Holly Grove Stream Restoration Site

Guilford County, North Carolina
Cataloging Unit: 03030002
EEP Contract #: D06028-B
October 28, 2013

MONITORING REPORT 2013 (YEAR 5)

Submitted to:
North Carolina Department of Environment and Natural Resources
North Carolina Ecosystem Enhancement Program
1652 Mail Service Center
Raleigh, NC 27699-1652

Submitted by:
Restoration Systems, LLC
1101 Haynes Street, Suite 211
Raleigh, North Carolina 27604
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Phone: 919-755-9490

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Prepared for:

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Raleigh, North Carolina 27604

Prepared by:

Wolf Creek Engineering, pllc
7 Florida Avenue
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EXECUTIVE SUMMARY

The Holly Grove Site is located in Guilford County, North Carolina within the Cape Fear River Basin, Cataloging Unit 03030002. The project consisted of restoring, enhancing, and preserving approximately 21,000 linear feet of stream, restoring approximately 42 acres of riparian buffers, and preserving approximately 1.11 acres of wetlands. The Site is in a rural setting in the Southern Outer Piedmont hydrophysiographic ecoregion and was previously used to grow row crops with woody vegetation confined to isolated areas. Prior to restoration, the channels were highly degraded due to unrestricted livestock access, channelization activities, and lack of riparian vegetation. The restoration design was based on a Priority Level 1 and 2 approach to restore proper channel dimension and allow for appropriate sediment transport. Restoration practices on this project were implemented with the intent of minimizing unnecessary disturbance to adjacent land and to protect mature riparian vegetation where it existed. The constructed stream profile has restored stable bed morphology including appropriate riffle-pool sequencing. Cross-vanes, J-Hook vanes, and in-stream log structures have been integrated into the channel to provide grade control, maintain stable streambanks while the riparian vegetation establishes, and provide in-stream habitat. Biodegradable fiber matting was used to provide temporary stabilization on the newly graded streambanks. Excavated materials from the existing channel were used to backfill around in-stream structures and to build riffles with a natural substrate and function.

Hydrology
The Site has been subjected to at least three greater-than-bankfull event and at least three bankfull or near-bankfull events. The first event occured prior to completion of construction when Tropical Storm Fay (August 2008) produced a high-flow event in which floodwaters crested 2.5 feet above bankfull. Approximately seventy percent (70%) of the project was complete at that time and subjected to this high water event. In late September, 2010, Tropical Storm Nicole resulted in 4.5 inches of rain on the site and over-bankfull flows. During the summer of 2013 at least one greater-than-bankfull event occurred in which floodwaters crested over 4 feet above bankfull.

Stream
The restored stream reaches have successfully managed the bankfull and above bankfull flow events over the last five years. The overall grade of the channel has been maintained and the banks of the channels are stable throughout the Site.

Vegetation
Native woody and herbaceous species were used to establish, at minimum, a fifty-foot riparian buffer on each side of the restored reach. Herbaceous species have established throughout the site and there is significant evidence of additional volunteer species becoming established within the buffer. The riparian buffer bare-root planting had an average survival rate of 313 stems per acre through the fifth year. There is an average density of 2,388 stems per acre including planted stems and natural volunteers.

1.0 PROJECT GOALS, BACKGROUND, AND ATTRIBUTES

The purpose of the Holly Grove Stream Restoration Site (Site) was to restore degraded sections of Buckhorn Creek and several of its tributaries located in Guilford County, North Carolina. This monitoring report presents information regarding the site and watershed conditions, the restoration approach for the project, the monitoring results, remedial action plan and detailed monitoring drawings of the site.

1.1 General Project Description

Buckhorn Creek is located approximately 15 miles northeast of the City of Greensboro in rural Guilford County, North Carolina (Figure 1: Vicinity Map). The site consists of approximately 42 acres of floodplain, approximately 21,000 linear feet of stream designated as Buckhorn Creek and its tributaries, and 1.11 acres of existing wetlands (Figure 2: Project Map). The stream reaches consist of perennial, first and second order streams that have historically been impacted by riparian and bank vegetation removal, channel straightening, unrestricted livestock access, and agricultural land-use practices. Existing land use within the site consists of forested areas and row crops. The site is located within moderately sloping colluvial valleys and elevations range from approximately 615 to 720 feet above sea level. Past land management activities have consisted of timber harvesting with subsequent land clearing for agricultural uses including cattle and row crop farming. The land outside of the conservation easement remains in active agricultural production.

1.1.1 USGS and NCDWQ River Basin Designations

The project reach is located in the Haw River watershed of the Cape Fear River Basin (United States Geological Survey (USGS) 14-digit Hydrologic Unit 03030002020070) within North Carolina Division of Water Quality (NCDWQ) sub-basin 03-06-02. This sub-basin is primarily rural agriculture, although residential land use accounts for a significant portion. Buckhorn Creek drains into Reedy Fork Creek approximately ¾ miles downstream of the Site, which in turn flows to the Haw River eight miles downstream.

1.1.2 NCDWQ Surface Water Classification

Reedy Fork Creek in the vicinity of the Site is assigned a best usage classification of C, NSW by the NCDWQ and as such there are no restrictions on watershed development or types of discharge. These waters are suitable for aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture. Secondary recreation includes wading, boating, and other uses not involving human body contact with water on an organized or frequent basis. The supplemental classification, NSW (Nutrient Sensitive Waters) includes areas with water quality problems associated with excessive plant growth resulting from nutrient enrichment.

The portion of Reedy Fork Creek to which Buckhorn Creek drains and the portion of the Haw River that is approximately two miles east of the Site are listed on the DWQ final 2004 and draft 2006 303(d) lists. Streams which are included in the 303(d) list do not meet water quality standards or have impaired uses.

1.2 Project Goals and Objectives

The primary goals of the Holly Grove Stream Restoration Project are to:

- Restore aquatic and riparian habitat within the on-site portions of the Buckhorn Creek watershed.
- Restore geomorphic stability to the subject stream reaches.

These goals will be accomplished through the following objectives:

- Restoration of approximately forty-two acres of Mesic Mixed Hardwood Forest along both sides of Buckhorn Creek and its tributaries.
- Removing nonpoint sources of pollution associated with agricultural activities including the establishment of a native woody riparian buffer (at least 50' wide) adjacent to streams and wetlands to treat surface runoff which may be laden with sediment and/or agricultural pollutants from the adjacent landscape.
- Reestablishing stream stability and the capacity to transport watershed flows and sediment loads by restoring a stable dimension, pattern, and profile supported by natural in-stream habitat and grade/bank stabilization structures.
- Promoting floodwater attenuation through a) conveying bankfull stream flows through construction of bankfull bench, b) restoring secondary, entrenched tributaries thereby reducing floodwater velocities, and c) re-vegetating floodplains to increase frictional resistance on floodwaters crossing the Site.
- Improving aquatic habitat by enhancing stream bed variability and the use of in-stream structures.
- Providing wildlife habitat including fringe and forest edge.

These accomplishments will result in:

- Restoration and enhancement of **15,822** Stream Mitigation Units.
- Protecting the Site with a perpetual conservation easement.

1.3 Project Structure

The project is composed of seven distinct reaches; the main channel, Buckhorn Creek, and each of its tributaries, Middle Branch, West Branch, East Branch, Lower East Branch, Southeast Creek, and Southwest Creek. The project structure is tabulated in the corresponding Table 1 (See Below).

1.4 Restoration Type and Approach

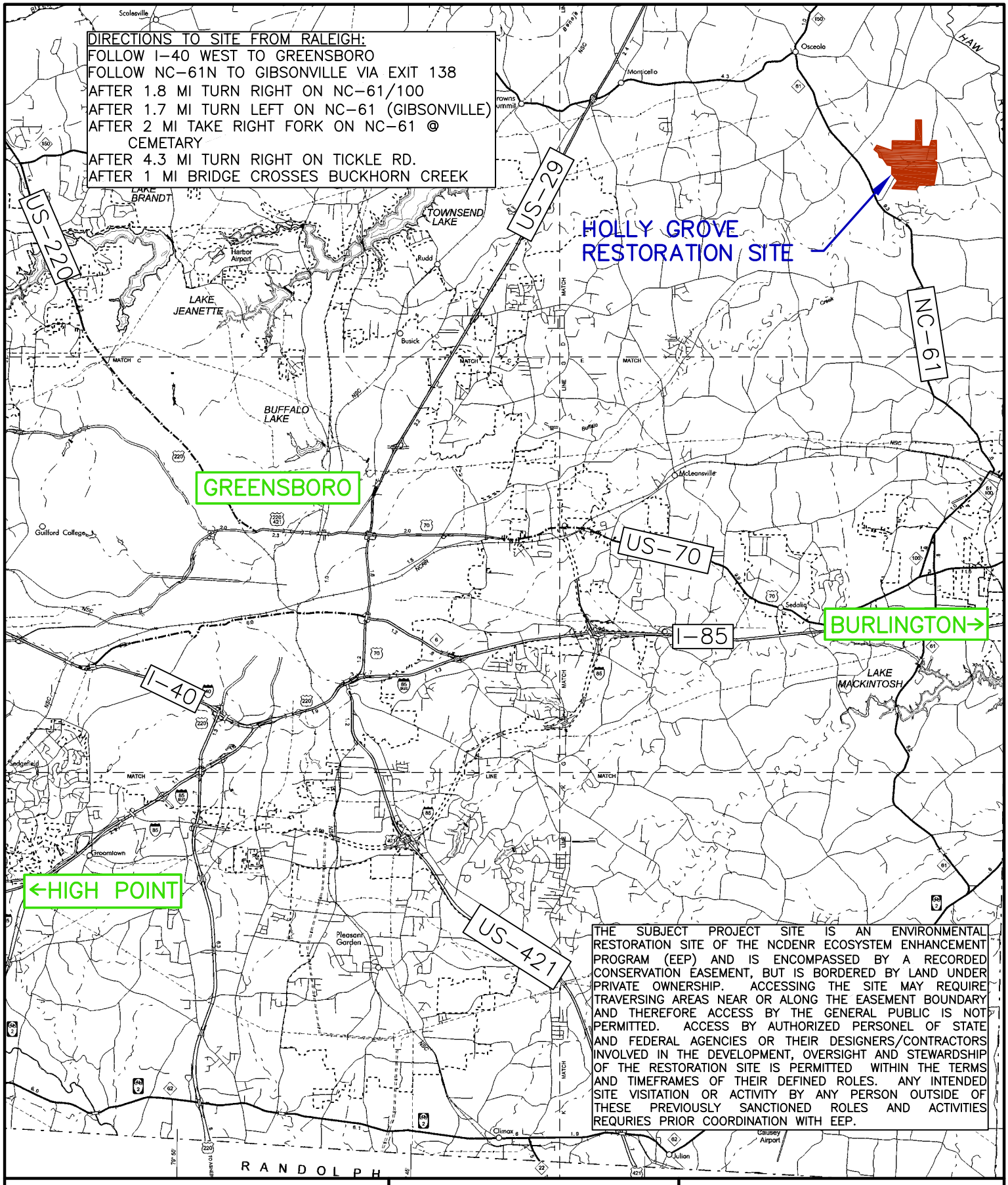
Restoration and enhancement practices implemented on this project were designed to minimize unnecessary disturbance to adjacent land and to protect mature riparian vegetation where it exists. Consideration was given to the potential functional lift provided by restoration activities in comparison to the functional lift that could be realized through the natural process of channel evolution. Included in this consideration was an attempt to determine the disturbance and sedimentation that could occur as a result of this natural process. Where restoration was determined to be warranted, consideration was given to which reaches could best be served by maintaining as much of the existing channel pattern as possible.

The proposed channels of Buckhorn Creek and its tributaries were designed as Type B4c streams with the exception of the lower reach of Middle Branch. This channel configuration provides the most stable and natural form in the moderately sloping colluvial valleys that are found throughout the Site. Not only does it effectively convey bankfull discharge and sediment load but also conforms to the natural conveyance of flood flows. Additionally, since broad alluvial valleys are generally not found within the Site, the lower sinuosity of the Type B4c streams allowed for minimization grading and earthwork activities. The constructed channel dimensions, patterns, and profiles were based on hydraulic relationships and morphologic dimensionless ratios of the reference reaches.

Restoration activities included restoring stable channel morphology supported by natural in-stream habitat and grade/bank stabilization structures, the elimination of accelerated bank erosion, and reestablishment of native riparian buffers at least 50 feet in width. Exotic riparian vegetation was removed in areas of the project to allow for replanting of native riparian species. In-stream structures were installed to provide for enhanced aquatic habitat, protection of the newly constructed stream banks, and grade control for the newly constructed channel.

1.5 Project History, Contacts and Attribute Data

The summary of the project history, contacts, and attribute data is tabulated in Tables II, III, and IV (See Below).



PREPARED FOR: Ecosystem Enhancement Program

PREPARED BY: Restoration Systems, LLC

AND BY: Wolf Creek Engineering

SCALE

1/2 0 1 3

MILES

SITE VICINITY MAP

HOLLY GROVE RESTORATION SITE
GUILFORD COUNTY, NORTH CAROLINA
EEP Contract #: D06028-B

FIGURE 1

POND
WEST BRANCH
MIDDLE BRANCH
BUCKHORN CREEK
WETLANDS
LITTLE BRANCH
LAGOON
EAST BRANCH
TICKLE ROAD
GAS PIPELINE
UT TO SW CREEK
SW CREEK
BUCKHORN CREEK
POND
SE CREEK
UT TO SE CREEK

PREPARED FOR:

Ecosystem Enhancement Program

PREPARED BY:

RESTORATION SYSTEMS, LLC

AND BY:

Wolf Creek ENGINEERING

LEGEND

- STREAM RESTORATION
- STREAM PRESERVATION
- STREAM ENHANCEMENT
- WETLANDS
- FORD
- CONSERVATION EASEMENT
- PROPERTY BOUNDARY
- GAS PIPELINE

SCALE

200 0 200 400 600 800

FEET

SITE MAP

HOLLY GROVE RESTORATION SITE
GUILFORD COUNTY, NORTH CAROLINA
EEP Contract #: D06028-B

FIGURE 2

Table I Project Components
Holly Grove Stream Restoration Site / EEP Contact #D06028-B

Restoration Reach/Area	Restoration Level	Approach	Pre-Restoration LF or AC	Post-Restoration LF or AC	Station Range/Location	Comments
Buckhorn Creek	R	P2	8,757	8,848	100+00 - 194+50	
West Branch	E2	E2	870	870	300+00 - 308+00	
West Branch	R	P2	390	391	300+00 - 303+91	
Middle Branch	E2	E2	240	240	398+91 - 401+31	
Middle Branch	R	P1	1,549	1,561	401+31 - 417+37	
Middle Branch	E2	E2	472	472	417+37 - 422+09	
Middle Branch	R	P1	90	194	423+00 - 425+40	
East Branch	P	-	960	960	480+00 - 498+80	
East Branch	E2	E2	920	920	480+00 - 498+80	
East Branch	R	P1	300	329	490+00 - 493+29	
East Branch	R	P1	739	761	500+00 - 507+61	
Little Branch	E2	E2	553	553	19+945 - 205+54	
SW Creek	R	P1	723	723	600+00 - 607+34	
SW Creek	E2	E2	2,229	2,229	608+26 - 630+55	
UT to SW Creek	P	-	325	325	650+00 - 653+50	
SE Creek	R	P1	342	363	700+00 - 704+36	
SE Creek	P	-	881	881	706+25 - 715+06	
UT to SE Creek	P	-	528	528	750+00 - 755+28	
Wetland A	E	-	1.11	1.11	Middle Branch	

Component Summation							
Restoration Level	Stream (LF)	Riparian Wetland (Ac)		Non-Riparian (Ac	Upland (Ac)	Buffer (Ac)	BMP
		Riverine	Non-Riverine				
Restoration	13,170						
Enhancement		1.11					
Enhancement I							
Enhancement II	5,284						
Creation							
Preservation	2,694						
HQ Preservation							
		1.11					
Totals	**21,148**	**1.11**				**42**	**BMP Count**

= Non-Applicable

Table II Project Activity and Reporting History Holly Grove Restoration Project		
Activity or Report	**Data Collection Complete**	**Completion or Delivery**
Restoration Plan	Apr 2007	Jun 2007
Final Design - Construction Plans	N/A	Oct 2007
Construction	N/A	Oct 2008
Temporary S&E mix applied to entire project area	N/A	Sep 2008
Permanent seed mix applied to entire site	N/A	Sep 2008
Bare-root plantings for floodplain and uplands	N/A	Dec 2008
Mitigation Plan / As-Built (Year 0 Monitoring - baseline)	Oct 2008	Dec 2008
Year 1 Monitoring	Oct 2009	Dec 2009
Year 2 Monitoring	Oct 2010	Nov 2010
Year 3 Monitoring	Oct 2011	Oct 2011
Year 4 Monitoring	Oct 2012	Nov 2012
Year 5 Monitoring	Oct 2013	Oct 2013

Table III Project Contact Table Holly Grove Restoration Project		
Designer		
Wolf Creek Engineering, pllc	7 Florida Avenue Weaverville NC, 28787	
S. Grant Ginn	828-658-3649	
Construction Contractor		
North State Environmental, Inc	2889 Lowery St. Winston-Salem, NC 27101	
Darrell Westmoreland	336-725-2010	
Planting & Seeding Contractor		
North State Environmental, Inc	2889 Lowery St. Winston-Salem, NC 27101	
Stephen Joyce	336-725-2010	
Monitoring Performers		
Stream Monitoring - Wolf Creek Engineering, pllc	S. Grant Ginn	828-658-3649
Vegetation Monitoring - Catena Group	Mike Wood	919-732-1300

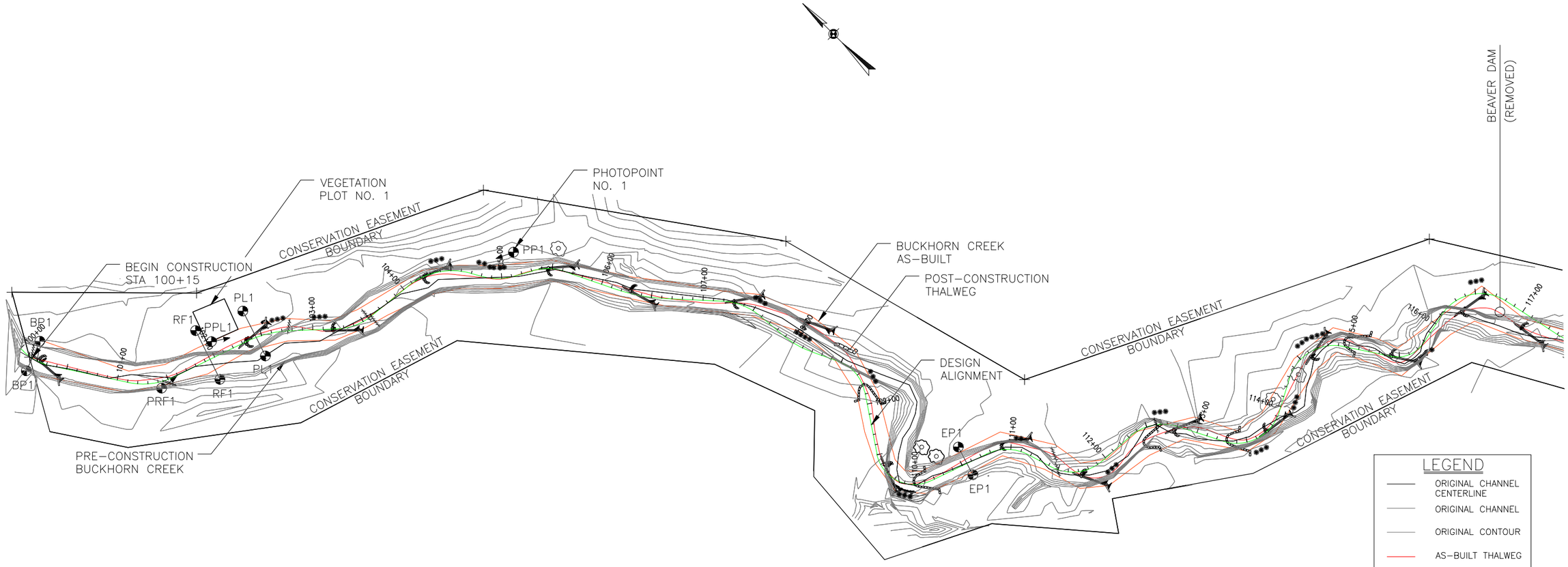
Table IV Project Attribute Table Holly Grove Restoration Project						
Project County	Guilford					
Physiographic Region	Piedmont					
Ecoregion	Southern Outer Piedmont					
Project River Basin	Cape Fear River Basin					
USGS HUC for Project (14 digit)	03030002020070					
NCDWQ Sub-basin for Project	03-06-02					
Within extent of EEP Watershed Plan?						
WRC Class (Warm, Cool, Cold)						
% of project esaement fenced or demarcated	100% Demarcated Easement Corners					
Beaver activity observed during design phase?	Yes, on Buckhorn Creek upstream of bridge					
Restoration Component Attribute Table						
	Buckhorn	West	Middle	East	Southeast	Southwest
Drainage area (mi^2)	4.27	0.2	0.2	0.2	0.14	0.19
Stream order	Second	First	First	First	First	First
Restored length (feet)	8757	390	1639	1039	342	723
Perennial or Intermittent	Perennial	Perennial	Perennial	Perennial	Perennial	Perennial
Watershed type	Rural	Rural	Rural	Rural	Rural	Rural
Watershed LULC Distribution (e.g.)						
Residential	20%	10%	5%	10%	5%	10%
Ag-Row Crop	40%	60%	50%	10%	90%	10%
Ag-Livestock	10%	5%	10%	0%	0%	0%
Forested	30%	25%	35%	80%	5%	80%
Watershed impervious cover (%)	10	5	5	5	2	2
NCDWQ AU/Index number	16-(1)a					
NCDWQ classification	C, NSW	C, NSW	C, NSW	C, NSW	C, NSW	C, NSW
303d listed?	No					
Upstream of a 303d listed segment?	Yes					
Reasons for 303d listing or stressor	non-point urban and agricultural runoff					
Total acreage of easement	64.87					
Total vegetated acreage within easement	47.06					
Total planted acreage as part of the restoration	45.3					
Rosgen classification of pre-existing	F, G	G	G	G	G	G
Rosgen classification of As-Built	B4c	B4c	B4c	B4c	B4c	B4c
Valley type	II	II	II	II	II	II
Valley slope	0.0051	0.0239	0.0165	0.0119	0.0159	0.0169
Valley side slope range	4% - 40%					
Valley toe slope range	0.4% - 2%					
Cowardin classification	N/A					
Trout waters designation	N/A					
Species of concern, endangered?	Yes, Bald Eagle & Carolina Darter					
Dominant soil series and characteristics	Ch , Co	CcD	Ch	CcD , Ch	CcD	CcD
Series	Congaree	Cecil	Chewacla	Chewacla	Cecil	Cecil
Depth (in)	0-80	0-80	0-70	0-70	0-80	0-80
Clay %	5-35	5-70	5-35	5-35	5-70	5-70
K	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
T	-	-	-	-	-	-

Wolf Creek Engineering
ENGINEERING & ENVIRONMENTAL CONSULTING
51 North Knob Lane Weaverville, NC 28787
PHONE: (828) 658-3649 WWW.WOLFCREEKENG.COM

PROJECT	HOLLY GROVE STREAM RESTORATION SITE
OWNER	RESTORATION SYSTEMS, LLC
TITLE	MONITORING PLANS

SCALE	DRWN. BY	PROJECT NO.	SHEET NUMBER
AS NOTED	cme	1024	MP-1
DATE 10/16/2013	CHKD. BY SGG		

DATE	BY	REV.	DESCRIPTION



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BP1 LT	BEGIN PROFILE	892197.58	1827118.27	–
PRF1	PHOTO PT. RIFFLE	892081.9	1827168.92	–
RF1 RT	RIFFLE X.S.	892047.92	1827214.63	98.00
RF1 LT	RIFFLE X.S.	892097.66	1827231.6	98.66
PPL1	PHOTO PT. POOL	892079.26	1827234.84	97.28
PL1 RT	POOL X.S.	892032.47	1827261.68	97.34
PL1 LT	POOL X.S.	892078.62	1827277.13	98.46
EP1 RT	END PROFILE	891450.75	1827684.19	94.53
EP1 LT	END PROFILE	891490.02	1827699.27	95.11
PP1	PHOTO POINT NO. 1	891932.76	1827501.67	–

50 0 50 150
SCALE IN FEET

NO AREAS OF CONCERN ON THIS SHEET

LEGEND

- ORIGINAL CHANNEL CENTERLINE
- ORIGINAL CHANNEL
- ORIGINAL CONTOUR
- AS-BUILT THALWEG
- AS-BUILT TOP OF BANK
- DESIGN CHANNEL CENTERLINE
- LOG VANE
- LOG VANE W/ BAFFLE
- CROSS VANE
- BOULDER VANE
- IRON ROD
- GAUGE
- STABLE
- LOW CONCERN
- MODERATE CONCERN
- HIGH CONCERN

NOTE: VEGETATION HAS GROWN INTO THE MAJORITY OF RIFFLES DUE TO LACK OF SHADE FROM MATURE BUFFER

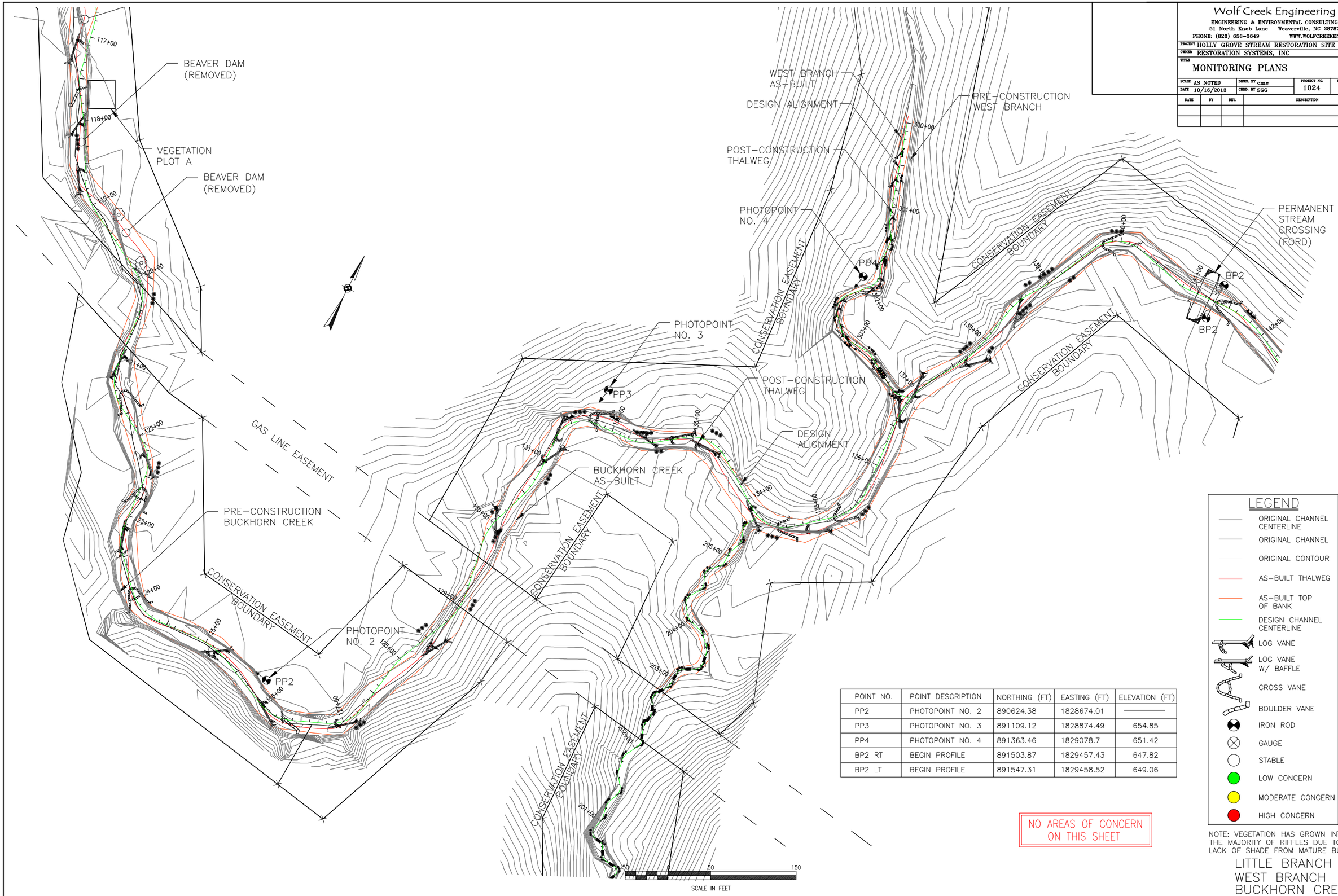
BUCKHORN CREEK

Wolf Creek Engineering
ENGINEERING & ENVIRONMENTAL CONSULTING
51 North Knob Lane Weaverville, NC 28787
PHONE: (828) 658-3649 WWW.WOLFCREEKENG.COM

PROJECT	HOLLY GROVE STREAM RESTORATION SITE
OWNER	RESTORATION SYSTEMS, INC
TITLE	MONITORING PLANS

SCALE	DRWN. BY	PROJECT NO.	SHEET NUMBER
AS NOTED	cme	1024	MP-2
DATE 10/16/2013	CHKD. BY SGG		

DATE	BY	REV.	DESCRIPTION



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PP2	PHOTOPOINT NO. 2	890624.38	1828674.01	———
PP3	PHOTOPOINT NO. 3	891109.12	1828874.49	654.85
PP4	PHOTOPOINT NO. 4	891363.46	1829078.7	651.42
BP2 RT	BEGIN PROFILE	891503.87	1829457.43	647.82
BP2 LT	BEGIN PROFILE	891547.31	1829458.52	649.06

NO AREAS OF CONCERN ON THIS SHEET

LEGEND

- ORIGINAL CHANNEL CENTERLINE
- ORIGINAL CHANNEL
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LITTLE BRANCH
WEST BRANCH
BUCKHORN CREEK

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51 North Knob Lane Weaverville, NC 28787
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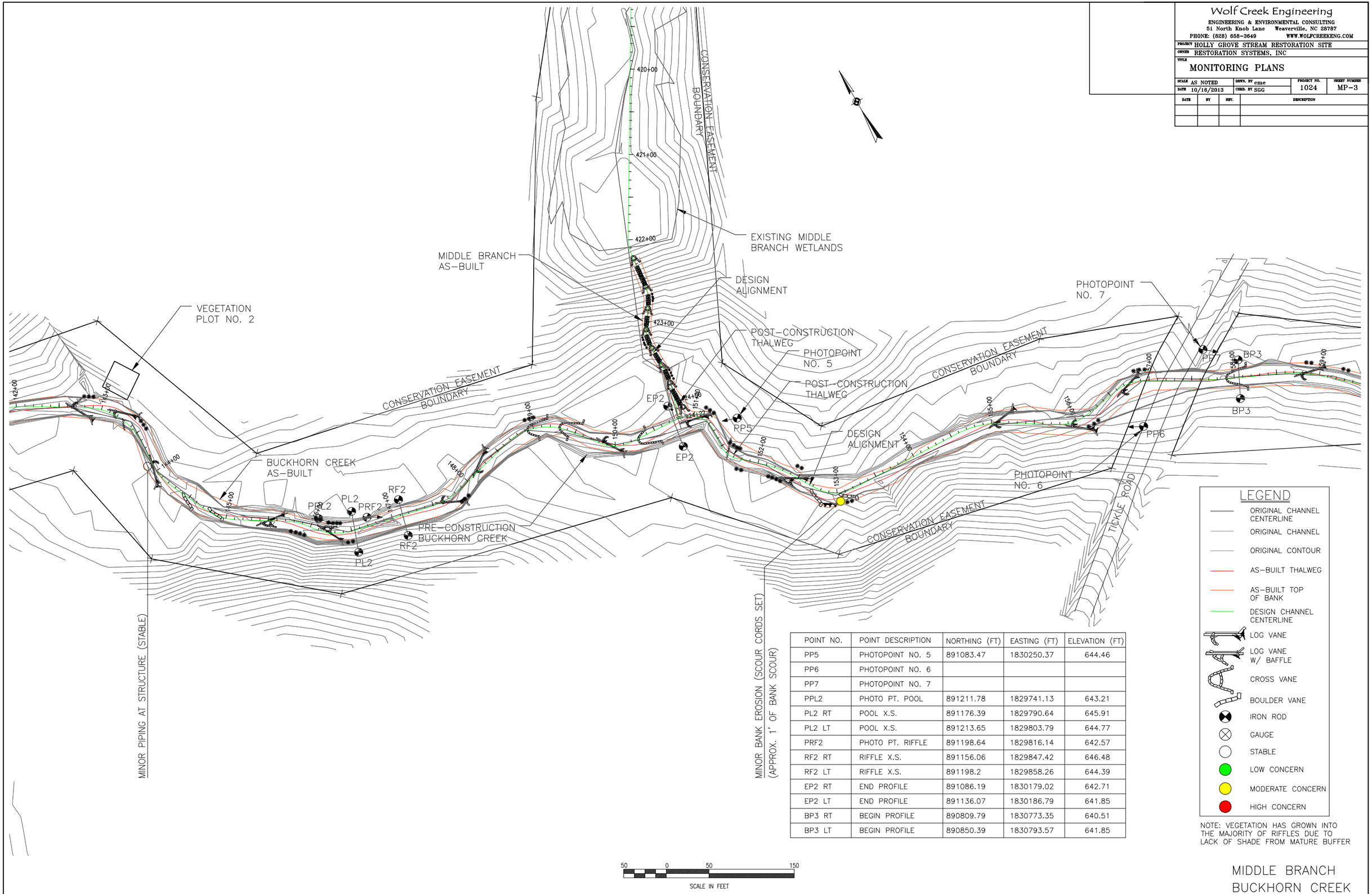
PROJECT: HOLLY GROVE STREAM RESTORATION SITE
OWNER: RESTORATION SYSTEMS, INC
TITLE: MONITORING PLANS

SCALE	DWN. BY	PROJECT NO.	SHEET NUMBER
AS NOTED	cme	1024	MP-3
DATE 10/16/2013	CHKD. BY SGG		

DATE	BY	REV.	DESCRIPTION



POINT NO.	POINT DESCRIPTION	NORTHING (FT)	EASTING (FT)	ELEVATION (FT)
PP5	PHOTOPOINT NO. 5	891083.47	1830250.37	644.46
PP6	PHOTOPOINT NO. 6			
PP7	PHOTOPOINT NO. 7			
PPL2	PHOTO PT. POOL	891211.78	1829741.13	643.21
PL2 RT	POOL X.S.	891176.39	1829790.64	645.91
PL2 LT	POOL X.S.	891213.65	1829803.79	644.77
PRF2	PHOTO PT. RIFFLE	891198.64	1829816.14	642.57
RF2 RT	RIFFLE X.S.	891156.06	1829847.42	646.48
RF2 LT	RIFFLE X.S.	891198.2	1829858.26	644.39
EP2 RT	END PROFILE	891086.19	1830179.02	642.71
EP2 LT	END PROFILE	891136.07	1830186.79	641.85
BP3 RT	BEGIN PROFILE	890809.79	1830773.35	640.51
BP3 LT	BEGIN PROFILE	890850.39	1830793.57	641.85

LEGEND
- ORIGINAL CHANNEL CENTERLINE
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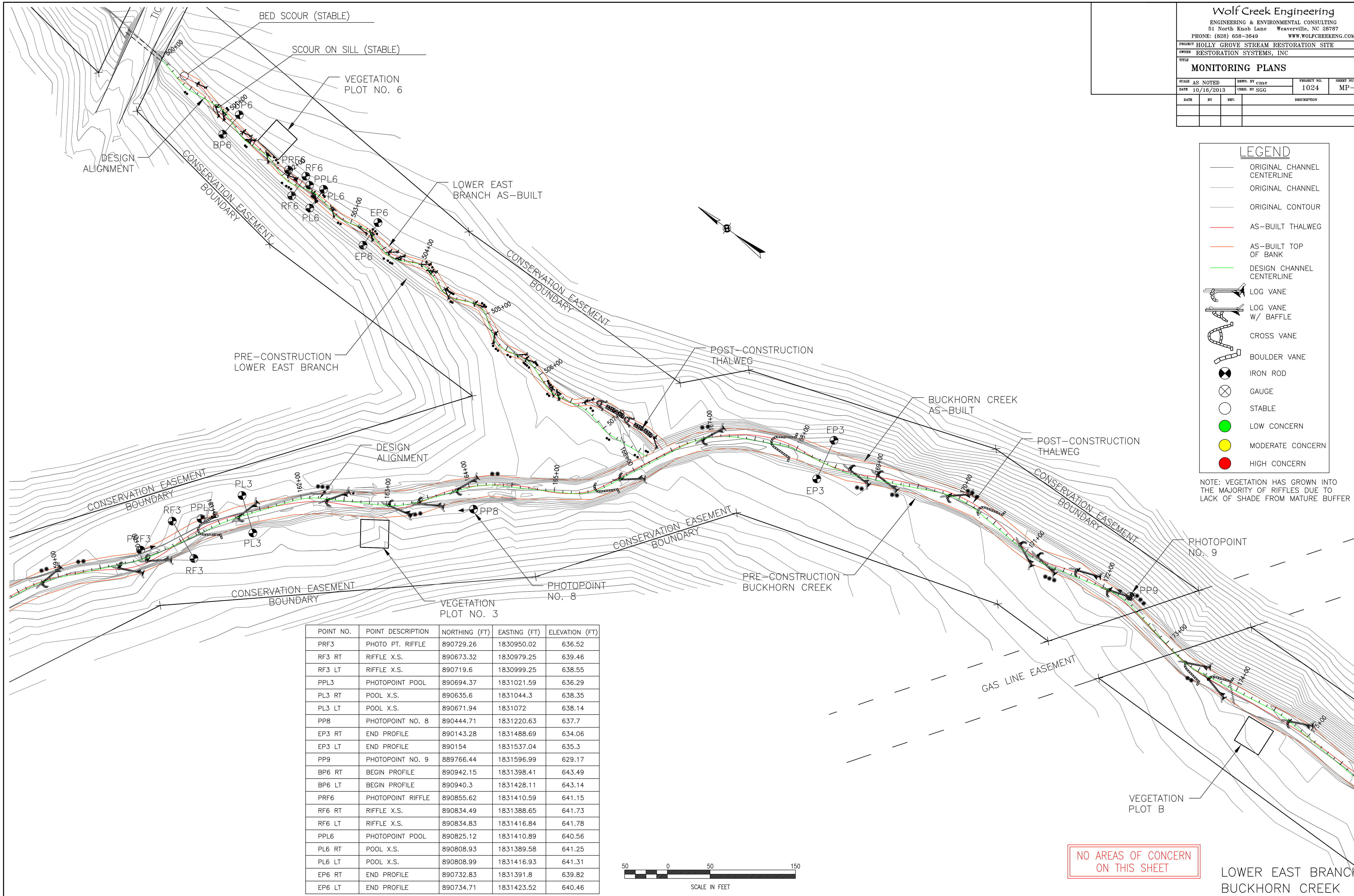
MIDDLE BRANCH
BUCKHORN CREEK



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PROJECT: HOLLY GROVE STREAM RESTORATION SITE
OWNER: RESTORATION SYSTEMS, INC
TITLE: **MONITORING PLANS**

SCALE	DRWN. BY	PROJECT NO.	SHEET NUMBER
AS NOTED	cme	1024	MP-4
DATE 10/16/2013	CHKD. BY SGG		

DATE	BY	REV.	DESCRIPTION

LEGEND

- ORIGINAL CHANNEL CENTERLINE
- ORIGINAL CHANNEL
- ORIGINAL CONTOUR
- AS-BUILT THALWEG
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PRF3	PHOTO PT. RIFFLE	890729.26	1830950.02	636.52
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RF3 LT	RIFFLE X.S.	890719.6	1830999.25	638.55
PPL3	PHOTOPOINT POOL	890694.37	1831021.59	636.29
PL3 RT	POOL X.S.	890635.6	1831044.3	638.35
PL3 LT	POOL X.S.	890671.94	1831072	638.14
PP8	PHOTOPOINT NO. 8	890444.71	1831220.63	637.7
EP3 RT	END PROFILE	890143.28	1831488.69	634.06
EP3 LT	END PROFILE	890154	1831537.04	635.3
PP9	PHOTOPOINT NO. 9	889766.44	1831596.99	629.17
BP6 RT	BEGIN PROFILE	890942.15	1831398.41	643.49
BP6 LT	BEGIN PROFILE	890940.3	1831428.11	643.14
PRF6	PHOTOPOINT RIFFLE	890855.62	1831410.59	641.15
RF6 RT	RIFFLE X.S.	890834.49	1831388.65	641.73
RF6 LT	RIFFLE X.S.	890834.83	1831416.84	641.78
PPL6	PHOTOPOINT POOL	890825.12	1831410.89	640.56
PL6 RT	POOL X.S.	890808.93	1831389.58	641.25
PL6 LT	POOL X.S.	890808.99	1831416.93	641.31
EP6 RT	END PROFILE	890732.83	1831391.8	639.82
EP6 LT	END PROFILE	890734.71	1831423.52	640.46

NO AREAS OF CONCERN ON THIS SHEET

LOWER EAST BRANCH
BUCKHORN CREEK

Wolf Creek Engineering
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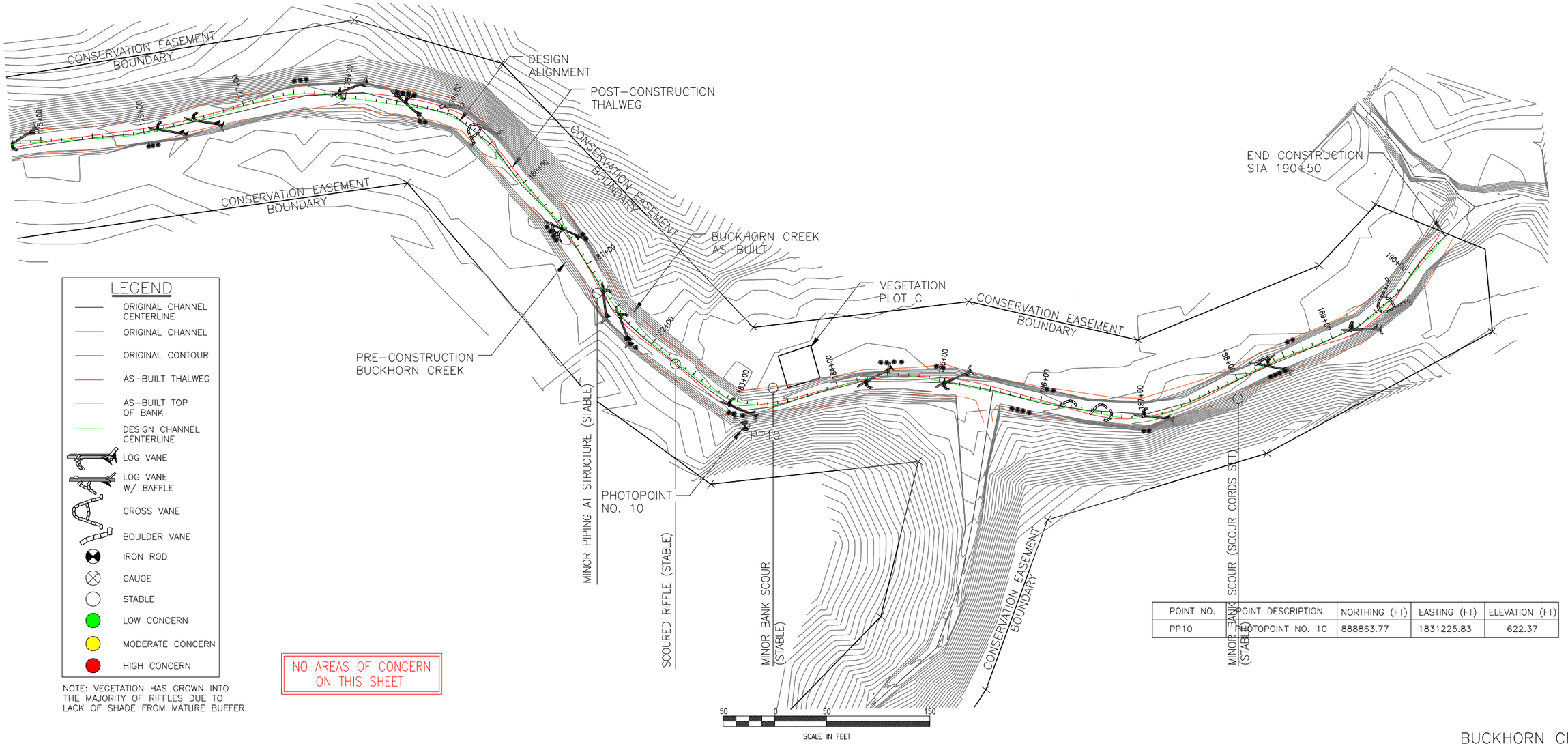
51 North Knob Lane Weaverville, NC 28787
PHONE: (828) 658-3649 WWW.WOLFCREEKENG.COM

