	66.8	65.3	124.9	28.6	19	31.7	67.7	69.0	128.2	27.5	19																								
Pattern																																				
Channel Belt Width (ft)	28.5	45.0	48.4	54.1	8.3	17																														
Radius of Curvature (ft)	23.6	31.3	31.2	39.6	4.7	14																														
Rc: Bankfull Width (ft/ft)	2.0	2.0	2.0	2.0	N/A	1																														
Meander Wavelength (ft)	100.5	130.0	138.2	153.3	18.2	12																														
Meander Width Ratio	1.5	1.7	1.8	1.9	N/A	3																														
Additional Reach Parameters																																				
Rosgen Classification	C						C5																													
Channel Thalweg Length (ft)	1,465						1,471																													
Sinuosity (ft)	1.15						1.16																													
Water Surface Slope (Channel) (ft/ft)	-						0.0092																													
Bankfull Slope (ft/ft)	0.0091						0.0094																													
Ri% / Ru% / P% / G% / S%	28%	15%	34%	20%	3%		31%	10%	41%	15%	4%																									
SC% / SA% / G% / C% / B% / Be%*							0%	50%	47%	3%	0%	0%																								
d16 / d35 / d50 / d84 / d95 (mm)																																				
% of Reach with Eroding Banks	0%						0%																													
Channel Stability or Habitat Metric	N/A						N/A																													
Biological or Other	N/A						N/A																													

N/A - Information does not apply.
Ri = Riffle / Ru = Run / P = Pool / G = Glide / S = Step
SC = Silt-Clay / SA = Sand / G = Gravel / C = Cobble / B = Boulder / Be = Bedrock
*Percentages based on riffle and pool pebble counts.

Table 11b. Monitoring Data - Stream Reach Data Summary
Dye Branch II / Project No. 92255 - Dye Branch-Downstream (869 feet)

Parameter	Baseline						MY - 1						MY - 2						MY - 3						MY - 4						MY - 5					
Dimension & Substrate - Riffle	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**
Bankfull Width (ft)	18.4	18.6	18.6	18.8	N/A	2	18.5	18.7	18.7	18.8	N/A	2																								
Floodprone Width (ft)	48.7	61.8	61.8	74.8	N/A	2	47.6	60.6	60.6	73.5	N/A	2																								
Bankfull Mean Depth (ft)	1.9	2.0	2.0	2.0	N/A	2	1.6	1.8	1.8	1.9	N/A	2																								
Bankfull Max Depth (ft)	2.9	3.0	3.0	3.1	N/A	2	2.4	2.7	2.7	3.0	N/A	2																								
Bankfull Cross-Sectional Area (ft^2)	34.0	36.1	36.1	38.1	N/A	2	29.5	32.7	32.7	35.9	N/A	2																								
Width/Depth Ratio	9.3	9.6	9.6	9.9	N/A	2	9.9	10.8	10.8	11.7	N/A	2																								
Entrenchment Ratio	2.7	3.4	3.4	4.0	N/A	2	2.6	3.3	3.3	3.9	N/A	2																								
Bank Height Ratio	1.0	1.0	1.0	1.0	N/A	2	1.0	1.0	1.0	1.0	N/A	2																								
Profile																																				
Riffle Length (ft)	15.7	50.3	55.7	79.3	20.2	7	14.4	48.7	43.0	87.0	24.1	7																								
Riffle Slope (ft/ft)	0.001	0.006	0.006	0.014	0.004	7	0.001	0.003	0.003	0.006	0.002	7																								
Pool Length (ft)	10.1	19.9	15.9	39.6	8.9	14	9.7	17.6	17.5	26.1	5.8	15																								
Pool Max Depth (ft)	3.3	3.9	3.8	5.1	0.6	12	3.2	3.9	4.0	4.9	0.5	13																								
Pool Spacing (ft)	15.3	57.5	38.8	130.2	41.5	14	10.8	56.8	40.6	129.1	40.4	14																								
Pattern																																				
Channel Belt Width (ft)	28.3	49.2	57.5	65.4	15.4	9																														
Radius of Curvature (ft)	32.7	40.7	42.2	50.1	5.6	7																														
Rc: Bankfull Width (ft/ft)	1.6	1.6	1.6	1.6	N/A	1																														
Meander Wavelength (ft)	138.9	162.2	157.3	210.5	27.2	6																														
Meander Width Ratio	3.1	3.1	3.1	3.1	N/A	2																														
Additional Reach Parameters																																				
Rosgen Classification	C						C5																													
Channel Thalweg Length (ft)	870						869																													
Sinuosity (ft)	1.10						1.09																													
Water Surface Slope (Channel) (ft/ft)	-						0.0099																													
Bankfull Slope (ft/ft)	0.0106						0.0104																													
Ri% / Ru% / P% / G% / S%	43%	6%	34%	13%	3%		39%	10%	31%	18%	2%																									
SC% / SA% / G% / C% / B% / Be%*							3%	75%	22%	0%	0%	0																								
d16 / d35 / d50 / d84 / d95 (mm)																																				
% of Reach with Eroding Banks	0%						0%																													
Channel Stability or Habitat Metric	N/A						N/A																													
Biological or Other	N/A						N/A																													