PROJECT	HOLLY GROVE STREAM RESTORATION SITE
OWNER	RESTORATION SYSTEMS, INC
TITLE	MONITORING PLANS

SCALE	DWN. BY	PROJECT NO.	SHEET NUMBER
AS NOTED	cme	1024	MP-5
DATE 10/16/2013	CHKD. BY SGG		

DATE	BY	REV.	DESCRIPTION



POINT NO.	POINT DESCRIPTION	NORTHING (FT)	EASTING (FT)	ELEVATION (FT)
PP10	PHOTOPOINT NO. 10	888863.77	1831225.83	622.37

BUCKHORN CREEK

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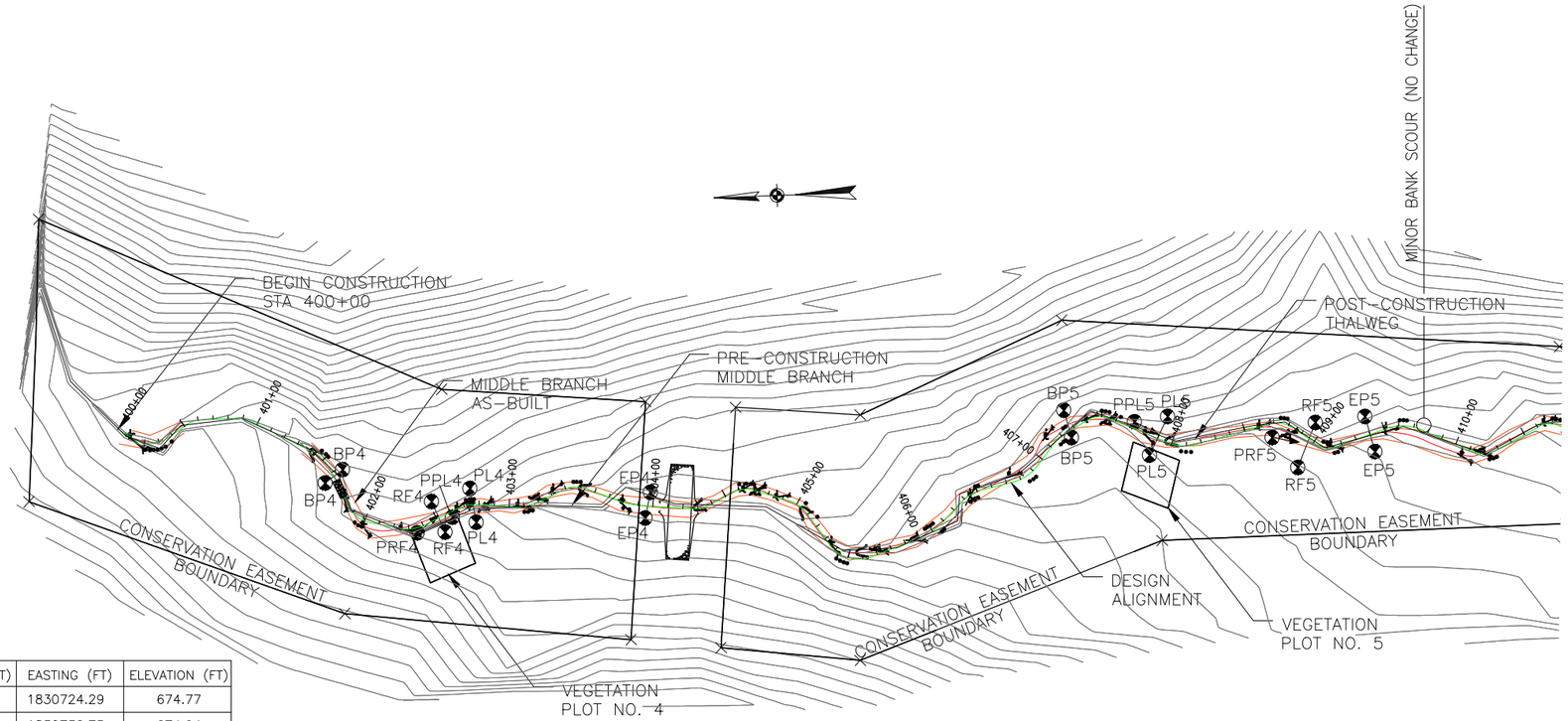
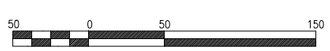
PROJECT: HOLLY GROVE STREAM RESTORATION SITE
OWNER: RESTORATION SYSTEMS, INC
TITLE: MONITORING PLANS

SCALE	DRWN. BY	PROJECT NO.	SHEET NUMBER
AS NOTED	cme	1024	MP-6
DATE 10/16/2013	CHKD. BY SGG		

DATE	BY	REV.	DESCRIPTION



POINT NO.	POINT DESCRIPTION	NORTHING (FT)	EASTING (FT)	ELEVATION (FT)
BP4 RT	BEGIN PROFILE	893112.11	1830724.29	674.77
BP4 LT	BEGIN PROFILE	893100.16	1830732.75	674.94
PRF 4	PHOTOPOINT RIFFLE	893052.14	1830688.91	672.84
RF4 RT	RIFFLE X.S.	893033.61	1830688.71	672.97
RF4 LT	RIFFLE X.S.	893041.95	1830709.35	673.1
PPL4	PHOTOPOINT POOL	893028.41	1830698.43	672.27
PL4 RT	POOL X.S.	893012.69	1830694.5	672.34
PL4 LT	POOL X.S.	893016.06	1830717.08	672.37
EP4 RT	END PROFILE	892900.43	1830693.07	670.12
EP4 LT	END PROFILE	892896.35	1830710.01	670.19
BP5 RT	BEGIN PROFILE	892615.37	1830735.78	665.53
BP5 LT	BEGIN PROFILE	892619.77	1830754.12	665.59
PRF 5	PHOTOPOINT RIFFLE	892481.99	1830730.82	662.8
RF5 RT	RIFFLE X.S.	892465.75	1830710.28	663.37
RF5 LT	RIFFLE X.S.	892453.05	1830739.76	662.65
PPL5	PHOTOPOINT POOL	892573.02	1830744.67	663.74
PL5 RT	POOL X.S.	892563.99	1830722.2	664.33
PL5 LT	POOL X.S.	892551	1830747.44	664.4
EP5 RT	END PROFILE	892414.15	1830718.87	661.96
EP5 LT	END PROFILE	892419.91	1830742.4	661.71



NO AREAS OF CONCERN ON THIS SHEET

LEGEND

- ORIGINAL CHANNEL CENTERLINE
- ORIGINAL CHANNEL
- ORIGINAL CONTOUR
- AS-BUILT THALWEG
- AS-BUILT TOP OF BANK
- DESIGN CHANNEL CENTERLINE
- LOG VANE
- LOG VANE W/ BAFFLE
- CROSS VANE
- BOULDER VANE
- IRON ROD
- GAUGE
- STABLE
- LOW CONCERN
- MODERATE CONCERN
- HIGH CONCERN

NOTE: VEGETATION HAS GROWN INTO THE MAJORITY OF RIFFLES DUE TO LACK OF SHADE FROM MATURE BUFFER

MIDDLE BRANCH

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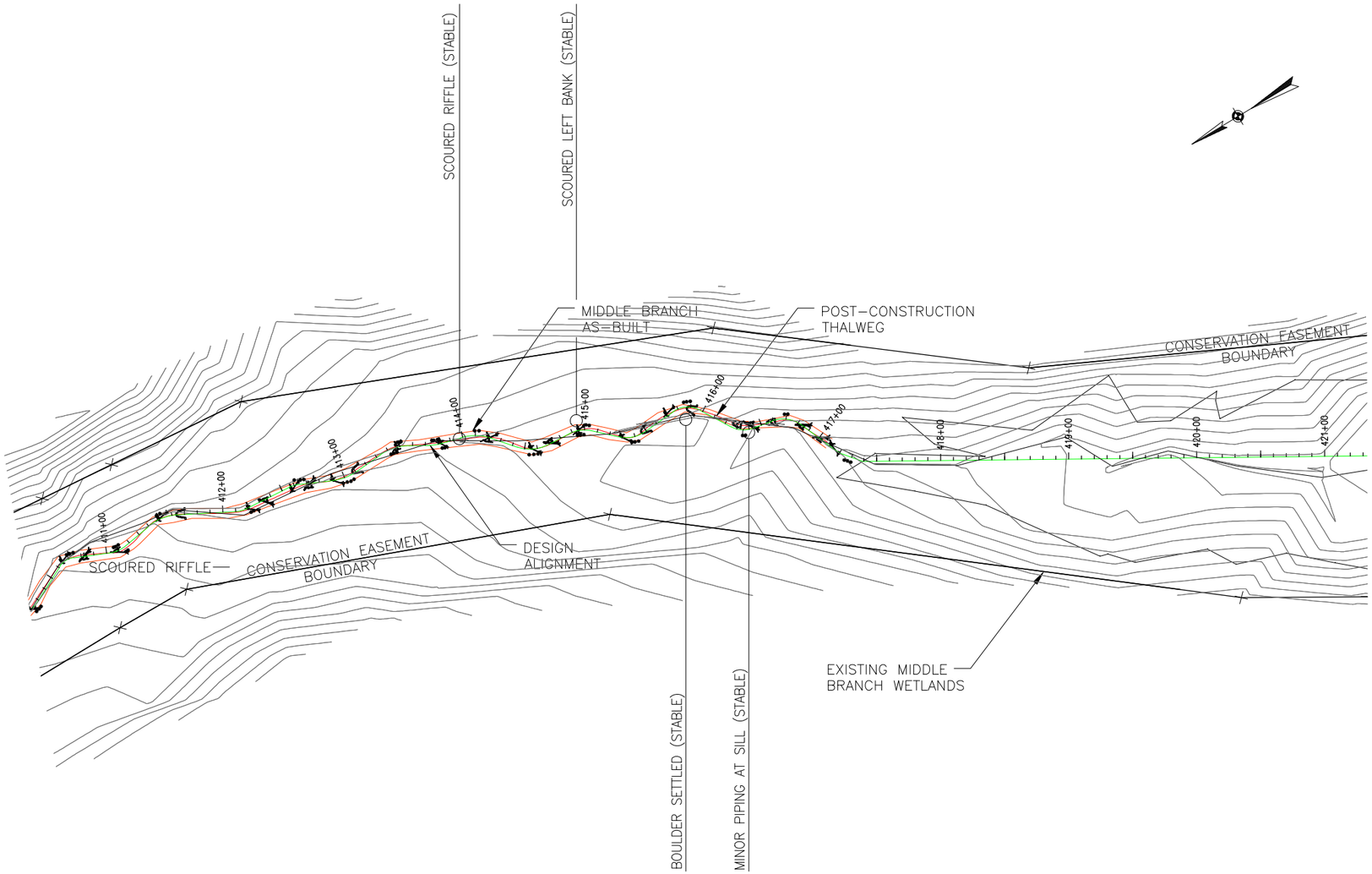
PROJECT	HOLLY GROVE STREAM RESTORATION SITE
OWNER	RESTORATION SYSTEMS, INC
TITLE	MONITORING PLANS

SCALE	DRWN. BY	PROJECT NO.	SHEET NUMBER
AS NOTED	cme	1024	MP-7
DATE 10/16/2013	CHKD. BY SGG		

DATE	BY	REV.	DESCRIPTION



NO AREAS OF CONCERN ON THIS SHEET

50 0 50 150
SCALE IN FEET

LEGEND

- ORIGINAL CHANNEL CENTERLINE
- ORIGINAL CHANNEL
- ORIGINAL CONTOUR
- AS-BUILT THALWEG
- AS-BUILT TOP OF BANK
- DESIGN CHANNEL CENTERLINE
- LOG VANE
- LOG VANE W/ BAFFLE
- CROSS VANE
- BOULDER VANE
- IRON ROD
- GAUGE
- STABLE
- LOW CONCERN
- MODERATE CONCERN
- HIGH CONCERN

NOTE: VEGETATION HAS GROWN INTO THE MAJORITY OF RIFFLES DUE TO LACK OF SHADE FROM MATURE BUFFER

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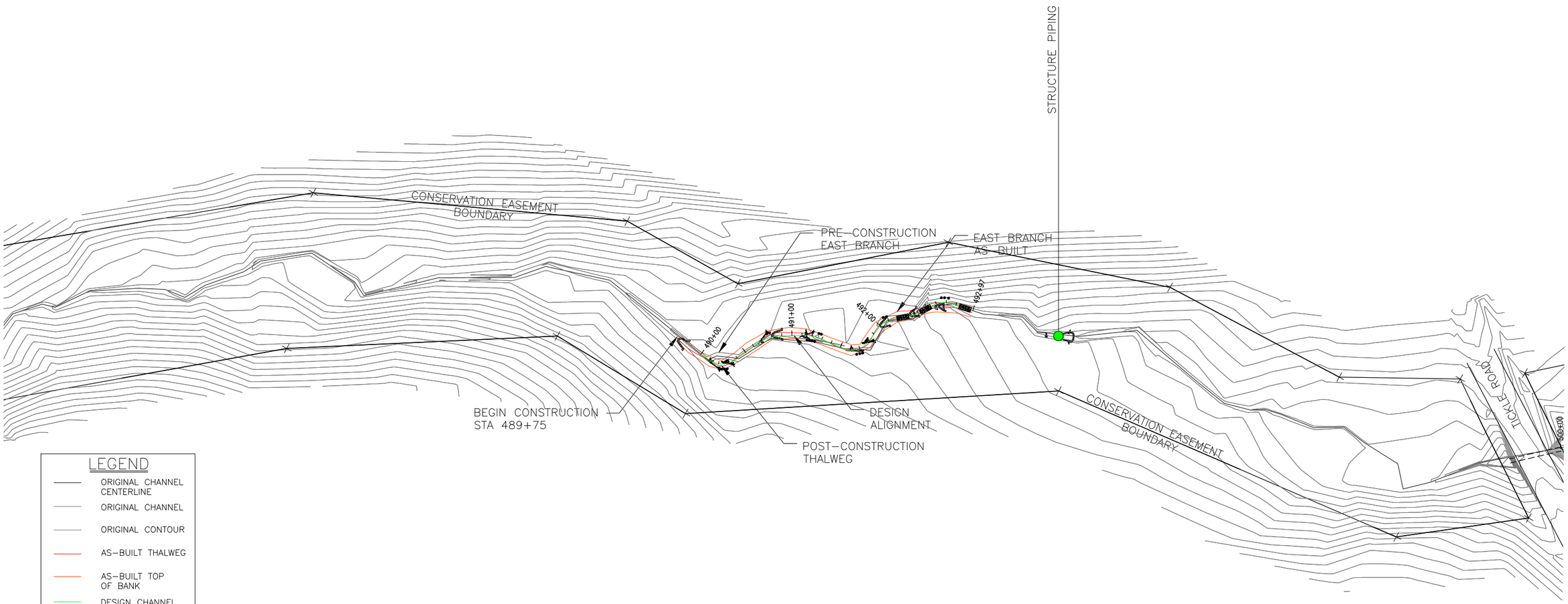
PROJECT	HOLLY GROVE STREAM RESTORATION SITE
OWNER	RESTORATION SYSTEMS, INC
TITLE	MONITORING PLANS

SCALE	DRWN. BY	PROJECT NO.	SHEET NUMBER
AS NOTED	cme	1024	MP-8
DATE 10/16/2013	CHKD. BY SGG		

DATE	BY	REV.	DESCRIPTION



LEGEND

- ORIGINAL CHANNEL CENTERLINE
- ORIGINAL CHANNEL
- ORIGINAL CONTOUR
- AS-BUILT THALWEG
- AS-BUILT TOP OF BANK
- DESIGN CHANNEL CENTERLINE
- LOG VANE
- LOG VANE W/ BAFFLE
- CROSS VANE
- BOULDER VANE
- IRON ROD
- GAUGE
- STABLE
- LOW CONCERN
- MODERATE CONCERN
- HIGH CONCERN

NOTE: VEGETATION HAS GROWN INTO THE MAJORITY OF RIFFLES DUE TO LACK OF SHADE FROM MATURE BUFFER

50 0 50 150
SCALE IN FEET

EAST BRANCH

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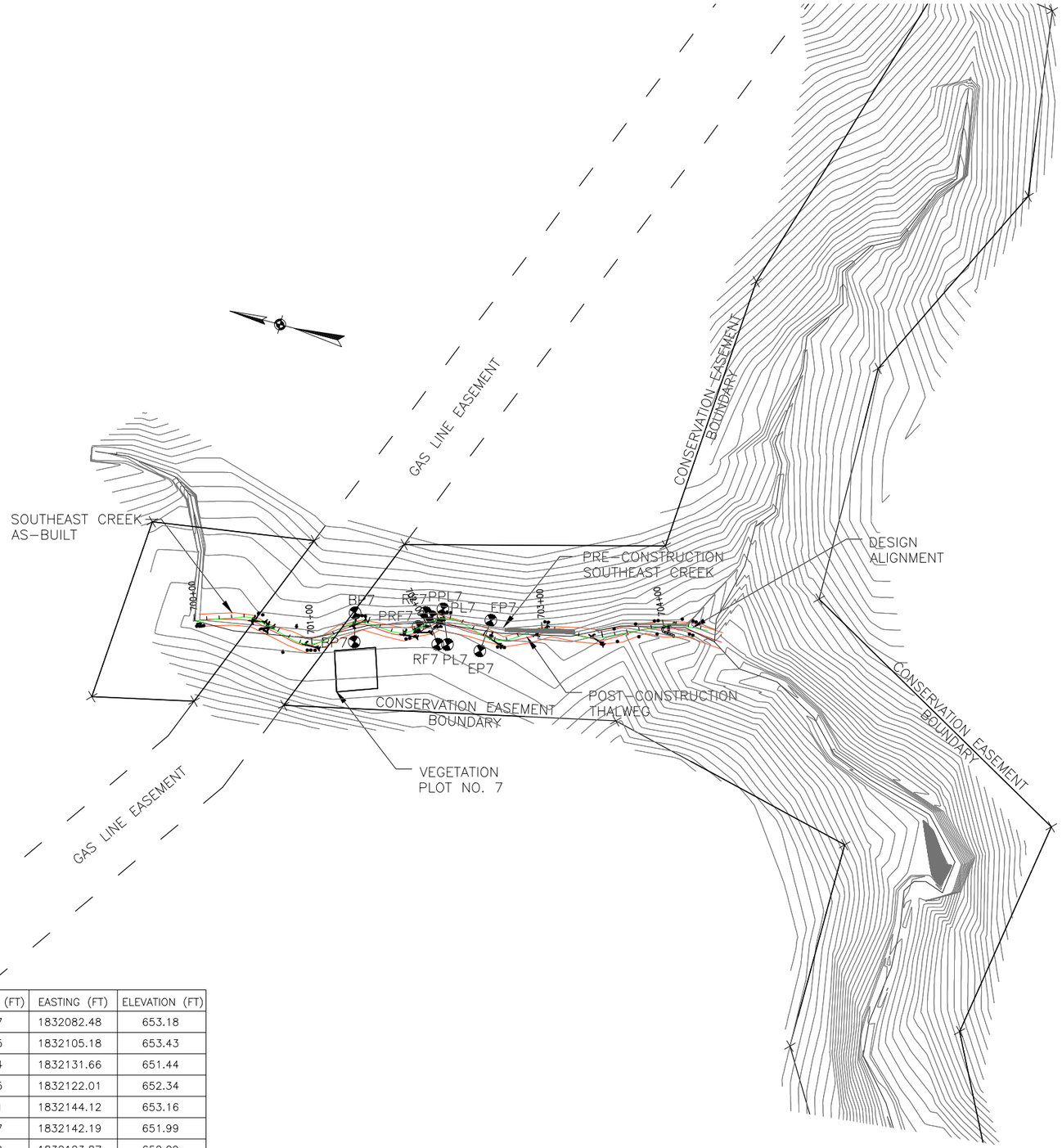
PROJECT	HOLLY GROVE STREAM RESTORATION SITE
OWNER	RESTORATION SYSTEMS, INC
TITLE	MONITORING PLANS

SCALE	DRWN. BY	PROJECT NO.	SHEET NUMBER
AS NOTED	cme	1024	mp-9
DATE 10/16/2013	CHKD. BY SGG		

DATE	BY	REV.	DESCRIPTION



POINT NO.	POINT DESCRIPTION	NORTHING (FT)	EASTING (FT)	ELEVATION (FT)
BP7 RT	BEGIN PROFILE	889394.27	1832082.48	653.18
BP7 LT	BEGIN PROFILE	889388.85	1832105.18	653.43
PRF 7	PHOTOPOINT RIFFLE	889294.04	1832131.66	651.44
RF7 RT	RIFFLE X.S.	889275.05	1832122.01	652.34
RF7 LT	RIFFLE X.S.	889291.11	1832144.12	653.16
PPL7	PHOTOPOINT POOL	889285.67	1832142.19	651.99
PL7 RT	POOL X.S.	889267.49	1832123.87	652.09
PL7 LT	POOL X.S.	889278.35	1832150.58	653.53
EP7 RT	END PROFILE	889240.74	1832125.74	651.43
EP7 LT	END PROFILE	889238.74	1832151.82	653.54

50 0 50 150
SCALE IN FEET

NO AREAS OF CONCERN ON THIS SHEET

LEGEND
- ORIGINAL CHANNEL CENTERLINE
- ORIGINAL CHANNEL
- ORIGINAL CONTOUR
- AS-BUILT THALWEG
- AS-BUILT TOP OF BANK
- DESIGN CHANNEL CENTERLINE
- LOG VANE
- LOG VANE W/ BAFFLE
- CROSS VANE
- BOULDER VANE
- IRON ROD
- GAUGE
- STABLE
- LOW CONCERN
- MODERATE CONCERN
- HIGH CONCERN

NOTE: VEGETATION HAS GROWN INTO THE MAJORITY OF RIFFLES DUE TO LACK OF SHADE FROM MATURE BUFFER

SOUTHEAST CREEK

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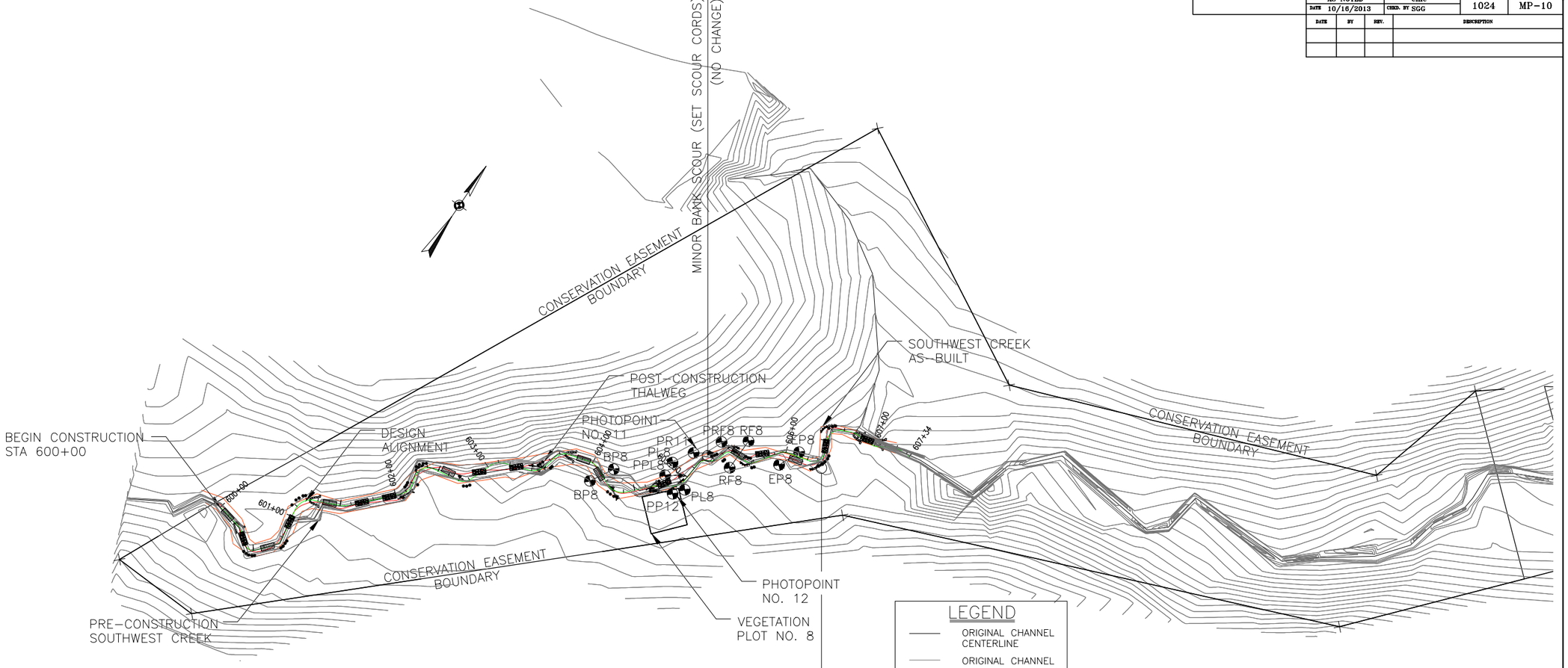
PROJECT	HOLLY GROVE STREAM RESTORATION SITE
OWNER	RESTORATION SYSTEMS, INC
TITLE	MONITORING PLANS

SCALE	DWN. BY	PROJECT NO.	SHEET NUMBER
AS NOTED	cme	1024	MP-10
DATE 10/16/2013	CHKD. BY SGG		

DATE	BY	REV.	DESCRIPTION



POINT NO.	POINT DESCRIPTION	NORTHING (FT)	EASTING (FT)	ELEVATION (FT)
BP8 RT	BEGIN PROFILE	888530.2	1829244.79	————
BP8 LT	BEGIN PROFILE	888550.58	1829256.28	————
PR8 5	PHOTOPOINT RIFFLE	888624.26	1829321.4	————
RF8 RT	RIFFLE X.S.	888609.33	1829340.21	————
RF8 LT	RIFFLE X.S.	888638.13	1829340.74	————
PPL8	PHOTOPOINT POOL	888571.69	1829296.89	————
PL8 RT	POOL X.S.	888570.92	1829318.35	————
PL8 LT	POOL X.S.	888584.77	1829295.99	————
EP8 RT	END PROFILE	888635.95	1829374.79	————
EP8 LT	END PROFILE	888655.17	1829383.15	————
PP11	PHOTOPOINT NO. 11	888602.23	1829306.57	————
PP12	PHOTOPOINT NO. 12	888562.04	1829311.53	————

50 0 50 150
SCALE IN FEET

LEGEND
- ORIGINAL CHANNEL CENTERLINE
- ORIGINAL CHANNEL
- ORIGINAL CONTOUR
- AS-BUILT THALWEG
- AS-BUILT TOP OF BANK
- DESIGN CHANNEL CENTERLINE
- LOG VANE
- LOG VANE W/ BAFFLE
- CROSS VANE
- BOULDER VANE
- IRON ROD
- GAUGE
- STABLE
- LOW CONCERN
- MODERATE CONCERN
- HIGH CONCERN

NO AREAS OF CONCERN ON THIS SHEET

NOTE: VEGETATION HAS GROWN INTO THE MAJORITY OF RIFFLES DUE TO LACK OF SHADE FROM MATURE BUFFER

SOUTHWEST CREEK

2.0 Project condition and monitoring results

2.1 Vegetation Assessment

The Carolina Vegetation Survey – Ecosystem Enhancement Program (CVS-EEP) 2008 protocol for recording vegetation (Lee et. al 2008) was used to determine the planting pattern of woody stems with respect to species, spacing, and density as well as to forecast survivability and growth of planted stems in subsequent monitoring years. Eleven (11) randomly placed 10 meter by 10 meter vegetative sampling plots were established within the project easement area. The corners of each monitoring plot have been marked in the field and their position documented by GPS survey. Plots were placed within the applicable planting zones to capture the heterogeneity of the designed vegetative communities. Plot corners were permanently marked with rebar and recorded during the baseline survey. All planted stems and plot corners were marked with orange flagging tape to facilitate relocation during subsequent monitoring years. A reference photograph was taken for each plot at the origin looking diagonally across the plot to the opposite corner.

Eleven vegetation plots were monitored according to Level II of the CVS-EEP vegetation monitoring protocol (Version 4.2) which accounts for planted and natural stems. This protocol has been implemented for monitoring year (MY) -01, MY-02, MY-03, MY-04, and MY-05. Vegetation Plot 7 was relocated during MY-02 to avoid disturbance from gas line easement maintenance. Including Plots 1-8, and A-C, there are 313 planted stems/acre, excluding livestakes. There are 2,388 stems/acre including planted stems, livestakes, and natural volunteers. Vegetation plots 1, 3, 4, 6, A, B, and C contain planted stem counts above the success criteria of 260 stems/acre. The success criterion for planted woody species is 320 stems/acre after MY-03. A mortality rate of 10 percent will be allowed after MY-04 (288 stems/acre), with another 10 percent allowed after MY-05 (260 stems/acre).

Table V: Vegetation Summary

Plot	Date Sampled	Planted Living Stems	Dead or Missing Stems	Volunteer Stems	Total Living Stems	Average Stems Per Acre	# species
1	10/2/2013	9	1	81	**90**	364	15
2	10/2/2013	4	0	80	**84**	162	9
3	10/2/2013	7	0	34	**41**	283	9
4	10/2/2013	9	0	88	**97**	364	16
5	10/2/2013	5	0	31	**36**	202	8
6	10/2/2013	10	0	4	**14**	405	6
7	10/2/2013	4	0	1	**5**	162	4
8	10/2/2013	6	0	94	**100**	243	15
A	10/2/2013	8	0	65	**73**	324	6
B	10/2/2013	10	0	18	**28**	405	5
C	10/2/2013	13	0	49	**62**	526	10

2.1.1 Vegetative Problems

The vegetation problem areas are composed of areas of low planted stem density in the vicinity of plots 2, 5, 7, and 8 due to the CVS data results. Invasive exotics observed throughout the conservation easement that are a threat to native vegetation include tree of heaven (*Ailanthus altissima*), princess tree (*Paulownia tomentosa*), and Johnson grass (*Sorghum halapense*). Other invasive exotics infrequently observed that did not seem to be an imminent threat include tall fescue (*Schedonurus arundinaceus*), Japanese honeysuckle (*Lonicera japonica*), Multiflora rose (*Rosa multiflora*), and Chinese privet (*Ligustrum sinense*). According to the EEP Invasives of Concern/Interest List, tree of heaven, princess tree, mulitflora rose, Chinese privet, and Japanese honeysuckle are all classified as "High Concern" species and fescue as a "Low/Moderate Concern" species. Although these invasive exotic species are given different ranks of severity, the functionality of the project is not expected to be impaired significantly.

2.1.2 Vegetative Plot Photos

A photo point was established in each vegetation plot. Photo points are positioned for each plot at the origin facing diagonally across the plot to the opposite corner. The photographs were captured on the same day as the vegetation plot surveys (Appendix A).

2.1.3 Remedial Action

Remedial planting of 1-gallon trees occurred in February 2013 (See highlighted planting areas in Appendix C). Exotic Invasive treatments occurred in March and September of 2013. A summary of treatments are provided below.

Remedial Planting:

February 2013: 450 - 1 gallon trees (green ash, river birch and black gum) unknown quantity of each. (Replanted areas highlighted in Appendix C)

Exotic Invasive Treatments:

Early March – Chinese privet, tree of heaven, multiflora rose, princess tree (treatment throughout easement)

Early September 2013 – Chinese privet, tree of heaven, multiflora rose, princess tree (treatment throughout easement)

Late September 2013 – Kudzu (see Appendix C for specific treatment areas)

2.2 Stream Assessment

Monitoring protocol follows that outlined within the EEP Site Specific Mitigation Plan and detailed in the U.S. Army Corps of Engineers (USACE) Stream Mitigation Guidelines for Monitoring Level I. Specifically, stream monitoring included measurements of stream dimension, profile, pattern, bed materials, photo documentation, and stream bankfull return interval.

Streambanks remain intact and stable and fully vegetated throughout the site. Vegetation remains in many riffles on the main channel, however the extent of vegetation in the bed of the channel has diminished with increased shading from more mature bank vegetation.

2.2.1 Hydrology

The site has been subjected to at least three greater-than-bankfull events and several bankfull or near-bankfull events. In August of 2008, Tropical Storm Fay crossed central North Carolina resulting in eight (8) inches of rainfall on-site and water elevations 2.5 feet above bankfull on Buckhorn Creek. Approximately seventy percent (70%) of the project was complete at that time and subjected to this estimated fifty-year storm event. In October of 2008, locally heavy rainfall produced a bankfull event at the Site during the final stages of construction. In June of 2009, heavy rainfall resulted in water elevations 0.2 to 0.3 feet above bankfull. Heavy rainfall associated with remnants of Hurricane Ida produced one additional event in November of 2009, after Year 1 monitoring was completed which again resulted in an elevated flow event. In late September of 2010, Tropical Storm Nicole moved north across central and eastern North Carolina and produced approximately 4.5 inches of rain over 48 hours resulting in flood waters which crested 0.4 feet above bankfull. During Year 3, at least one rainfall event occurred resulting in water which crested 0.1 feet above bankfull. There was no evidence of a greater than bankfull event during Year 4 monitoring. During Year 5 Monitoring there was evidence of at least one greater-than-bankfull event resulting in water which crested over four (4) feet above bankfull.

Table VI Verification of Bankfull Events – Lick Creek Stream Restoration Site (D04013-1)

Date of Data Collection	Date of Occurrence of Bankfull Event	Height above Bankfull (ft)	Method of Data Collection
9/3/08	8/27/08	2.5	Debris Evidence
8/13/09	June 2009	0.2	Crest Gauge
10/11/10	September 2010	0.4	Crest Gauge
9/26/11	2011	0.1	Crest Gauge
9/17/12	2012	-0.4	Crest Gauge
9/24/13	2013	>4	Debris Evidence

2.2.2 Geomorphology

Following the procedures established in the USDA Forest Service Manual (Harrelson et al 1994) and the methodologies utilized in the Rosgen stream assessment and classification system (Rosgen 1994, 1996), data collected consisted of detailed dimension and pattern measurements, longitudinal profiles, and bed materials sampling.

Re-survey of the permanent cross sections and profile reaches have shown minimal alterations in local bed elevations with the bed form and the channel pattern remaining consistent with the As-built condition. Overall, Buckhorn Creek, Middle Branch, Lower East Branch, Southeast Creek and Southwest Creek all showed little adjustment from the Year 4 condition. Location of bed features relative to the pattern is consistent with the As-built survey.

Pebble counts were conducted at each riffle cross-section, as well as across the overall study reaches. Pebble count data was plotted by size distribution in order to assess the D_{50} and D_{84} size class. Pebble count data from Reach 2 and Reach 7 remained relatively the same compared to Year 4. This is likely due to vegetation growth in the channel holding sediment in place. Pebble

count data from all other reaches showed an increase in both the D_{50} and the D_{84} values. This may be due in part to significant bankfull event that occurred earlier in the year that moved much of the smaller sediment through the system.

Table VII. BEHI and Sediment Export Estimates

Exhibit Table VI. BEHI and Sediment Export Estimates Morgan Creek Stream Restoration															
Time Point	Segment/ Reach	Linear Footage	Extreme		Very High		High		Moderate		Low		Very Low		Sediment Export
			ft	%	ft	%	ft	%	ft	%	ft	%	ft	%	tons/yr
YEAR 5	Buckhorn R1	4280							180	4	4100	96			14.3
	Buckhorn R2	1500									1000	100			3.5
	Buckhorn R3	3070							400	13	2670	87			21.7
	Middle Br	1796									1796	100			2.2
	Lower East Br	1073									1073	100			1.3
	Southeast Br	363									363	100			0.4
	Southwest B	723									723	100			0.9
Project Total		12805													44.3

2 .2.3 Problem Areas

In Year 5 Monitoring of the Holly Grove Stream Restoration Site, some minor issues remain that were identified during Year 4.

1.) Several riffles on Buckhorn Creek and Southeast Branch still exhibit excessive vegetation in the channel bed.
2.) There was one (1) location of moderate piping at a log vane.
3.) There were two (2) areas of local bank scour that appear to be stable.

None of the problem areas are cause for concern regarding performance of the stream or future stability.

2.2.4 Photo Reference Stations

Photograph reference Stations (PRSs) have been established to assist in characterizing the site and to allow qualitative evaluation of the site conditions. The location of each photo station has been permanently marked in the field and the bearing/orientation of the photograph is indicated on the As-built plans to allow for consistent repetition. A total of twenty-eight (28) PRSs have been established along the restored stream (Appendix B). Sixteen (16) of these PRSs have been located upstream of the permanent monitoring cross sections. These photographs are taken facing downstream looking at the section, and show as much of the banks and channel as possible

2.2.5 Stability Assessment Table

Table VIII. Categorical Stream Feature Visual Stability Assessment

Feature	Performance Percentage Buckhorn Creek (8,848 ft)					
	Initial	MY-01	MY-02	MY-03	MY-04	MY-05
Riffles	100%	100%	100%	100%	100%	100%
Pools	100%	100%	100%	100%	100%	100%
Thalweg	100%	100%	100%	100%	100%	100%
Meanders	100%	100%	100%	100%	100%	100%
Bed General	100%	100%	100%	100%	100%	100%
Vanes / J Hooks etc.	100%	99%	100%	100%	100%	100%
Wads and Boulders	100%	100%	100%	100%	100%	100%

Feature	Performance Percentage Middle Branch (1,755 ft)					
	Initial	MY-01	MY-02	MY-03	MY-04	MY-05
Riffles	100%	97%	99%	100%	100%	100%
Pools	100%	100%	100%	100%	100%	100%
Thalweg	100%	100%	100%	100%	100%	100%
Meanders	100%	100%	99%	100%	100%	100%
Bed General	100%	100%	100%	100%	100%	100%
Vanes / J Hooks etc.	100%	98%	99%	100%	100%	100%
Wads and Boulders	100%	83%	83%	100%	100%	100%

Feature	Performance Percentage East Branch (1,090 ft)					
	Initial	MY-01	MY-02	MY-03	MY-04	MY-05
Riffles	100%	100%	99%	99%	99%	99%
Pools	100%	100%	100%	100%	100%	100%
Thalweg	100%	100%	100%	100%	100%	100%
Meanders	100%	100%	100%	100%	100%	100%
Bed General	100%	100%	100%	100%	100%	100%
Vanes / J Hooks etc.	100%	100%	99%	99%	99%	99%
Wads and Boulders	100%	100%	100%	100%	100%	100%

Feature	Performance Percentage Southeast Creek (363 ft)					
	Initial	MY-01	MY-02	MY-03	MY-04	MY-05
Riffles	100%	96%	100%	100%	100%	100%
Pools	100%	100%	100%	100%	100%	100%
Thalweg	100%	100%	100%	100%	100%	100%
Meanders	100%	100%	100%	100%	100%	100%
Bed General	100%	100%	100%	100%	100%	100%
Vanes / J Hooks etc.	100%	100%	100%	100%	100%	100%
Wads and Boulders	100%	100%	100%	100%	100%	100%

Feature	Performance Percentage Southwest Creek (723 ft)					
	Initial	MY-01	MY-02	MY-03	MY-04	MY-05
Riffles	100%	100%	100%	100%	100%	100%
Pools	100%	100%	100%	100%	100%	100%
Thalweg	100%	100%	100%	100%	100%	100%
Meanders	100%	100%	100%	100%	100%	100%
Bed General	100%	100%	100%	100%	100%	100%
Vanes / J Hooks etc.	100%	100%	100%	100%	100%	100%
Wads and Boulders	100%	100%	100%	100%	100%	100%

Table IX-a Baseline Stream Data Summary

Holly Grove Restoration Site - Buckhorn Creek (8848 ft)

Parameter	Gauge	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			As-Built / Baseline					
Simension and Substrate - Riffle		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Med	Max	Min	Mean	Med	Max	SD	n
Bankfull Width (ft)					24			26					20.1				22	23	25	23.4		23.4	25.4		
Floodprone Width (ft)					32			32					63				30	52.5	75	50		50	70		
Bankfull Mean Depth (ft)					1.6			2.3					1.73				1.69	1.78	1.91	1.3		1.5	1.9		
[1]Bankfull Max Depth (ft)					2.3			3					2				2.3	2.4	2.6	1.9		2.1	2.6		
Bankfull Cross-Sectional Area (ft2)					42			55					34.8				37	40.9	48	30.3		34.3	48.3		
Width/Depth Ratio					10			16					12					13		13.4		16	18.1		
Entrenchment Ratio					1.2			1.3			2.7		2.9	3.1			1.4	2.28	3			2.5			
[1]Bank Height Ratio					2			2.3					1.2					1							
d50 (mm)					14			14					28												
Profile																									
Riffle Length (ft)																	23	40	64	38		58	74		
Riffle Slope (ft/ft)					0.006		0.007	0.008					0.013				0.004	0.005	0.006	0.0026		0.0069	0.017		
Pool Length (ft)																	21	25	54	55		67	87		
Pool Max Depth (ft)					2.8		3.35	3.9					2.6				3.4	3.6	3.8	1.08		2.89	3.51		
Pool Spacing (ft)					60		110	160			71		102.5	134			88	119	150	56		119	136		
[2]Pool Volume (ft3)																									
Pattern																									
Channel Beltwidth (ft)					40		80	120			33		36.5	40			33	54	75	183		217	250		
Radius of Curvature (ft)					50		145	240			47		182.5	318			44	59.5	75	41		87	167		
Radius of Curvature Ratio (ft/ft)					1.9		5.95	10			2.3		9.15	16			2	2.5	3	1.7		3.72	7		
Meander Wavelength (ft)					110		225	340			37		104.5	172			44	134.5	225	140		221	380		
Meander Width Ratio (ft/ft)					1.7		3.15	4.6			1.6		1.8	2			1.5	2.25	3	7.82		9.27	10.7		
Substrate, bed and transport parameters																									
[4]Ri% / Ru% / P% / G% / S%																				35	18	29		17	
[4]SC% / Sa% / G% / C% / B% / Be%																									
[4]d16 / d35 / d50 / d84 / d95 / dip / disp (mm)																									
Reach Shear Stress (competency) lb/ft2																		0.66							
Max part size (mm) mobilized at bankfull																		144							
Stream Power (transport capacity) W/m2																									
Additional Reach Parameters																									
Drainage Area (sq mi)					3.76						2.2														
Impervious cover estimate (%)																									
Rosgen Classification					F4 & G4						B4c							B4c				B4c			
Bankfull Velocity (fps)					3.3													4.5							
Bankfull discharge (cfs)					186																				
Valley length (ft)																									
Channel Thalweg length (ft)					8756													8777				8848			
Sinuosity (ft)					1.17						1.05							1.2				1.17			
Water Surface Slope (channel) (ft/ft)					0.0054						0.0079							0.005		0.0042			0.0051		
BF slope (ft/ft)					0.005						0.006							0.006				0.0047			
[5]Bankfull Floodplain Area (acres)																									
[6]Proportion Overwide (%)																									
[7]Entrenchment Class (ER Range)																									
[8]Incision Class (BHR Ranch)																									
BEHI VL% / L% / M% / H% / VH% / E%																									
Channel Stability or Habitat Metric																									
Biological or Other																									

Table IX-b Baseline Stream Data Summary

Holly Grove Restoration Site - West Branch (391 ft)

Parameter	Gauge	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			As-Built / Baseline					
Simension and Substrate - Riffle		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Med	Max	Min	Mean	Med	Max	SD	n
Bankfull Width (ft)							6.3						20.1					9		9		10.5	12		
Floodprone Width (ft)							7.5						63				12	19.5	27						
Bankfull Mean Depth (ft)							0.9						1.73					0.7							
[1]Bankfull Max Depth (ft)							1.2						2					0.95							
Bankfull Cross-Sectional Area (ft2)							5.5						34.8					6.3							
Width/Depth Ratio							7						12					13							
Entrenchment Ratio							1.2				2.7		2.9	3.1			1.4	1.7	3						
[1]Bank Height Ratio							1.7						1.2					1							
d50 (mm)							28						28												
Profile																									
Riffle Length (ft)																	13	16	19						
Riffle Slope (ft/ft)							0.02						0.013					0.013							
Pool Length (ft)																	7	14	20						
Pool Max Depth (ft)							1.4						2.6					1.4							
Pool Spacing (ft)					30		65	100			33		36.5	40			36	45	54	40		46	52		
[2]Pool Volume (ft3)																									
Pattern																									
Channel Beltwidth (ft)					40		50	60			33		36.5	40			13	20	27			80			
Radius of Curvature (ft)					45		97.5	150			47		182.5	318			18	22.5	27	23		41.5	60		
Radius of Curvature Ratio (ft/ft)					7		15	23			2.3		9.15	16			2	2.5	3	2.3		4.2	6		
Meander Wavelength (ft)					55		77.5	100			37		104.5	172			18	49.5	81			89			
Meander Width Ratio (ft/ft)					6		8	10			1.6		1.8	2			1.5	2.25	3						
Substrate, bed and transport parameters																									
[4]Ri% / Ru% / P% / G% / S%																									
[4]SC% / Sa% / G% / C% / B% / Be%																									
[4]d16 / d35 / d50 / d84 / d95 / dip / disp (mm)																									
Reach Shear Stress (competency) lb/ft2																		0.53							
Max part size (mm) mobilized at bankfull																		96							
Stream Power (transport capacity) W/m2																									
Additional Reach Parameters																									
Drainage Area (sq mi)							0.2						2.2												
Impervious cover estimate (%)																									
Rosgen Classification							G4						B4c					B4c				B4c			
Bankfull Velocity (fps)							3.9											4.5							
Bankfull discharge (cfs)							28																		
Valley length (ft)																									
Channel Thalweg length (ft)							400											386				391			
Sinuosity (ft)							1.06						1.05					1.2				1.17			
Water Surface Slope (channel) (ft/ft)							0.014						0.0079					0.013							
BF slope (ft/ft)							0.015						-					0.015							
[5]Bankfull Floodplain Area (acres)																									
[6]Proportion Overwide (%)																									
[7]Entrenchment Class (ER Range)																									
[8]Incision Class (BHR Ranch)																									
BEHI VL% / L% / M% / H% / VH% / E%																									
Channel Stability or Habitat Metric																									
Biological or Other																									

Table IX-c Baseline Stream Data Summary

Holly Grove Restoration Site - Middle Branch (1796 ft)

Parameter	Gauge	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			As-Built / Baseline					
Simension and Substrate - Riffle		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Med	Max	Min	Mean	Med	Max	SD	n
Bankfull Width (ft)							6.3						20.1					9		6.2			7.2		
Floodprone Width (ft)							7.5						63				12	19.5	27	55			80		
Bankfull Mean Depth (ft)							0.9						1.73					0.7		0.6			0.7		
[1]Bankfull Max Depth (ft)							1.2						2					0.95		1			1.1		
Bankfull Cross-Sectional Area (ft2)							5.5						34.8					6.3		3.7			5.2		
Width/Depth Ratio							7						12					13		10			10.4		
Entrenchment Ratio							1.2				2.7		2.9	3.1			1.4	1.7	3	7.6			13		
[1]Bank Height Ratio							1.7						1.2					1							
d50 (mm)							28						28												
Profile																									
Riffle Length (ft)																	10	15	32	17			38		
Riffle Slope (ft/ft)							0.02						0.013					0.013		0.0148			0.0184		
Pool Length (ft)																	6	13	16	17			29		
Pool Max Depth (ft)							1.4						2.6					1.4		0.9			1.32		
Pool Spacing (ft)					30		65	100			33		36.5	40			36	45	54	44			75		
[2]Pool Volume (ft3)																									
Pattern																									
Channel Beltwidth (ft)					40		50	60			33		36.5	40			13	20	27	30			88		
Radius of Curvature (ft)					45		97.5	150			47		182.5	318			18	22.5	27	16			130		
Radius of Curvature Ratio (ft/ft)					7		15	23			2.3		9.15	16			2	2.5	3	2.4			19.4		
Meander Wavelength (ft)					55		77.5	100			37		104.5	172			18	49.5	81	60			105		
Meander Width Ratio (ft/ft)					6		8	10			1.6		1.8	2			1.5	2.25	3	3			8.8		
Substrate, bed and transport parameters																									
[4]Ri% / Ru% / P% / G% / S%																				34	25		29	12	
[4]SC% / Sa% / G% / C% / B% / Be%																									
[4]d16 / d35 / d50 / d84 / d95 / dip / disp (mm)																									
Reach Shear Stress (competency) lb/ft2																		0.58							
Max part size (mm) mobilized at bankfull																		115							
Stream Power (transport capacity) W/m2																									
Additional Reach Parameters																									
Drainage Area (sq mi)							0.2						2.2												
Impervious cover estimate (%)																									
Rosgen Classification							G4						B4c					B4c				B4c			
Bankfull Velocity (fps)							3.9											4.5							
Bankfull discharge (cfs)							28																		
Valley length (ft)																									
Channel Thalweg length (ft)							1778											1790				1796			
Sinuosity (ft)							1.06						1.05					1.2				1.07			
Water Surface Slope (channel) (ft/ft)							0.014						0.0079					0.013		0.0164			0.0187		
BF slope (ft/ft)							0.015						-					0.015		0.016			0.019		
[5]Bankfull Floodplain Area (acres)																									
[6]Proportion Overwide (%)																									
[7]Entrenchment Class (ER Range)																									
[8]Incision Class (BHR Ranch)																									
BEHI VL% / L% / M% / H% / VH% / E%																									
Channel Stability or Habitat Metric																									
Biological or Other																									

Table IX-d Baseline Stream Data Summary

Holly Grove Restoration Site - East Branch (1073 ft)

Parameter	Gauge	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			As-Built / Baseline					
Simension and Substrate - Riffle		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Med	Max	Min	Mean	Med	Max	SD	n
Bankfull Width (ft)							6.3						20.1					9				8.6			
Floodprone Width (ft)							7.5						63				12	19.5	27			18			
Bankfull Mean Depth (ft)							0.9						1.73					0.7				0.8			
[1]Bankfull Max Depth (ft)							1.2						2					0.95				1			
Bankfull Cross-Sectional Area (ft2)							5.5						34.8					6.3				6.5			
Width/Depth Ratio							7						12					13				11.4			
Entrenchment Ratio							1.2				2.7		2.9	3.1			1.4	1.7	3			2.1			
[1]Bank Height Ratio							1.7						1.2					1							
d50 (mm)							28						28												
Profile																									
Riffle Length (ft)																	12	17	21	22		23	26		
Riffle Slope (ft/ft)							0.02						0.013					0.013		0.0071		0.0104	0.0132		
Pool Length (ft)																	12	15	18	13		14	17		
Pool Max Depth (ft)							1.4						2.6					1.4		0.5		0.8	0.9		
Pool Spacing (ft)					30		65	100			33		36.5	40			36	45	54	34		35	44		
[2]Pool Volume (ft3)																									
Pattern																									
Channel Beltwidth (ft)					40		50	60			33		36.5	40			13	20	27	28		36	45		
Radius of Curvature (ft)					45		97.5	150			47		182.5	318			18	22.5	27	33		44	60		
Radius of Curvature Ratio (ft/ft)					7		15	23			2.3		9.15	16			2	2.5	3	3.8		5.1	7		
Meander Wavelength (ft)					55		77.5	100			37		104.5	172			18	49.5	81	76		81	91		
Meander Width Ratio (ft/ft)					6		8	10			1.6		1.8	2			1.5	2.25	3	3.25		9.4	5.25		
Substrate, bed and transport parameters																									
[4]Ri% / Ru% / P% / G% / S%																				41	16	24		19	
[4]SC% / Sa% / G% / C% / B% / Be%																									
[4]d16 / d35 / d50 / d84 / d95 / dip / disp (mm)																									
Reach Shear Stress (competency) lb/ft2																		0.54							
Max part size (mm) mobilized at bankfull																		102							
Stream Power (transport capacity) W/m2																									
Additional Reach Parameters																									
Drainage Area (sq mi)							0.2						2.2												
Impervious cover estimate (%)																									
Rosgen Classification							G4						B4c					B4c				B4c			
Bankfull Velocity (fps)							3.9											4.5							
Bankfull discharge (cfs)							28																		
Valley length (ft)																									
Channel Thalweg length (ft)							1039											1058				1073			
Sinuosity (ft)							1.06						1.05					1.2				1.04			
Water Surface Slope (channel) (ft/ft)							0.014						0.0079					0.013				0.011			
BF slope (ft/ft)							0.015						-					0.015				0.011			
[5]Bankfull Floodplain Area (acres)																									
[6]Proportion Overwide (%)																									
[7]Entrenchment Class (ER Range)																									
[8]Incision Class (BHR Ranch)																									
BEHI VL% / L% / M% / H% / VH% / E%																									
Channel Stability or Habitat Metric																									
Biological or Other																									

Table IX-e Baseline Stream Data Summary

Holly Grove Restoration Site - Southeast Creek (363 ft)

Parameter	Gauge	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			As-Built / Baseline					
Simension and Substrate - Riffle		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Med	Max	Min	Mean	Med	Max	SD	n
Bankfull Width (ft)							6.3						20.1					7.5				8			
Floodprone Width (ft)							7.5						63				10	16.5	23			25			
Bankfull Mean Depth (ft)							0.9						1.73					0.6				0.5			
[1]Bankfull Max Depth (ft)							1.2						2					0.75				0.8			
Bankfull Cross-Sectional Area (ft2)							5.5						34.8					4.2				4.3			
Width/Depth Ratio							7						12					13				15			
Entrenchment Ratio							1.2				2.7		2.9	3.1			1.4	2.2	3			3.1			
[1]Bank Height Ratio							1.7						1.2					1							
d50 (mm)							28						28												
Profile																									
Riffle Length (ft)																	10	12	19	14		15	18		
Riffle Slope (ft/ft)							0.02						0.013					0.016				0.0067			
Pool Length (ft)																	10	13	20	18		19	21		
Pool Max Depth (ft)							1.4						2.6					1.1		0.49		0.52	1.4		
Pool Spacing (ft)					30		65	100			33		36.5	40			30	37.5	45	20		22	40		
[2]Pool Volume (ft3)																									
Pattern																									
Channel Beltwidth (ft)					40		50	60			33		36.5	40			11	17	23	27		30.5	34		
Radius of Curvature (ft)					45		97.5	150			47		182.5	318			15	19	23	40		64	88		
Radius of Curvature Ratio (ft/ft)					7		15	23			2.3		9.15	16			2	2.5	3	5		8	11		
Meander Wavelength (ft)					55		77.5	100			37		104.5	172			15	41.5	68	81		86	91		
Meander Width Ratio (ft/ft)					6		8	10			1.6		1.8	2			1.5	2.25	3	3.4		38.5	4.3		
Substrate, bed and transport parameters																									
[4]Ri% / Ru% / P% / G% / S%																				40	15	30		15	
[4]SC% / Sa% / G% / C% / B% / Be%																									
[4]d16 / d35 / d50 / d84 / d95 / dip / disp (mm)																									
Reach Shear Stress (competency) lb/ft2																		0.53							
Max part size (mm) mobilized at bankfull																		96							
Stream Power (transport capacity) W/m2																									
Additional Reach Parameters																									
Drainage Area (sq mi)							0.2						2.2												
Impervious cover estimate (%)																									
Rosgen Classification							G4						B4c					B4c				B4c			
Bankfull Velocity (fps)							3.9											4.5							
Bankfull discharge (cfs)							28																		
Valley length (ft)																									
Channel Thalweg length (ft)							342											359				363			
Sinuosity (ft)							1.06						1.05					1.2				1.05			
Water Surface Slope (channel) (ft/ft)							0.014						0.0079					0.016				0.0106			
BF slope (ft/ft)							0.015						-					0.019				0.0106			
[5]Bankfull Floodplain Area (acres)																									
[6]Proportion Overwide (%)																									
[7]Entrenchment Class (ER Range)																									
[8]Incision Class (BHR Ranch)																									
BEHI VL% / L% / M% / H% / VH% / E%																									
Channel Stability or Habitat Metric																									
Biological or Other																									

Table IX-f Baseline Stream Data Summary

Holly Grove Restoration Site - Southwest Creek (723 ft)

Parameter	Gauge	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			As-Built / Baseline					
Simension and Substrate - Riffle		LL	UL	Eq.	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Med	Max	Min	Mean	Med	Max	SD	n
Bankfull Width (ft)							6.3						20.1					8				8			
Floodprone Width (ft)							7.5						63				11	17.5	24			15.6			
Bankfull Mean Depth (ft)							0.9						1.73					0.6				0.4			
[1]Bankfull Max Depth (ft)							1.2						2					0.85				0.7			
Bankfull Cross-Sectional Area (ft2)							5.5						34.8					4.9				3.4			
Width/Depth Ratio							7						12					13				18.6			
Entrenchment Ratio							1.2				2.7		2.9	3.1			1.4	2.2	3			1.95			
[1]Bank Height Ratio							1.7						1.2					1							
d50 (mm)							28						28												
Profile																									
Riffle Length (ft)																	10	14	19	9		11	18		
Riffle Slope (ft/ft)							0.02						0.013					0.007		0.0012		0.0018	0.032		
Pool Length (ft)																	6	10	13	5		8	12		
Pool Max Depth (ft)							1.4						2.6					1.3		1.15		1.45	1.65		
Pool Spacing (ft)					30		65	100			33		36.5	40			32	40	48	19		25	32		
[2]Pool Volume (ft3)																									
Pattern																									
Channel Beltwidth (ft)					40		50	60			33		36.5	40			12	18	24	50		55	60		
Radius of Curvature (ft)					45		97.5	150			47		182.5	318			16	20	24	20		28.5	37		
Radius of Curvature Ratio (ft/ft)					7		15	23			2.3		9.15	16			2	2.5	3	2.5		3.55	4.6		
Meander Wavelength (ft)					55		77.5	100			37		104.5	172			16	44	72	60		93	126		
Meander Width Ratio (ft/ft)					6		8	10			1.6		1.8	2			1.5	2.25	3	6.25		6.88	7.5		
Substrate, bed and transport parameters																									
[4]Ri% / Ru% / P% / G% / S%																				33	19	30		18	
[4]SC% / Sa% / G% / C% / B% / Be%																									
[4]d16 / d35 / d50 / d84 / d95 / dip / disp (mm)																									
Reach Shear Stress (competency) lb/ft2																		0.25							
Max part size (mm) mobilized at bankfull																		50							
Stream Power (transport capacity) W/m2																									
Additional Reach Parameters																									
Drainage Area (sq mi)							0.2						2.2												
Impervious cover estimate (%)																									
Rosgen Classification							G4						B4c					B4c				B4c			
Bankfull Velocity (fps)							3.9											4.5							
Bankfull discharge (cfs)							28																		
Valley length (ft)																									
Channel Thalweg length (ft)																						723			
Sinuosity (ft)							1.06						1.05					1.2				1.17			
Water Surface Slope (channel) (ft/ft)							0.014						0.0079					0.007				0.0122			
BF slope (ft/ft)							0.015						-					0.008				0.0122			
[5]Bankfull Floodplain Area (acres)																									
[6]Proportion Overwide (%)																									
[7]Entrenchment Class (ER Range)																									
[8]Incision Class (BHR Ranch)																									
BEHI VL% / L% / M% / H% / VH% / E%																									
Channel Stability or Habitat Metric																									
Biological or Other																									

Table X-a Morphology and Hydraulic Monitoring Summary
Holly Grove Stream Restoration Site (D06028-B)
Reach 1: Buckhorn Creek

Parameter	Cross Section 1 Riffle						Cross Section 2 Pool						Cross Section					
Dimension	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
Bkf Width (ft)	20	23.7	23.7	23.3	22.7		22	23.4	23.5	23.5	22.1							
Floodprone Width (ft)	70	82	82	82	82		-	-	-	-	-							
Bkf Cross Sectional Area (ft^2)	35.4	35.3	31.3	32.8	32.3		48	46.8	48.4	47.2	45.4							
Bkf Mean Depth (ft)	1.5	1.5	1.3	1.4	1.4		2.2	2	2.1	2	2.1							
Bkf Max Depth (ft)	2.1	2.6	2.3	2.4	2.4		3.9	4.2	4.3	4.2	4.1							
Width/Depth Ratio	15.3	15.9	18	16.6	15.9		-	-	-	-	-							
Entrenchment Ratio	>3	>3	>3	>3	>3		-	-	-	-	-							
Bank Height Ratio	1	1	1	1	1		-	-	-	-	-							
Wetted Perimeter (ft)																		
Hydraulic Radius (ft)																		
Substrate																		
D_{50} (mm)	26.5	4.7	36.6	38.7	51.9													
D_{84} (mm)	64	55	77	98	104													

Parameter	MY-1 (2006)			MY-2 (2007)			MY-3 (2008)			MY-4 (2009)			MY-5 (2010)			MY+ (2011)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Beltwidth (ft)	40	115	65	40	115	65	40	115	65	40	115	65	40	115	65			
Radius of Curvature (ft)	29	371	105	29	371	105	29	371	105	29	371	105	29	371	105			
Meander Wavelength (ft)	125	320	180	125	320	180	125	320	180	125	320	180	125	320	180			
Meander Width Ratio	2	5.75	3.25	2	5.75	3.25	2	5.75	3.25	2	5.75	3.25	2	5.75	3.25			
Profile																		
Riffle Length (ft)	28	81	47	20.5	80.2	37.5	23	51	38	31.6	71.3	47.8	30.1	58	45.2			
Riffle Slope (ft/ft)	0.0024	0.0126	0.0094	0	0.0212	0.0071	0.0004	0.0138	0.0042	0.003	0.0241	0.0113	0.0016	0.016	0.0019			
Pool length (ft)	24.4	38	29.5	-	-	-	-	-	-	-	-	-	-	-	-			
Pool Spacing (ft)	37	130	82	59.5	164	93	20	123.8	85.8	74.2	119.5	86.1	78.2	120.9	90.6			
Additional Reach Parameters																		
Valley Length (ft)	-	-	967	-	-	967	-	-	967	-	-	967	-	-	967			
Channel Length (ft)	-	-	1085	-	-	1085	-	-	1085	-	-	1085	-	-	1085			
Sinuosity	-	-	1.1	-	-	1.1	-	-	1.1	-	-	1.1	-	-	1.1			
Water Surface Slope (ft/ft)	0.0024	0.0126	0.0094	0.0039	0.0081	-	0.0036	0.0042	-	-	-	-	-	-	-			
Bkf Slope (ft/ft)	-	-	0.006	-	-	0.0056	-	-	0.0047	-		0.006	-		0.006			
Rosgen Classification	-	-	B4c	-	-	B4c	-	-	B4c	-	-	B4c	-	-	B4c			
Habitat Index																		
Macrobenthos																		

Table X-b Morphology and Hydraulic Monitoring Summary
Holly Grove Stream Restoration Site (D06028-B)
Reach 2: Buckhorn Creek

Parameter	Cross Section 3 Riffle						Cross Section 4 Pool						Cross Section					
Dimension	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
Bkf Width (ft)	20.4	20.2	19.7	20	18.5		22.2	22	22.8	20.6	20.1							
Floodprone Width (ft)	34	34	34	34	34		-	-		-	-							
Bkf Cross Sectional Area (ft^2)	25.4	27.6	21.1	22.7	21.7		45.1	49.1	47.6	43.2	42.2							
Bkf Mean Depth (ft)	1.2	1.4	1.1	1.1	1.2		2	2.2	2.1	2.1	2.1							
Bkf Max Depth (ft)	1.7	1.9	1.6	1.9	1.6		3	3.1	2.9	2.8	2.7							
Width/Depth Ratio	16.4	14.8	18.4	17.6	15.7		-	-	-	-	-							
Entrenchment Ratio	1.6	1.6	1.7	1.7	1.8		-	-	-	-	-							
Bank Height Ratio	1	1	1	1	1		-	-	-	-	-							
Wetted Perimeter (ft)																		
Hydraulic Radius (ft)																		
Substrate																		
D_{50} (mm)	67.2	32	22	59.6	49.6													
D_{84} (mm)	184	116	140	131	131													

Parameter	MY-1 (2006)			MY-2 (2007)			MY-3 (2008)			MY-4 (2009)			MY-5 (2010)			MY+ (2011)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Beltwidth (ft)	55	162	60	55	162	60	55	162	60	55	162	60	55	162	60			
Radius of Curvature (ft)	61	245	130	61	245	130	61	245	130	61	245	130	61	245	130			
Meander Wavelength (ft)	182	225	195	182	225	195	182	225	195	182	225	195	182	225	195			
Meander Width Ratio	2.5	7.5	2.8	2.5	7.5	2.8	2.5	7.5	2.8	2.5	7.5	2.8	2.5	7.5	2.8			
Profile																		
Riffle Length (ft)	25	87	34	39	90	50.3	28	90	50.3	13.1	52.6	30.9	26.8	49.5	33.7			
Riffle Slope (ft)	0.0012	0.0228	0.0099	0.0023	0.0172	0.0083	0.0023	0.0172	0.0083	0.0052	0.0325	0.0177	0.0001	0.0206	0.0101			
Pool length (ft)	16.2	36.8	31.8	-	-	-	-	-	-	-	-	-	-	-	-			
Pool Spacing (ft)	26	151	56	39	159	68	39	159	68	28.7	144.7	54.8	45	142.1	75.4			
Additional Reach Parameters																		
Valley Length (ft)	-	-	882	-	-	882	-	-	882	-	-	882	-	-	882			
Channel Length (ft)	-	-	968	-	-	968	-	-	968	-	-	968	-	-	968			
Sinuosity	-	-	1.18	-	-	1.18	-	-	1.18	-	-	1.18	-	-	1.18			
Water Surface Slope (ft/ft)	0.0012	0.0228	0.0099	0.0015	0.0046	0.0069	0.0046	0.0069	-	-	-	-	-	-	-			
Bkf Slope (ft/ft)	-	-	0.0057	-	-	0.0055	-	-	0.0062	-	-	0.007	-	-	0.007			
Rosgen Classification	-	-	B4c	-	-	B4c	-	-	B4c	-	-	B4c	-	-	B4c			
Habitat Index																		
Macrobenthos																		

Table X-c Morphology and Hydraulic Monitoring Summary
Holly Grove Stream Restoration Site (D06028-B)
Reach 3: Buckhorn Creek

Parameter	Cross Section 5 Riffle						Cross Section 6 Pool						Cross Section					
Dimension	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
Bkf Width (ft)	25.5	27.5	26.8	24.6	27.1		22.5	22.8	22.9	29.9	26.7							
Floodprone Width (ft)	65	65	65	65	65		-	-	-	-	-							
Bkf Cross Sectional Area (ft^2)	48	47.7	45.2	39	43.5		62.8	66.2	66.2	64.9	67.2							
Bkf Mean Depth (ft)	1.9	1.7	1.7	1.6	1.6		2.8	2.9	2.9	2.2	2.5							
Bkf Max Depth (ft)	2.6	2.8	2.7	2.5	2.6		4.7	4.9	4.8	4.8	5.1							
Width/Depth Ratio	13.5	15.9	15.9	15.5	16.9		-	-	-	-	-							
Entrenchment Ratio	2.5	2.5	2.4	2.6	2.4		-	-	-	-	-							
Bank Height Ratio	1	1	1	1	1		-	-	-	-	-							
Wetted Perimeter (ft)																		
Hydraulic Radius (ft)																		
Substrate																		
D_{50} (mm)	60.6	15.4	17.3	1.7	56.9													
D_{84} (mm)	118	109	127	83	141													

Parameter	MY-1 (2006)			MY-2 (2007)			MY-3 (2008)			MY-4 (2009)			MY-5 (2010)			MY+ (2011)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Beltwidth (ft)	45	87	50	45	87	50	45	87	50	45	87	50	45	87	50			
Radius of Curvature (ft)	177	284	222	177	284	222	177	284	222	177	284	222	177	284	222			
Meander Wavelength (ft)	243	288	274	243	288	274	243	288	274	243	288	274	243	288	274			
Meander Width Ratio	1.8	3.4	2	1.8	3.4	2	1.8	3.4	2	1.8	3.4	2	1.8	3.4	2			
Profile																		
Riffle Length (ft)	17	103	49	18	85	51.6	4	72	35	4.25	75.95	33.4	5.52	58.1	26.7			
Riffle Slope (ft)	0.0032	0.014	0.007	0.0029	0.0217	0.0076	0.0025	0.0148	0.0082	0.0051	0.0196	0.0103	0.0042	0.0163	0.0078			
Pool length (ft)	19.9	49.6	24.7	-	-	-	-	-	-	-	-	-	-	-	-			
Pool Spacing (ft)	31	167	75	19.5	164	78	31	112	64.9	33.2	157	63.6	33.69	105.9	52			
Additional Reach Parameters																		
Valley Length (ft)	-	-	1009	-	-	1009	-	-	1009	-	-	1009	-	-	1009			
Channel Length (ft)	-	-	1040	-	-	1040	-	-	1040	-	-	1040	-	-	1040			
Sinuosity	-	-	1.03	-	-	1.03	-	-	1.03	-	-	1.03	-	-	1.03			
Water Surface Slope (ft/ft)	0.0032	0.014	0.0066	-	-	0.0044	0.0045	0.0045	0.0045	-	-	-	-	-	-			
Bkf Slope (ft/ft)	-	-	0.0047	-	-	0.0051	-	-	0.0047	-	-	0.0051	-	-	0.0051			
Rosgen Classification	-	-	B4c	-	-	B4c	-	-	B4c	-	-	B4c	-	-	B4c			
Habitat Index																		
Macrobenthos																		

Table X-d Morphology and Hydraulic Monitoring Summary
Holly Grove Stream Restoration Site (D06028-B)
Reach 4: Middle Branch

Parameter	Cross Section 1 Riffle						Cross Section 2 Pool						Cross Section					
Dimension	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
Bkf Width (ft)	6.4	6.9	6	6	5.7		10.5	10.7	10	7.67	7.24							
Floodprone Width (ft)	40	40	40	40	40		-	-	-	-	-							
Bkf Cross Sectional Area (ft^2)	3.5	3.8	3.7	3.7	3.5		9.4	11.1	10.4	9.7	9.2							
Bkf Mean Depth (ft)	0.6	0.5	0.6	0.6	0.6		0.9	1	1	1.3	1.3							
Bkf Max Depth (ft)	1	1	1.1	1.4	1.2		2.4	2	2.3	1.9	1.9							
Width/Depth Ratio	11.8	12.6	9.9	9.6	9.4		-	-	-	-	-							
Entrenchment Ratio	>3	>3	>3	>3	>3		-	-	-	-	-							
Bank Height Ratio	1	1	1	1	1		-	-	-	-	-							
Wetted Perimeter (ft)																		
Hydraulic Radius (ft)																		
Substrate																		
D_{50} (mm)	20.6	2.2	0.1	0.1	18.8													
D_{84} (mm)	58	53	95	48	99													

Parameter	MY-1 (2006)			MY-2 (2007)			MY-3 (2008)			MY-4 (2009)			MY-5 (2010)			MY+ (2011)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Beltwidth (ft)	14	21	18	14	21	18	14	21	18	14	21	18	14	21	18			
Radius of Curvature (ft)	25	59	40	25	59	40	25	59	40	25	59	40	25	59	40			
Meander Wavelength (ft)	66	100	88	66	100	88	66	100	88	66	100	88	66	100	88			
Meander Width Ratio	2.8	4.2	3.6	2.8	4.2	3.6	2.8	4.2	3.6	2.8	4.2	3.6	2.8	4.2	3.6			
Profile																		
Riffle Length (ft)	9	23	15.8	8.3	18.1	14.5	4	16	11.5	13.5	31	15.3	6.5	12.2	7.5			
Riffle Slope (ft/ft)	0.0155	0.0409	0.0271	0	0.0348	0.0348	0.0100	0.0481	0.0131	0.0007	0.0234	0.0149	0.0031	0.0646	0.0338			
Pool length (ft)	5	11.9	8.7	-	-	-	-	-	-	-	-	-	-	-	-			
Pool Spacing (ft)	20	41	23	12	52	35	10	41.9	21.5	13	50.7	28.1	15.7	37.3	24.4			
Additional Reach Parameters																		
Valley Length (ft)	-	-	220	-	-	220	-	-	220	-	-	220	-	-	220			
Channel Length (ft)	-	-	236	-	-	236	-	-	236	-	-	236	-	-	236			
Sinuosity	-	-	1.1	-	-	1.07	-	-	1.07	-	-	1.07	-	-	1.07			
Water Surface Slope (ft/ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Bkf Slope (ft/ft)	-	-	0.0205	-	-	0.0197	-	-	0.0209	-	-	0.022	-	-	0.022			
Rosgen Classification	-	-	B4c	-	-	B4c	-	-	B4c	-	-	B4c	-	-	B4c			
Habitat Index																		
Macrobenthos																		

Table X-e Morphology and Hydraulic Monitoring Summary
Holly Grove Stream Restoration Site (D06028-B)
Reach 5: Middle Branch

Parameter	Cross Section 3 Riffle						Cross Section 4 Pool						Cross Section					
Dimension	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
Bkf Width (ft)	8.2	7.9	7.2	7.6	7.7		8.6	8.4	8.5	9.8	7.3							
Floodprone Width (ft)	40	40	40	40	40		-	-	-	-	-							
Bkf Cross Sectional Area (ft^2)	5.9	5.6	4.9	5.8	5.4		9.7	10.1	8.5	10.6	8.4							
Bkf Mean Depth (ft)	0.7	0.7	0.7	0.8	0.7		1.1	1.2	1.2	1.1	1.1							
Bkf Max Depth (ft)	1.2	1.2	1.1	1.2	1.2		2	1.9	1.8	1.8	1.6							
Width/Depth Ratio	11.5	11.1	10.5	9.9	11		-	-	-	-	-							
Entrenchment Ratio	>3	>3	>3	>3	>3		-	-	-	-	-							
Bank Height Ratio	1	1	1	1	1		-	-	-	-	-							
Wetted Perimeter (ft)																		
Hydraulic Radius (ft)																		
Substrate																		
D_{50} (mm)	15.3	10.8	4.5	8.8	25.6													
D_{84} (mm)	44	49	46	45	66													

Parameter	MY-1 (2006)			MY-2 (2007)			MY-3 (2008)			MY-4 (2009)			MY-5 (2010)			MY+ (2011)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Beltwidth (ft)	22	24	23	22	24	23	22	24	23	22	24	23	22	24	23			
Radius of Curvature (ft)	52	71	62	52	71	62	52	71	62	52	71	62	52	71	62			
Meander Wavelength (ft)	91	133	108	91	133	108	91	133	108	91	133	108	91	133	108			
Meander Width Ratio	237	2.9	2.8	237	2.9	2.8	237	2.9	2.8	237	2.9	2.8	237	2.9	2.8			
Profile																		
Riffle Length (ft)	16	43	18	13.5	41.5	22	13	46	19.3	14.5	43.7	26.9	17.5	27.4	21.9			
Riffle Slope (ft)	0.009	0.0093	0.0092	0.0044	0.0123	0.0064	0.0096	0.0277	0.0104	0.0013	0.0304	0.009	0.0041	0.0295	0.006			
Pool length (ft)	11.7	16.2	16.2	-	-	-	-	-	-	-	-	-	-	-	-			
Pool Spacing (ft)	44	74.6	48.5	13.5	61	43	49.5	64.5	54	13.4	63.3	46.4	42.3	76.4	49.8			
Additional Reach Parameters																		
Valley Length (ft)	-	-	197	-	-	197	-	-	197	-	-	197	-	-	197			
Channel Length (ft)	-	-	211	-	-	211	-	-	211	-	-	211	-	-	211			
Sinuosity	-	-	1.1	-	-	1.07	-	-	1.07	-	-	1.07	-	-	1.07			
Water Surface Slope (ft/ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Bkf Slope (ft/ft)	-	-	0.0117	-	-	0.0166	-	-	0.0177	-	-	0.0112	-	-	0.0112			
Rosgen Classification	-	-	B4c	-	-	B4c	-	-	B4c	-	-	B4c	-	-	B4c			
Habitat Index																		
Macrobenthos																		

Table X-f Morphology and Hydraulic Monitoring Summary
Holly Grove Stream Restoration Site (D06028-B)
Reach 6: Lower East Branch

Parameter	Cross Section 5 Riffle						Cross Section 6 Pool						Cross Section					
Dimension	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
Bkf Width (ft)	7.1	8	7.7	6.5	7.4		12.1	9.2	10	10.8	10.2							
Floodprone Width (ft)	30	30	30	30	30		-	-	-	-	-							
Bkf Cross Sectional Area (ft^2)	2.7	3	2.9	2.6	3.2		11.5	10.2	10.3	10.5	10.2							
Bkf Mean Depth (ft)	0.4	0.4	0.4	0.4	0.4		1	1.1	1	1	1.1							
Bkf Max Depth (ft)	0.6	0.7	0.7	0.7	0.8		2.5	2	2.1	1.9	2							
Width/Depth Ratio	18.6	21.6	20.3	20.3	17.3		-	-	-	-	-							
Entrenchment Ratio	>3	>3	>3	>3	>3		-	-	-	-	-							
Bank Height Ratio	1	1	1	1	1		-	-	-	-	-							
Wetted Perimeter (ft)																		
Hydraulic Radius (ft)																		
Substrate																		
D_{50} (mm)	9.8	0.1	0.1	0.1	0.1													
D_{84} (mm)	29	23	19	23	37													

Parameter	MY-1 (2006)			MY-2 (2007)			MY-3 (2008)			MY-4 (2009)			MY-5 (2010)			MY+ (2011)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Beltwidth (ft)	16	17	16	16	17	16	16	17	16	16	17	16	16	17	16			
Radius of Curvature (ft)	-	-	193	-	-	193	-	-	193	-	-	193	-	-	193			
Meander Wavelength (ft)	-	-	87	-	-	87	-	-	87	-	-	87	-	-	87			
Meander Width Ratio	2.3	2.4	2.3	2.3	2.4	2.3	2.3	2.4	2.3	2.3	2.4	2.3	2.3	2.4	2.3			
Profile																		
Riffle Length (ft)	17.5	27	18.8	11.7	22.5	16.9	4	24	12	6.7	25.4	11.2	2.8	29	21.9			
Riffle Slope (ft)	0.0037	0.0176	0.012	0.0107	0.0222	0.0107	0.0125	0.0825	0.0149	0.0037	0.0245	0.018	0.0072	0.0395	0.0146			
Pool length (ft)	6.5	12.5	9.5	-	-	-	-	-	-	-	-	-						
Pool Spacing (ft)	30	44	38.4	28.6	39.5	33.6	25	39	31.3	12	63.6	34.5	12.7	64.7	29.4			
Additional Reach Parameters																		
Valley Length (ft)	-	-	207.4	-	-	207.4	-	-	207.4	-	-	207.4	-	-	207.4			
Channel Length (ft)	-	-	209.7	-	-	209.7	-	-	209.7	-	-	209.7	-	-	209.7			
Sinuosity	-	-	1.0	-	-	1.01	-	-	1.01	-	-	1.01	-	-	1.01			
Water Surface Slope (ft/ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Bkf Slope (ft/ft)	-	-	0.0104	-	-	0.0141	-	-	0.0134	-	-	0.0102	-	-	0.0102			
Rosgen Classification	-	-	B4c	-	-	B4c	-	-	B4c	-	-	B4c	-	-	B4c			
Habitat Index																		
Macrobenthos																		

Table X-g Morphology and Hydraulic Monitoring Summary
Holly Grove Stream Restoration Site (D06028-B)
Reach 7: Southeast Creek

Parameter	Cross Section 1 Riffle						Cross Section 2 Pool						Cross Section					
Dimension	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
Bkf Width (ft)	15	14.5	13.3	12.9	13.8		10.5	9.8	9.3	9.4	9.1							
Floodprone Width (ft)	35	35	35	35	35		-	-	-	-	-							
Bkf Cross Sectional Area (ft^2)	9.5	7.6	8.8	7.3	9		9.7	9.6	9.9	10	9.3							
Bkf Mean Depth (ft)	0.6	0.05	0.7	0.6	0.7		0.9	1	1.1	1.1	1							
Bkf Max Depth (ft)	1.2	1.2	1.1	1.1	1.3		1.8	1.9	1.9	2.1	1.9							
Width/Depth Ratio	23.8	27.7	20.2	22.8	21.2		-	-	-	-	-							
Entrenchment Ratio	2.3	2.3	2.41	2.7	2.5		-	-	-	-	-							
Bank Height Ratio	1	1	1	1	1		-	-	-	-	-							
Wetted Perimeter (ft)																		
Hydraulic Radius (ft)																		
Substrate																		
D_{50} (mm)	0.1	2.4	0.1	0.1	0.1													
D_{84} (mm)	43	21	9	9	8													

Parameter	MY-1 (2006)			MY-2 (2007)			MY-3 (2008)			MY-4 (2009)			MY-5 (2010)			MY+ (2011)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Beltwidth (ft)	21	26	23	21	26	23	21	26	23	21	26	23	21	26	23			
Radius of Curvature (ft)	37	48	44	37	48	44	37	48	44	37	48	44	37	48	44			
Meander Wavelength (ft)	70	80	77	70	80	77	70	80	77	70	80	77	70	80	77			
Meander Width Ratio	1.4	1.7	1.5	1.4	1.7	1.5	1.4	1.7	1.5	1.4	1.7	1.5	1.4	1.7	1.5			
Profile																		
Riffle Length (ft)	12	20.5	19	12.6	24.9	18.8	7.8	29.5	18.8	8.5	25.1	17.23	3.1	19.7	13.8			
Riffle Slope (ft/ft)	0.0017	0.0052	0.0029	0.0024	0.004	0.0032	0.0044	0.0167	0.016	0.0314	0.0415	0.038	0.0052	0.0251	0.0124			
Pool length (ft)	5	8.1	6	-	-	-	-	-	-	-	-	-	-	-	-			
Pool Spacing (ft)	29.6	43.5	40.5	29.3	44.2	36.8	7	45	21.3	6.85	31.5	24.6	9.3	33.7	30			
Additional Reach Parameters																		
Valley Length (ft)	-	-	157.6	-	-	157.6	-	-	157.6	-	-	157.6	-	-	157.6			
Channel Length (ft)	-	-	167	-	-	167	-	-	167	-	-	167	-	-	167			
Sinuosity	-	-	1.1	-	-	1.06	-	-	1.06	-	-	1.06	-	-	1.06			
Water Surface Slope (ft/ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Bkf Slope (ft/ft)	-	-	0.0106	-	-	0.0096	-	-	0.0134	-	-	0.0127	-	-	0.0127			
Rosgen Classification	-	-	B4c	-	-	B4c	-	-	B4c	-	-	B4c	-	-	B4c			
Habitat Index																		
Macrobenthos																		

Table X-h Morphology and Hydraulic Monitoring Summary
Holly Grove Stream Restoration Site (D06028-B)
Reach 8: Southwest Creek

Parameter	Cross Section 3 Riffle						Cross Section 4 Pool						Cross Section					
Dimension	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
Bkf Width (ft)	8.2	8.4	9	8.9	8.7		6.6	7.2	7.5	7.1	6.4							
Floodprone Width (ft)	15	15	15	15	15		-	-	-	-	-							
Bkf Cross Sectional Area (ft^2)	4.4	4.9	5.3	5.1	4.4		7.4	9.1	8.6	9.2	9.3							
Bkf Mean Depth (ft)	0.5	0.6	0.6	0.6	0.5		1.1	1.3	1.1	1.3	1.5							
Bkf Max Depth (ft)	0.7	0.8	0.9	0.9	0.8		1.7	1.8	1.8	1.7	1.8							
Width/Depth Ratio	15.2	14.5	15.2	15.5	17.2		-	-	-	-	-							
Entrenchment Ratio	1.83	1.83	1.67	1.68	1.72		-	-	-	-	-							
Bank Height Ratio	1	1	1	1	1		-	-	-	-	-							
Wetted Perimeter (ft)																		
Hydraulic Radius (ft)																		
Substrate																		
D_{50} (mm)	7.3	13.3	15.1	27.5	18.1													
D_{84} (mm)	56	42	60	97	89													

Parameter	MY-1 (2006)			MY-2 (2007)			MY-3 (2008)			MY-4 (2009)			MY-5 (2010)			MY+ (2011)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Beltwidth (ft)	19	42	25	19	42	25	19	42	25	19	42	25	19	42	25			
Radius of Curvature (ft)	19	26	25	19	26	25	19	26	25	19	26	25	19	26	25			
Meander Wavelength (ft)	59	99	66	59	99	66	59	99	66	59	99	66	59	99	66			
Meander Width Ratio	2.3	5.1	3	2.3	5.1	3	2.3	5.1	3	2.3	5.1	3	2.3	5.1	3			
Profile																		
Riffle Length (ft)	4	15	9	5.1	14.3	8.5	6.6	16.3	12	5.4	24.9	12.7	10.9	15.9	11.5			
Riffle Slope (ft)	0.002	0.0092	0.0056	0	0.0373	0.0056	0	0.0055	0.005	0	0.0223	0.0112	0.0021	0.033	0.0147			
Pool length (ft)	7	19.5	11.4	-	-	-	-	-	-	-	-	-	-	-	-			
Pool Spacing (ft)	21	38.5	27.5	9.9	32.6	23.9	19.5	33	26.7	13.5	39.6	24.6	16.7	35	21.1			
Additional Reach Parameters																		
Valley Length (ft)	-	-	174.4	-	-	174.4	-	-	174.4	-	-	174.4	-	-	174.4			
Channel Length (ft)	-	-	198.2	-	-	198.2	-	-	198.2	-	-	198.2	-	-	198.2			
Sinuosity	-	-	1.1	-	-	1.14	-	-	1.14	-	-	1.14	-	-	1.14			
Water Surface Slope (ft/ft)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Bkf Slope (ft/ft)	-	-	0.0123	-	-	0.0128	-	-	0.0107	-	-	0.01	-	-	0.01			
Rosgen Classification	-	-	B4c	-	-	B4c	-	-	B4c	-	-	B4c	-	-	B4c			
Habitat Index																		
Macrobenthos																		

APPENDIX A

VEGETATION RAW DATA

Vegetation Plot 1 – Year 5

Vegetation Plot 2– Year 5

Vegetation Plot 3– Year 5

Vegetation Plot 4– Year 5

Vegetation Plot 5– Year 5

Vegetation Plot 6– Year 5

Vegetation Plot 7– Year 5

Vegetation Plot 8– Year 5

Vegetation Plot A– Year 5

Vegetation Plot B– Year 5

Vegetation Plot C– Year 5

Plot (continued): E92523-01-VP1

ID	Species	map char	source	X (m)	Y (m)	Sep 2012 Data: ddh (mm)	Height (cm)	DBH (cm)	Notes*	THIS YEAR'S DATA: ddh (mm)	Height (cm)	DBH (cm)	Re-sprout	Vigor*	Damage*	Notes

Vegetation Monitoring Data (VMD) Datasheet — **Please fill in any missing data and correct any errors.**

Plot E92523-01-VP1

VMD Year (1-5): 5 Date: 10/2/13 - 10/2/13

Taxonomic Standard: Weakley's Flora

Taxonomic Standard DATE: 2012

Latitude or UTM-N: (dec.deg. or m) 36.19963 Datum: NAD83/WGS84

Longitude or UTM-E: -79.58552 UTM Zone: 17

Coordinate Accuracy (m): 1 X-Axis bearing (deg): 116

Plot Dimensions: X: 10 Y: 10 ☐ Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X

Party:	Role:
Chris Sweet	PL
Nancy Scott	PL

Date last planted:

New planting date m/yy? /

☐ Check box if plot was not sampled, specify reason below

Notes: very thick blackberry

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Sep 2012 Data: Height 1cm*	DBH 1 cm	Notes*	THIS YEAR'S DATA: Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
722	Salix nigra	c	R	1.9	7.0	249.0	1.0	☐	288	1.7	☐	3	INS DIS	
723	Quercus michauxii	d	R	2.3	7.8	108.0	DBH?	☑	132	–	☐	3	INS DIS	
728	Quercus sp.	g	R	~~7.0~~ 3.5	~~1.9~~ 3.0	Missing		☐	113	–	☐	3	INS	
734	Corylus americana	h	R	7.5	0.0	182.0	0.4	☑	229	.6	☐	3	[illegible] Rubu[illegible]	
735	Ulmus alata	i	R	8.2	4.9	211.0	0.5	☐	[illegible]	1.2	☐	3	ins/vine [illegible]	
738	Diospyros virginiana	b	R	1.9	5.2	89.0		☐	102		☐	2	Smothered no leaves	
740	Platanus occidentalis var. occidentalis	e	R	2.7	0.0	530.0	3.5	☐	7m	6	☐	3	[illegible]	
741	Corylus americana	f	R	5.3	1.5	89.0		☐	107	—	☐	3	vine/DIS	
886	Quercus pagoda	a	R	0.0	8.6	54.0		☐	46	—	☐	3	INS	

 # stems: 9

New Stems, not included last year, but are obviously planted. If more space needed, use blank PWS (Planted Woody Stems) Form:

Species Name	Source*	X (m)	Y (m)	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes

***Notes by ID:** 723-Alba?
734-smothered

*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Plot (continued): E92523-01-VP1