N/A - Information does not apply.
Ri = Riffle / Ru = Run / P = Pool / G = Glide / S = Step
SC = Silt-Clay / SA = Sand / G = Gravel / C = Cobble / B = Boulder / Be = Bedrock
*Percentages based on riffle and pool pebble counts.

Appendix E
Hydrologic Data

Table 12. Verification of Bankfull Events Dye Branch II / Project No. 92255		
Date of Occurrence	**Method**	**Feet Above Average Bankfull Elevation**
7/8/2011	Water level logger	1.07
9/21/2011	Water level logger	1.14
9/24/2011	Water level logger	0.52

Figure 3. Dye Branch Water Level Logger Chart

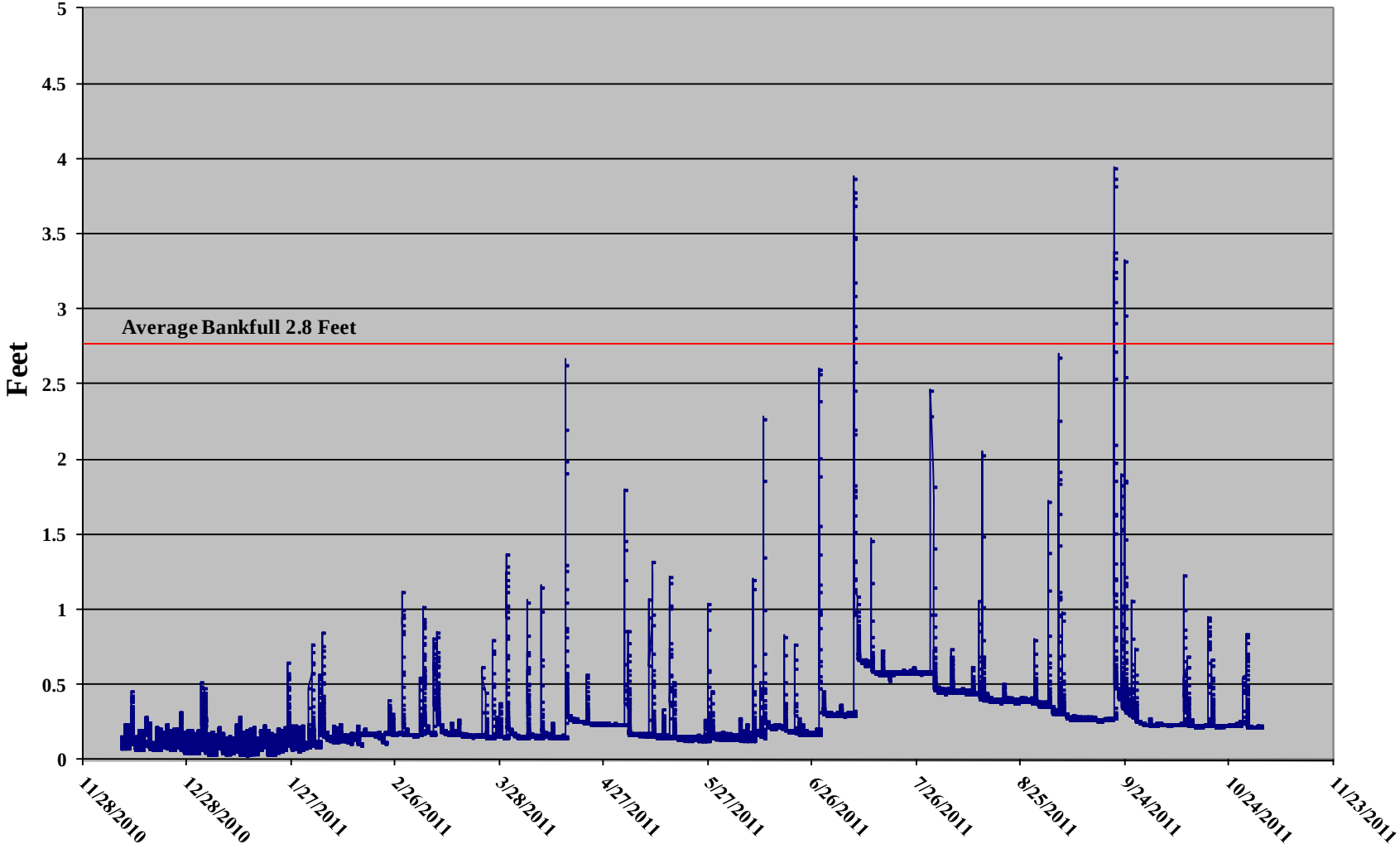
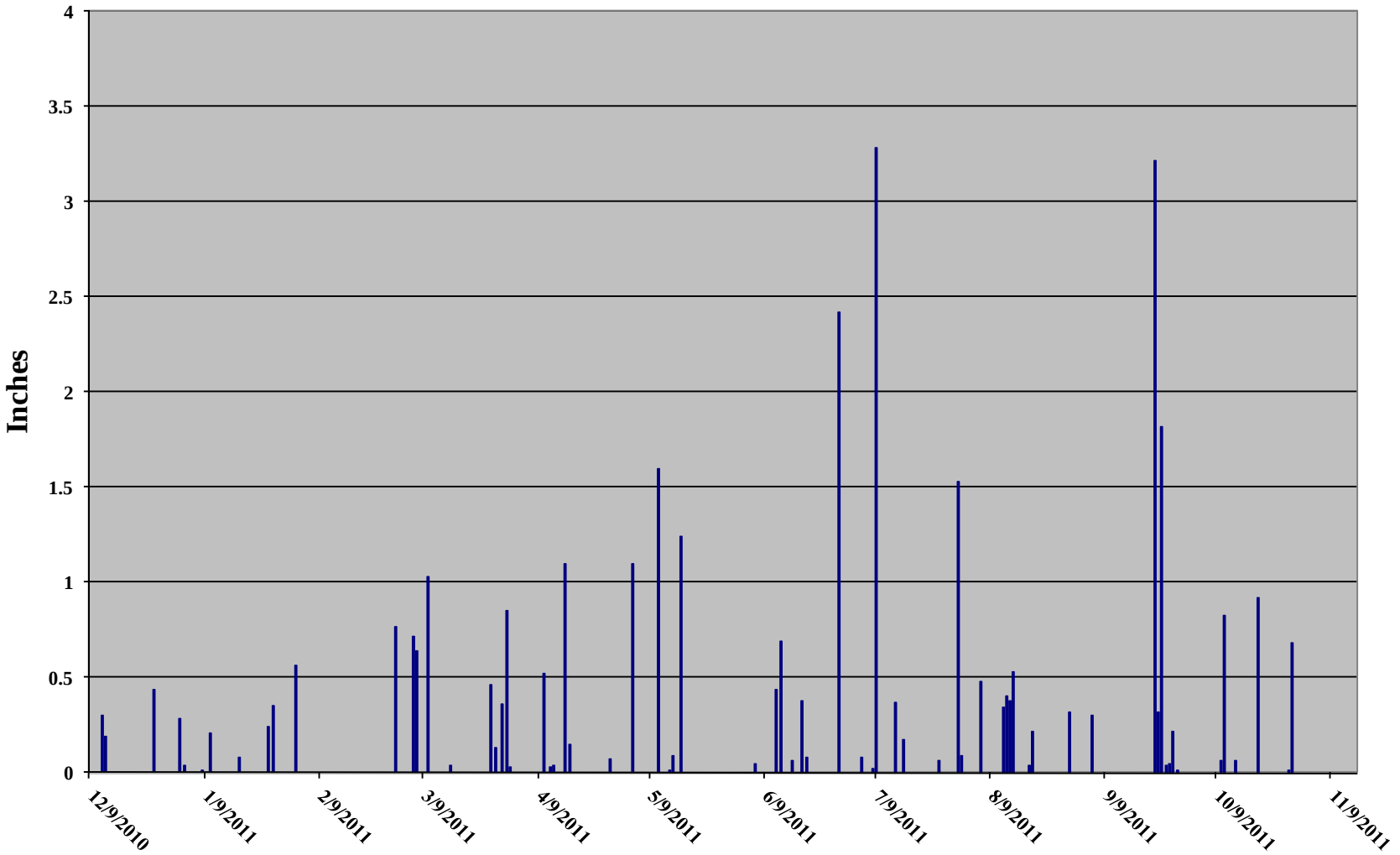


Figure 3. Precipitation for Mooresville, North Carolina



NC CRONOS (North Carolina Climate Retrieval and Observations Network of the Southeast Database). State Climate Office of North Carolina. Version 2.7.2. Mooresville 1.9 SSE (NC-IR-1). http://www.nc-climate.ncsu.edu/cronos/ Accessed November 2011.