ID	Species	map char	source	X (m)	Y (m)	Sep 2012 Data ddh (mm)	Height (cm)	DBH (cm)	Notes*	THIS YEAR'S DATA ddh (mm)	Height (cm)	DBH (cm)	Re-sprout	Vigor*	Damage*	Notes

Natural Woody Stems - tallied by species

Explanation of cut-off & subsampling**:

Height Cut-Off (All stems shorter than this are ignored. If >10cm, explain why to the right.): ☑ 10cm ☐ 50cm ☐ 100cm ☐ 137cm

Species Name	☑ c	SEEDLINGS — HEIGHT CLASSES: Sub-Seed	10 cm-50 cm	50 cm-100 cm	100 cm-137 cm	SAPLINGS — DBH: Sub-Sapl	0-1 cm	1-2.5	TREES — DBH: 2.5-	5-	=10 (write DBH)
Salix nigra		—				—	2	2	1	1	
Platanus occidentalis		—				—			1	1	
Lyriodendron tulipifera		—		1	1	—	2	1	2		
Liquidambar styraciflua		—	3	3	2	—	3	2			
Carpinus caroliniana		—			1	—	1				
Fraxinus pennsylvanica		—		1	1	—					
Acer rubrum		—	1	3	1	—	1				

**Required if cut-off >10cm or subsample ? 100%. ●1 ●2 ●3 ●4 ●5 ●6 ●7 ●8 ●9 ●10 Form WS2, ver 9.1

photo 1796

Acer negundo

Rosa multiflora

Diospyros virginiana

Herbaceous to Note:

Lyrisosno japanica

*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEERRODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

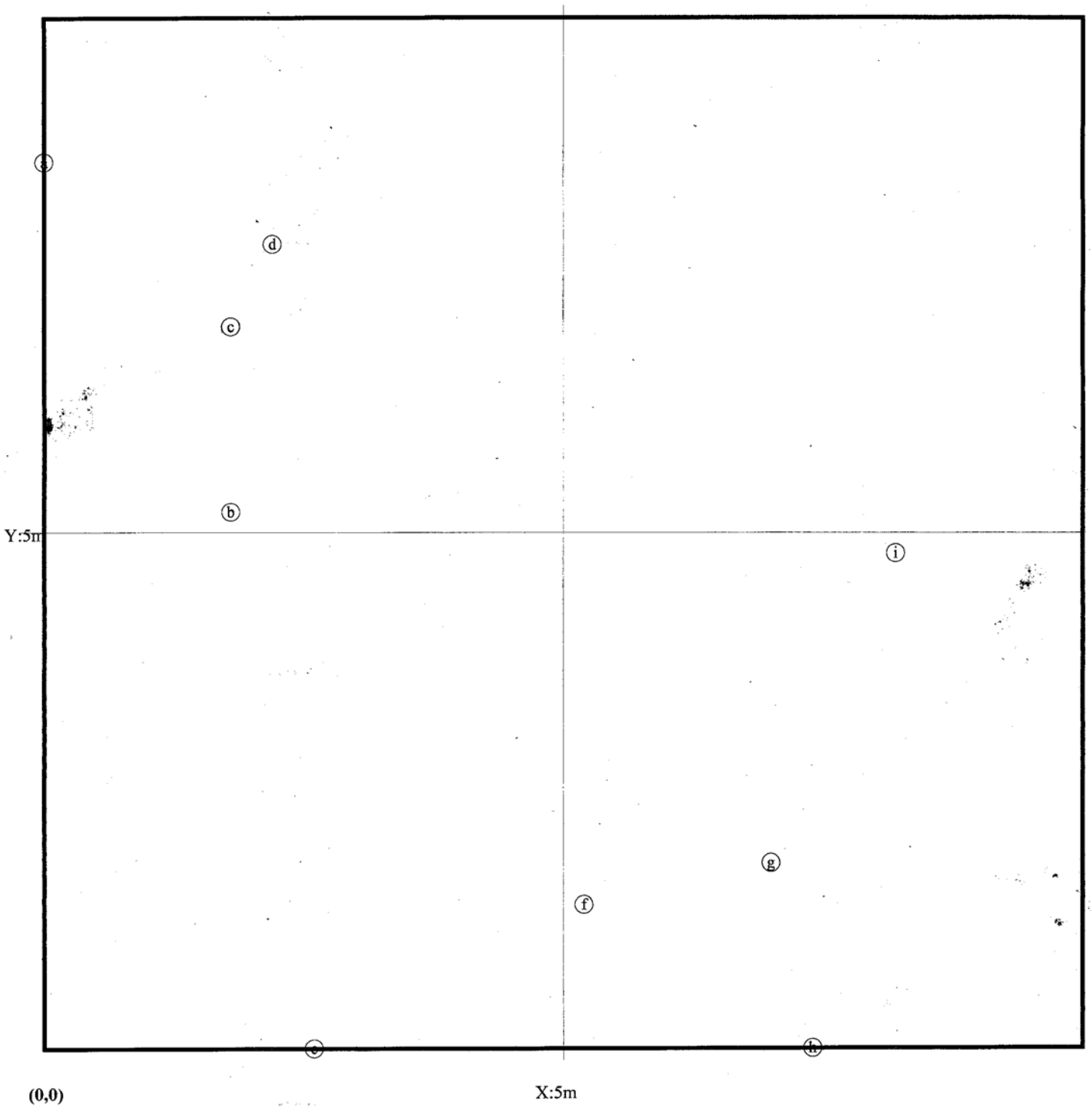
Printed in the CVS-EEP Entry Tool ver. 2.3.1

Map of stems on plot E92523-01-VP1

X-axis: 116 °

N

 # stems: 9
map size: LARGE



*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Printed in the CVS-EEP Entry Tool ver. 2.3.1

Vegetation Monitoring Data (VMD) Datasheet **Please fill in any missing data and correct any errors.**

Plot E92523-01-VP2

VMD Year (1-5): 5 Date: 8/15/13 - 8/15/13

Taxonomic Standard: Weakley's Flora

Taxonomic Standard DATE: 2012

Latitude or UTM-N: (dec.deg. or m) 36.19803 Datum: NAD83/W

Longitude or UTM-E: -79.57738 UTM Zone: 17

Coordinate Accuracy (m): 1 X-Axis bearing (deg): 147

Plot Dimensions: X: 10 Y: 10 ☐ Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X

Party: Chris Krantz, N. Scott Role:

Date last planted:

New planting date m/yy? /

☐ Check box if plot was not sampled, specify reason below

Notes: Japanese honeysuckle heavy, photo 170

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Sep 2012 Data Height 1cm*	Sep 2012 Data DBH 1 cm	Notes*	THIS YEAR'S DATA Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
600	Cornus amomum	ⓐ	R	2.2	3.4	166.0	0.5	☐	212	.7	☐	4	INS	pinkflag
602	Fraxinus pennsylvanica	ⓒ	R	7.5	3.6	84.0		☐	192	.8	☐	4	DIS	rust on leaves
603	Diospyros virginiana	ⓓ	R	9.4	0.6	24.0		☑	14	—	☑	3	INS	[illegible]
605	Fraxinus pennsylvanica	ⓑ	R	7.2	9.0	75.0		☐	125		☐	4	—	[illegible]

 # stems: 4

New Stems, not included last year, but are obviously planted. If more space needed, use blank PWS (Planted Woody Stems) Form:

Species Name	Source*	X (m)	Y (m)	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes

***Notes by ID:** 603-vine, disease

Natural Woody Stems - tallied by species

Height Cut-Off (All stems shorter than this are ignored. If >10cm, explain why to the right.): ☐ 10cm ☐ 50cm ☐ 100cm ☐ 137cm

Explanation of cut-off & subsampling:

Species Name	☑ c	Seedlings — Height Classes: Sub-Seed	10 cm-50 cm	50 cm-100 cm	100 cm-137 cm	Saplings — DBH: Sub-Sapl	0-1 cm	1-2.5	Trees — DBH: 2.5-	5-	=10 (write DBH)
Platanus occidentalis		—		•	•;	—	•	⊠	::		
Liquidambar styraciflua		—			⊠••	—	⊠⊠••	⊠••			
Fraxinus pennsylvanica		—		•		—	::	:•	•		
Acer negundo		—				—	••				
Carpinus caroliniana		—		••		—					
Quercus [illegible]		—				—	•				
Rosa multiflora		—				—	⊠				

**Required if cut-off >10cm or subsample ? 100%. ●1 ●2 ●3 ●4 ●5 ●6 ●7 ●8 ●9 ●10 Form WS2, ver 9.1

Liriodendron tulipifera

*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

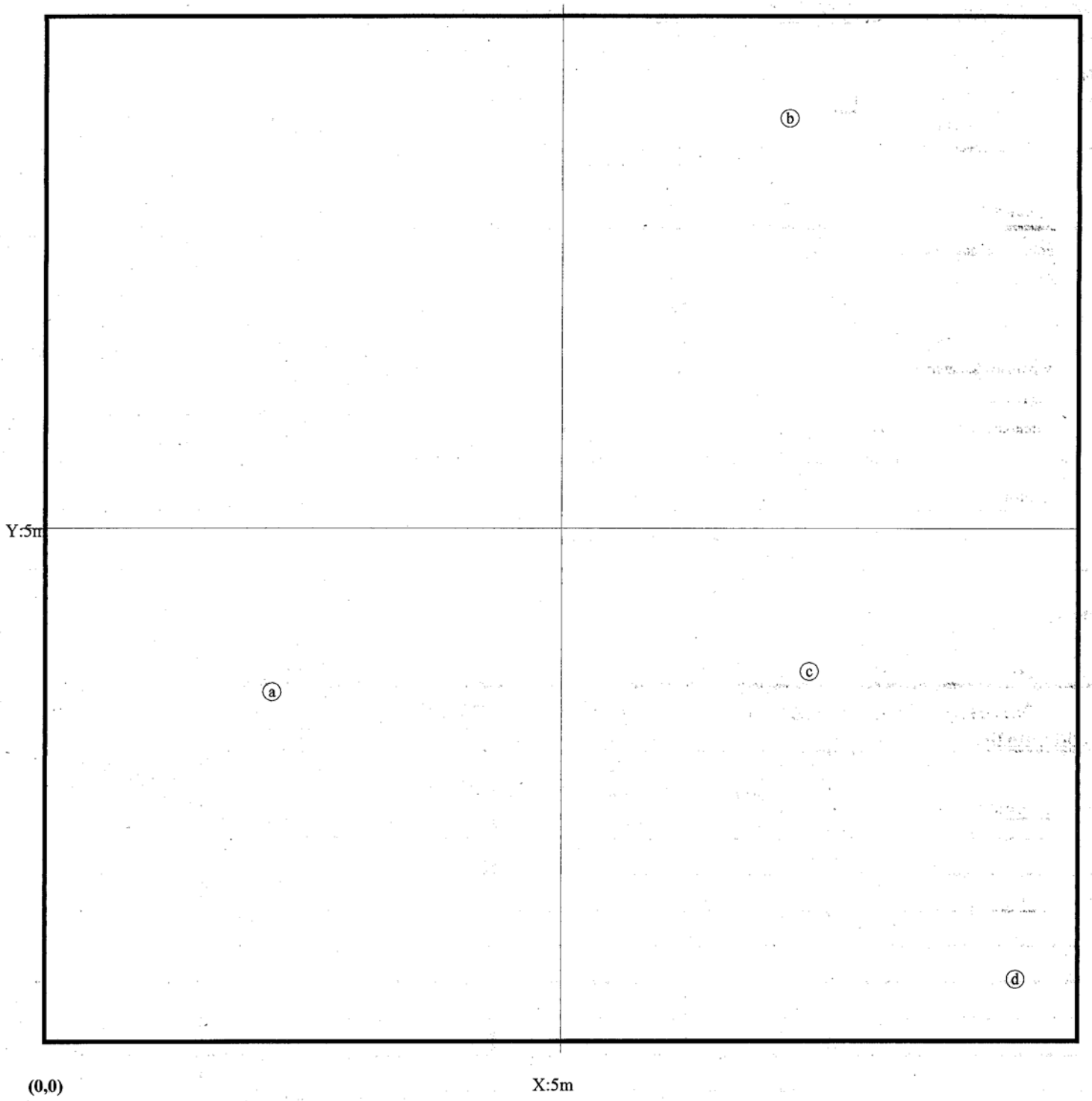
*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Map of stems on plot E92523-01-VP2

X-axis: 147 °

N

 # stems: 4
map size: LARGE



*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Printed in the CVS-EEP Entry Tool ver. 2.3.1

Vegetation Monitoring Data (VMD) Datasheet **Please fill in any missing data and correct any errors.**

Plot E92523-01-VP3

VMD Year (1-5):	5	Date:	10 / 2 / 13 - 10 / 2 /13
Taxonomic Standard:			Weakley's Flora
Taxonomic Standard DATE:			2012
Latitude or UTM-N: (dec.deg. or m)			36.19547 Datum: NAD83/W
Longitude or UTM-E:			-79.57227 UTM Zone: 17
Coordinate Accuracy (m):	1	X-Axis bearing (deg):	236
Plot Dimensions: X:	10	Y:	10 ☐ Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X

Party: C. Sheats, N. Scott — Role:

Date last planted: New planting date m/yy? /

☐ Check box if plot was not sampled, specify reason below

Notes:

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Sep 2012 Data Height 1cm*	Sep 2012 Data DBH 1 cm	Notes*	THIS YEAR'S DATA Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
612	Fraxinus pennsylvanica	ⓐ	R	1.7	3.0	163.0	0.8	☑	258	1.8	☐	3	DIS	
613	Cornus amomum	ⓑ	R	1.8	5.3	216.0	0.8	☐	326	1.5	☐	3	INS	
614	Quercus ~~michauxii~~ lyrata	ⓒ	R	2.2	7.6	160.0	0.5	☑	247	1	☐	3	INS	
616	Corylus americana	ⓕ	R	6.5	4.3	144.0	0.2	☐	134	-	☐	3	INS	
617	Viburnum dentatum var. dentatum	ⓔ	R	6.3	0.1	117.0	*DBH?*	☐	283	.4	☐	3	INS	
619	Quercus ~~michauxii~~ lyrata	ⓖ	R	9.3	7.0	173.0	0.8	☐	208	1.3	☐	4	INS	
620	Cercis canadensis var. canadensis	ⓓ	R	4.5	6.0	288.0	1.0	☐	354	2	☐	4	INS	

 # stems: 7

New Stems, not included last year, but are obviously planted. If more space needed, use blank PWS (Planted Woody Stems) Form:

Species Name	Source*	X (m)	Y (m)	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes

***Notes by ID:** 612-yr3: disease | yr4: diseased
614-vine

Note: Chinese trumpet creeper vine, rubus, honeysuckle photo #1802

Natural Woody Stems - tallied by species

Height Cut-Off (All stems shorter than this are ignored. If >10cm, explain why to the right.): ☐ 10cm ☐ 50cm ☐ 100cm ☐ 137cm

Explanation of cut-off & subsampling:**

Species Name	☑ c	Seedlings — Height Classes: Sub-Seed	10 cm-50 cm	50 cm-100 cm	100 cm-137 cm	Saplings — DBH: Sub-Sapl	0-1 cm	1-2.5	Trees — DBH: 2.5-	5-	=10 (write DBH)
Fraxinus penn		—		••	•	—	•• •	•		•	
Liquidamber		—				—	•				
Acer negundo		—		•		—	•	::	⊠ ••	::	
Diospyros virginiana		—				—	•	•			
		—				—					
		—				—					
		—				—					

****Required** if cut-off >10cm or subsample ? 100%. ●1 ●2 ●3 ●4 ●5 ●6 ●7 ●8 ●9 ●10

Form WS2, ver 9.1

*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

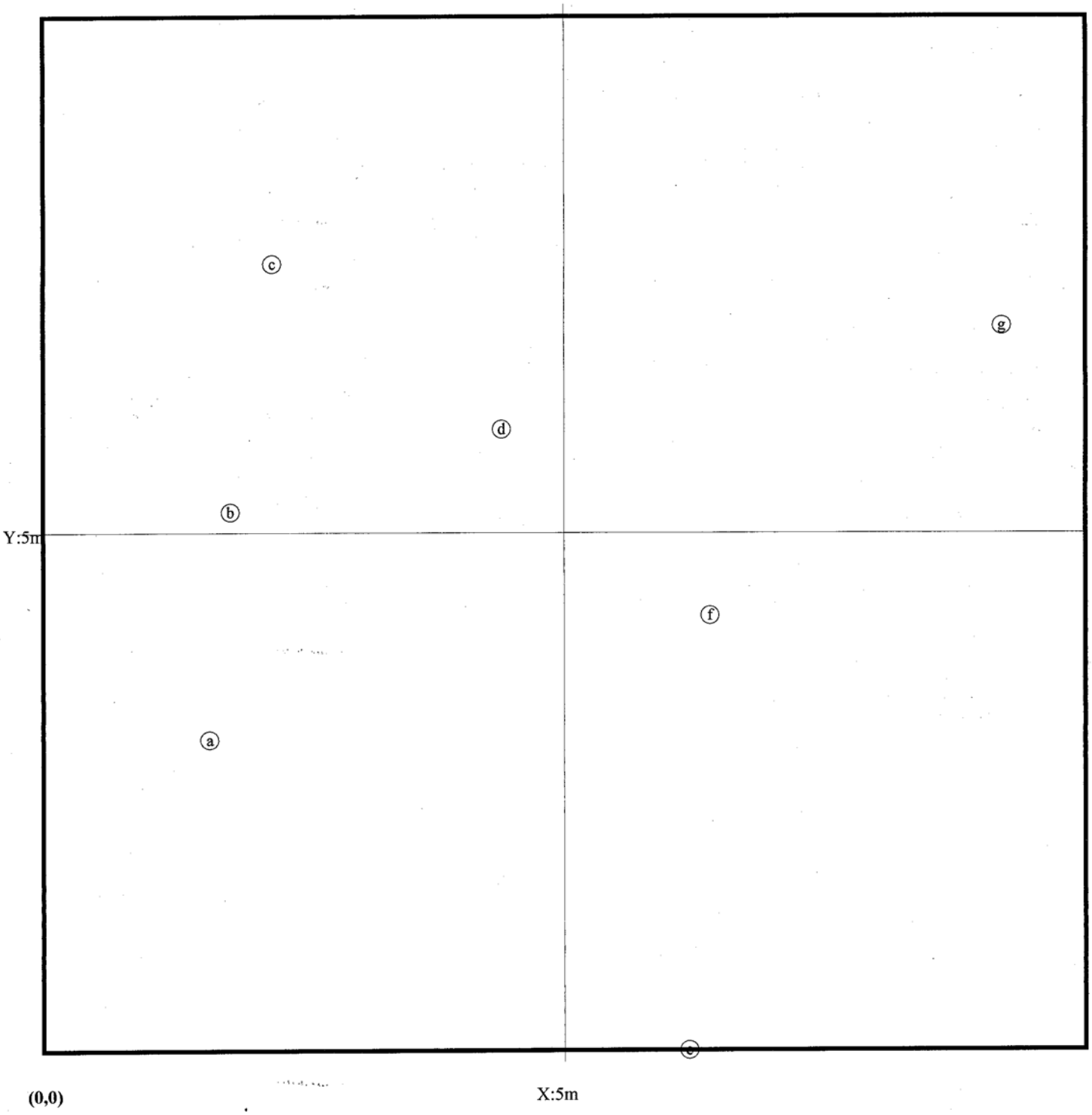
Printed in the CVS-EEP Entry Tool ver. 2.3.1

Map of stems on plot E92523-01-VP3

X-axis: 236 °

 # stems: 7
map size: LARGE

N



*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Printed in the CVS-EEP Entry Tool ver. 2.3.1

Vegetation Monitoring Data (VMD) Datasheet **Please fill in any missing data and correct any errors.**

Plot E92523-01-VP4

VMD Year (1-5): 5 Date: 10 / 2 / 13 - 10 / 2 /13

Taxonomic Standard: Weakley's Flora

Taxonomic Standard DATE: 2012

Latitude or UTM-N: (dec.deg. or m) 36.20236 Datum: NAD83/W

Longitude or UTM-E: -79.57381 UTM Zone: 17

Coordinate Accuracy (m): 1 X-Axis bearing (deg): 252

Plot Dimensions: X: 10 Y: 10 ☐ Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X

Party:	Role:
C. Sheats	
N. Scott	

Date last planted:

New planting date m/yy? /

☐ Check box if plot was not sampled, specify reason below

Notes:

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Sep 2012 Data Height 1cm*	Sep 2012 Data DBH 1 cm	Notes*	THIS YEAR'S DATA Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
625	Diospyros virginiana	a	R	1.5	0.1	59.0		☐	65	-	☐	3	DIS	
626	Quercus phellos	c	R	2.3	2.9	58.0		☐	62	-	☐	3	DIS	
627	Diospyros virginiana	f	R	5.5	7.6	32.0		☑	50	-	☐	2	DIS	
630	Betula nigra	e	R	5.3	1.7	185.0	0.4	☐	268	1.2	☐	4	DIS, INS	
633	Fraxinus pennsylvanica	i	R	9.7	8.2	72.0		☑	111	-	☐	3	VINE	
634	Diospyros virginiana	h	R	8.3	8.4	39.0		☐	53	-	☐	3	DIS	
635	Corylus americana	b	R	1.9	4.4	48.0		☐	65	-	☐	3	DIS	
636	Amelanchier arborea	g	R	6.5	2.1	41.0		☐	102	-	☐	4		
909	Cercis canadensis var. canadensis	d	R	3.0	7.5	50.0		☑	78	-	☐	3	DEER	

 # stems: 9

New Stems, not included last year, but are obviously planted. If more space needed, use blank PWS (Planted Woody Stems) Form:

Species Name	Source*	X (m)	Y (m)	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes

***Notes by ID:**

627-insects

633-did not measure resprout

909-(New this year; the x is unknown)

*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Plot (continued): E92523-01-VP4

ID	Species	map char	source	X (m)	Y (m)	Sep 2012 Data: ddh (mm)	Height (cm)	DBH (cm)	Notes*	THIS YEAR'S DATA: ddh (mm)	Height (cm)	DBH (cm)	Re-sprout	Vigor*	Damage*	Notes

Natural Woody Stems - tallied by species

Height Cut-Off (All stems shorter than this are ignored. If >10cm, explain why to the right.): ☑ 10cm ☐ 50cm ☐ 100cm ☐ 137cm

Explanation of cut-off & subsampling:**

Species Name	☑ c	SEEDLINGS — HEIGHT CLASSES: Sub-Seed	10 cm-50 cm	50 cm-100 cm	100 cm-137 cm	SAPLINGS — DBH: Sub-Sapl	0-1 cm	1-2.5	TREES — DBH: 2.5-	5-	=10 (write DBH)
Fraxinus penn.		—	1	2	1	—		2			
Acer rubrum		—	1			—					
Pinus taeda		—				—	2				
Pinus virginiana		—				—	2				
Liquidambar styr.		—	1	1	1	—	2	1	2		
Bacchanus halimefolia		—				—	1				
Lyriodendron tulip		—	1			—					

****Required** if cut-off >10cm or subsample ? 100%.

1 2 3 4 5 6 7 8 9 10

Form WS2, ver 9.1

Rhus coppalina 1

Fraxinus americana 1

Prunus virginiana 1

Quercus phellos 1

Juniperus virginiana 1

Japonesehoneysuckle dominant herb

Andropogon

Photo # 1798

*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

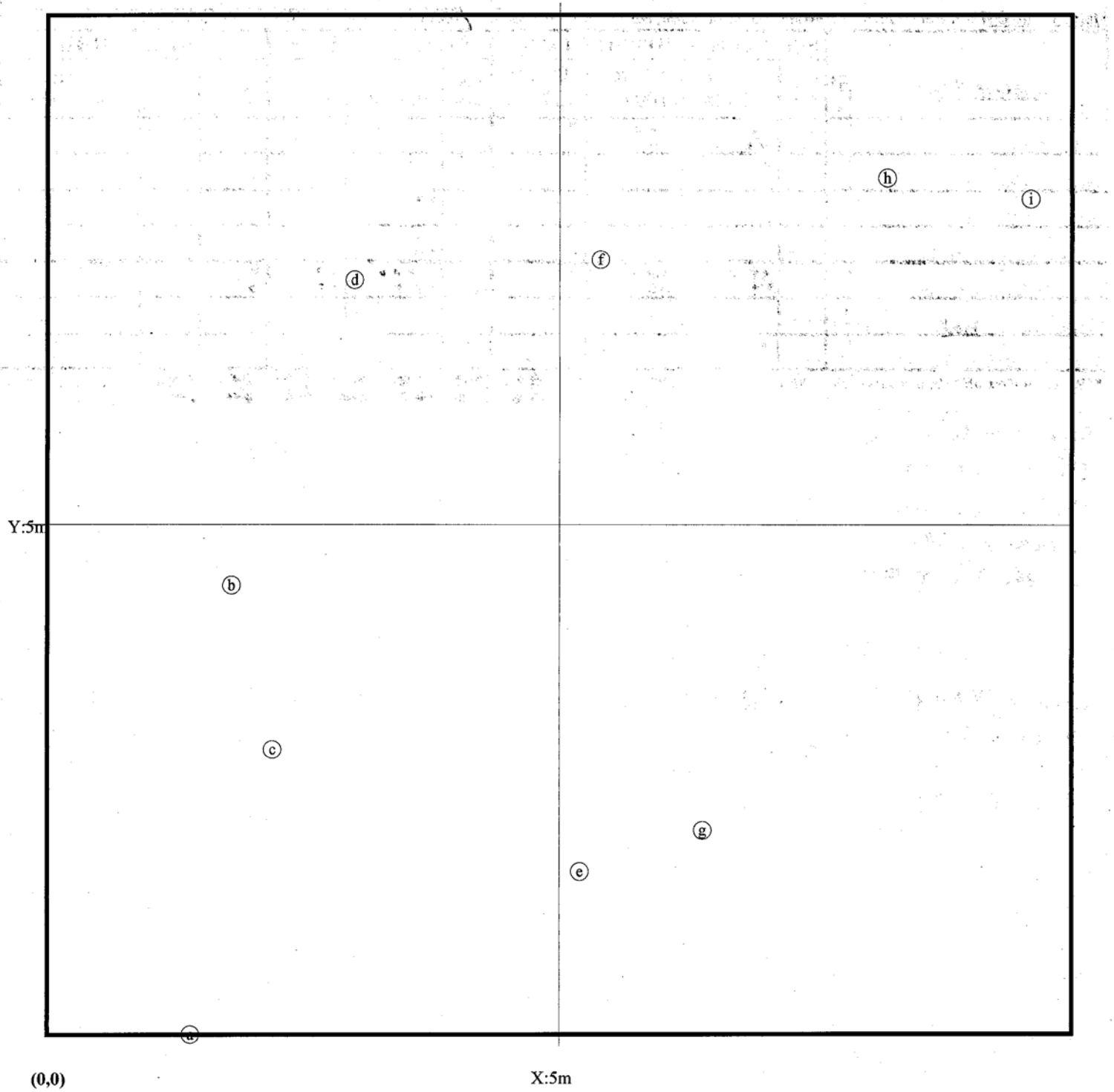
*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Map of stems on plot E92523-01-VP4

X-axis: 252 °

 # stems: 9
map size: LARGE



*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Printed in the CVS-EEP Entry Tool ver. 2.3.1

Vegetation Monitoring Data (VMD) Datasheet — **Please fill in any missing data and correct any errors.**

Plot E92523-01-VP5

VMD Year (1-5): 5 Date: 10 / 2 / 13 - 10 / 2 /13

Taxonomic Standard: Weakley's Flora

Taxonomic Standard DATE: 2012

Latitude or UTM-N: (dec.deg. or m) 36.20105 Datum: NAD83/W

Longitude or UTM-E: -79.57369 UTM Zone: 17

Coordinate Accuracy (m): 1 X-Axis bearing (deg): 286

Plot Dimensions: X: 10 Y: 10 ☐ Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X

Party: C. Sheats, N. Scott — Role:

Date last planted:

New planting date m/yy? /

☐ Check box if plot was not sampled, specify reason below

Notes:

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Sep 2012 Data Height 1cm*	Sep 2012 Data DBH 1 cm	Notes*	THIS YEAR'S DATA Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
647	Celtis laevigata	ⓒ	R	7.5	0.2	172.0	0.3	☑	258	1.4	☐	3	INS	
648	Cercis canadensis var. canadensis	ⓓ	R	8.0	0.9	124.0	DBH?	☑	182	.3	☐	3	INS / DIS / VINE	grapevine
649	Cercis canadensis var. canadensis	ⓔ	R	8.4	3.5	190.0	0.7	☑	368	1.5	☐	3	INS	
652	Quercus sp. michauxii	ⓑ	R	5.3	9.2	111.0	DBH?	☐	107	—	☐	3	INS	
655	~~Celtis~~ Cephalanthus occidentalis	ⓐ	R	0.6	9.7	193.0	0.7	☑	226	1	☐	3	INS, DIS	

 # stems: 5

New Stems, not included last year, but are obviously planted. If more space needed, use blank PWS (Planted Woody Stems) Form:

Species Name	Source*	X (m)	Y (m)	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes

***Notes by ID:**
647-insect
648-insects
649-diseased
655-yr3: diseased | yr4: diseased

rubus dominant, goldenrod, honeysuckle herb layer

Natural Woody Stems - tallied by species

Explanation of cut-off & subsampling:**

Height Cut-Off (All stems shorter than this are ignored. If >10cm, explain why to the right.): ☐ 10cm ☐ 50cm ☐ 100cm ☐ 137cm

Species Name	☑ c	Seedlings — Height Classes: Sub-Seed	10 cm-50 cm	50 cm-100 cm	100 cm-137 cm	Saplings — DBH: Sub-Sapl	0-1 cm	1-2.5	Trees — DBH: 2.5-	5-	=10 (write DBH)
Juglans nigra		—				—	••	••	•		
Fraxinus penn.		—	••	••	••	—	••				
Rosa multiflora		—				—	•				
Platanus occidentalis		—				—			•		
Liquidambar		—	••			—					
		—				—					
		—				—					

****Required** if cut-off >10cm or subsample ? 100%. ●1 ●2 ●3 ●4 ●5 ●6 ●7 ●8 ●9 ●10

Form WS2, ver 9.1

*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

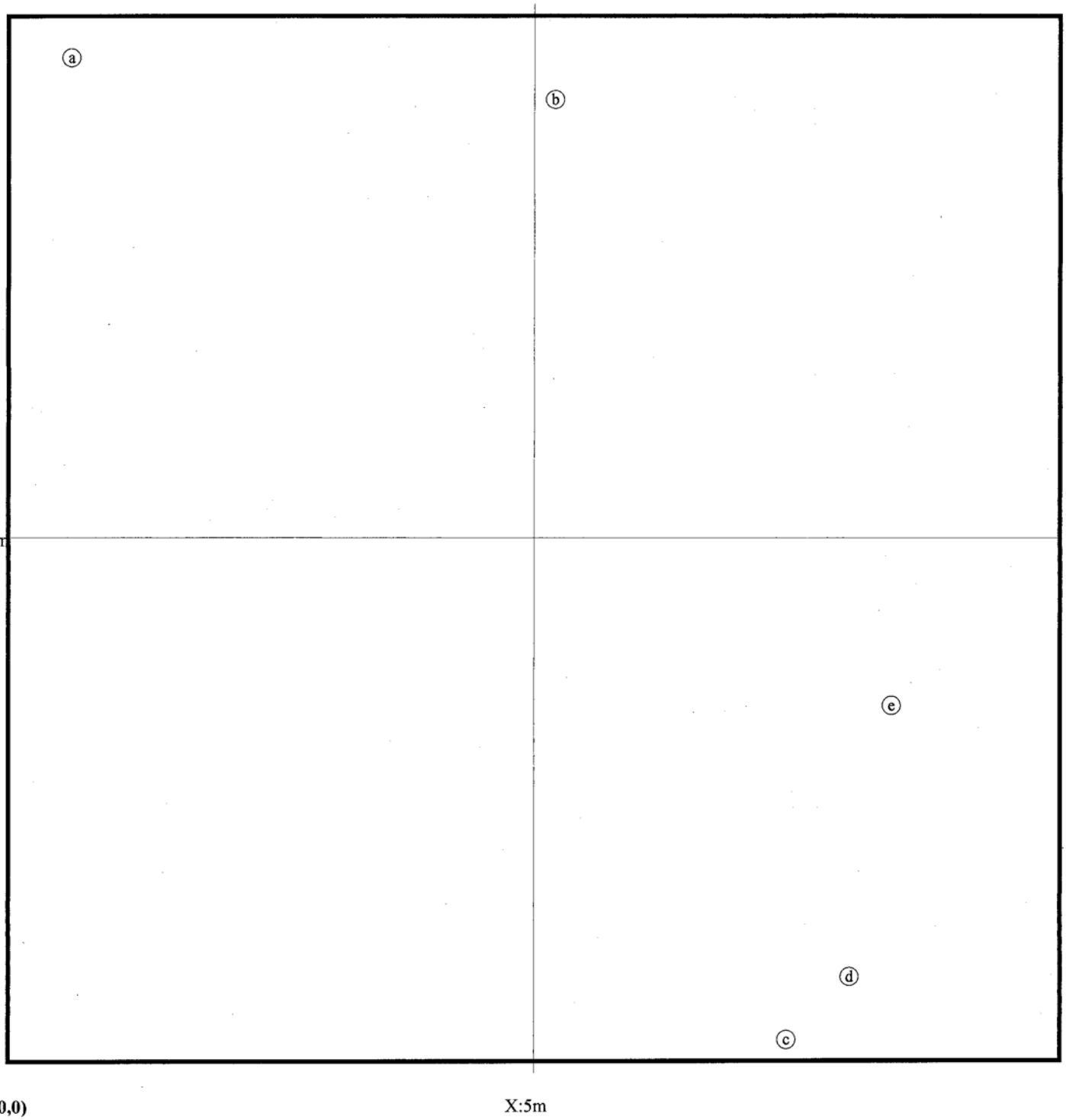
Printed in the CVS-EEP Entry Tool ver. 2.3.1

Map of stems on plot E92523-01-VP5

X-axis: 286 °

 # stems: 5
map size: LARGE

N



*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Printed in the CVS-EEP Entry Tool ver. 2.3.1

Vegetation Monitoring Data (VMD) Datasheet **Please fill in any missing data and correct any errors.**

Plot E92523-01-VP6

VMD Year (1-5): 5 Date: 8/15/13 - 8/15/13

Taxonomic Standard: Weakley's Flora

Taxonomic Standard DATE: 2012

Latitude or UTM-N: (dec.deg. or m) 36.19648 Datum: NAD83/WGS84

Longitude or UTM-E: -79.57130 UTM Zone: 17

Coordinate Accuracy (m): 1 X-Axis bearing (deg): 184

Plot Dimensions: X: 10 Y: 10 ☐ Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X

Party:	Role:
C. Sheats	
N. Scott	

Date last planted:

New planting date m/yy? /

☐ Check box if plot was not sampled, specify reason below

Notes: golden rod dom + tall fescue + Johnsongrass (x1)

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Sep 2012 Data Height 1cm*	Sep 2012 Data DBH 1 cm	Notes*	THIS YEAR'S DATA Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
660	Quercus lyrata	c	R	1.7	1.6	161.0	0.4	☐	200	.7	☐	4	DEER	
662	Quercus lyrata	i	R	8.7	1.3	41.0		☐	42		☐	3		
663	Fraxinus pennsylvanica	h	R	7.7	4.3	78.0		☐	107		☐	4	DIS	
664	Liriodendron tulipifera var. tulipifera	f	R	5.2	4.3	70.0		☐	108		☐	4	DIS	
665	Betula nigra	d	R	2.8	4.3	110.0	*DBH?*	☐	172	.2	☐	4	—	
666	Platanus occidentalis var. occidentalis	a	R	0.7	4.4	69.0		☑	142	.3	☐	4	INS	
667	Platanus occidentalis var. occidentalis	b	R	1.3	7.1	110.0	*DBH?*	☐	190	.5	☐	4	—	
668	Quercus lyrata	e	R	3.6	7.2	51.0		☐	97		☐	4	INS	
669	Fraxinus pennsylvanica	g	R	7.5	9.9	87.0		☐	127		☐	4	DIS	
672	Quercus lyrata	j	R	8.6	8.0	138.0	2.0	☐	185	.10	☐	3	INS	

 # stems: 10

New Stems, not included last year, but are obviously planted. If more space needed, use blank PWS (Planted Woody Stems) Form:

Species Name	Source*	X (m)	Y (m)	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes

***Notes by ID:** 666-diseased

*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Printed in the CVS-EEP Entry Tool ver. 2.3.1

Plot (continued): E92523-01-VP6

ID	Species	map char	source	X (m)	Y (m)	Sep 2012 Data: ddh (mm)	Height (cm)	DBH (cm)	Notes*	THIS YEAR'S DATA: ddh (mm)	Height (cm)	DBH (cm)	Re-sprout	Vigor*	Damage*	Notes

Natural Woody Stems - tallied by species

Explanation of cut-off & subsampling**:

Height Cut-Off (All stems shorter than this are ignored. If >10cm, explain why to the right.): ☑ 10cm ☐ 50cm ☐ 100cm ☐ 137cm

Species Name	☑ c	SEEDLINGS — HEIGHT CLASSES: Sub-Seed	10 cm-50 cm	50 cm-100 cm	100 cm-137 cm	SAPLINGS — DBH: Sub-Sapl	0-1 cm	1-2.5	TREES — DBH: 2.5-	5-	=10 (write DBH)
Salix nigra					•		••				
Fraxinus pennsylvanica				•							

**Required if cut-off >10cm or subsample ? 100%.

●1 ●2 ●3 ●●4 ●●5 ●●6 ●●7 ●●8 ●●9 ●●10

Form WS2, ver 9.1

*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

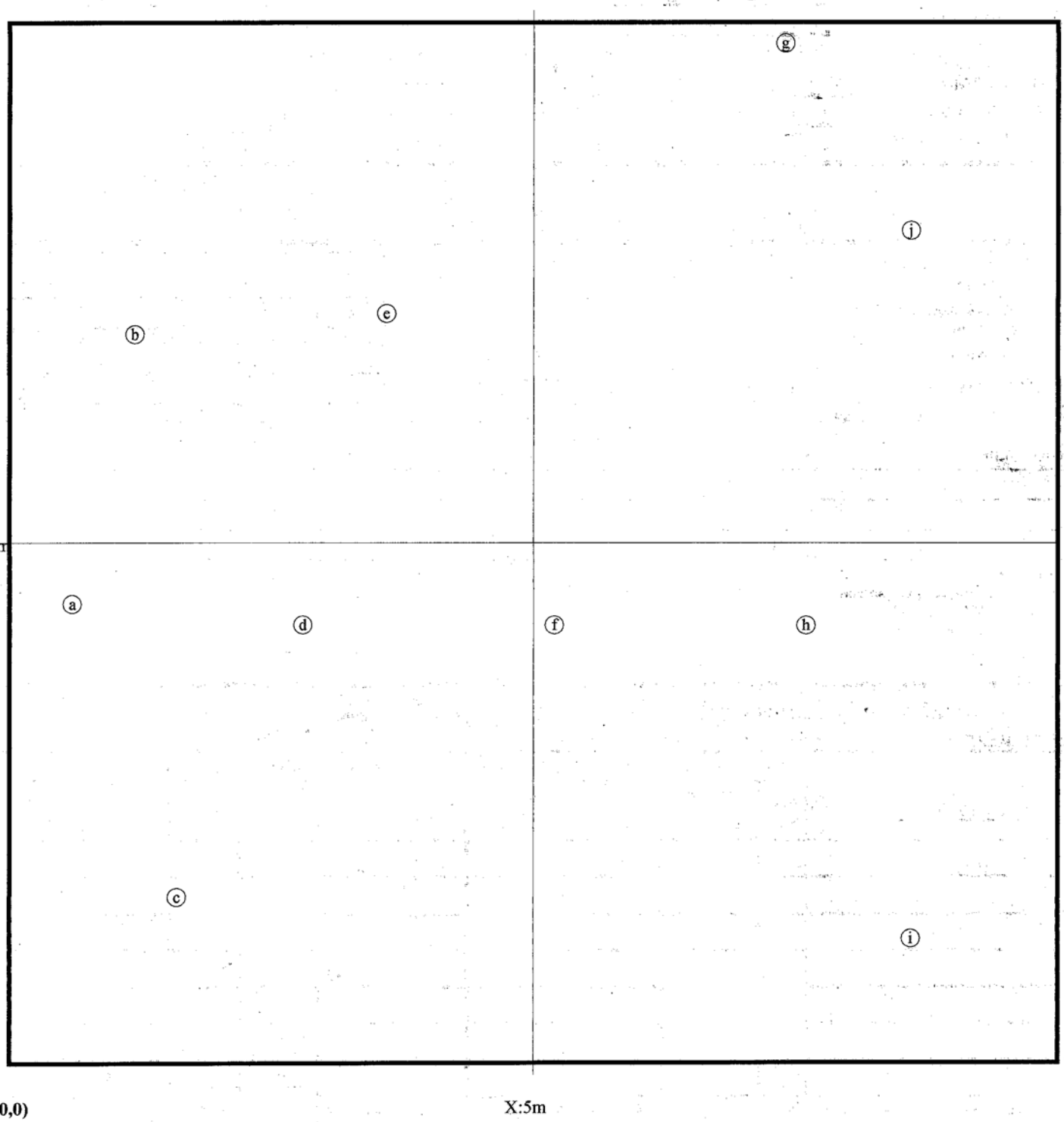
*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Map of stems on plot E92523-01-VP6

X-axis: 184 °

N

 # stems: 10
map size: LARGE



*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Printed in the CVS-EEP Entry Tool ver. 2.3.1

Vegetation Monitoring Data (VMD) Datasheet **Please fill in any missing data and correct any errors.**

Plot E92523-01-VP7

VMD Year (1-5): 5	Date: 10/2/13 - 10/2/13	Party: N. Scott, C. Sheats	Role:
Taxonomic Standard:	Weakley's Flora	Date last planted:	
Taxonomic Standard DATE:	2012	New planting date m/yy? /	
Latitude or UTM-N: (dec.deg. or m)	36.19223 Datum: NAD83/W	☐ Check box if plot was not sampled, specify reason below	
Longitude or UTM-E:	-79.56899 UTM Zone: 17	Notes:	
Coordinate Accuracy (m):	1 X-Axis bearing (deg): 250		
Plot Dimensions: X:	10 Y: 10 ☐ Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X		

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Sep 2012 Data Height 1cm*	Sep 2012 Data DBH 1 cm	Notes*	THIS YEAR'S DATA Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
675	Platanus occidentalis var. occidentalis	ⓐ	R	0.1	10.0	470.0	6.5	☑	5.5m	11	☐	4		
676	Platanus occidentalis var. occidentalis	ⓓ	R	8.7	2.3	345.0	3.0	☑	525	6	☐	4		
677	Nyssa sylvatica	ⓒ	R	7.7	6.0	104.0	*DBH?*	☑	153	.3	☐	4	ins	
933	Fraxinus pennsylvanica	ⓑ	P	1.0	1.5	150.0	0.3	☑	232	1.7	☐	4	vine	grape

 # stems: 4

New Stems, not included last year, but are obviously planted. If more space needed, use blank PWS (Planted Woody Stems) Form:

Species Name	Source*	X (m)	Y (m)	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes

***Notes by ID:**
675-yr2: | yr4: insects
676-yr2: | yr4: insects
677-yr2: | yr4: insects
933-yr3: | yr4: insects

~~Betula nigra~~ 9.8 9.4 198 4 4

Natural Woody Stems - tallied by species

Height Cut-Off (All stems shorter than this are ignored. If >10cm, explain why to the right.): ☐ 10cm ☐ 50cm ☐ 100cm ☐ 137cm

Explanation of cut-off & subsampling:**

Species Name	☑ c	SEEDLINGS — HEIGHT CLASSES: Sub-Seed	10 cm-50 cm	50 cm-100 cm	100 cm-137 cm	SAPLINGS — DBH: Sub-Sapl	0-1 cm	1-2.5	TREES — DBH: 2.5-	5-	=10 (write DBH)
~~Betula nigra~~		—				—					
Platanus occidentalis		—				—	•				
		—				—					
		—				—					
		—				—					
		—				—					
		—				—					

****Required** if cut-off >10cm or subsample ? 100%. ●1 ●2 ●3 ●4 ●5 ●6 ●7 ●8 ●9 ●10 Form WS2, ver 9.1

photo 1800 hub dominated by goldenrod, Johnson grass

*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

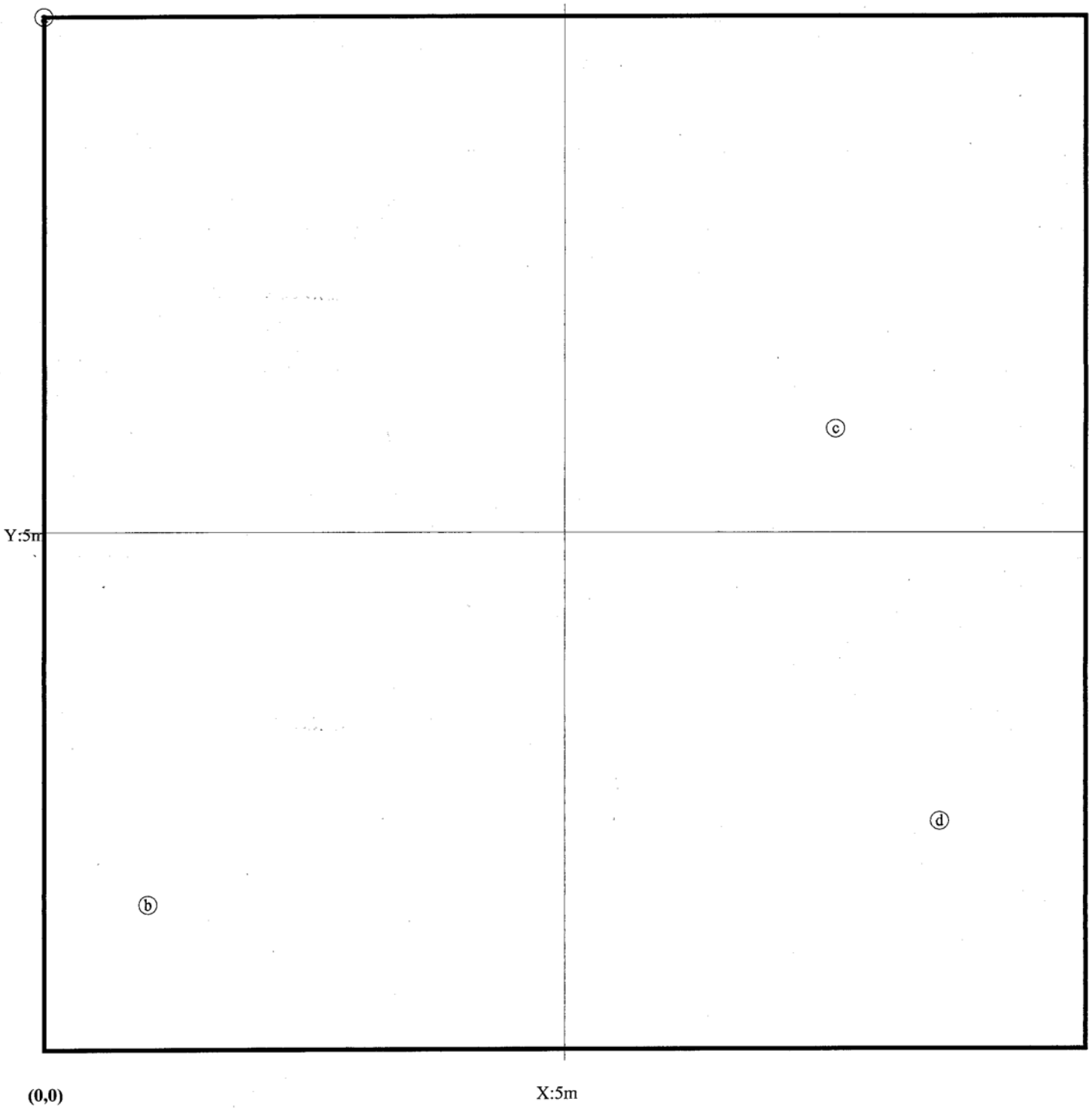
*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Map of stems on plot E92523-01-VP7

X-axis: 250 °

 # stems: 4
map size: LARGE

N



*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Printed in the CVS-EEP Entry Tool ver. 2.3.1

Vegetation Monitoring Data (VMD) Datasheet **Please fill in any missing data and correct any errors.**

Plot E92523-01-VP8

VMD Year (1-5): 5 Date: 10/2/13 - 10/2/13

Taxonomic Standard: Weakley's Flora

Taxonomic Standard DATE: 2012

Latitude or UTM-N: (dec.deg. or m) 36.18998 Datum: NAD83/WGS84

Longitude or UTM-E: -79.57815 UTM Zone: 17

Coordinate Accuracy (m): 1 X-Axis bearing (deg): 132

Plot Dimensions: X: 10 Y: 10 ☐ Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X

Party:	Role:
C. Sheets	
N. Scott	

Date last planted:

New planting date m/yy? /

☐ Check box if plot was not sampled, specify reason below

Notes: photo 1247

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Sep 2012 Data Height 1cm*	Sep 2012 Data DBH 1 cm	Notes*	THIS YEAR'S DATA Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
679	Fraxinus pennsylvanica	a	R	2.3	1.5	299.0	1.3	☑	333	2	☐	4	NS	
680	Liriodendron tulipifera var. tulipifera	d	R	6.3	2.5	329.0	2.0	☑	465	3	☐	4	INS	
681	Fraxinus pennsylvanica	f	R	9.0	3.7	330.0	1.4	☑	222	1.2	☐	2		topdied
682	Liriodendron tulipifera var. tulipifera	e	R	8.0	6.2	268.0	1.4	☑	350	1.7	☐	4	DIS	
683	Quercus lyrata	c	R	5.6	7.9	74.0		☑	5		☐	3	INS	
684	Liriodendron tulipifera var. tulipifera	b	R	4.2	10.0	154.0	3.0	☑	174	.5	☐	4	DIS	

 # stems: 6

New Stems, not included last year, but are obviously planted. If more space needed, use blank PWS (Planted Woody Stems) Form:

Species Name	Source*	X (m)	Y (m)	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes

***Notes by ID:**
679-diseased
680-diseased
681-diseased
682-diseased
683-diseased
684-diseased, top dead

*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Printed in the CVS-EEP Entry Tool ver. 2.3.1

Plot (continued): E92523-01-VP8					Sep 2012 Data			Notes*	THIS YEAR'S DATA						
ID	Species	map char	source	X (m)	Y (m)	ddh (mm)	Height (cm)	DBH (cm)		ddh (mm)	Height (cm)	DBH (cm)	Re-sprout	Vigor*	Damage*	Notes

Natural Woody Stems - tallied by species

Explanation of cut-off & subsampling**

Height Cut-Off (All stems shorter than this are ignored. If >10cm, explain why to the right.): ☑ 10cm ☐ 50cm ☐ 100cm ☐ 137cm

Species Name	☑ c	SEEDLINGS — HEIGHT CLASSES				SAPLINGS — DBH			TREES — DBH		
		Sub-Seed	10 cm-50 cm	50 cm-100 cm	100 cm-137 cm	Sub-Sapl	0-1 cm	1-2.5	2.5-	5-	=10 (write DBH)
Liquidambar styraciflua											
Carya alba											
Liriodendron tulipifera											
Fraxinus penn											
Quercus spp. Alba											
Sambucus canadensis											
Acer rubrum											

**Required if cut-off >10cm or subsample ? 100%.

1 2 3 4 5 6 7 8 9 10 Form WS2, ver 9.1

Tree of Heaven

~~Tea~~

Platanus

Cercis canadensis

Elaeagnus

Nyssa sylvatica

*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

**DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other, Unknown, ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

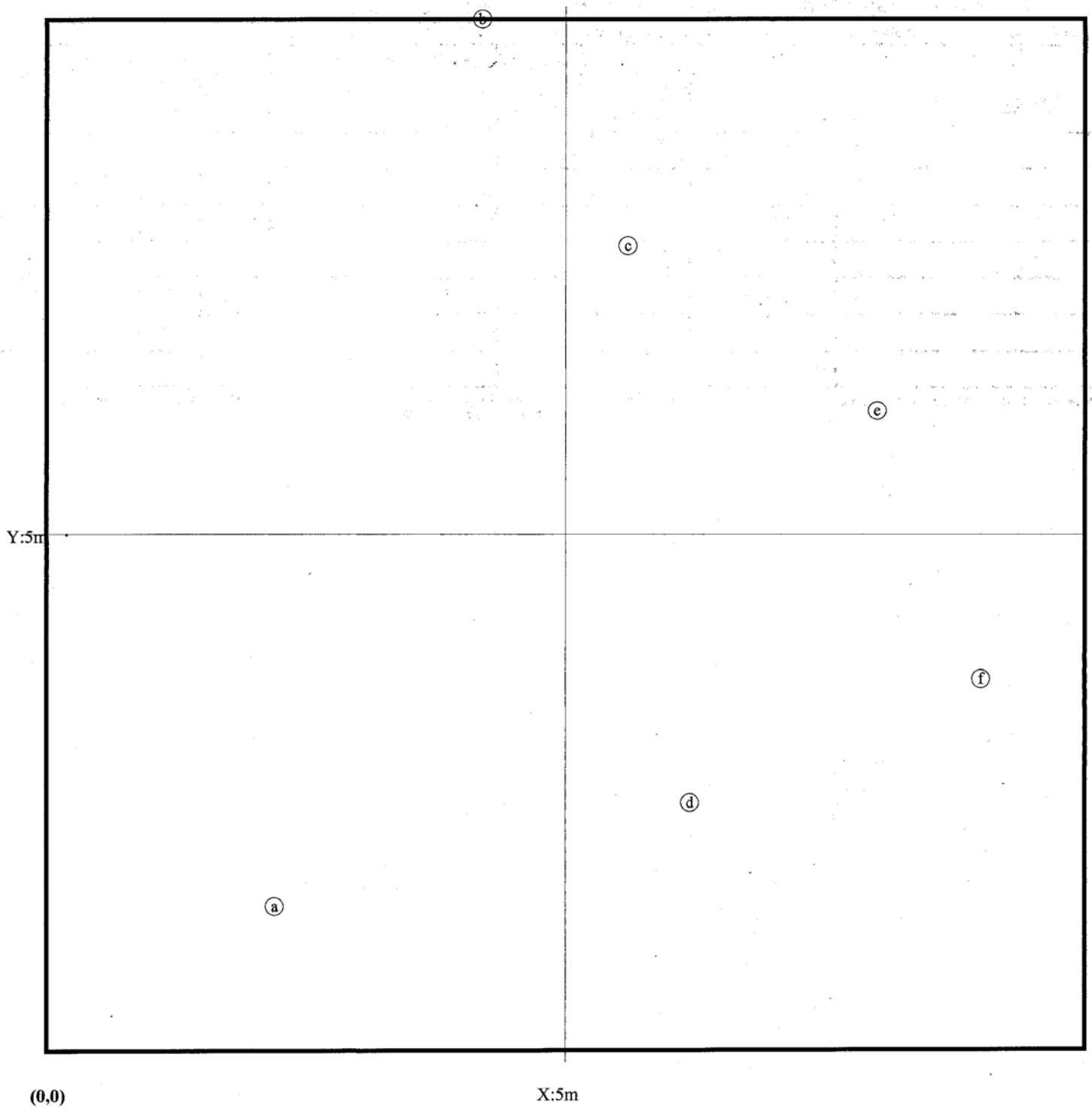
*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Map of stems on plot E92523-01-VP8

X-axis: 132 °

N

 # stems: 6
map size: LARGE



*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

*DAMAGE: REMoval, CUT, MOWing; BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Printed in the CVS-EEP Entry Tool ver. 2.3.1

Vegetation Monitoring Data (VMD) Datasheet — **Please fill in any missing data and correct any errors.**

Plot E92523-01-VPA

VMD Year (1-5): 5 Date: 10 / 2 / 13 - 10 / 2 / 13

Taxonomic Standard: Weakley's Flora

Taxonomic Standard DATE:

Latitude or UTM-N: (dec.deg. or m) 36.19709 Datum: NAD83/WGS84

Longitude or UTM-E: -79.58234 UTM Zone: 17

Coordinate Accuracy (m): 1 X-Axis bearing (deg): 152

Plot Dimensions: X: 10 Y: 10 ☐ Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X

Party: C. Sheats; N. Scott — Role:

Date last planted:
New planting date m/yy? /
☐ Check box if plot was not sampled, specify reason below
Notes:

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Sep 2012 Data Height 1cm*	Sep 2012 Data DBH 1 cm	Notes*	THIS YEAR'S DATA Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
578	Quercus sp.	h	R	8.7	8.0	89.0		☐	138	.3	☐	4	ins	
579	Diospyros virginiana	g	R	8.4	9.1	138.0	3.0	☐	187	.7	☐	3	vine	honeysuckle
580	Cercis canadensis var. canadensis	e	R	7.2	5.7	123.0	DBH?	☑	194	.7	☐	3	vine DIS strang	honeysuckle
581	Viburnum dentatum var. dentatum	c	R	4.3	5.2	225.0	1.0	☐	293	1.5	☐	4	vine	honeysuckle
582	Fraxinus pennsylvanica	a	R	1.7	5.3	95.0		☐	119	—	☐	3	none	
585	Sambucus canadensis	b	L	2.1	0.1	186.0	0.6	☑	192	1	☐	3	DIS	
589	Fraxinus pennsylvanica	d	R	6.0	3.6	67.0		☑	76	—	☐	2	vine	
590	Fraxinus pennsylvanica	f	R	8.1	3.5	71.0		☐	98	—	☐	2	vine	honeysuckle
591	Viburnum dentatum var. dentatum	i	R	9.7	0.6	65.0		☑	65	—	☐	1	smothered	

 # stems: 9

New Stems, not included last year, but are obviously planted. If more space needed, use blank PWS (Planted Woody Stems) Form:

Species Name	Source*	X (m)	Y (m)	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes

***Notes by ID:**
580-yr2: insects | yr3: vine | yr4: diseased
585-yr3: insect | yr4: diseased
589-no leaves
591-smothered

dominant herb:
honeysuckle
goldenrod
rubus

*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Printed in the CVS-EEP Entry Tool ver. 2.3.1

Plot (continued): E92523-01-VPA

ID	Species	map char	source	X (m)	Y (m)	Sep 2012 Data ddh (mm)	Height (cm)	DBH (cm)	Notes*	THIS YEAR'S DATA ddh (mm)	Height (cm)	DBH (cm)	Re-sprout	Vigor*	Damage*	Notes

Natural Woody Stems - tallied by species

Explanation of cut-off & subsampling:**

Height Cut-Off (All stems shorter than this are ignored. If >10cm, explain why to the right.): ☑ 10cm ☐ 50cm ☐ 100cm ☐ 137cm

Species Name	☑ c	SEEDLINGS — HEIGHT CLASSES: Sub-Seed	10 cm-50 cm	50 cm-100 cm	100 cm-137 cm	SAPLINGS — DBH: Sub-Sapl	0-1 cm	1-2.5	TREES — DBH: 2.5-	5-	=10 (write DBH)
Platanus occidentalis		—	1	4		—	2		1		
Liquidambar styraciflua		—	1	2	3	—	4				
Acer rubrum		—				—	1				
Diospyros virginiana		—				—			1		
Carpinus caroliniana		—			2	—					
Lyriodendron tulipifera		—	2	1	1	—					
Quercus phelos		—		1		—	1				

**Required if cut-off >10cm or subsample ? 100%.

1 2 3 4 5 6 7 8 9 10

Form WS2, ver 9.1

Sambucus 2

Alnus serulata 2

Pinus virginiana 1

Salix nigra 1

Juglans nigra 1

Photo# 1797

*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

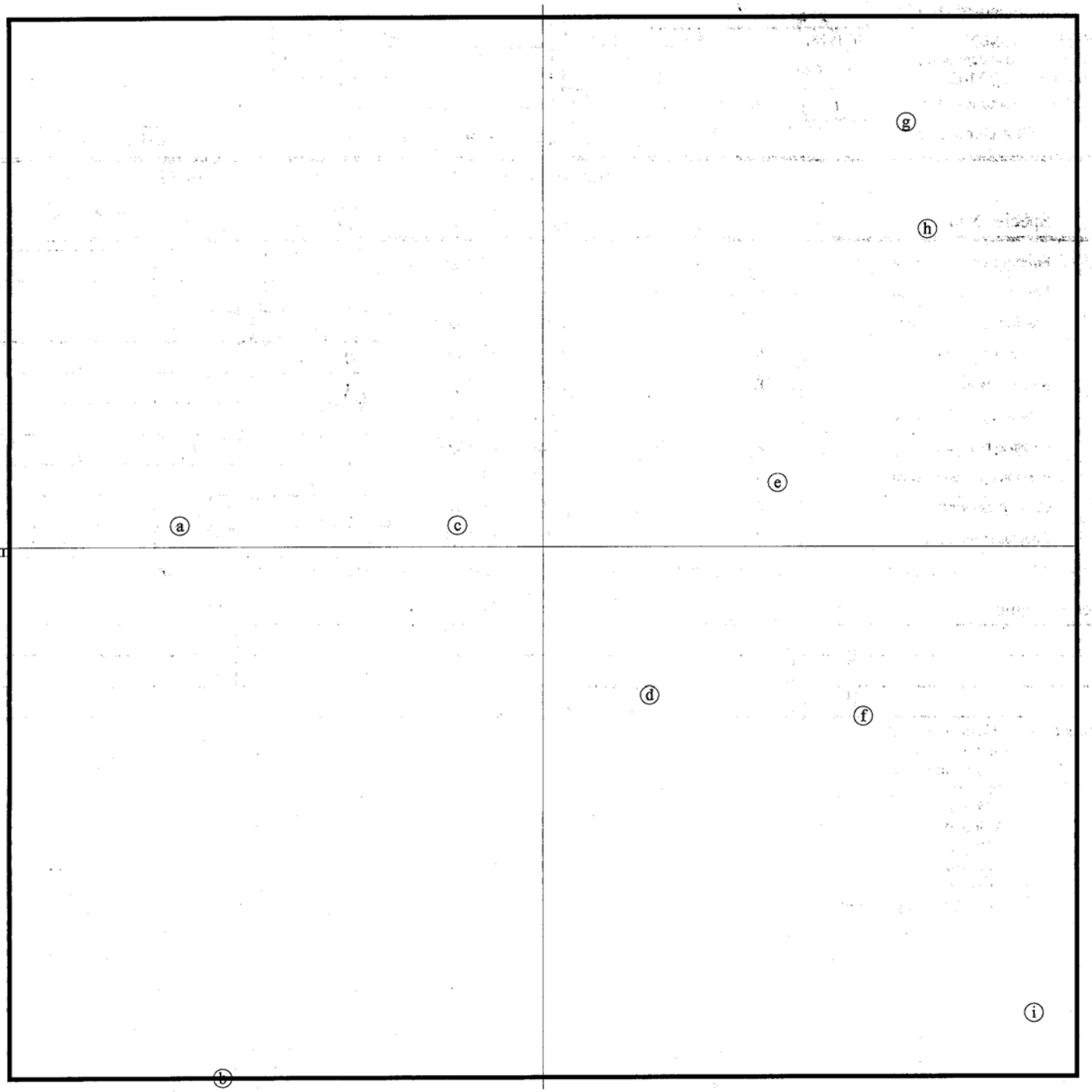
*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Map of stems on plot E92523-01-VPA

X-axis: 152 °

N

 # stems: 9
map size: LARGE



*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Printed in the CVS-EEP Entry Tool ver. 2.3.1

Vegetation Monitoring Data (VMD) Datasheet **Please fill in any missing data and correct any errors.**

Plot E92523-01-VPB

VMD Year (1-5): 5 Date: 10 / 2 / 13 - 10 / 2 / 13

Taxonomic Standard: Weakley's Flora

Taxonomic Standard DATE: 2012

Latitude or UTM-N: (dec.deg. or m) 36.19282 Datum: NAD83/WGS84

Longitude or UTM-E: -79.57080 UTM Zone: 17

Coordinate Accuracy (m): 1 X-Axis bearing (deg): 266

Plot Dimensions: X: 10 Y: 10 ☐ Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X

Party:	Role:
C. Sheats	
N. Scott	

Date last planted:

New planting date m/yy? /

☐ Check box if plot was not sampled, specify reason below

Notes:

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Sep 2012 Data Height 1cm*	Sep 2012 Data DBH 1 cm	Notes*	THIS YEAR'S DATA Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
951	Fraxinus pennsylvanica	a	R	1.8	1.7	123.0	DBH?	☑	182	1	☐	3	INS	
952	Fraxinus pennsylvanica	b	R	1.8	4.3	163.0	0.9	☑	270	1.5	☐	3	INS, DIS	
953	Fraxinus pennsylvanica	c	R	1.9	6.7	219.0	1.3	☑	297	2.5	☐	3	INS, DIS	
957	Nyssa sylvatica	e	R	4.4	2.6	127.0	DBH?	☑	220	.6	☐	3	INS	
958	Nyssa sylvatica	d	R	4.4	0.3	100.0		☑	187	.3	☐	3		
959	Fraxinus pennsylvanica	f	R	6.8	4.2	253.0	1.5	☑	304	2.7	☐	3		
960	Nyssa sylvatica	g	R	6.8	6.7	102.0	DBH?	☑	182	.3	☐	3	DIS	
962	Fraxinus pennsylvanica	j	R	9.0	7.6	202.0	1.2	☑	273	1.5	☐	2		
963	Corylus americana	i	R	9.0	3.1	198.0	0.5	☑	224	1.2	☐	3	INS	
964	Corylus americana	h	R	9.0	0.9	117.0	DBH?	☑	182	.3	☐	3	INS, DIS	

 # stems: 10

New Stems, not included last year, but are obviously planted. If more space needed, use blank PWS (Planted Woody Stems) Form:

Species Name	Source*	X (m)	Y (m)	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes

***Notes by ID:**

951-Stem ID 501
952-Stem ID 502
953-Stem ID 503
957-507
958-508
959-510
960-511
962-514
963-516
964-yr3: 517 | yr4: insects

*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Plot (continued): E92523-01-VPB

ID	Species	map char	source	X (m)	Y (m)	Sep 2012 Data: ddh (mm)	Height (cm)	DBH (cm)	Notes*	THIS YEAR'S DATA: ddh (mm)	Height (cm)	DBH (cm)	Re-sprout	Vigor*	Damage*	Notes

Natural Woody Stems - tallied by species

Explanation of cut-off & subsampling**:

Height Cut-Off (All stems shorter than this are ignored. If >10cm, explain why to the right.): ☑ 10cm ☐ 50cm ☐ 100cm ☐ 137cm

Species Name	☑ c	SEEDLINGS — HEIGHT CLASSES: Sub-Seed	10 cm-50 cm	50 cm-100 cm	100 cm-137 cm	SAPLINGS — DBH: Sub-Sapl	0-1 cm	1-2.5	TREES — DBH: 2.5-	5-	=10 (write DBH)
Salix nigra		—				—				•	
Acer negundo		—			•	—	•	•••	••	•	
Liquidambar		—	•			—					
Salix exicia		—				—		••			
Corylus americana		—				—	•				
Fraxinus pennsylvanica		—				—	•	•	•		
		—				—					

**Required if cut-off >10cm or subsample ? 100%. ●1 ●2 ●3 ●4 ●5 ●6 ●7 ●8 ●9 ●10 Form WS2, ver 9.1

herbaceous:
Juncus
wingstem
rubus
goldenrod

*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

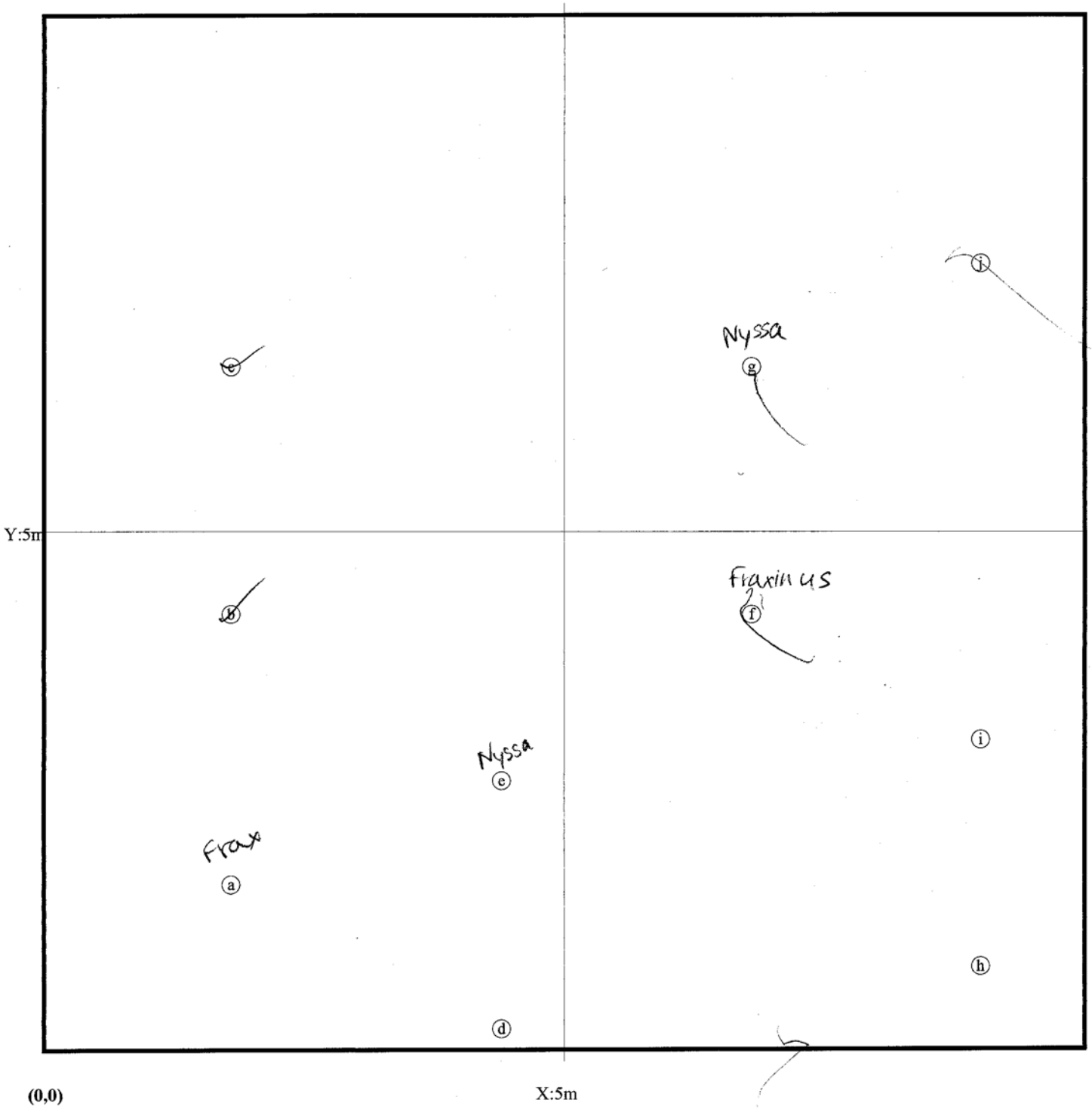
*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Map of stems on plot E92523-01-VPB

X-axis: 266 °

 # stems: 10
map size: LARGE

N



*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Printed in the CVS-EEP Entry Tool ver. 2.3.1

Vegetation Monitoring Data (VMD) Datasheet **Please fill in any missing data and correct any errors.**

Plot E92523-01-VPC

VMD Year (1-5): 5 Date: 10/2/13 - 10/2/13

Taxonomic Standard: Weakley's Flora

Taxonomic Standard DATE: 2012

Latitude or UTM-N: (dec.deg. or m) 36.19075 Datum: NAD83/WGS84

Longitude or UTM-E: -79.57179 UTM Zone: 17

Coordinate Accuracy (m): 1 X-Axis bearing (deg): 168

Plot Dimensions: X: 10 Y: 10 ☐ Plot has reverse orientation for X and Y axis (Y is 90 degrees to the right of X

Party:	Role:
C. Sheats	
N. Scott	

Date last planted:

New planting date m/yy? /

☐ Check box if plot was not sampled, specify reason below

Notes:

ID	Species Name	Map char	Source*	X 0.1m	Y 0.1m	Sep 2012 Data Height 1cm*	Sep 2012 Data DBH 1 cm	Notes*	THIS YEAR'S DATA Height 1cm*	DBH 1 cm	Re-sprout	Vigor*	Damage*	Notes
698	Quercus lyrata	(f)	R	5.6	0.4	202.0	1.0	☐	364	2.2	☐	4	INS	
699	Platanus occidentalis var. occidentalis	(j)	R	8.3	0.4	334.0	2.0	☑	4.5m	3.5	☐	4	INS, VINE	Lyonesserve
700	Liriodendron tulipifera var. tulipifera	(m)	R	9.4	1.6	258.0	1.2	☑	378	2.5	☐	4		
701	Quercus lyrata	(h)	R	6.8	2.1	232.0	1.2	☐	295	2.7	☐	4		
702	Fraxinus pennsylvanica	(d)	R	4.0	2.2	298.0	1.2	☐	312	2	☐	4	vine	grape
703	Betula nigra	(a)	R	0.2	4.9	386.0	2.0	☑	450	4	☐	4		
704	Quercus lyrata	(c)	R	2.6	4.9	360.0	3.4	☐	500	4.8	☐	4	vine, INS	
705	Fraxinus pennsylvanica	(k)	R	8.3	4.4	234.0	1.2	☑	297	2.5	☐	4	vine	
707	Liriodendron tulipifera var. tulipifera	(i)	R	6.8	7.2	161.0	0.4	☐	227	1	☐	3	vine	
708	Quercus lyrata	(e)	R	4.1	7.2	265.0	1.5	☑	308	2.2	☐	4	DIS	
709	Betula nigra	(b)	R	1.4	7.2	475.0	5.5	☑	700	7.7	☐	4		
711	Fraxinus pennsylvanica	(g)	R	5.8	9.7	460.0	4.0	☑	500	5.5	☐	4		
712	Quercus lyrata	(l)	R	8.5	9.7	293.0	2.4	☑	367	4	☐	4		

 # stems: 13

New Stems, not included last year, but are obviously planted. If more space needed, use blank PWS (Planted Woody Stems) Form:

Species Name	Source*	X (m)	Y (m)	Height 1 cm*	DBH 1 cm	Vigor*	Damage*	Notes

***Notes by ID:**

699-diseased
700-diseased
703-diseased
705-smothered
708-diseased
709-diseased
711-diseased
712-diseased

*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Printed in the CVS-EEP Entry Tool ver. 2.3.1

Plot (continued): E92523-01-VPC

ID	Species	map char	source	X (m)	Y (m)	Sep 2012 Data ddh (mm)	Height (cm)	DBH (cm)	Notes*	THIS YEAR'S DATA ddh (mm)	Height (cm)	DBH (cm)	Re-sprout	Vigor*	Damage*	Notes

Natural Woody Stems - tallied by species

Explanation of cut-off & subsampling**:

Height Cut-Off (All stems shorter than this are ignored. If >10cm, explain why to the right.): ☐ 10cm ☐ 50cm ☐ 100cm ☐ 137cm

Species Name	☑ c	SEEDLINGS — HEIGHT CLASSES: Sub-Seed	10 cm-50 cm	50 cm-100 cm	100 cm-137 cm	SAPLINGS — DBH: Sub-Sapl	0-1 cm	1-2.5	TREES — DBH: 2.5-	5-	=10 (write DBH)
Platanus occidentalis		—		1	2	—	2	3	9	2	
Coralus americana		—				—	2				
Lyreoderdron tulip		—				—					
Betula nigra		—	1			—	2	2		1	
Fraxinus pennsylvanica		—				—		1	2		
Cercis canadensis		—			1	—					
Liquidambar		—			1	—					

**Required if cut-off >10cm or subsample ? 100%. 1 2 3 4 5 6 7 8 9 10 Form WS2, ver 9.1

Tree Heaven

Notes: wingstem lyressea japonica dominant herbs

Acer negundo

Bacchanus halomofolia

*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

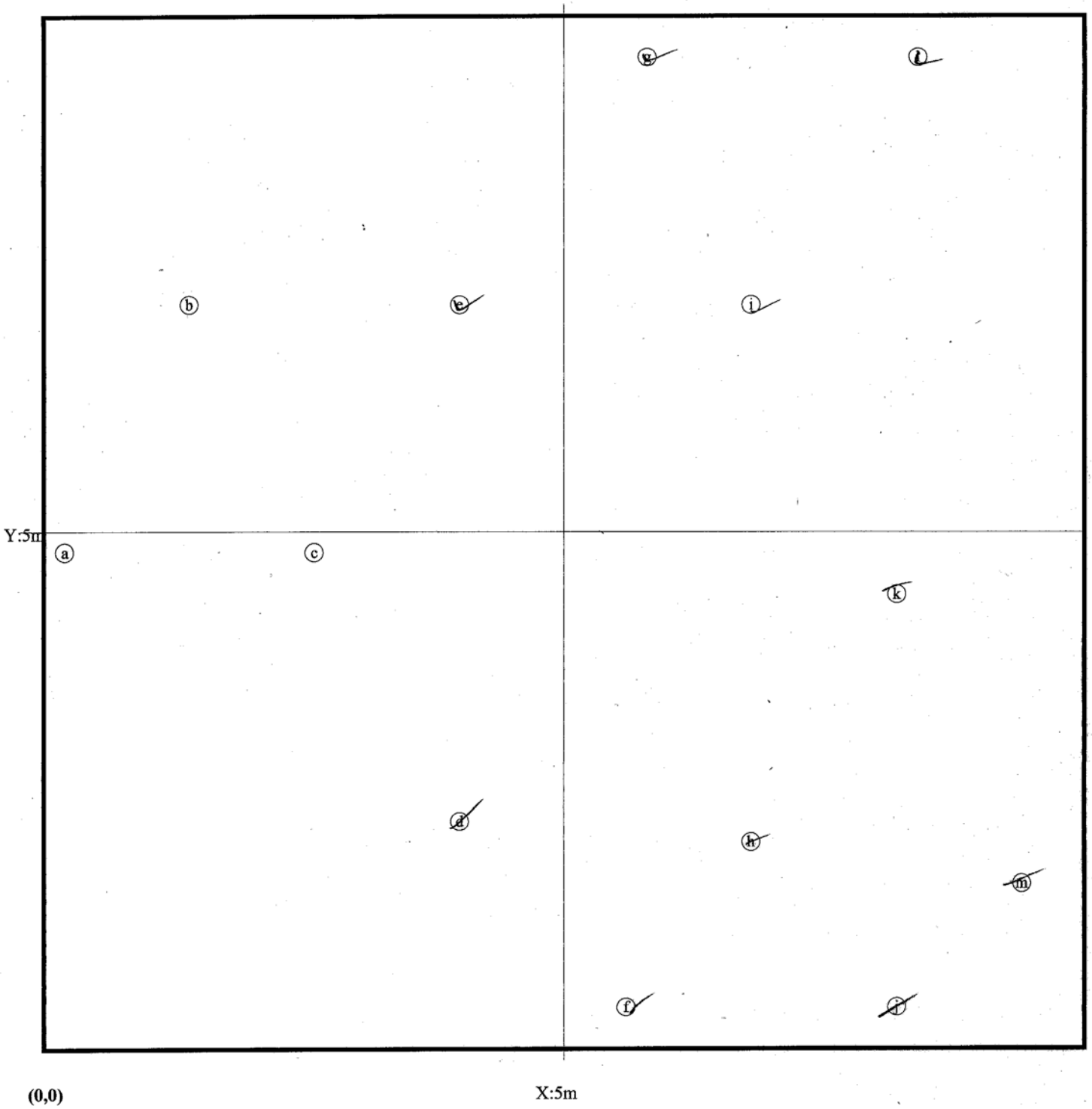
*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Map of stems on plot E92523-01-VPC

X-axis: 168 °

N

 # stems: 13
map size: LARGE



*SOURCE: Tr=Transplant, L=Live stake, B=Ball and burlap, P=Potted, Tu=Tubling, R=bare Root, M=Mechanically, U=Unknown

*VIGOR: 4=excellent, 3=good, 2=fair, 1=unlikely to survive year, 0=dead, M=missing.

*DAMAGE: REMoval, CUT, MOWing, BEAVer, DEER, RODents, INSects, GAME, LIVESTock, Other/Unknown ANIMal, Human TRAMpled, Site Too WET, Site Too DRY, FLOOD, DROUght, STORM, HURRicane, DISeased, VINE Strangulation, UNKNown, specify other.

*HEIGHT PRECISION drops to 10cm if >2.5m and 50cm if >4m.

Printed in the CVS-EEP Entry Tool ver. 2.3.1

APPENDIX B

GEOMORPHIC RAW DATA

Photo Point 1

Buckhorn Creek facing upstream Year 0 Photo No. 1

Buckhorn Creek facing upstream Year 3 Photo No. 4

Buckhorn Creek facing upstream Year 1 Photo No. 2

Buckhorn Creek facing upstream Year 4 Photo No. 5

Buckhorn Creek facing upstream Year 2 Photo No. 3

Buckhorn Creek facing upstream Year 5 Photo No. 6

Photo Point 2

Buckhorn Creek facing upstream Year 0 Photo No. 7

Buckhorn Creek facing upstream Year 3 Photo No. 10

Buckhorn Creek facing upstream Year 1 Photo No. 8

Buckhorn Creek facing upstream Year 4 Photo No. 11

Buckhorn Creek facing upstream Year 2 Photo No. 9

Buckhorn Creek facing upstream Year 5 Photo No. 12

Photo Point 3

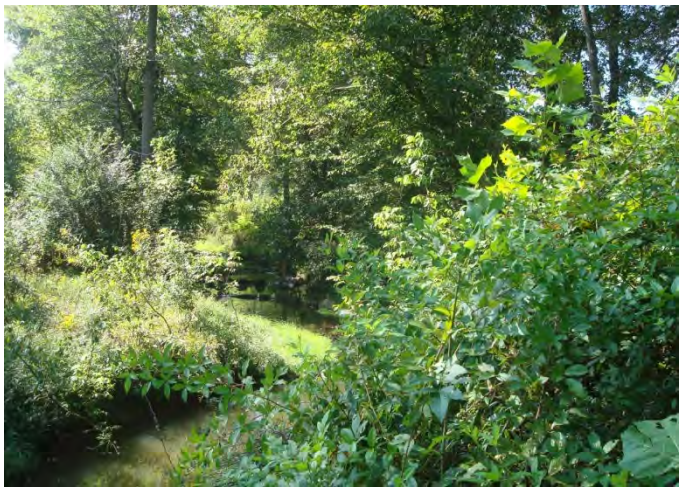
Buckhorn Creek facing upstream Year 0 Photo No. 13

Buckhorn Creek facing upstream Year 3 Photo No. 16

Buckhorn Creek facing upstream Year 1 Photo No. 14

Buckhorn Creek facing upstream Year 4 Photo No. 17

Buckhorn Creek facing upstream Year 2 Photo No. 15



Buckhorn Creek facing upstream Year 5 Photo No. 18

Photo Point 4

West Branch facing downstream Year 0 Photo No. 19

West Branch facing downstream Year 3 Photo No. 22

West Branch facing downstream Year 1 Photo No. 20

West Branch facing downstream Year 4 Photo No. 23

West Branch facing downstream Year 2 Photo No. 21

West Branch facing downstream Year 5 Photo No. 24

Photo Point 5

Buckhorn Creek facing upstream Year 0 Photo No. 25

Buckhorn Creek facing upstream Year 3 Photo No.28

Buckhorn Creek facing upstream Year 1 Photo No. 26

Buckhorn Creek facing upstream Year 4 Photo No. 29

Buckhorn Creek facing upstream Year 2 Photo No. 27

Buckhorn Creek facing upstream Year 5 Photo No.30

Photo Point 6

Buckhorn Creek at bridge, facing upstream Year 0 Photo No. 31

Buckhorn Creek at bridge, facing upstream Year 3 Photo No. 34

Buckhorn Creek at bridge, facing upstream Year 1 Photo No. 32

Buckhorn Creek at bridge, facing upstream Year 4 Photo No. 35

Buckhorn Creek at bridge, facing upstream Year 2 Photo No. 33

Buckhorn Creek at bridge, facing upstream Year 5 Photo No.36

Photo Point 7

Buckhorn Creek at bridge, facing downstream Year 0 Photo No. 37

Buckhorn Creek at bridge, facing downstream Year 3 Photo No.40

Buckhorn Creek at bridge, facing downstream Year 1 Photo No. 38

Buckhorn Creek at bridge, facing downstream Year 4 Photo No. 41

Buckhorn Creek at bridge, facing downstream Year 2 Photo No. 39

Buckhorn Creek at bridge, facing downstream Year 5 Photo No. 42

Photo Point 8

Buckhorn Creek facing upstream Year 0 Photo No. 43

Buckhorn Creek facing upstream Year 3 Photo No. 46

Buckhorn Creek facing upstream Year 1 Photo No. 44

Buckhorn Creek facing upstream Year 4 Photo No. 47

Buckhorn Creek facing upstream Year 2 Photo No. 45

Buckhorn Creek facing upstream Year 5 Photo No. 48

Photo Point 9

Buckhorn Creek facing upstream Year 0 Photo No. 49

Buckhorn Creek facing upstream Year 3 Photo No. 52

Buckhorn Creek facing upstream Year 1 Photo No. 50

Buckhorn Creek facing upstream Year 4 Photo No. 53

Buckhorn Creek facing upstream Year 2 Photo No. 51

Buckhorn Creek facing upstream Year 5 Photo No. 54

Photo Point 10

Buckhorn Creek facing upstream Year 0 Photo No. 55

Buckhorn Creek facing upstream Year 3 Photo No. 58

Buckhorn Creek facing upstream Year 1 Photo No. 56

Buckhorn Creek facing upstream Year 4 Photo No. 59

Buckhorn Creek facing upstream Year 2 Photo No. 57

Buckhorn Creek facing upstream Year 5 Photo No. 60

Photo Point 11

Southwest Creek facing downstream Year 0 Photo No. 61

Southwest Creek facing downstream Year 3 Photo No. 64

Southwest Creek facing downstream Year 1 Photo No. 62

Southwest Creek facing downstream Year 4 Photo No. 65

Southwest Creek facing downstream Year 2 Photo No. 63

Southwest Creek facing downstream Year 5 Photo No. 66

Photo Point 12

Southwest Creek facing upstream Year 0 Photo No. 67

Southwest Creek facing upstream Year 3 Photo No. 70

Southwest Creek facing upstream Year 1 Photo No. 68

Southwest Creek facing upstream Year 4 Photo No. 71

Southwest Creek facing upstream Year 2 Photo No. 69

Southwest Creek facing upstream Year 5 Photo No. 72

Table B2. Visual Morphological Stability Assessment

Holly Grove Stream Restoration Site (D06028-B)

Buckhorn Creek 8,848 ft

Feature Category	Metric	(# Stable) Number Performing as Intended	Total Number per As-built	Total Number / feet in unstable state	% Performing in Stable Condition	Feature Performing Mean or Total
A. Riffles	1. Present	86	86	N/A	100%	
	2. Armor stable	86	86	N/A	100%	
	3. Facet grade appears stable	86	86	N/A	100%	
	4. Minimal evidence of embedding/fining	86	86	N/A	100%	
	5. Length appropriate	86	86	N/A	100%	**100%**
B. Pools	1. Present	88	88	0	100%	
	2. Sufficently deep	88	88	N/A	100%	
	3. Length appropriate	88	88	N/A	100%	**100%**
C. Thalweg	1. Upstream of meander bend centered	86	86	N/A	100%	
	2. Downstream of meander bend centered	86	86	N/A	100%	**100%**
D. Meanders	1. Outer bend in state of limited erosion	84	88	N/A	95%	
	2. Of those eroding, # w/ concomitant point bar formation	0	N/A	N/A	100%	
	3. Apparent Rc within specification	88	88	N/A	100%	
	4. Sufficient floodplain access and relief	88	88	N/A	100%	**100%**
E. Bed General	1. General channel bed agradation areas	N/A	N/A	0/0	100%	
	2. Channel bed degradation - areas of increasing down-cutting or head-cutting	N/A	N/A	0/200	100%	**100%**
F. Vanes	1. Free of back or arm scour	108	108	N/A	100%	
	2. Height appropriate	108	108	N/A	100%	
	3. Angle and geometry appear appropriate	108	108	N/A	100%	
	4. Free of piping or other structural failures	108	108	N/A	100%	**100%**
G. Wads/Boulders	1. Free of scour	23	23	N/A	100%	
	2. Footing stable	23	23	N/A	100%	**100%**

Table B2. Visual Morphological Stability Assessment

Holly Grove Stream Restoration Site (D06028-B)

Middle Branch 1,755 ft

Feature Category	Metric	(# Stable) Number Performing as Intended	Total Number per As-built	Total Number / feet in unstable state	% Performing in Stable Condition	Feature Performing Mean or Total
A. Riffles	1. Present	44	44	N/A	100%	
	2. Armor stable	44	44	N/A	100%	
	3. Facet grade appears stable	43	44	N/A	98%	
	4. Minimal evidence of embedding/fining	44	44	N/A	100%	
	5. Length appropriate	44	44	N/A	100%	**100%**
B. Pools	1. Present	46	46	N/A	100%	
	2. Sufficently deep	46	46	N/A	100%	
	3. Length appropriate	46	46	N/A	100%	**100%**
C. Thalweg	1. Upstream of meander bend centered	44	44	N/A	100%	
	2. Downstream of meander bend centered	44	44	N/A	100%	**100%**
D. Meanders	1. Outer bend in state of limited erosion	45	46	N/A	98%	
	2. Of those eroding, # w/ concomitant point bar formation	0	N/A	N/A	100%	
	3. Apparent Rc within specification	46	46	N/A	100%	
	4. Sufficient floodplain access and relief	46	46	N/A	100%	**99%**
E. Bed General	1. General channel bed agradation areas	N/A	N/A	0/0	100%	
	2. Channel bed degradation - areas of increasing down-cutting or head-cutting	N/A	N/A	0/0	100%	**100%**
F. Vanes	1. Free of back or arm scour	69	69	N/A	100%	
	2. Height appropriate	69	69	N/A	100%	
	3. Angle and geometry appear appropriate	69	69	N/A	100%	
	4. Free of piping or other structural failures	69	69	N/A	100%	**100%**
G. Wads/Boulders	1. Free of scour	3	3	N/A	100%	
	2. Footing stable	3	3	N/A	100%	**100%**

Table B2. Visual Morphological Stability Assessment

Holly Grove Stream Restoration Site (D06028-B)

East Branch 1,090 ft

Feature Category	Metric	(# Stable) Number Performing as Intended	Total Number per As-built	Total Number / feet in unstable state	% Performing in Stable Condition	Feature Performing Mean or Total
A. Riffles	1. Present	25	25	N/A	100%	
	2. Armor stable	24	25	N/A	96%	
	3. Facet grade appears stable	25	25	N/A	100%	
	4. Minimal evidence of embedding/fining	25	25	N/A	100%	
	5. Length appropriate	25	25	N/A	100%	**99%**
B. Pools	1. Present	25	25	N/A	100%	
	2. Sufficently deep	25	25	N/A	100%	
	3. Length appropriate	25	25	N/A	100%	**100%**
C. Thalweg	1. Upstream of meander bend centered	25	25	N/A	100%	
	2. Downstream of meander bend centered	25	25	N/A	100%	**100%**
D. Meanders	1. Outer bend in state of limited erosion	25	25	N/A	100%	
	2. Of those eroding, # w/ concomitant point bar formation	0	N/A	N/A	100%	
	3. Apparent Rc within specification	25	25	N/A	100%	
	4. Sufficient floodplain access and relief	25	25	N/A	100%	**100%**
E. Bed General	1. General channel bed agradation areas	N/A	N/A	0/0	100%	
	2. Channel bed degradation - areas of increasing down-cutting or head-cutting	N/A	N/A	0/0	100%	**100%**
F. Vanes	1. Free of back or arm scour	37	38	N/A	97%	
	2. Height appropriate	38	38	N/A	100%	
	3. Angle and geometry appear appropriate	38	38	N/A	100%	
	4. Free of piping or other structural failures	37	38	N/A	97%	**99%**
G. Wads/Boulders	1. Free of scour	1	1	N/A	100%	
	2. Footing stable	1	1	N/A	100%	**100%**

Table B2. Visual Morphological Stability Assessment

Holly Grove Stream Restoration Site (D06028-B)

Southeast Creek 363 ft

Feature Category	Metric	(# Stable) Number Performing as Intended	Total Number per As-built	Total Number / feet in unstable state	% Performing in Stable Condition	Feature Performing Mean or Total
A. Riffles	1. Present	10	10	N/A	100%	
	2. Armor stable	10	10	N/A	100%	
	3. Facet grade appears stable	10	10	N/A	100%	
	4. Minimal evidence of embedding/fining	10	10	N/A	100%	
	5. Length appropriate	10	10	N/A	100%	**100%**
B. Pools	1. Present	10	10	N/A	100%	
	2. Sufficently deep	10	10	N/A	100%	
	3. Length appropriate	10	10	N/A	100%	**100%**
C. Thalweg	1. Upstream of meander bend centered	10	10	N/A	100%	
	2. Downstream of meander bend centered	10	10	N/A	100%	**100%**
D. Meanders	1. Outer bend in state of limited erosion	9	9	N/A	100%	
	2. Of those eroding, # w/ concomitant point bar formation	0	N/A	N/A	100%	
	3. Apparent Rc within specification	9	9	N/A	100%	
	4. Sufficient floodplain access and relief	9	9	N/A	100%	**100%**
E. Bed General	1. General channel bed agradation areas	N/A	N/A	0/0	100%	
	2. Channel bed degradation - areas of increasing down-cutting or head-cutting	N/A	N/A	0/0	100%	**100%**
F. Vanes	1. Free of back or arm scour	11	11	N/A	100%	
	2. Height appropriate	11	11	N/A	100%	
	3. Angle and geometry appear appropriate	11	11	N/A	100%	
	4. Free of piping or other structural failures	11	11	N/A	100%	**100%**
G. Wads/Boulders	1. Free of scour	2	2	N/A	100%	
	2. Footing stable	2	2	N/A	100%	**100%**

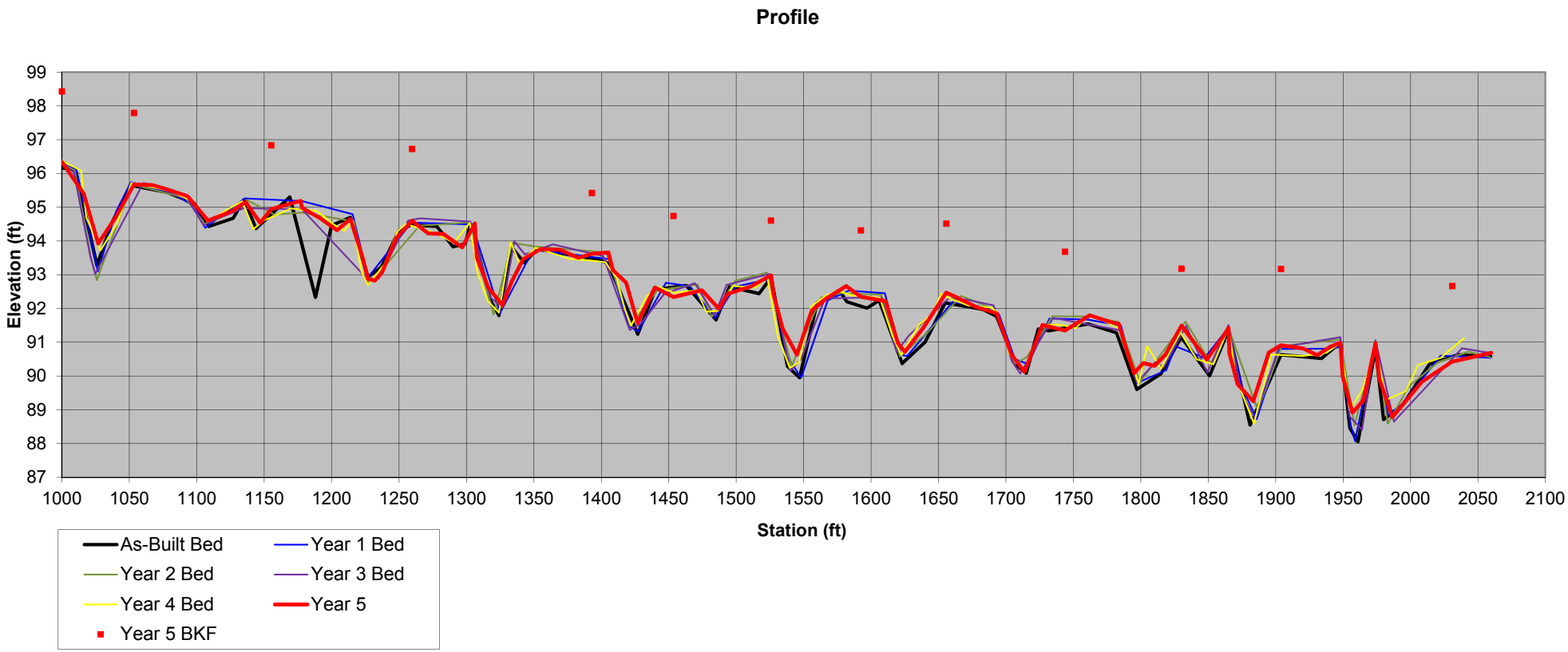
Table B2. Visual Morphological Stability Assessment

Holly Grove Stream Restoration Site (D06028-B)

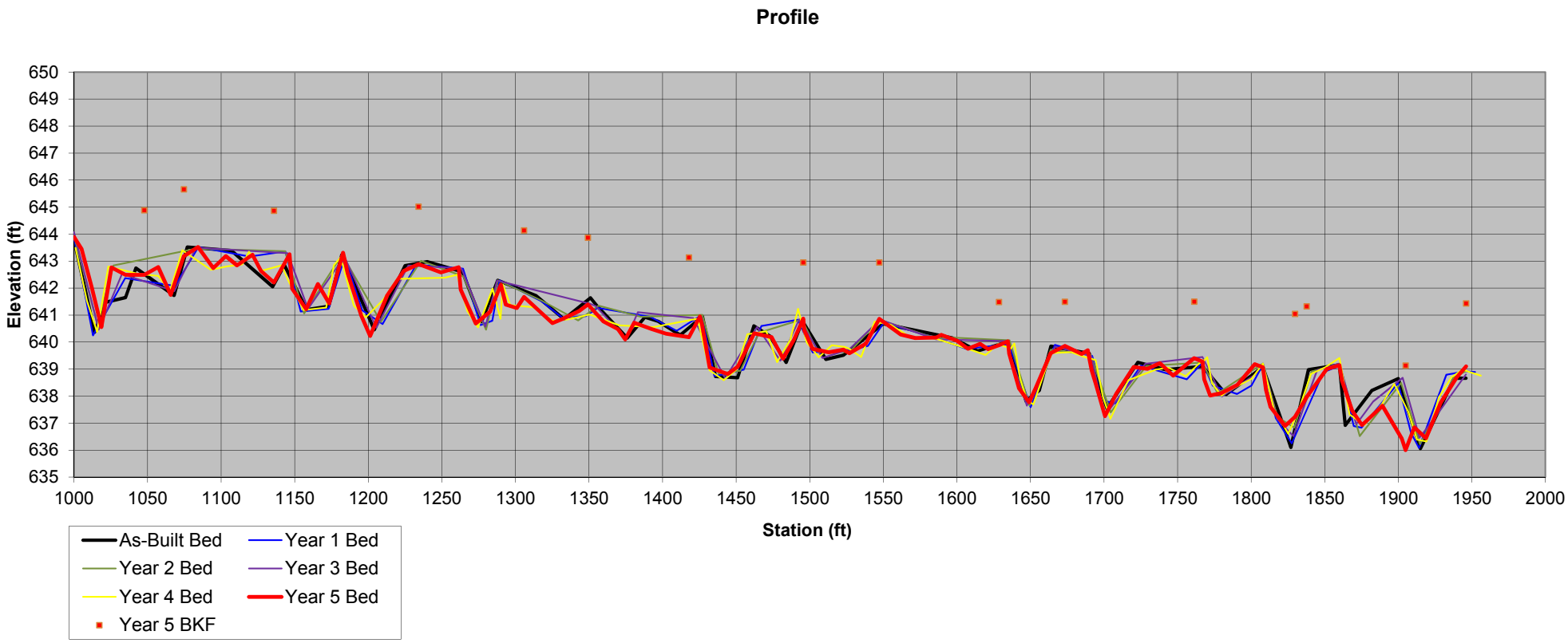
Southwest Creek 723 ft

Feature Category	Metric	(# Stable) Number Performing as Intended	Total Number per As-built	Total Number / feet in unstable state	% Performing in Stable Condition	Feature Performing Mean or Total
A. Riffles	1. Present	23	23	N/A	100%	
	2. Armor stable	23	23	N/A	100%	
	3. Facet grade appears stable	23	23	N/A	100%	
	4. Minimal evidence of embedding/fining	23	23	N/A	100%	
	5. Length appropriate	23	23	N/A	100%	**100%**
B. Pools	1. Present	25	25	N/A	100%	
	2. Sufficently deep	25	25	N/A	100%	
	3. Length appropriate	25	25	N/A	100%	**100%**
C. Thalweg	1. Upstream of meander bend centered	23	23	N/A	100%	
	2. Downstream of meander bend centered	23	23	N/A	100%	**100%**
D. Meanders	1. Outer bend in state of limited erosion	23	25	N/A	92%	
	2. Of those eroding, # w/ concomitant point bar formation	0	N/A	N/A	100%	
	3. Apparent Rc within specification	25	25	N/A	100%	
	4. Sufficient floodplain access and relief	25	25	N/A	100%	**100%**
E. Bed General	1. General channel bed agradation areas	N/A	N/A	0/0	100%	
	2. Channel bed degradation - areas of increasing down-cutting or head-cutting	N/A	N/A	0/0	100%	**100%**
F. Vanes	1. Free of back or arm scour	9	9	N/A	100%	
	2. Height appropriate	9	9	N/A	100%	
	3. Angle and geometry appear appropriate	9	9	N/A	100%	
	4. Free of piping or other structural failures	9	9	N/A	100%	**100%**
G. Wads/Boulders	1. Free of scour	34	34	N/A	100%	
	2. Footing stable	34	34	N/A	100%	**100%**

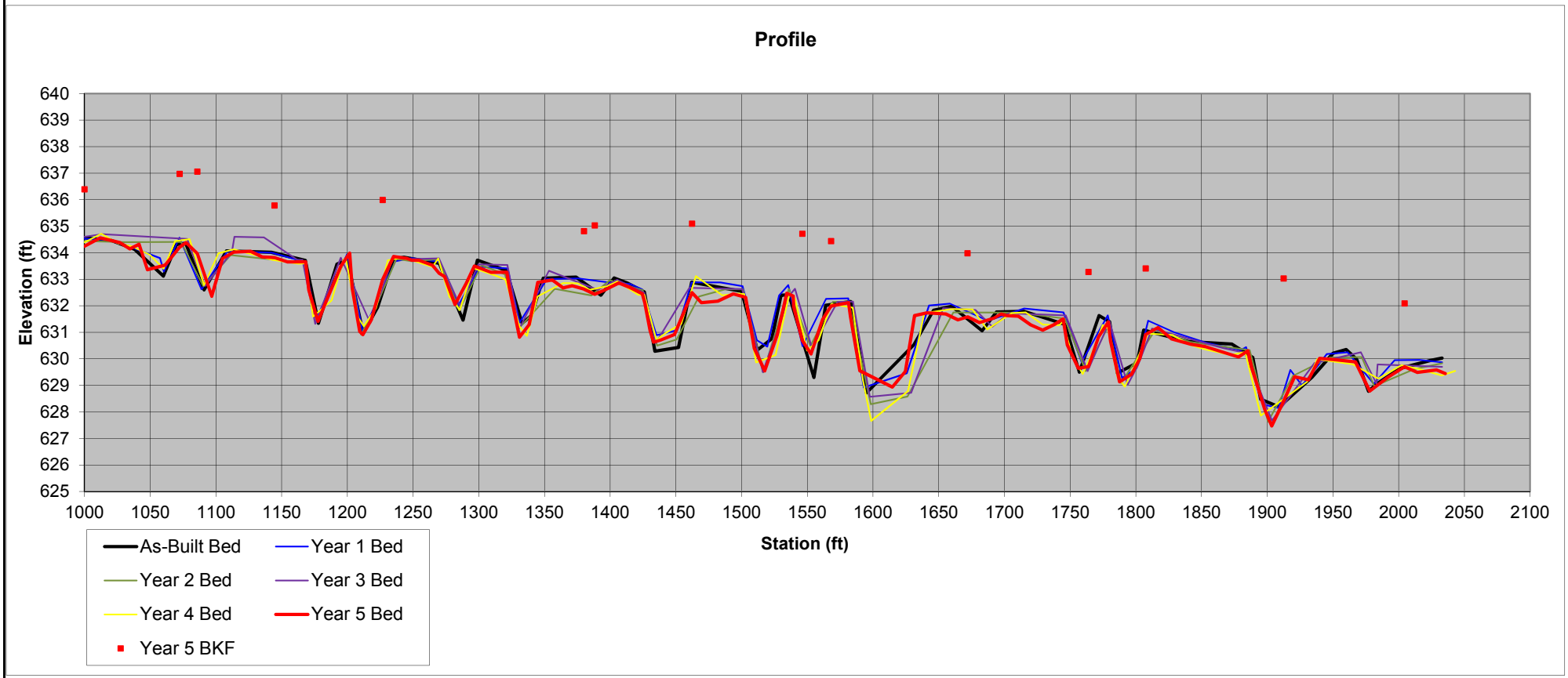
Holly Grove Stream Restoration Site
Guilford County, NC
Profile Reach 1 - Buckhorn Creek



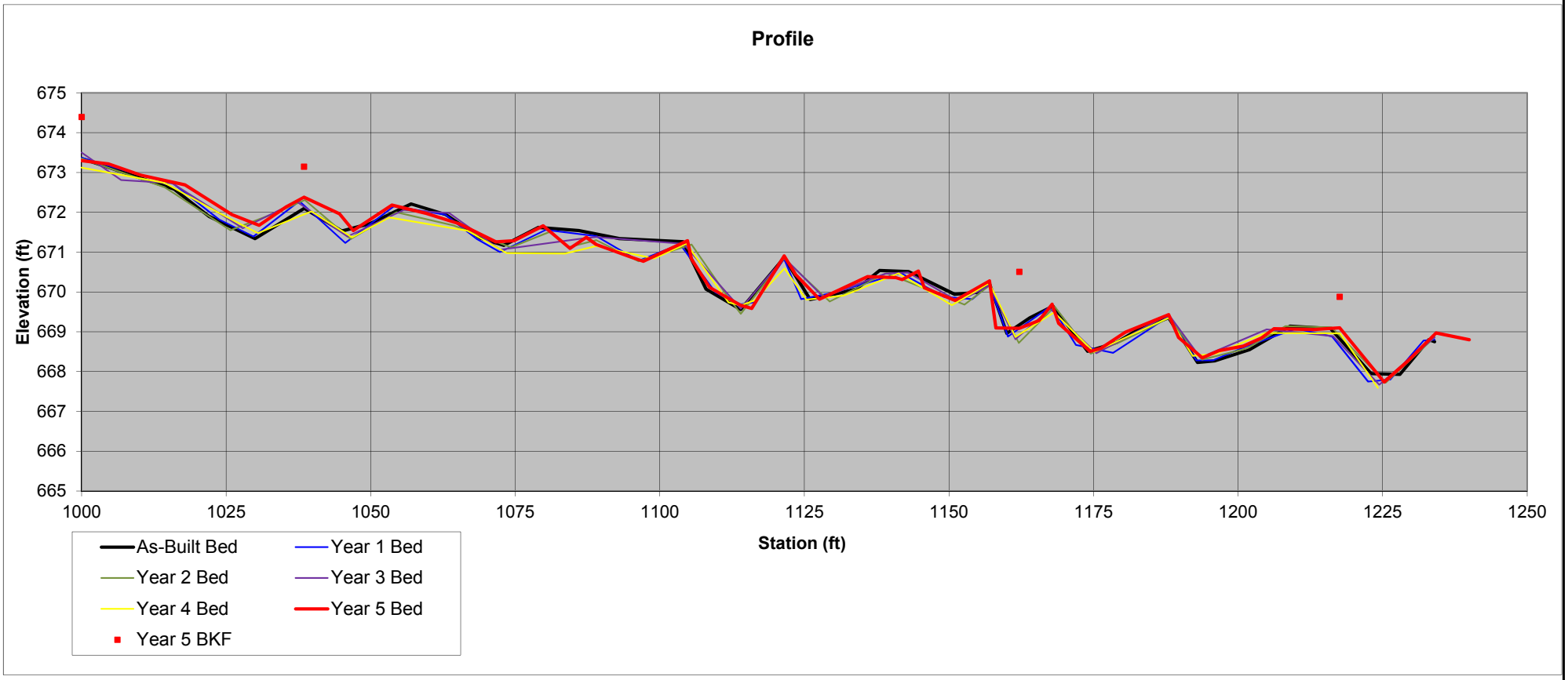
Holly Grove Stream Restoration Site
Guilford County, NC
Profile Reach 2 - Buckhorn Creek



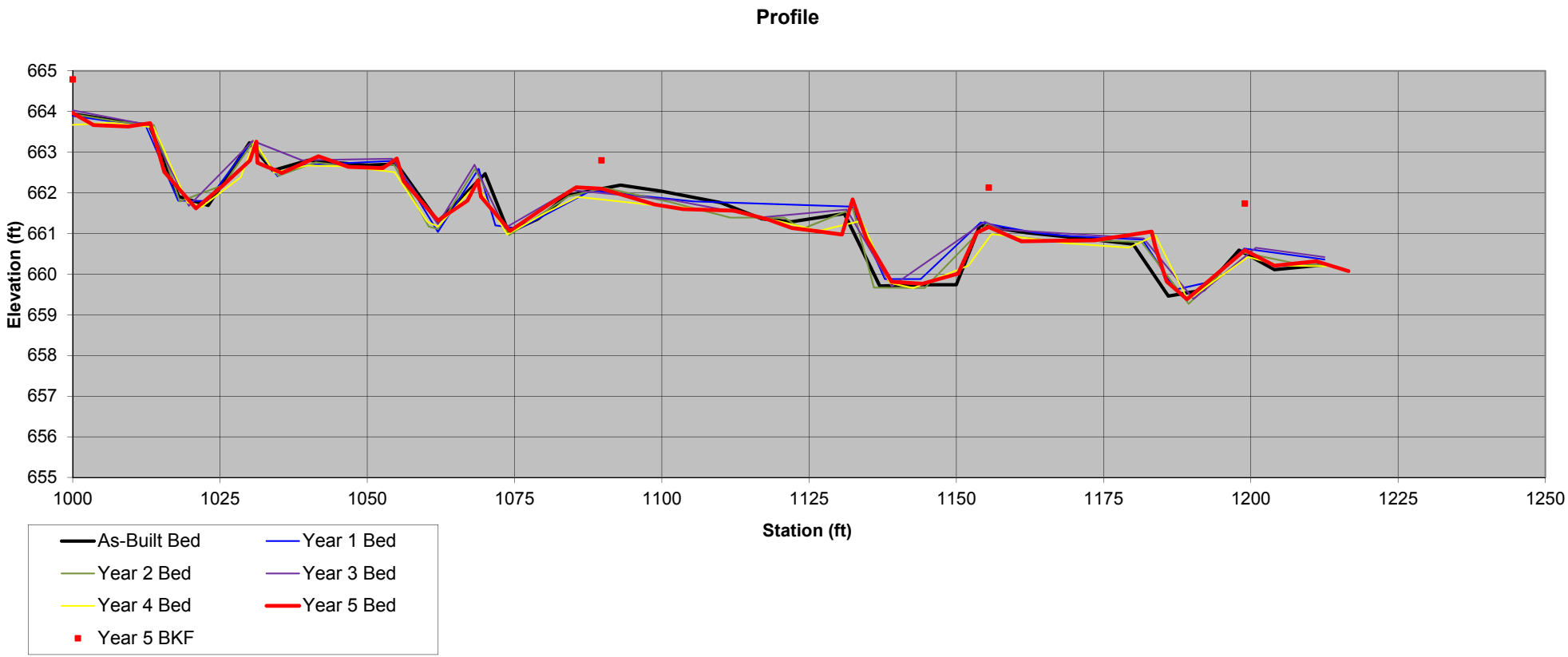
Holly Grove Stream Restoration Site
Guilford County, NC
Profile Reach 3 - Buckhorn Creek



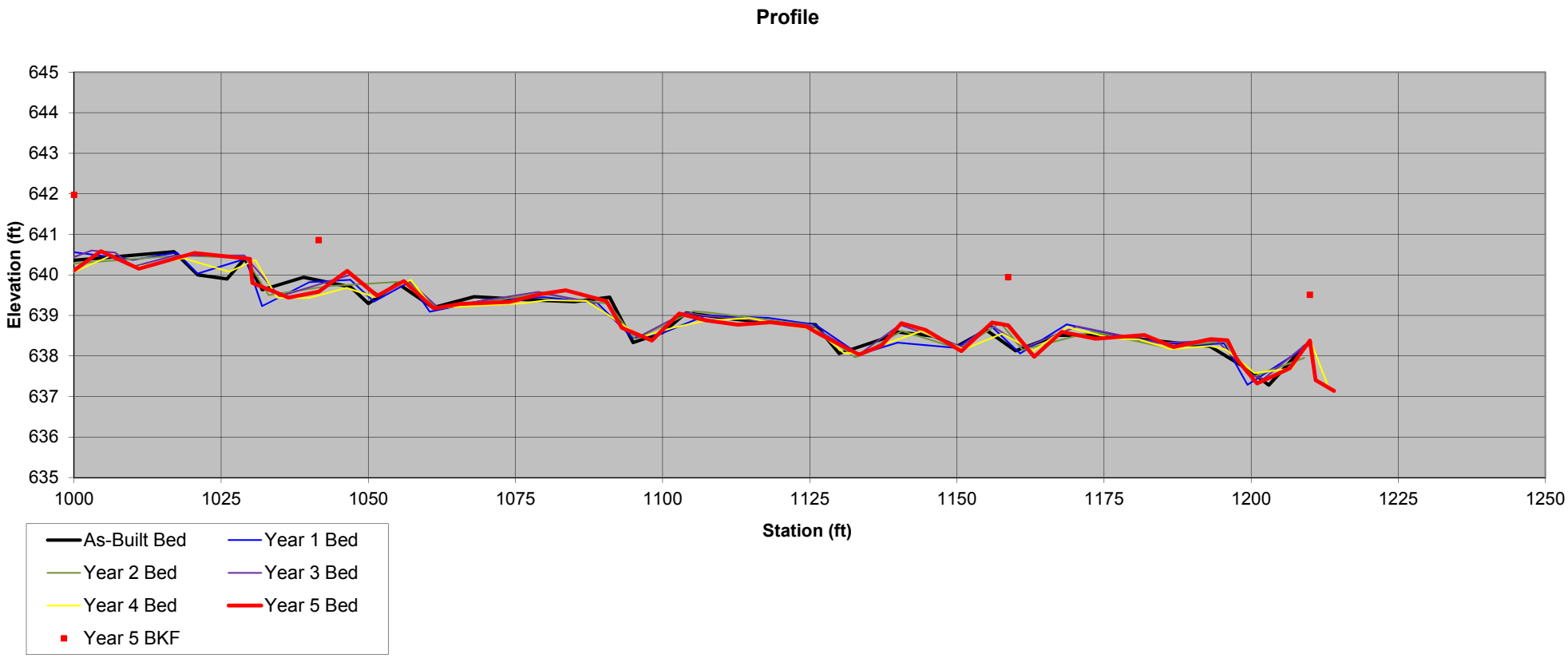
Holly Grove Stream Restoration Site
Guilford County, NC
Profile Reach 4 - Middle Branch



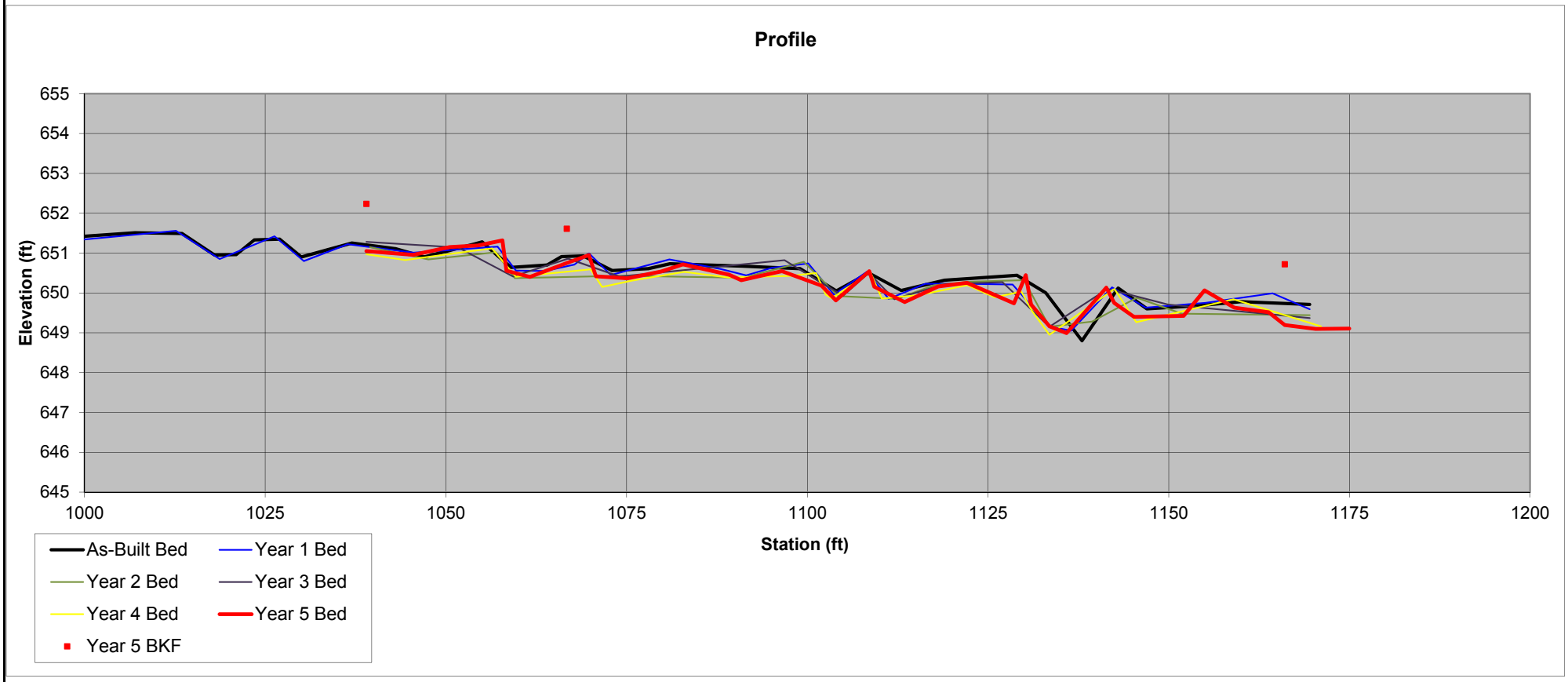
Holly Grove Stream Restoration Site
Guilford County, NC
Profile Reach 5 - Middle Branch



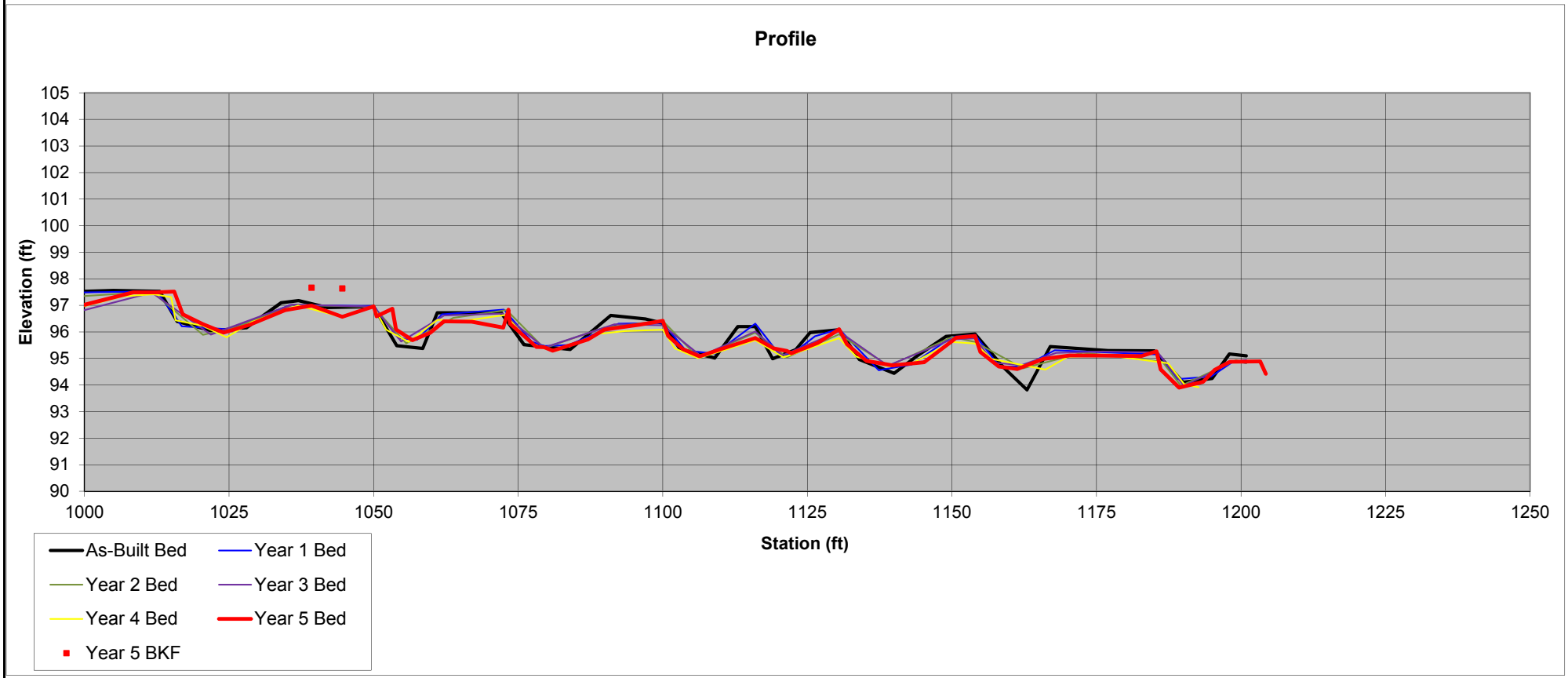
Holly Grove Stream Restoration Site
Guilford County, NC
Profile Reach 6 - Lower East Branch



Holly Grove Stream Restoration Site
Guilford County, NC
Profile Reach 7 - Southeast Creek



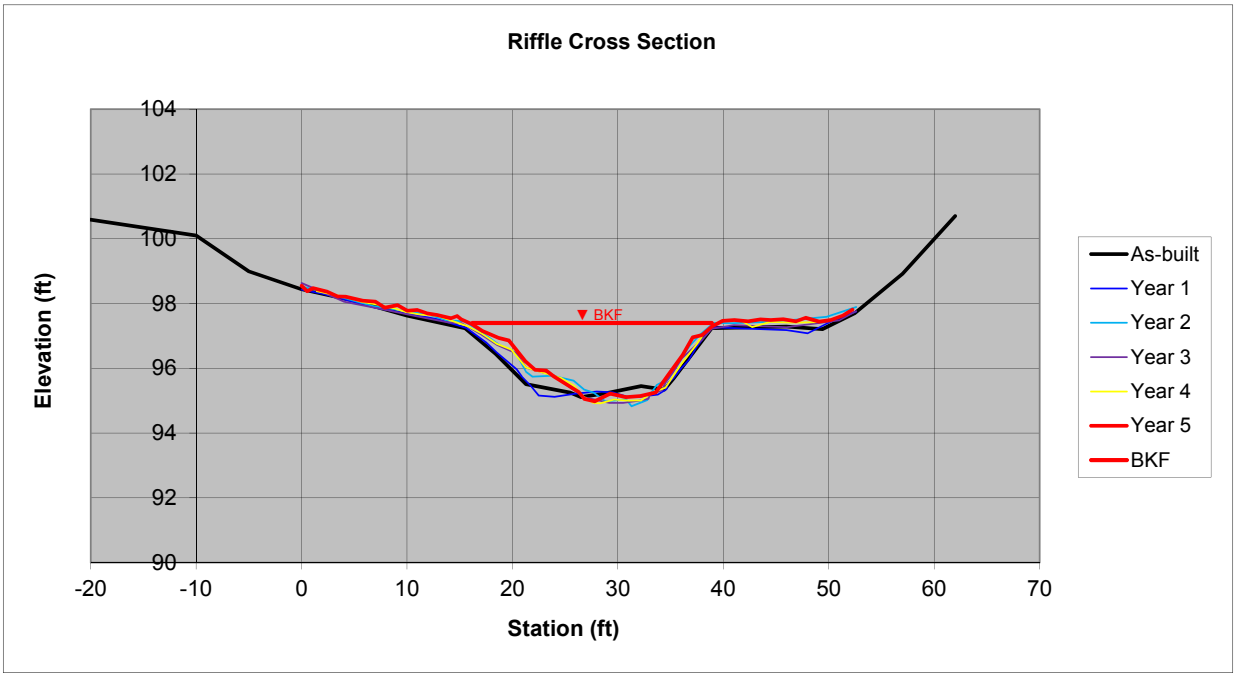
Holly Grove Stream Restoration Site
Guilford County, NC
Profile Reach 8 - Southwest Creek



Holly Grove Stream Restoration Site
Guilford County, NC
Riffle Cross Section RF1
Reach 1 - Buckhorn Creek - Sta 11+78.6

Year 5

Facing Downstream



As-Built		Year 1		Year 2		Year 3		Year 4		Year 5	
Date	1/8/09	Date	10/20/09	Date	10/11/10	Date	10/5/11	Date	9/17/12	Date	9/30/13
Area	34.3	Area	35.4	Area	35.3	Area	31.3	Area	32.8	Area	32.3
Bkf W	23.4	Bkf W	23.3	Bkf W	23.7	Bkf W	23.7	Bkf W	23.3	Bkf W	22.7
Dmean	1.5	Dmean	1.5	Dmean	1.5	Dmean	1.3	Dmean	1.4	Dmean	1.4
Dmax	2.1	Dmax	2.1	Dmax	2.6	Dmax	2.3	Dmax	2.4	Dmax	2.4
W/d	16.0	W/d	15.3	W/d	15.9	W/d	18.0	W/d	16.6	W/d	15.9

Holly Grove Stream Restoration Site
Guilford County, NC
Riffle Cross Section RF1
Reach 1 - Buckhorn Creek - Sta 11+78.6

As-Built			
Station	FS/BS	Elev.	Desc.
BM	6.36	97.34	PL1 IR Lt
HI		103.70	
-20	3.11	100.59	GRND
-10	3.60	100.10	
-5	4.71	98.99	
0	5.26	98.44	GRND
5	5.61	98.09	
10	6.07	97.63	
15.5	6.46	97.24	BKF
18.4	7.25	96.45	
21.3	8.19	95.51	TOE
25.5	8.45	95.25	EOW
26.5	8.59	95.11	THL
29	8.46	95.24	
32.2	8.25	95.45	
34.4	8.36	95.34	EOW
35.3	8.01	95.69	TOE
38.9	6.46	97.24	BKF
46	6.41	97.29	
49.4	6.49	97.21	
52.5	5.99	97.71	GRND
57	4.78	98.92	
62	3.00	100.70	

Year 1			
Station	FS/BS	Elev.	Desc.
BM	3.78	98.67	RF1 IR Lt
HI		102.45	
0	4.02	98.43	GRND
2	4.15	98.30	GRND
7	4.58	97.87	GRND
13	4.94	97.51	GRND
15.6	5.20	97.25	GRND
17.5	5.65	96.80	BKF LT
18.5	5.96	96.49	BNK
20	6.37	96.08	BNK
20.4	6.48	95.97	BNK
20.9	6.71	95.74	BNK
21.7	6.98	95.47	EOW
22.5	7.29	95.16	BED
24	7.33	95.12	BED
26	7.23	95.22	BED
28	7.17	95.28	BED
29.5	7.19	95.26	BED
30.9	7.33	95.12	BED
32	7.33	95.12	BED
33.8	7.26	95.19	BED
34.6	7.10	95.35	BED
34.8	6.89	95.56	EOW
35.3	6.75	95.70	BNK
36	6.45	96.00	BNK
36.7	6.21	96.24	BNK
37.4	5.83	96.62	BKF RT
38.9	5.18	97.27	GRND
42	5.22	97.23	GRND
46	5.27	97.18	GRND
48	5.37	97.08	GRND
50	5.04	97.41	GRND
51.6	4.82	97.63	GRND
52.6	4.7	97.75	GRND
25		97.14	

Year 2			
Station	FS/BS	Elev.	Desc.
BM	4.81	98.73	IR Lt
HI		103.54	
0	5.01	98.53	GRND
2.8	5.26	98.28	GRND
6.8	5.62	97.92	GRND
11.8	5.86	97.68	GRND
13.8	6.06	97.48	GRND
15.4	6.09	97.45	BKF
16.8	6.36	97.18	BNK
18.8	6.83	96.71	BNK
20.3	7.06	96.48	BNK
21.3	7.65	95.89	BNK
21.9	7.80	95.74	BED
23.8	7.77	95.77	BED
25.8	7.92	95.62	BED
26.8	8.20	95.34	BED
27.7	8.29	95.25	EOW
28.8	8.56	94.98	BED
30.8	8.50	95.04	BED
31.3	8.71	94.83	THL
32.8	8.52	95.02	BED
33.1	8.32	95.22	EOW
33.7	8.05	95.49	BED
34.8	7.86	95.68	BED
35.8	7.33	96.21	BNK
36.8	6.85	96.69	BNK
37.8	6.50	97.04	BNK
39.1	6.14	97.40	BKF
40.8	6.15	97.39	GRND
44.8	6.10	97.44	GRND
49.8	5.95	97.59	GRND
52.6	5.65	97.89	GRND

Year 3			
Station	FS/BS	Elev.	Desc.
BM	5.82	98.66	IR Lt
HI		104.48	
0	5.85	98.63	GRND
2	6.13	98.35	
4	6.42	98.06	
8	6.68	97.80	
11	6.88	97.60	
14	7.07	97.41	
15.2	7.09	97.39	BKF
17	7.43	97.05	BNK
18.5	7.75	96.73	
20.4	8.02	96.46	
21.3	8.46	96.02	BED
24	8.71	95.77	
25.2	9.01	95.47	
26.5	9.30	95.18	EOW
26.6	9.36	95.12	BED
28	9.46	95.02	
29.2	9.55	94.93	THL
30.5	9.55	94.93	BED
32	9.48	95.00	
32.9	9.42	95.06	
33	9.31	95.17	EOW
34.2	9.16	95.32	BNK
34.5	8.93	95.55	
35.2	8.62	95.86	
36.1	8.16	96.32	
38	7.59	96.89	
38.9	7.26	97.22	BKF
41	7.15	97.33	GRND
46	7.21	97.27	
51	7	97.48	
52.6	6.72	97.76	

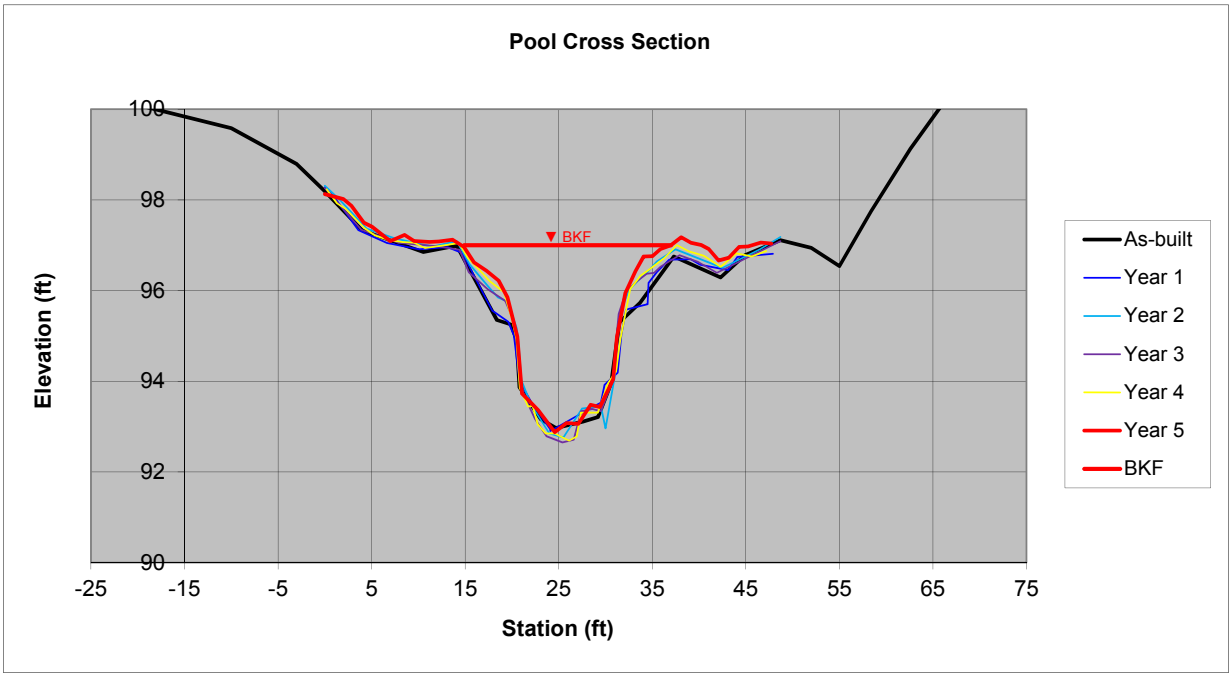
Year 4			
Station	FS/BS	Elev.	Desc.
BM	0.00		IR Lt
HI		0.00	
1.4		98.38	
4.3		98.19	
5.7		98.05	
7.2		97.96	
8.8		97.85	
9.9		97.74	
11.3		97.66	
12.8		97.62	
14.1		97.48	
15.8		97.30	BKF
17.1		97.06	
18.5		96.76	
19.9		96.58	
21.3		96.03	
23.2		95.84	
24.7		95.70	
25.8		95.46	
26.6		95.16	
27.6		94.94	
28.3		94.92	
29.6		95.03	
31.0		95.00	
32.2		95.01	
33.3		95.25	
34.5		95.40	
36.1		96.16	
37.4		96.69	
38.2		97.07	
39.1		97.35	
39.9		97.46	
41.8		97.45	
42.7		97.27	
44.4		97.43	
46.7		97.41	
48.7		97.42	
50.6		97.54	

Year 5			
Station	FS/BS	Elev.	Desc.
BM	0.00	0.00	IR Lt
HI		0.00	
0.0		98.5	
0.5		98.4	
1.1		98.5	
2.4		98.4	
3.4		98.2	
4.2		98.2	
5.8		98.1	
7.0		98.1	
7.9		97.9	
9.1		98.0	
10.0		97.8	
11.0		97.8	
11.9		97.7	
12.9		97.6	
14.2		97.5	
14.8		97.6	
15.2		97.5	
16.2		97.4	
17.1		97.2	BKF
18.7		96.9	
19.7		96.9	
21.2		96.2	
22.1		96.0	
23.2		95.9	
23.9		95.8	
25.3		95.5	
26.3		95.3	
26.8		95.1	
27.8		95.0	
29.3		95.2	
30.8		95.1	
32.2		95.1	
33.6		95.3	
34.8		95.8	
36.2		96.4	
37.1		97.0	
38.0		97.0	
38.9		97.3	BKF
39.9		97.5	
41.1		97.5	
42.4		97.5	
43.5		97.5	
44.5		97.5	
45.7		97.5	
46.9		97.5	
47.8		97.6	
49.1		97.4	
50.2		97.5	
51.4		97.6	
52.3		97.8	

Holly Grove Stream Restoration Site
Guilford County, NC
Pool Cross Section PL1
Reach 1 - Buckhorn Creek - Sta 12+28.7

Year 5

Facing Downstream



As-Built		Year 1		Year 2		Year 3		Year 4		Year 5	
Date	1/8/09	Date	10/20/09	Date	10/11/10	Date	10/5/11	Date	9/17/12	Date	9/30/13
Area	52.7	Area	48.0	Area	46.8	Area	48.4	Area	47.2	Area	45.4
Bkf W	23.2	Bkf W	22.1	Bkf W	23.4	Bkf W	23.5	Bkf W	23.5	Bkf W	22.1
Dmean	2.3	Dmean	2.2	Dmean	2.0	Dmean	2.1	Dmean	2.0	Dmean	2.1
Dmax	4.0	Dmax	3.9	Dmax	4.2	Dmax	4.3	Dmax	4.2	Dmax	4.1
W/d	10.2	W/d	10.2	W/d	11.7	W/d	11.4	W/d	11.7	W/d	10.8

Holly Grove Stream Restoration Site
Guilford County, NC
Pool Cross Section PL1
Reach 1 - Buckhorn Creek - Sta 12+28.7

As-Built			
Station	FS/BS	Elev.	Desc.
BM	6.36	97.34	PL1 IR Rt
HI		103.70	
-25	3.35	100.35	
-10	4.12	99.58	
-3	4.91	98.79	
0	5.51	98.19	GRND
4	6.37	97.33	
10.5	6.85	96.85	
14.1	6.71	96.99	BKF
18.4	8.35	95.35	
19.9	8.45	95.25	
20.5	8.80	94.90	EOW
20.8	9.83	93.87	
23.1	10.54	93.16	
24.7	10.73	92.97	
27.6	10.59	93.11	
29.2	10.49	93.21	
30.6	9.75	93.95	
31.2	8.84	94.86	EOW
31.5	8.40	95.30	
33.7	7.97	95.73	
37.3	6.95	96.75	BKF
42.3	7.41	96.29	
44.9	6.92	96.78	
48.7	6.59	97.11	
52	6.76	96.94	
55	7.16	96.54	
58.4	5.95	97.75	
62.6	4.57	99.13	
67.5	3.17	100.53	

Year 1			
Station	FS/BS	Elev.	Desc.
BM	3.78	98.67	RF1 IR Lt
HI		102.45	
0	4.17	98.28	GRND
1.1	4.41	98.04	GRND
3.6	5.12	97.33	GRND
6.6	5.40	97.05	GRND
10.1	5.54	96.91	GRND
13.1	5.49	96.96	GRND
14.7	5.62	96.83	GRND
16.8	6.46	95.99	GRND
17.9	6.89	95.56	BKF LT
19.6	7.14	95.31	BNK
20.2	7.43	95.02	LOG
20.8	8.44	94.01	EOW
22.2	8.96	93.49	BED
24.1	9.51	92.94	BED
24.1	9.55	92.9	BED
28.7	9.01	93.44	BED
29.5	8.92	93.53	BED
29.9	8.53	93.92	BED
31.3	8.26	94.19	BED
31.7	7.43	95.02	BED
32.2	6.87	95.58	EOW
34.5	6.75	95.7	BNK
34.6	6.28	96.17	BNK
35.5	6.04	96.41	BNK
36.8	5.77	96.68	BKF RT
39.1	5.76	96.69	GRND
40.1	5.88	96.57	GRND
43.1	6	96.45	GRND
44.1	5.71	96.74	GRND
47.9	5.64	96.81	GRND
25		97.14	

Year 2			
Station	FS/BS	Elev.	Desc.
BM	5.91	98.55	IR Lt
HI		104.46	
0	6.15	98.31	GRND
1.5	6.44	98.02	GRND
4.5	7.10	97.36	GRND
7.5	7.31	97.15	GRND
11.5	7.49	96.97	GRND
14.1	7.37	97.09	BKF
15.5	7.89	96.57	BNK
17.5	8.38	96.08	BNK
18.5	8.61	95.85	BNK
19.5	8.70	95.76	BNK
20.5	9.28	95.18	BNK
20.7	9.59	94.87	EOW
21	10.44	94.02	BED
22	10.96	93.50	BED
24	11.61	92.85	BED
25.5	11.70	92.76	BED
27.5	11.06	93.40	BED
29.5	11.01	93.45	BED
30	11.50	92.96	BED
31	10.35	94.11	BED
31.2	9.62	94.84	EOW
31.5	8.99	95.47	BNK
32.5	8.45	96.01	BNK
33.5	8.24	96.22	BNK
34.5	8.05	96.41	BNK
35.5	7.82	96.64	BKF
37.5	7.55	96.91	GRND
42.5	7.96	96.50	GRND
46.5	7.55	96.91	GRND
48.7	7.28	97.18	GRND

Year 3			
Station	FS/BS	Elev.	Desc.
BM	5.71	98.46	IR Lt
HI		104.17	
0	5.91	98.26	GRND
3.9	6.83	97.34	
7.9	7.12	97.05	
11.9	7.19	96.98	
14.4	7.27	96.90	BKF
15.4	7.77	96.40	BNK
17.4	8.14	96.03	
19.3	8.40	95.77	
20	8.74	95.43	
20.4	9.12	95.05	
20.5	9.38	94.79	EOW
20.8	10.14	94.03	TOE
21.4	10.53	93.64	BED
22.5	11.01	93.16	
23.7	11.38	92.79	
25.4	11.52	92.65	
26.6	11.46	92.71	THL
27.4	10.83	93.34	BED
28.6	10.78	93.39	
29.5	10.83	93.34	
30.5	10.31	93.86	
30.9	10.13	94.04	
31.1	9.37	94.80	EOW
31.4	8.69	95.48	BNK
32.2	8.19	95.98	
33.4	7.96	96.21	
34.4	7.80	96.37	
35.2	7.78	96.39	BKF
35.9	7.64	96.53	GRND
37.9	7.39	96.78	
39.9	7.54	96.63	
41.9	7.78	96.39	
48.7	7.08	97.09	

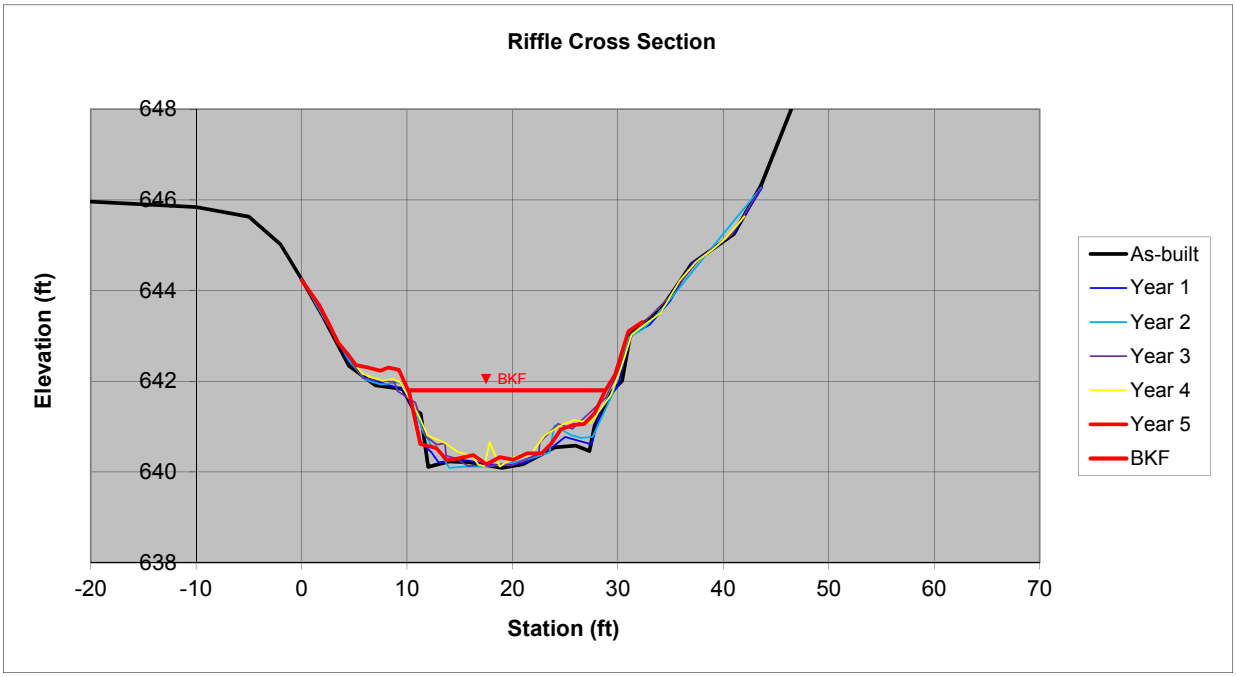
Year 4			
Station	FS/BS	Elev.	Desc.
BM	0.00	100.00	IR Lt
HI		100.00	
0.2		98.23	
1.3		97.92	
2.2		97.80	
4.3		97.37	
5.4		97.22	
6.9		97.11	
8.3		97.07	
9.5		97.06	
10.7		96.94	
12.6		96.99	
14.3		97.05	
15.3		96.71	
16.5		96.47	
17.6		96.21	
19.2		95.96	
20.0		95.37	
20.5		94.92	
20.8		93.86	
21.8		93.44	
22.2		93.46	
22.8		93.05	
23.6		92.85	
24.6		92.85	
26.1		92.69	
26.9		92.78	
27.4		93.31	
29.2		93.31	
30.3		93.95	
31.1		94.23	
31.6		94.93	
32.6		96.03	
33.7		96.32	
34.6		96.45	
36.3		96.71	
37.6		97.00	
38.9		96.86	
40.5		96.77	
42.3		96.53	
44.0		96.82	
45.63		96.7493	
47.18		96.8722	

Year 5			
Station	FS/BS	Elev.	Desc.
BM	0.00	0.00	IR Lt
HI		0.00	
0.0		98.1	
2.0		98.0	
2.8		97.9	
4.2		97.5	
5.0		97.4	
7.0		97.1	
8.5		97.2	
9.5		97.1	
11.2		97.1	
12.2		97.1	
13.7		97.1	
14.9		97.0	BKF
16.0		96.6	
17.3		96.4	
18.6		96.2	
19.5		95.8	
20.6		95.0	
21.1		93.7	
22.8		93.4	
24.6		92.9	
25.8		93.1	
27.1		93.1	
28.4		93.5	
29.4		93.4	
30.8		94.0	
31.2		95.0	
32.1		95.9	
33.2		96.4	
34.1		96.8	
35.0		96.8	
35.9		96.9	BKF
37.0		97.0	
38.1		97.2	
39.1		97.1	
40.2		97.0	
41.0		96.9	
42.1		96.7	
43.2		96.7	
44.3		97.0	
45.3		97.0	
46.6		97.1	
47.7		97.0	

Holly Grove Stream Restoration Site
Guilford County, NC
Riffle Cross Section RF2
Reach 2 - Buckhorn Creek - Sta 15+89.6

Year 5

Facing Downstream



As-Built		Year 1		Year 2		Year 3		Year 4		Year 5	
Date	1/8/09	Date	10/20/09	Date	10/12/10	Date	10/5/11	Date	9/17/12	Date	9/30/13
Area	26.3	Area	25.4	Area	27.6	Area	21.1	Area	22.7	Area	21.7
Bkf W	19.9	Bkf W	20.4	Bkf W	20.2	Bkf W	19.7	Bkf W	20	Bkf W	18.5
Dmean	1.3	Dmean	1.2	Dmean	1.4	Dmean	1.1	Dmean	1.1	Dmean	1.2
Dmax	1.7	Dmax	1.7	Dmax	1.9	Dmax	1.6	Dmax	1.9	Dmax	1.6
W/d	15.1	W/d	16.4	W/d	14.8	W/d	18.4	W/d	17.6	W/d	15.7

Holly Grove Stream Restoration Site
Guilford County, NC
Riffle Cross Section RF2
Reach 2 - Buckhorn Creek - Sta 15+89.6

As-Built

Station	FS/BS	Elev.	Desc.
BM	6.90	644.39	RF2 IR Lt
HI		651.29	
-20	5.33	645.96	
-10	5.45	645.84	
-5	5.66	645.63	
-2	6.27	645.02	
0	7.04	644.25	GRND
2	7.85	643.44	
4.5	8.95	642.34	
7	9.38	641.91	
9.6	9.46	641.83	BKF
10.6	9.90	641.39	
11.3	10.00	641.29	EOW
12	11.18	640.11	
14	11.06	640.23	
16	11.08	640.21	
19	11.20	640.09	
21	11.12	640.17	
24	10.75	640.54	
26	10.71	640.58	
27.3	10.83	640.46	EOW
27.8	10.27	641.02	
29.5	9.50	641.79	
30.4	9.28	642.01	
31.2	8.23	643.06	BKF
34	7.73	643.56	
37	6.70	644.59	
41	6.04	645.25	
43.6	4.96	646.33	GRND
48	2.38	648.91	

Year 1

Station	FS/BS	Elev.	Desc.
BM	6.55	644.77	PL2 IR Lt
HI		651.32	
0	7.06	644.26	GRND
4.5	8.89	642.43	GRND
6	9.24	642.08	GRND
8.5	9.42	641.90	GRND
9.6	9.50	641.82	BKF LT
10.7	9.98	641.34	BNK
11.3	10.67	640.65	BNK
12.3	10.88	640.44	EOW
13	11.11	640.21	BED
15	11.04	640.28	BED
17	11.12	640.20	BED
19	11.18	640.14	BED
21	11.13	640.19	BED
23.1	10.90	640.42	EOW
25	10.55	640.77	BED
27.5	10.71	640.61	BED
28.4	9.95	641.37	BANK
30	9.42	641.90	BANK
31.2	8.31	643.01	BKF RT
33	8.08	643.24	GRND
35	7.54	643.78	GRND
37	6.73	644.59	GRND
41	6.05	645.27	GRND
43.7	5.04	646.28	GRND

Year 2

Station	FS/BS	Elev.	Desc.
BM	6.50	644.77	IR Lt
HI		651.27	
0	7.00	644.27	GRND
1.5	7.63	643.64	GRND
4.5	8.81	642.46	GRND
6	9.23	642.04	GRND
7.5	9.34	641.93	GRND
9.3	9.30	641.97	BKF
10.5	9.73	641.54	BNK
11.5	10.38	640.89	BNK
12.3	10.68	640.59	BNK
13.1	10.82	640.45	EOW
14	11.18	640.09	BED
15.5	11.15	640.12	BED
17.5	11.15	640.12	BED
19.5	11.09	640.18	BED
21.5	10.99	640.28	BED
23.5	10.84	640.43	EOW
24	10.25	641.02	BED
25.5	10.45	640.82	BED
26.5	10.52	640.75	BED
27.6	10.50	640.77	BED
29.5	9.55	641.72	BNK
31	8.31	642.96	BKF
32.5	8.10	643.17	GRND
34.5	7.60	643.67	GRND
38.5	6.44	644.83	GRND
43.6	5.00	646.27	GRND

Year 3

Station	FS/BS	Elev.	Desc.
BM	6.59	644.39	IR Lt
HI		650.98	
0	6.70	644.28	GRND
1.8	7.42	643.56	
2.8	7.85	643.13	
5.8	8.91	642.07	
8.8	9.00	641.98	
9.1	9.20	641.78	BKF
10.8	9.45	641.53	BNK
11.8	10.19	640.79	
12.8	10.38	640.60	
13.6	10.35	640.63	EOW
13.7	10.62	640.36	
14.6	10.68	640.30	BED
15.8	10.85	640.13	
16.8	10.83	640.15	
17.8	10.85	640.13	
18.9	10.81	640.17	
19.9	10.84	640.14	
22.5	10.58	640.40	
22.6	10.33	640.65	EOW
24.3	9.92	641.06	BNK
25.7	10.03	640.95	
28.8	9.35	641.63	
29.8	8.89	642.09	
31.4	7.93	643.05	GRND
34.8	7.14	643.84	
37.8	6.26	644.72	
40.8	5.75	645.23	
42.8	5	645.98	
43.5	4.73	646.25	

Year 4

Station	FS/BS	Elev.	Desc.
BM	0.00	100.00	IR Lt
HI		100.00	
1.9		643.59	
3.1		643.02	
4.4		642.57	
5.8		642.17	
6.9		642.07	BKF
7.7		642.02	
8.7		642.05	
9.3		641.98	
10.9		641.33	
12.0		640.80	
13.5		640.65	
14.8		640.45	
16.2		640.35	
16.8		640.16	
17.3		640.13	
17.8		640.65	
18.8		640.12	
20.2		640.33	
21.7		640.37	
23.1		640.81	
24.9		641.06	
25.9		641.14	
27.4		641.09	
29.3		641.70	
30.4		642.32	BKF
31.3		643.02	
32.6		643.26	
34.0		643.50	
35.8		644.22	
37.4		644.63	
39.0		644.90	
40.3		645.17	
42.0		645.64	

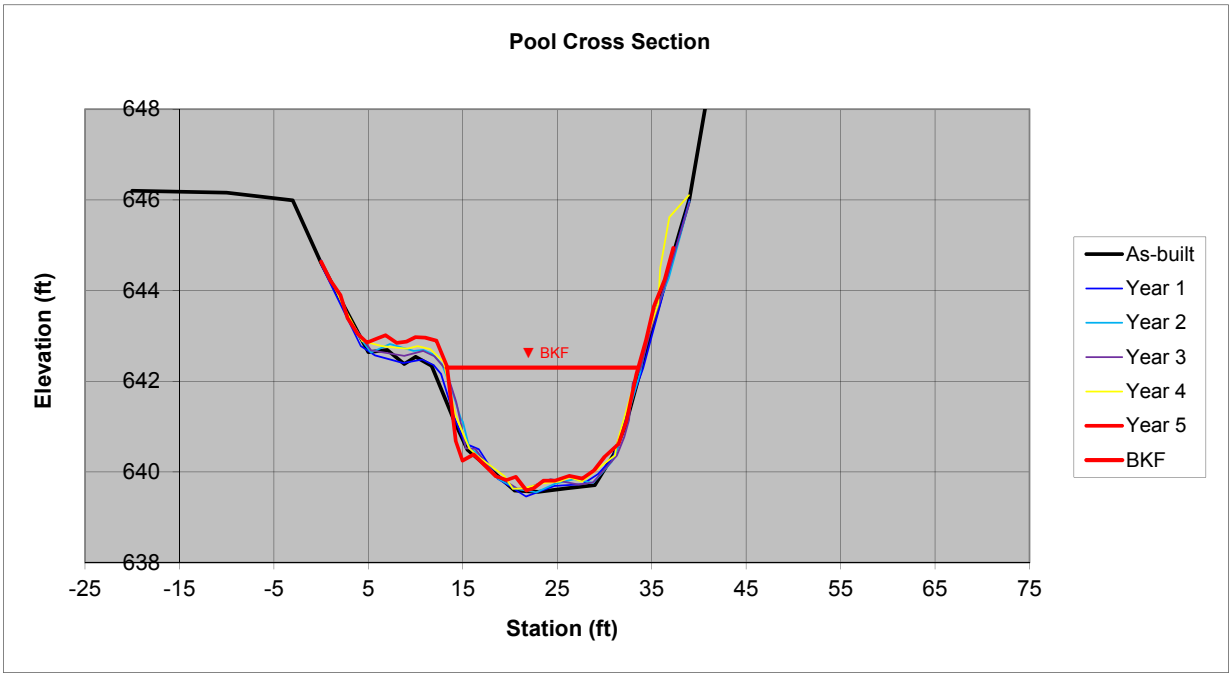
Year 5

Station	FS/BS	Elev.	Desc.
BM	0.00		IR Lt
HI		0.00	
0		644.23	
0.87		643.95	
1.71		643.67	
2.5		643.31	
3.46		642.85	
4.38		642.60	
5.17		642.35	
6.18		642.31	
7.48		642.23	
8.22		642.30	
9.23		642.25	
10.21		641.75	BKF
11.27		640.62	
12.76		640.53	
13.77		640.26	
14.71		640.29	
16.28		640.37	
17.55		640.17	
18.79		640.33	
20.07		640.27	
21.42		640.41	
22.79		640.41	
23.67		640.62	
24.6		640.9	
25.8		641.0	
26.8		641.1	
27.8		641.3	
28.7		641.8	BKF
29.7		642.2	
31.0		643.1	
32.3		643.3	
33.6		643.6	
34.7		643.9	
35.5		644.3	
36.5		644.6	
37.8		644.9	
38.5		645.0	
39.6		645.2	
40.5		645.3	
41.6		645.7	
42.5		646.1	
43.0		646.3	

Holly Grove Stream Restoration Site
Guilford County, NC
Pool Cross Section PL2
Reach 2 - Buckhorn Creek - Sta 15+30.7

Year 5

Facing Downstream



As-Built		Year 1		Year 2		Year 3		Year 4		Year 5	
Date	1/8/09	Date	10/20/09	Date	10/12/10	Date	10/5/11	Date	9/17/12	Date	9/30/13
Area	45.6	Area	43.8	Area	49.1	Area	47.6	Area	43.2	Area	42.2
Bkf W	23.3	Bkf W	22.2	Bkf W	22	Bkf W	22.8	Bkf W	20.6	Bkf W	20.1
Dmean	2.0	Dmean	2.0	Dmean	2.2	Dmean	2.1	Dmean	2.1	Dmean	2.1
Dmax	2.8	Dmax	2.9	Dmax	3.1	Dmax	2.9	Dmax	2.8	Dmax	2.7
W/d	11.9	W/d	11.2	W/d	9.9	W/d	10.9	W/d	9.8	W/d	9.6

Holly Grove Stream Restoration Site
Guilford County, NC
Pool Cross Section PL2
Reach 2 - Buckhorn Creek - Sta 15+30.7

As-Built			
Station	FS/BS	Elev.	Desc.
BM	6.90	644.39	RF2 IR Lt
HI		651.29	
-20	5.09	646.20	
-10	5.13	646.16	
-3	5.30	645.99	
0	6.68	644.61	GRND
5	8.65	642.64	
7	8.60	642.69	
8.8	8.91	642.38	
10	8.75	642.54	
11.7	8.95	642.34	BKF
14.2	10.22	641.07	
15.5	10.80	640.49	
18	11.25	640.04	
20.5	11.70	639.59	
23	11.73	639.56	BR
26	11.65	639.64	BR
29	11.58	639.71	
31	10.90	640.39	
32.3	10.22	641.07	EOW
35	8.15	643.14	
38	5.98	645.31	
39	5.27	646.02	
40.8	3.10	648.19	

Year 1			
Station	FS/BS	Elev.	Desc.
BM	6.55	644.77	PL2 IT Lt
HI		651.32	
0	6.75	644.57	GRND
4.2	8.54	642.78	GRND
5.7	8.75	642.57	GRND
8.7	8.92	642.4	GRND
10.7	8.84	642.48	GRND
11.9	8.96	642.36	BKF LT
12.7	9.16	642.16	BNK
14.2	10.17	641.15	EOW
15.2	10.69	640.63	BED
16.7	10.82	640.5	BED
18.7	11.47	639.85	BED
21.7	11.86	639.46	BED
24.7	11.63	639.69	BED
27.7	11.59	639.73	BED
29.3	11.37	639.95	BED
30.9	11.01	640.31	BED
32.2	10.14	641.18	EOW
34.1	9.03	642.29	BNK
36.7	7.01	644.31	BNK
39	5.32	646	GRND

Year 2			
Station	FS/BS	Elev.	Desc.
BM	6.50	644.77	IR Lt
HI		651.27	
0	6.62	644.65	GRND
1.8	7.37	643.90	GRND
3.8	8.23	643.04	GRND
5.3	8.64	642.63	GRND
7.3	8.45	642.82	GRND
9.8	8.60	642.67	GRND
10.8	8.58	642.69	GRND
11.8	8.67	642.60	BKF
12.8	8.90	642.37	BNK
13.8	9.43	641.84	BNK
14.8	10.10	641.17	BNK
15	10.16	641.11	EOW
15.7	10.74	640.53	BED
16.8	10.90	640.37	BED
18.8	11.43	639.84	BED
20.8	11.65	639.62	BED
22.8	11.72	639.55	BED
24.8	11.53	639.74	BED
26.8	11.43	639.84	BED
28.8	11.51	639.76	BED
29.8	11.28	639.99	BED
30.8	11.04	640.23	BED
31.3	10.81	640.46	BED
32.3	10.15	641.12	EOW
33.8	9.06	642.21	BNK
34.8	8.05	643.22	BNK
36.8	7.00	644.27	BNK
39	5.31	645.96	GRND

Year 3			
Station	FS/BS	Elev.	Desc.
BM	6.41	644.77	IR Lt
HI		651.18	
0	6.51	644.67	GRND
3.3	7.92	643.26	
5.3	8.50	642.68	
8.8	8.62	642.56	
10.8	8.51	642.67	
12	8.63	642.55	BKF
13.2	8.92	642.26	BNK
14.3	9.64	641.54	
14.7	10.01	641.17	EOW
15.3	10.66	640.52	BED
16.3	10.67	640.51	
18.3	11.22	639.96	
20.8	11.55	639.63	
21.8	11.54	639.64	
24.3	11.34	639.84	
27.3	11.46	639.72	THL
28.8	11.41	639.77	BED
31.3	10.82	640.36	
32.1	10.41	640.77	
32.6	10.03	641.15	EOW
33	9.22	641.96	BNK
33.8	8.91	642.27	
34.8	8.12	643.06	
36.3	7.13	644.05	
39	5.24	645.94	GRND

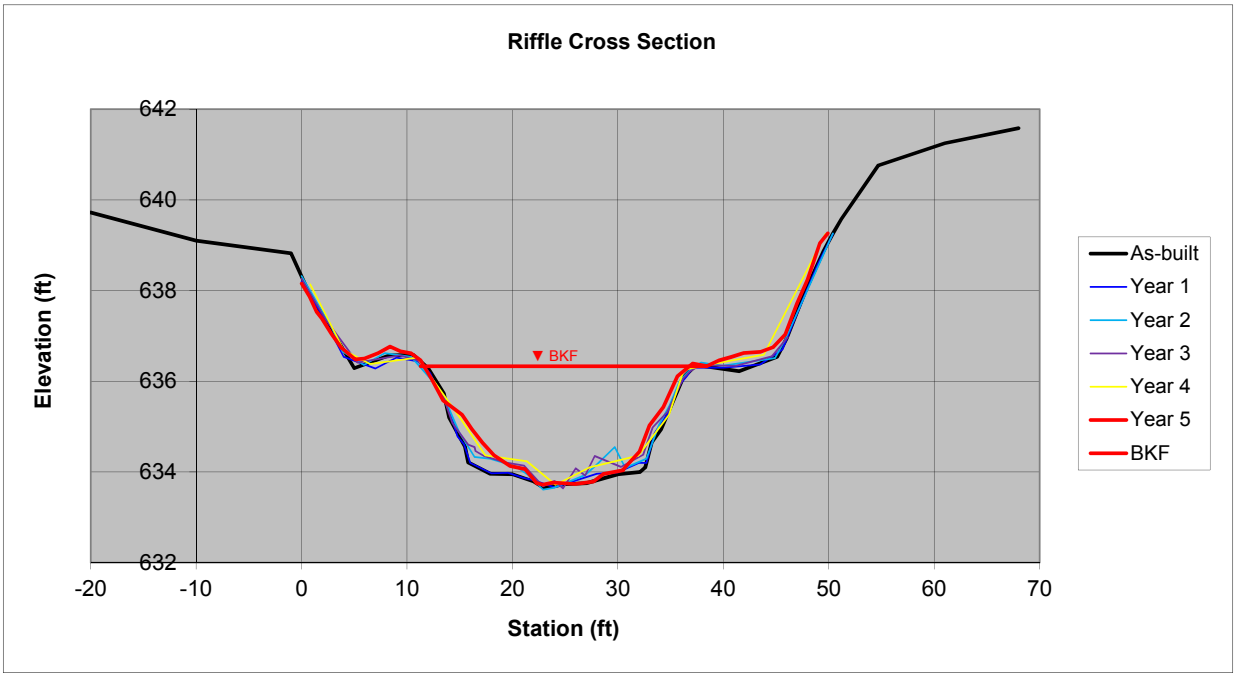
Year 4			
Station	FS/BS	Elev.	Desc.
BM	0.00	100.00	IR Lt
HI		100.00	
1.3		644.17	
2.3		643.67	
4.4		642.89	
6.5		642.77	
7.7		642.75	
9.1		642.72	
10.2		642.77	
11.5		642.71	
13.0		642.42	BKF
14.2		641.26	
15.7		640.52	
16.5		640.36	
19.4		639.91	
20.3		639.63	
21.5		639.64	
23.4		639.75	
25.3		639.79	
26.3		639.88	
27.6		639.79	
29.5		640.10	
31.1		640.37	
31.3		640.60	
33.4		642.13	
34.5		642.96	
35.7		643.71	
35.9		644.50	
36.9		645.62	
38.9		646.103	

Year 5			
Station	FS/BS	Elev.	Desc.
BM	0.00	0.00	IR Lt
HI		0.00	
0.0		644.6	
1.0		644.2	
2.1		643.9	
2.8		643.4	
3.9		643.0	
4.9		642.9	
5.9		642.9	
6.8		643.0	
8.0		642.8	
9.0		642.9	
10.0		643.0	
11.0		643.0	
12.2		642.9	
13.3		642.3	BKF
14.3		640.7	
15.0		640.3	
16.2		640.4	
18.5		639.9	
19.6		639.8	
20.6		639.9	
21.8		639.6	
22.5		639.6	
23.6		639.8	
24.7		639.8	
26.3		639.9	
27.7		639.9	
28.9		640.0	
30.0		640.3	
31.5		640.6	
32.3		641.1	
33.4		642.2	BKF
34.4		642.9	
35.3		643.7	
36.4		644.2	
37.3		644.9	
37.7		645.6	

Holly Grove Stream Restoration Site
Guilford County, NC
Riffle Cross Section RF3
Reach 3 - Buckhorn Creek - Sta 12+50.7

Year 5

Facing Downstream



As-Built		Year 1		Year 2		Year 3		Year 4		Year 5	
Date	1/8/09	Date	10/20/09	Date	10/12/10	Date	10/5/11	Date	9/17/12	Date	9/30/13
Area	48.3	Area	47.5	Area	47.7	Area	45.2	Area	39.0	Area	43.5
Bkf W	25.4	Bkf W	25.5	Bkf W	27.5	Bkf W	26.8	Bkf W	24.6	Bkf W	27.1
Dmean	1.9	Dmean	1.9	Dmean	1.7	Dmean	1.7	Dmean	1.6	Dmean	1.6
Dmax	2.6	Dmax	2.6	Dmax	2.8	Dmax	2.7	Dmax	2.5	Dmax	2.6
W/d	13.4	W/d	13.7	W/d	15.9	W/d	15.9	W/d	15.5	W/d	16.9

Holly Grove Stream Restoration Site
Guilford County, NC
Riffle Cross Section RF3
Reach 3 - Buckhorn Creek - Sta 12+50.7

As-Built

Station	FS/BS	Elev.	Desc.
BM	5.88	638.55	RF3 IR Lt
HI		644.43	
-20	4.71	639.72	
-10	5.33	639.10	
-1	5.61	638.82	
0	6.12	638.31	GRND
0.8	6.53	637.90	
2.3	7.08	637.35	
5	8.14	636.29	
8.3	7.86	636.57	
10.6	7.85	636.58	
12	8.14	636.29	BKF
13.5	8.70	635.73	
14	9.23	635.20	
15.5	9.87	634.56	
15.8	10.22	634.21	
16.9	10.35	634.08	
17.9	10.47	633.96	EOW
20	10.48	633.95	
22	10.64	633.79	
23	10.78	633.65	
25	10.70	633.73	
27	10.68	633.75	
30	10.48	633.95	
32.1	10.43	634.00	EOW
32.6	10.33	634.10	
33.2	9.78	634.65	
34.1	9.49	634.94	
36.2	8.35	636.08	
37.4	8.07	636.36	BKF
41.5	8.21	636.22	
45.1	7.89	636.54	
46	7.49	636.94	
47.8	6.43	638.00	
49.5	5.56	638.87	
50.4	5.17	639.26	GRND
51.2	4.85	639.58	
54.7	3.67	640.76	
61	3.18	641.25	
68	2.85	641.58	

Year 1

Station	FS/BS	Elev.	Desc.
BM	3.92	638.55	RF3 IR Lt
HI		642.47	
0	4.27	638.20	GRND
2	5.04	637.43	GRND
4	5.93	636.54	GRND
7	6.19	636.28	GRND
9	5.95	636.52	GRND
11	6.03	636.44	BKF LT?
11.6	6.14	636.33	BKF LT
12.2	6.29	636.18	BKF LT
12.8	6.60	635.87	BANK
13.6	6.85	635.62	BANK
14.8	7.69	634.78	BANK
15.4	7.86	634.61	BANK
16	8.27	634.20	EOW
18	8.50	633.97	BED
19.6	8.49	633.98	BED
21	8.60	633.87	BED
22	8.65	633.82	BED
24	8.81	633.66	BED
26	8.66	633.81	BED
28	8.51	633.96	BED
30	8.48	633.99	BED
32	8.27	634.20	BED
32.7	8.27	634.20	TOE
33.5	7.61	634.86	BNK
34.8	7.16	635.31	BNK
35.8	6.56	635.91	BNK
36.5	6.37	636.10	BNK
37.1	6.17	636.30	BKF
40	6.17	636.30	GRND
43.5	6.1	636.37	GRND
45.6	5.77	636.70	GRND
47	4.97	637.50	GRND
49	3.87	638.60	GRND
50.4	3.22	639.25	GRND

Year 2

Station	FS/BS	Elev.	Desc.
BM	3.11	638.55	IR Lt
HI		641.66	
0	3.34	638.32	GRND
2.9	4.50	637.16	GRND
3.9	5.01	636.65	GRND
5.9	5.30	636.36	GRND
7.9	5.04	636.62	GRND
10.4	5.12	636.54	GRND
12.9	5.78	635.88	GRND
13.5	6.00	635.66	BKF
14.9	6.77	634.89	BNK
16.4	7.33	634.33	BED
17.9	7.37	634.29	BED
19.9	7.51	634.15	BED
20.4	7.55	634.11	EOW
21.4	7.71	633.95	BED
22.9	8.05	633.61	BED
23.9	8.01	633.65	BED
24.9	7.92	633.74	BED
26.9	7.73	633.93	BED
27.9	7.52	634.14	BED
29.7	7.11	634.55	BED
30.7	7.57	634.09	BED
32.7	7.37	634.29	BED
33.9	6.62	635.04	BNK
34.9	6.19	635.47	BNK
35.9	5.64	636.02	BKF
36.9	5.40	636.26	GRND
37.9	5.25	636.41	GRND
39.9	5.32	636.34	GRND
44.9	5.15	636.51	GRND
45.9	4.73	636.93	GRND
50.4	2.40	639.26	GRND

Year 3

Station	FS/BS	Elev.	Desc.
BM	3.29	638.55	IR Lt
HI		641.84	
0	3.58	638.26	GRND
2.3	4.48	637.36	
5.3	5.43	636.41	
9.3	5.27	636.57	
11	5.38	636.46	BKF
12.3	5.75	636.09	BNK
13.4	6.15	635.69	
14.3	6.76	635.08	
15.8	7.24	634.60	
16.4	7.29	634.55	EOW
16.5	7.38	634.46	BED
17.3	7.49	634.35	
19.3	7.63	634.21	
21.1	7.70	634.14	
22.9	8.16	633.68	
24	8.04	633.80	
24.8	8.20	633.64	THL
26	7.76	634.08	BED
26.9	7.92	633.92	
27.8	7.49	634.35	
30.3	7.73	634.11	
32.4	7.46	634.38	
32.6	7.32	634.52	EOW
33.3	6.86	634.98	BNK
34.7	6.52	635.32	
36.2	5.78	636.06	BKF
36.8	5.63	636.21	GRND
37.8	5.49	636.35	
41.2	5.5	636.34	
44.6	5.29	636.55	
46.1	4.87	636.97	
47.3	4.23	637.61	
50.3	2.62	639.22	

Year 4

Station	FS/BS	Elev.	Desc.
BM	0.00	100.00	IR Lt
HI		100.00	
0.83		638.14	
3.98		636.70	
6.49		636.38	
10.97		636.52	BKF
15.2		635.14	
17.43		634.37	
21.37		634.23	
24.09		633.72	
27.32		634.10	
31.93		634.36	
34.84		635.26	
36.25		636.25	BKF
39.63		636.41	
43.84		636.58	
49.69		639.25	

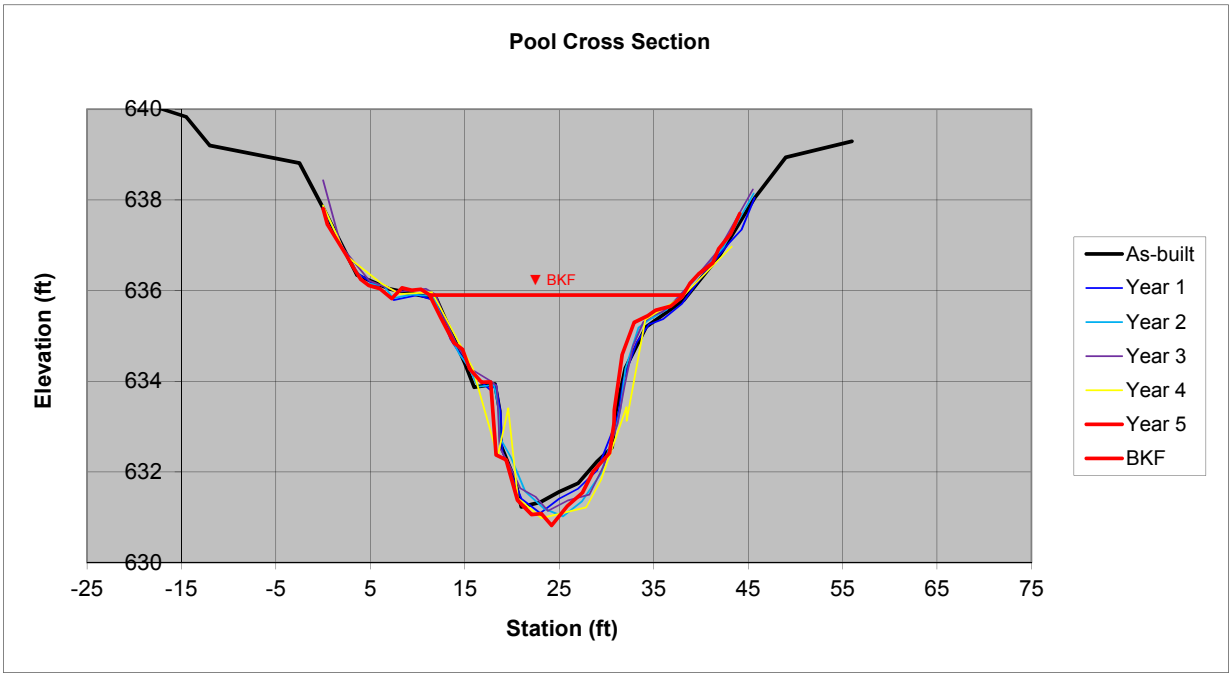
Year 5

Station	FS/BS	Elev.	Desc.
BM	0.00	100.00	IR Lt
HI		100.00	
0.0		638.16	
0.8		637.87	
1.4		637.54	
1.9		637.39	
2.8		637.05	
3.8		636.74	
5.1		636.48	
6.0		636.50	
7.3		636.62	
8.4		636.77	
9.4		636.66	
10.4		636.62	
11.3		636.46	BKF
12.3		636.04	
13.4		635.58	
15.2		635.26	
16.2		634.94	
17.2		634.64	
18.3		634.37	
19.8		634.13	
21.2		634.06	
22.3		633.76	
22.9		633.72	
23.9		633.77	
26.0		633.74	
27.7		633.79	
28.6		633.96	
30.5		634.04	
30.5		634.06	
32.1		634.45	
33.0		635.02	
34.3		635.43	
35.7		636.11	
37.1		636.39	
38.4		636.33	BKF
39.6		636.46	
40.8		636.53	
42.0		636.62	
43.5		636.65	
44.7		636.75	
45.9		637.03	
47.0		637.71	
48.0		638.24	
49.2		639.04	
49.9		639.26	

Holly Grove Stream Restoration Site
Guilford County, NC
Pool Cross Section PL3
Reach 3 - Buckhorn Creek - Sta 13+33.1

Year 5

Facing Downstream



As-Built		Year 1		Year 2		Year 3		Year 4		Year 5	
Date	1/8/09	Date	10/20/09	Date	10/12/10	Date	10/5/11	Date	9/17/12	Date	9/30/13
Area	62.7	Area	62.8	Area	66.2	Area	66.2	Area	64.9	Area	67.2
Bkf W	22.2	Bkf W	22.5	Bkf W	22.8	Bkf W	22.9	Bkf W	29.9	Bkf W	26.7
Dmean	2.8	Dmean	2.8	Dmean	2.9	Dmean	2.9	Dmean	2.2	Dmean	2.5
Dmax	4.6	Dmax	4.7	Dmax	4.9	Dmax	4.8	Dmax	4.8	Dmax	5.1
W/d	7.9	W/d	8.1	W/d	7.9	W/d	7.9	W/d	13.8	W/d	10.6

Holly Grove Stream Restoration Site
Guilford County, NC
Pool Cross Section PL3
Reach 3 - Buckhorn Creek - Sta 13+33.1

As-Built			
Station	FS/BS	Elev.	Desc.
BM	5.88	638.55	RF3 IR Lt
HI		644.43	
-20	4.23	640.20	
-14.5	4.60	639.83	
-12	5.23	639.20	
-2.5	5.62	638.81	
0	6.61	637.82	
3.6	8.09	636.34	
7	8.39	636.04	
12	8.61	635.82	BKF
15	10.03	634.40	
16	10.56	633.87	
18.2	10.49	633.94	LOG
18.7	11.09	633.34	EOW
18.8	11.83	632.60	
20.3	12.60	631.83	
21	13.20	631.23	
23	13.10	631.33	
25	12.87	631.56	
27	12.68	631.75	
29	12.20	632.23	
30.6	11.89	632.54	
31	11.09	633.34	EOW
32	10.14	634.29	
34.2	9.23	635.20	BKF
38.2	8.64	635.79	
42	7.65	636.78	
45.7	6.39	638.04	GRND
49	5.49	638.94	
56	5.14	639.29	
66	4.82	639.61	

Year 1			
Station	FS/BS	Elev.	Desc.
BM	3.92	638.55	PL2 IT Lt
HI		642.47	
0	4.62	637.85	GRND
2	5.48	636.99	GRND
3.5	6.06	636.41	GRND
6	6.42	636.05	GRND
7.5	6.68	635.79	GRND
10	6.57	635.9	GRND
12	6.70	635.77	BKF LT
13.5	7.55	634.92	BNK
16	8.35	634.12	BNK
17.7	8.66	633.81	BNK
18.3	8.54	633.93	LOG
18.8	9.17	633.3	EOW
19	10.03	632.44	BED
21	11.06	631.41	BED
23	11.38	631.09	BED
25	11.06	631.41	BED
27	10.84	631.63	BED
29	10.44	632.03	BED
31	9.38	633.09	BED
31.3	9.14	633.33	EOW
31.8	8.44	634.03	BNK
33.2	7.61	634.86	BNK
34.5	7.22	635.25	BKF RT
36	7.10	635.37	GRND
38	6.76	635.71	GRND
40	6.19	636.28	GRND
43	5.42	637.05	GRND
44.3	5.13	637.34	GRND
45.7	4.42	638.05	GRND

Year 2			
Station	FS/BS	Elev.	Desc.
BM	3.11	638.55	IR Lt
HI		641.66	
0	3.82	637.84	GRND
2.4	4.86	636.80	GRND
4.4	5.49	636.17	GRND
6.4	5.55	636.11	GRND
7.4	5.83	635.83	GRND
9.4	5.75	635.91	GRND
11.6	5.78	635.88	BKF
13.4	6.64	635.02	BNK
14.4	7.05	634.61	BNK
15.4	7.34	634.32	BNK
16.4	7.78	633.88	BED
18.1	7.74	633.92	LOG
18.6	8.29	633.37	EOW
18.7	8.90	632.76	BED
19.9	9.34	632.32	BED
21.4	10.09	631.57	BED
23.4	10.47	631.19	BED
25.4	10.64	631.02	BED
27.4	10.31	631.35	BED
29.4	9.70	631.96	BED
31.1	8.61	633.05	BED
31.5	8.25	633.41	EOW
32	7.39	634.27	BNK
33.4	6.48	635.18	BNK
34.4	6.32	635.34	BKF
36.4	6.08	635.58	GRND
39.4	5.42	636.24	GRND
42.4	4.70	636.96	GRND
45.6	3.52	638.14	GRND

Year 3			
Station	FS/BS	Elev.	Desc.
BM	5.64	638.14	IR Lt
HI		643.78	
0	5.35	638.43	GRND
1.9	6.80	636.98	
4.9	7.56	636.22	
7.9	7.81	635.97	
10.9	7.74	636.04	
11.4	7.80	635.98	BKF
11.9	7.87	635.91	BNK
12.9	8.41	635.37	
14.3	9.03	634.75	
15.9	9.54	634.24	
17.7	9.77	634.01	
18.4	9.89	633.89	EOW
18.7	11.25	632.53	BED
19.7	11.62	632.16	
20.9	12.14	631.64	
22.5	12.33	631.45	
23.8	12.64	631.14	THL
25.9	12.41	631.37	BED
28.2	12.28	631.50	
29.7	11.65	632.13	
31.2	10.71	633.07	
31.9	9.90	633.88	EOW
32.8	9.01	634.77	BNK
33.9	8.48	635.30	
34.8	8.34	635.44	
35.4	8.29	635.49	BKF
35.9	8.25	635.53	GRND
36.9	8.08	635.7	
38.9	7.63	636.15	
41.9	6.88	636.9	
45.5	5.55	638.23	

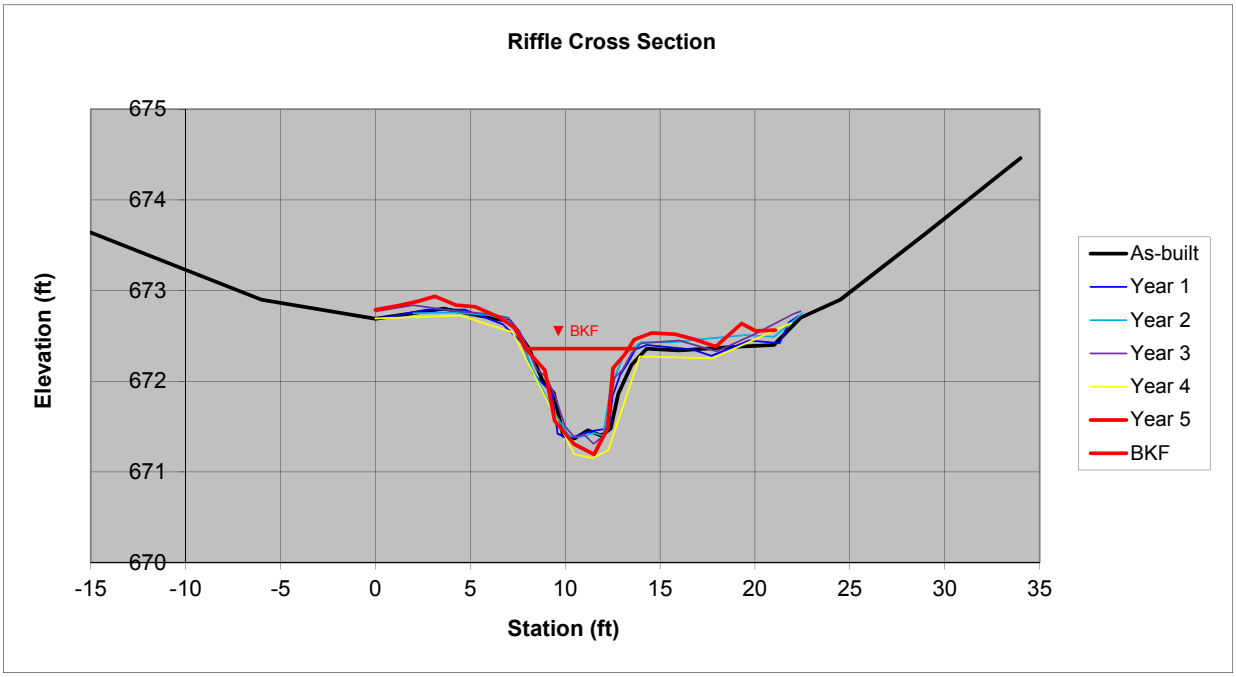
Year 4			
Station	FS/BS	Elev.	Desc.
BM	0.00		IR Lt
HI		0.00	
0		637.88	
2.48		636.76	
6.17		636.16	
8.12		635.92	
11.52		635.97	
15.82		634.30	
18.48		632.35	
19.6		633.40	
20.62		631.42	
23.12		630.98	
27.85		631.22	
29.4		631.81	
32.13		633.43	
32.14		633.13	
34.13		635.36	BKF
38.02		635.86	
43.27		636.97	

Year 5			
Station	FS/BS	Elev.	Desc.
BM	0.00	0.00	IR Lt
HI		0.00	
0.0		637.81	
0.5		637.45	
2.5		636.76	
3.2		636.51	
4.0		636.25	
4.9		636.11	
6.0		636.04	
7.3		635.82	
8.4		636.06	
9.4		636.01	
10.4		636.03	
11.3		635.90	BKF
12.4		635.41	
13.9		634.85	
14.8		634.70	
15.5		634.27	
16.8		633.98	
17.7		633.98	
18.3		632.38	
19.4		632.27	
20.6		631.38	
22.1		631.06	
23.1		631.08	
24.2		630.82	
25.9		631.25	
27.5		631.54	
28.6		632.01	
30.3		632.42	
30.8		633.07	
30.8		633.37	
31.7		634.59	
32.9		635.30	
34.4		635.44	
35.2		635.57	
36.8		635.65	
38.0		635.86	BKF
38.8		636.16	
39.8		636.36	
41.3		636.61	
41.9		636.92	
43.1		637.24	
44.1		637.70	

Holly Grove Stream Restoration Site
Guilford County, NC
Riffle Cross Section RF4
Reach 4 - Middle Branch - Sta 10+89.9

Year 5

Facing Downstream



As-Built		Year 1		Year 2		Year 3		Year 4		Year 5	
Date	1/8/09	Date	10/20/09	Date	10/11/10	Date	10/5/11	Date	9/17/12	Date	0/0/0
Area	3.7	Area	3.5	Area	3.8	Area	3.7	Area	3.7	Area	3.5
Bkf W	6.2	Bkf W	6.4	Bkf W	6.9	Bkf W	6	Bkf W	6	Bkf W	5.72
Dmean	0.6	Dmean	0.5	Dmean	0.5	Dmean	0.6	Dmean	0.6	Dmean	0.6
Dmax	1.0	Dmax	1.0	Dmax	1.0	Dmax	1.1	Dmax	1.4	Dmax	1.2
W/d	10.4	W/d	11.8	W/d	12.6	W/d	9.9	W/d	9.6	W/d	9.4

Holly Grove Stream Restoration Site
Guilford County, NC
Riffle Cross Section RF4
Reach 4 - Middle Branch - Sta 10+89.9

As-Built			
Station	FS/BS	Elev.	Desc.
BM	3.96	674.94	BP4 IR Lt
HI		678.90	
-15	5.26	673.64	
-6	6.00	672.90	
0	6.21	672.69	
3.6	6.10	672.80	
7.1	6.24	672.66	
8.1	6.54	672.36	bkf
8.8	6.89	672.01	
9.4	7.03	671.87	
9.9	7.50	671.40	
10.5	7.53	671.37	
11.2	7.44	671.46	
11.9	7.50	671.40	
12.4	7.42	671.48	
12.8	7.04	671.86	
13.5	6.72	672.18	
14.3	6.54	672.36	bkf
16	6.56	672.34	
19	6.52	672.38	
21	6.50	672.40	
22.4	6.20	672.70	
24.5	6.00	672.90	
29	5.27	673.63	
34	4.44	674.46	

Year 1			
Station	FS/BS	Elev.	Desc.
BM	4.31	674.77	BP4 IR Rt
HI		679.08	
0	6.40	672.68	GRND
2.7	6.29	672.79	GRND
4.7	6.29	672.79	GRND
6.7	6.45	672.63	GRND
7.7	6.65	672.43	GRND
7.9	6.74	672.34	BKF LT
8.3	6.99	672.09	BNK
9.3	7.21	671.87	BNK
9.6	7.66	671.42	BED
10.2	7.71	671.37	BED
10.8	7.67	671.41	BED
11.4	7.63	671.45	BED
12.3	7.60	671.48	BED
12.5	7.24	671.84	BNK
12.9	7.01	672.07	BKF
13.3	6.88	672.20	GRND
13.7	6.73	672.35	GRND
14.3	6.68	672.40	GRND
16.7	6.73	672.35	GRND
17.7	6.80	672.28	GRND
19.7	6.63	672.45	GRND
21.3	6.66	672.42	GRND
21.8	6.43	672.65	GRND
22.3	6.36	672.72	GRND

Year 2			
Station	FS/BS	Elev.	Desc.
BM	4.75	674.77	IR Rt
HI		679.52	
2	6.77	672.75	GRND
4	6.76	672.76	GRND
6	6.79	672.73	GRND
7.1	6.86	672.66	BKF
7.6	7.03	672.49	BNK
8.3	7.40	672.12	BNK
9.4	7.86	671.66	BNK
10.2	8.12	671.40	BED
10.7	8.14	671.38	BED
11.5	8.09	671.43	BED
12	8.12	671.40	BED
12.4	7.58	671.94	BNK
13.1	7.23	672.29	BNK
14	7.09	672.43	BKF
15.6	7.09	672.43	GRND
17	7.06	672.46	GRND
19.5	7.01	672.51	GRND
21	7.03	672.49	GRND
22.5	6.77	672.75	GRND

Year 3			
Station	FS/BS	Elev.	Desc.
BM	6.00	673.10	IR Lt
HI		679.10	
0	6.33	672.77	GRND
2	6.26	672.84	
4	6.32	672.78	
6	6.36	672.74	
7	6.40	672.70	BKF
7.6	6.55	672.55	BNK
8	6.72	672.38	
8.5	6.97	672.13	
9	7.05	672.05	
9.5	7.28	671.82	
10	7.60	671.50	TOE
10.5	7.72	671.38	BED
11	7.69	671.41	THL
11.5	7.79	671.31	BED
12.1	7.69	671.41	
12.6	7.06	672.04	BNK
13	6.98	672.12	
13.5	6.79	672.31	BNK
14	6.68	672.42	BKF
16	6.65	672.45	GRND
18	6.77	672.33	
20	6.58	672.52	
22	6.36	672.74	
22.4	6.33	672.77	

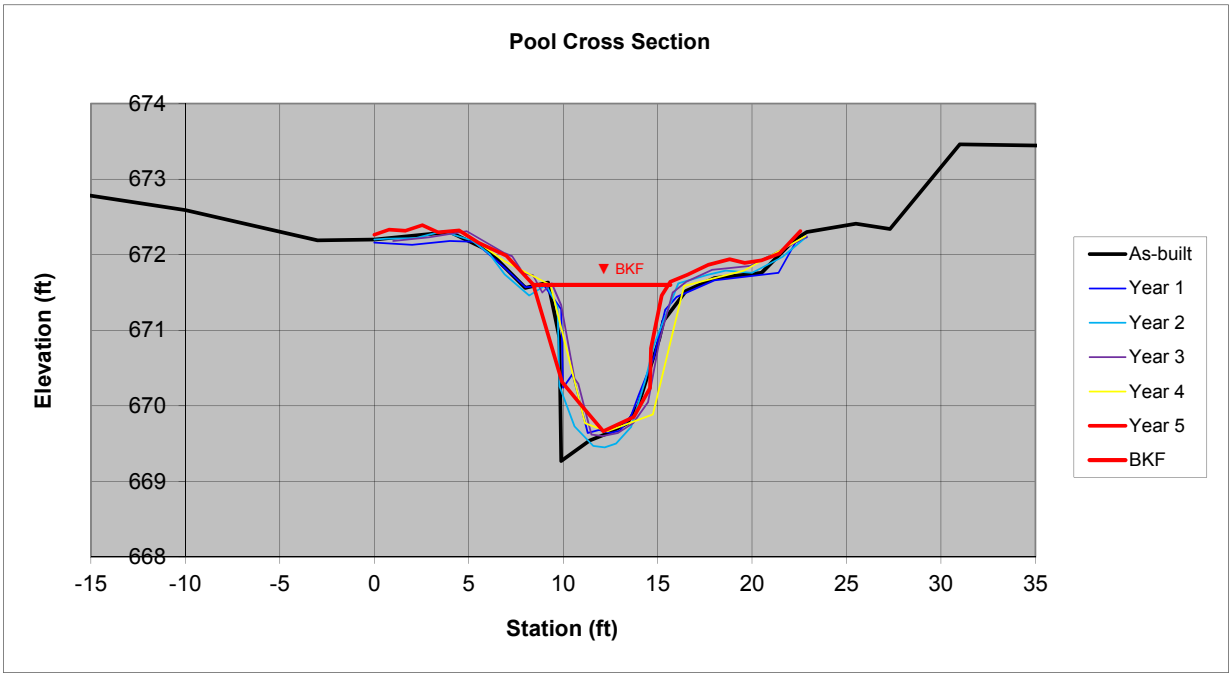
Year 4			
Station	FS/BS	Elev.	Desc.
BM	0.00	100.00	IR Lt
HI		100.00	
0		672.69	
4.48		672.72	
7.23		672.54	BKF
10.47		671.20	
11.43		671.15	
12.27		671.24	
13.93		672.27	BKF
17.8		672.25	
21.92		672.64	

Year 5			
Station	FS/BS	Elev.	Desc.
BM	0.00	0.00	IR Lt
HI		0.00	
0		672.79	
1.25		672.84	
2.32		672.89	
3.14		672.94	
4.25		672.84	
5.25		672.82	
6.47		672.71	
7.35		672.59	
7.92		672.36	BKF
8.93		672.12	
9.45		671.56	
10.46		671.31	
11.52		671.19	
12.23		671.48	
12.52		672.14	
13.11		672.29	
13.64		672.46	BKF
14.56		672.53	
15.81		672.52	
16.82		672.46	
17.94		672.38	
19.3		672.64	
20.0		672.55	
21.1		672.56	

Holly Grove Stream Restoration Site
Guilford County, NC
Pool Cross Section PL4
Reach 4 - Middle Branch - Sta 11+14.3

Year 5

Facing Downstream



As-Built		Year 1		Year 2		Year 3		Year 4		Year 5	
Date	1/8/09	Date	10/20/09	Date	10/11/10	Date	10/5/11	Date	9/17/12	Date	9/30/13
Area	11.2	Area	9.4	Area	11.1	Area	10.2	Area	9.7	Area	9.2
Bkf W	10.5	Bkf W	10.5	Bkf W	10.7	Bkf W	10	Bkf W	7.67	Bkf W	7.25
Dmean	1.1	Dmean	0.9	Dmean	1.0	Dmean	1.0	Dmean	1.3	Dmean	1.3
Dmax	2.4	Dmax	2.0	Dmax	2.3	Dmax	2.2	Dmax	1.9	Dmax	1.9
W/d	9.9	W/d	11.8	W/d	10.3	W/d	9.8	W/d	6.0	W/d	5.7

Holly Grove Stream Restoration Site
Guilford County, NC
Pool Cross Section PL4
Reach 4 - Middle Branch - Sta 11+14.3

As-Built			
Station	FS/BS	Elev.	Desc.
BM	3.20	674.94	BP4 IR Lt
HI		678.14	
-20	5.17	672.97	
-10	5.55	672.59	
-3	5.95	672.19	
0	5.94	672.20	
4	5.84	672.30	
6	6.08	672.06	
8	6.58	671.56	
9.2	6.51	671.63	
9.8	7.24	670.90	EOW
9.9	8.87	669.27	
11.4	8.60	669.54	
12.4	8.50	669.64	
13.4	8.37	669.77	
14	8.12	670.02	
15.1	7.25	670.89	EOW
15.3	7.02	671.12	
16.5	6.62	671.52	
18	6.45	671.69	
20.5	6.38	671.76	
22.2	5.95	672.19	
22.9	5.84	672.30	
25.5	5.73	672.41	
27.3	5.80	672.34	
31	4.68	673.46	
36	4.70	673.44	

Year 1			
Station	FS/BS	Elev.	Desc.
BM	4.31	674.77	BP4 IR Rt
HI		679.08	
0	6.92	672.16	GRND
2	6.95	672.13	GRND
4	6.90	672.18	GRND
5.3	6.91	672.17	GRND
6.8	7.23	671.85	GRND
8	7.51	671.57	GRND
9	7.49	671.59	LOG
9.9	7.80	671.28	LOG
10	8.84	670.24	BED
10.5	8.66	670.42	BLDR
11.3	9.44	669.64	BED
11.9	9.40	669.68	BED
12.5	9.44	669.64	BED
13	9.41	669.67	BED
13.6	9.21	669.87	BED
14	8.94	670.14	BED
14.8	8.44	670.64	BED
15.4	7.81	671.27	BNK
16	7.64	671.44	BKF RT
18	7.42	671.66	GRND
21.4	7.32	671.76	GRND
22.3	6.92	672.16	GRND
22.9	6.85	672.23	GRND

Year 2			
Station	FS/BS	Elev.	Desc.
BM	4.75	674.77	IR Lt
HI		679.52	
0	7.32	672.20	GRND
0.6	7.31	672.21	GRND
2.2	7.30	672.22	GRND
3.6	7.21	672.31	GRND
5	7.32	672.20	GRND
5.1	7.32	672.20	BKF
6.1	7.51	672.01	BNK
6.9	7.78	671.74	BNK
8.2	8.06	671.46	BNK
9.1	7.92	671.60	LOG
9.7	8.21	671.31	LOG
9.8	9.26	670.26	EOW
10.6	9.79	669.73	BED
11.6	10.05	669.47	BED
12.2	10.07	669.45	THL
12.8	10.02	669.50	BED
13.6	9.80	669.72	BED
14.35	9.18	670.34	EOW
14.8	8.72	670.80	BNK
16.1	7.90	671.62	BNK
17.6	7.79	671.73	BKF
18.6	7.73	671.79	GRND
20	7.76	671.76	GRND
21.6	7.55	671.97	GRND
22.8	7.30	672.22	GRND

Year 3			
Station	FS/BS	Elev.	Desc.
BM	6.71	672.37	IR Lt
HI		679.08	
1	6.90	672.18	GRND
2.9	6.85	672.23	
4.9	6.77	672.31	
6.9	7.06	672.02	
7.3	7.10	671.98	BKF
7.9	7.33	671.75	BNK
8.4	7.35	671.73	
8.9	7.58	671.50	
9.4	7.46	671.62	
9.9	7.75	671.33	LOG
10.6	8.72	670.36	LOG
10.8	8.79	670.29	ROCK
11.5	9.46	669.62	
12.1	9.48	669.60	BED
12.9	9.44	669.64	THL
13.7	9.31	669.77	BED
14.5	9.03	670.05	BED
15.1	8.22	670.86	BNK
15.8	7.58	671.50	BNK
16.5	7.44	671.64	BKF
17.9	7.28	671.80	GRND
19.9	7.23	671.85	
21.9	6.97	672.11	
22.9	6.84	672.24	

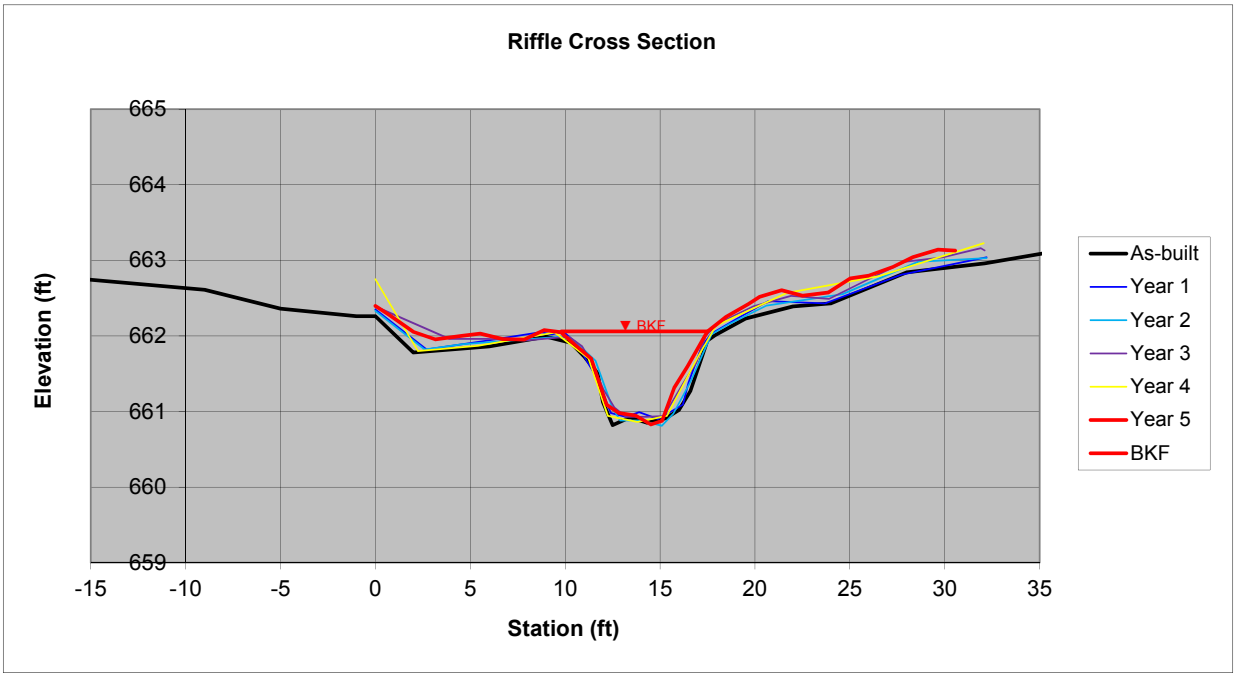
Year 4			
Station	FS/BS	Elev.	Desc.
BM	0.00	100.00	IR Lt
HI		100.00	
4.83		672.28	
6.91		671.91	
9.33		671.60	
11.16		669.77	BKF
12.33		669.66	
14.75		669.89	
16.4		671.59	
19.58		671.79	BKF
22.83		672.25	

Year 5			
Station	FS/BS	Elev.	Desc.
BM	0.00	0.00	IR Lt
HI		0.00	
0		672.26	
0.78		672.33	
1.65		672.32	
2.54		672.39	
3.37		672.30	
4.49		672.32	
5.52		672.16	
6.99		671.99	
8.42		671.60	BKF
9.95		670.31	
10.85		670.04	
12.12		669.66	
13.74		669.85	
14.6		670.23	
14.65		670.76	
15.22		671.46	
15.67		671.64	BKF
16.58		671.73	
17.68		671.87	
18.82		671.94	
19.61		671.89	
20.5		671.93	
21.44		672.01	
22.56		672.31	

Holly Grove Stream Restoration Site
Guilford County, NC
Riffle Cross Section RF5
Reach 5 - Middle Branch - Sta 11+68.1

Year 5

Facing Downstream



As-Built		Year 1		Year 2		Year 3		Year 4		Year 5	
Date	1/8/09	Date	10/20/09	Date	10/11/10	Date	10/5/11	Date	9/17/12	Date	9/30/13
Area	6.0	Area	5.9	Area	5.6	Area	4.9	Area	5.0	Area	5.4
Bkf W	8.9	Bkf W	8.2	Bkf W	7.9	Bkf W	7.2	Bkf W	8.0	Bkf W	7.7
Dmean	0.7	Dmean	0.7	Dmean	0.7	Dmean	0.7	Dmean	0.6	Dmean	0.7
Dmax	1.2	Dmax	1.2	Dmax	1.2	Dmax	1.1	Dmax	1.1	Dmax	1.2
W/d	13.2	W/d	11.5	W/d	11.1	W/d	10.5	W/d	12.8	W/d	11.0

Holly Grove Stream Restoration Site
Guilford County, NC
Riffle Cross Section RF5
Reach 5 - Middle Branch - Sta 11+68.1

As-Built			
Station	FS/BS	Elev.	Desc.
BM	2.82	665.59	BP5 IR Lt
HI		668.41	
-18	5.60	662.81	
-9	5.80	662.61	
-5	6.05	662.36	
-1	6.15	662.26	
0	6.15	662.26	
2	6.63	661.78	
6	6.55	661.86	
9	6.42	661.99	
10.3	6.50	661.91	
11	6.68	661.73	
11.7	6.90	661.51	
12	7.29	661.12	
12.5	7.59	660.82	
13.4	7.49	660.92	
14.3	7.56	660.85	
15.3	7.50	660.91	
16	7.39	661.02	
16.6	7.14	661.27	
17.5	6.47	661.94	
17.9	6.40	662.01	
19.5	6.18	662.23	
22	6.02	662.39	
24	5.98	662.43	
28	5.57	662.84	
32.1	5.45	662.96	
37	5.24	663.17	
42	5.42	662.99	
52	5.3	663.11	

Year 1			
Station	FS/BS	Elev.	Desc.
BM	3.98	665.59	BP5 IR Lt
HI		669.57	
0	7.22	662.35	GRND
2.7	7.75	661.82	GRND
5.7	7.64	661.93	GRND
8.7	7.52	662.05	GRND
9.3	7.55	662.02	GRND
9.9	7.51	662.06	BKF LT
10.6	7.67	661.90	BNK
11.7	8.14	661.43	BNK
12.4	8.59	660.98	BED
13.2	8.64	660.93	BED
13.9	8.58	660.99	BED
14.9	8.67	660.90	BED
16.2	8.48	661.09	BED
16.5	8.19	661.38	BANK
17.2	7.71	661.86	BANK
17.7	7.54	662.03	BANK
18.1	7.48	662.09	BKF RT
19	7.35	662.22	GRND
20.7	7.11	662.46	GRND
23.7	7.14	662.43	GRND
27.7	6.76	662.81	GRND
32.2	6.53	663.04	GRND

Year 2			
Station	FS/BS	Elev.	Desc.
BM	5.57	662.74	IR Lt
HI		668.31	
0	5.98	662.33	GRND
2.6	6.49	661.82	GRND
4.6	6.42	661.89	GRND
9.8	6.32	661.99	GRND
10.5	6.38	661.93	BKF
11.6	6.64	661.67	BNK
12.5	7.27	661.04	BED
12.9	7.43	660.88	BED
14	7.43	660.88	BED
15.1	7.50	660.81	BED
15.7	7.34	660.97	TOE
16.6	6.92	661.39	BNK
17.7	6.29	662.02	BNK
18.6	6.16	662.15	BKF
20.6	5.91	662.40	GRND
24.6	5.76	662.55	GRND
28.6	5.33	662.98	GRND
32.2	5.28	663.03	GRND

Year 3			
Station	FS/BS	Elev.	Desc.
BM	5.66	662.65	IR Lt
HI		668.31	
0	5.92	662.39	GRND
1.9	6.13	662.18	
3.9	6.35	661.96	
5.9	6.35	661.96	
7.9	6.37	661.94	
10.2	6.32	661.99	BKF
10.9	6.45	661.86	BNK
11.5	6.71	661.60	
12	7.01	661.30	TOE
12.6	7.26	661.05	
13.2	7.38	660.93	
14.3	7.38	660.93	
15.2	7.37	660.94	BANK
16.3	6.90	661.41	BNK
16.9	6.67	661.64	BNK
17.4	6.31	662.00	BNK
18.1	6.14	662.17	BKF
19.9	5.92	662.39	GRND
21.9	5.78	662.53	
23.9	5.82	662.49	
25.9	5.57	662.74	
27.9	5.33	662.98	
29.9	5.27	663.04	
31.9	5.15	663.16	
32.1	5.18	663.13	

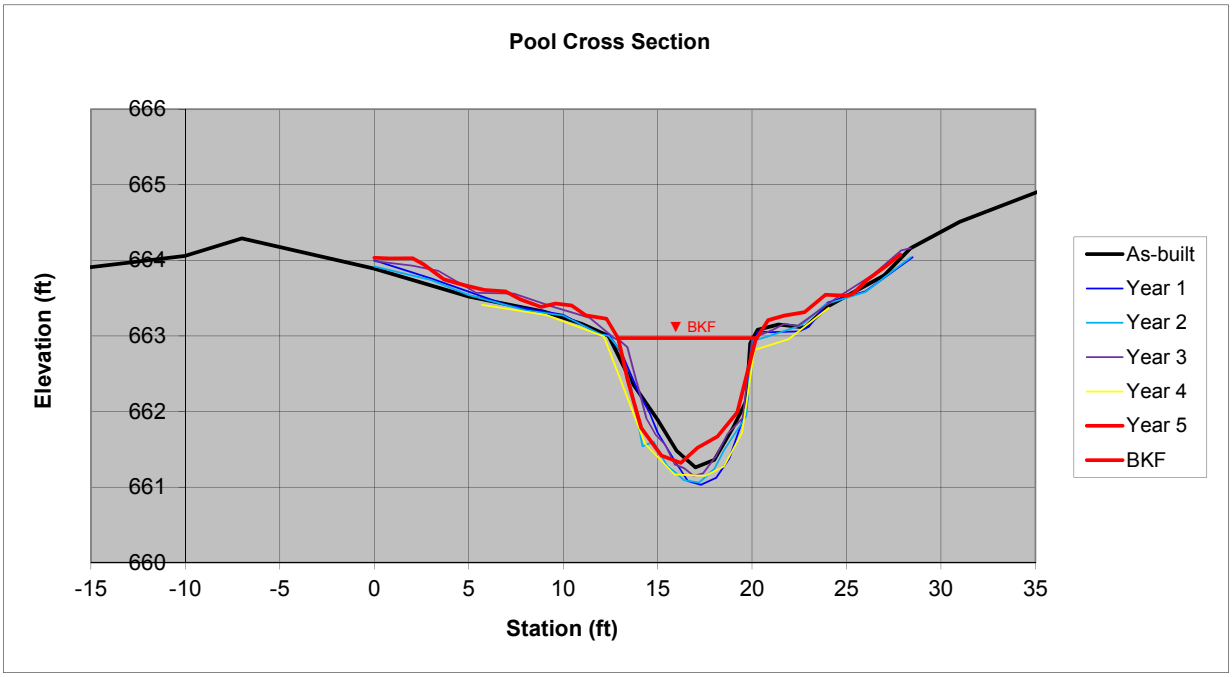
Year 4			
Station	FS/BS	Elev.	Desc.
BM	0.00		IR Lt
HI		0.00	
0		662.75	
2.24		661.80	
5.41		661.87	
9.46		662.05	BKF
11.23		661.70	
12.25		660.94	
13.81		660.86	
15.36		660.94	
17.02		661.73	BKF
17.95		662.13	
21.68		662.57	
26.53		662.79	
32.05		663.23	

Year 5			
Station	FS/BS	Elev.	Desc.
BM	0.00	0.00	IR Lt
HI		0.00	
0.0		662.40	
0.7		662.28	
2.0		662.05	
3.2		661.95	
4.5		662.00	
5.5		662.03	
6.7		661.96	
7.8		661.95	
8.9		662.08	
9.8		662.05	BKF
10.4		661.91	
11.4		661.70	
12.2		661.09	
12.8		660.98	
13.7		660.95	
14.5		660.83	
15.1		660.88	
15.8		661.31	
16.5		661.60	
17.5		662.06	BKF
18.5		662.25	
19.7		662.42	
20.2		662.51	
21.4		662.60	
22.5		662.53	
23.9		662.57	
25.0		662.76	
26.0		662.80	
27.3		662.91	
28.3		663.04	
29.7		663.14	
30.6		663.13	

Holly Grove Stream Restoration Site
Guilford County, NC
Pool Cross Section PL5
Reach 5 - Middle Branch - Sta 10+63.1

Year 5

Facing Downstream



As-Built		Year 1		Year 2		Year 3		Year 4		Year 5	
Date	1/8/09	Date	10/20/09	Date	10/11/10	Date	10/5/11	Date	9/17/12	Date	9/30/13
Area	8.4	Area	9.7	Area	10.1	Area	8.5	Area	10.6	Area	8.4
Bkf W	7.9	Bkf W	8.6	Bkf W	8.4	Bkf W	7.3	Bkf W	9.8	Bkf W	7.3
Dmean	1.1	Dmean	1.1	Dmean	1.2	Dmean	1.2	Dmean	1.1	Dmean	1.1
Dmax	1.7	Dmax	2.0	Dmax	1.9	Dmax	1.8	Dmax	1.8	Dmax	1.6
W/d	7.4	W/d	7.6	W/d	7.0	W/d	6.3	W/d	9.0	W/d	6.4

Holly Grove Stream Restoration Site
Guilford County, NC
Pool Cross Section PL5
Reach 5 - Middle Branch - Sta 10+63.1

As-Built			
Station	FS/BS	Elev.	Desc.
BM	2.82	665.59	BP5 IR Lt
HI		668.41	
-20	4.65	663.76	
-10	4.35	664.06	
-7	4.12	664.29	
0	4.52	663.89	
5	4.89	663.52	
9	5.09	663.32	
11	5.25	663.16	
12.4	5.41	663.00	
13.6	6.01	662.40	
15	6.52	661.89	
16	6.93	661.48	
17	7.15	661.26	
18	7.05	661.36	
19	6.62	661.79	
19.7	6.27	662.14	
19.9	5.51	662.90	
20.3	5.33	663.08	
21.4	5.26	663.15	
22.8	5.30	663.11	
24	5.02	663.39	
27	4.61	663.80	
28.4	4.25	664.16	
31	3.90	664.51	
36	3.42	664.99	
		668.41	

Year 1			
Station	FS/BS	Elev.	Desc.
BM	3.98	665.59	BP5 IR Lt
HI		669.57	
0	5.57	664	GRND
3	5.81	663.76	GRND
7	6.16	663.41	GRND
10	6.29	663.28	GRND
12	6.55	663.02	GRND
12.4	6.55	663.02	BKF LT
13.1	6.80	662.77	BNK
14	7.32	662.25	BNK
14.6	7.60	661.97	BNK
15	7.85	661.72	BED
15.9	8.22	661.35	BED
16.6	8.49	661.08	BED
17.3	8.54	661.03	BED
18.1	8.45	661.12	BED
18.8	8.19	661.38	BED
19.7	7.54	662.03	BNK
20	6.72	662.85	LOG
20.3	6.51	663.06	LOG
21	6.52	663.05	BNK
22.5	6.51	663.06	GRND
23	6.45	663.12	GRND
24	6.13	663.44	GRND
26	5.98	663.59	GRND
28.5	5.53	664.04	GRND

Year 2			
Station	FS/BS	Elev.	Desc.
BM	3.55	665.59	IR Lt
HI		669.14	
0	5.22	663.92	GRND
3	5.40	663.74	GRND
5	5.60	663.54	GRND
8	5.80	663.34	GRND
10	5.87	663.27	GRND
12	6.12	663.02	GRND
12.4	6.14	663.00	BKF
13	6.32	662.82	BNK
13.6	6.81	662.33	BNK
14.2	7.60	661.54	BNK
14.8	7.54	661.60	BNK
15.5	7.86	661.28	TOE
16	7.96	661.18	BED
16.4	8.05	661.09	BED
17.2	8.08	661.06	BED
18	7.90	661.24	BED
18.5	7.66	661.48	BED
19.7	7.20	661.94	BED
20	6.21	662.93	BNK
20.8	6.15	662.99	BNK
22.6	6.00	663.14	BNK
23.9	5.72	663.42	TOB
26	5.56	663.58	GRND
28.4	5.10	664.04	GRND

Year 3			
Station	FS/BS	Elev.	Desc.
BM	4.18	664.40	IR Lt
HI		668.58	
0	4.59	663.99	GRND
2	4.65	663.93	
3.4	4.72	663.86	
5.4	5.01	663.57	
7.4	5.02	663.56	
9.4	5.19	663.39	
11.4	5.34	663.24	
12.7	5.61	662.97	BKF
13	5.64	662.94	BNK
13.4	5.73	662.85	
13.9	6.20	662.38	
14.4	6.67	661.91	TOE
14.9	6.89	661.69	BED
15.4	7.02	661.56	
15.9	7.28	661.30	
16.4	7.33	661.25	
16.9	7.43	661.15	
17.4	7.40	661.18	
18.1	7.17	661.41	TOE
18.7	6.88	661.70	BNK
19.5	6.67	661.91	
20	5.62	662.96	
20.4	5.57	663.01	
21.1	5.50	663.08	
21.7	5.42	663.16	BKF
22.4	5.45	663.13	
24.4	5.09	663.49	GRND
26.4	4.77	663.81	
27.9	4.45	664.13	
28.4	4.42	664.16	

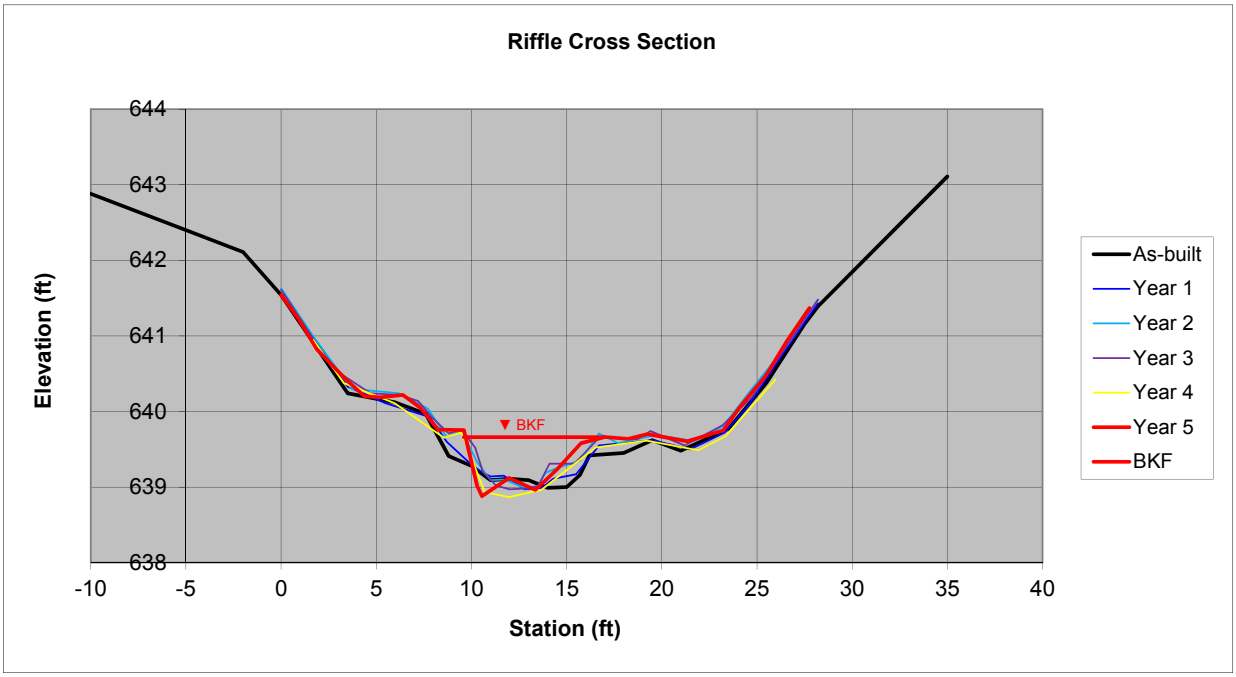
Year 4			
Station	FS/BS	Elev.	Desc.
BM	0.00		IR Lt
HI		0.00	
5.7		663.41	
9.11		663.28	
12.15		663.00	
14.34		661.57	
15.89		661.17	
17.52		661.15	
18.51		661.27	
19.48		661.72	
20.12		662.81	
21.93		662.96	BKF
24.06		663.37	

Year 5			
Station	FS/BS	Elev.	Desc.
BM	0.00	0.00	IR Lt
HI		0.00	
0.0		664.03	
0.8		664.03	
2.0		664.03	
2.6		663.95	
3.7		663.75	
4.8		663.67	
5.8		663.61	
6.9		663.59	
7.8		663.48	
8.8		663.38	
9.6		663.43	
10.5		663.40	
11.2		663.27	
12.3		663.23	
12.9		662.97	BKF
13.4		662.40	
14.1		661.78	
15.2		661.42	
16.2		661.32	
17.1		661.52	
18.2		661.67	
19.2		661.99	
20.2		662.94	BKF
20.9		663.21	
21.7		663.27	
22.8		663.31	
23.9		663.54	
25.0		663.53	
25.3		663.55	
26.1		663.75	
27.1		663.92	
27.9		664.08	

Holly Grove Stream Restoration Site
Guilford County, NC
Riffle Cross Section RF6
Reach 6 - Lower East Branch - Sta 11+07.2

Year 5

Facing Downstream



As-Built		Year 1		Year 2		Year 3		Year 4		Year 5	
Date	1/8/09	Date	10/20/09	Date	10/12/10	Date	10/5/11	Date	9/17/12	Date	9/30/13
Area	4.0	Area	2.8	Area	3.0	Area	2.9	Area	2.6	Area	3.2
Bkf W	10.7	Bkf W	8	Bkf W	8	Bkf W	7.7	Bkf W	6.5	Bkf W	7.4
Dmean	0.4	Dmean	0.4	Dmean	0.4	Dmean	0.4	Dmean	0.4	Dmean	0.4
Dmax	0.6	Dmax	0.6	Dmax	0.7	Dmax	0.7	Dmax	0.7	Dmax	0.8
W/d	28.5	W/d	22.7	W/d	21.6	W/d	20.3	W/d	16.3	W/d	17.3

Holly Grove Stream Restoration Site
Guilford County, NC
Riffle Cross Section RF6
Reach 6 - Lower East Branch - Sta 11+07.2

As-Built			
Station	FS/BS	Elev.	Desc.
BM	5.02	643.14	BP6 IR Lt
HI		648.16	
-10	5.28	642.88	
-5	5.76	642.40	
-2	6.05	642.11	
0	6.62	641.54	
3.5	7.92	640.24	
6	8.04	640.12	
7.6	8.19	639.97	
8.8	8.75	639.41	
10	8.88	639.28	
11	9.07	639.09	
12	9.05	639.11	
13	9.07	639.09	
14	9.17	638.99	
15	9.16	639.00	
15.7	9.00	639.16	
16.2	8.74	639.42	
18	8.71	639.45	
19.5	8.54	639.62	
21	8.68	639.48	
23.5	8.39	639.77	
25.5	7.78	640.38	
27.5	7.00	641.16	
28.2	6.77	641.39	
35	5.05	643.11	

Year 1			
Station	FS/BS	Elev.	Desc.
BM	6.06	643.14	BP6 IR Lt
HI		649.20	
0	7.67	641.53	GRND
1.5	8.16	641.04	GRND
3.5	8.87	640.33	GRND
5.5	9.09	640.11	GRND
7.5	9.25	639.95	GRND
7.8	9.27	639.93	BKF LT
8.7	9.60	639.60	BNK
9.6	9.81	639.39	BNK
10.2	9.95	639.25	BED
11	10.06	639.14	BED
11.7	10.05	639.15	BED
12.3	10.14	639.06	BED
12.8	10.23	638.97	BED
13.7	10.21	638.99	BED
14.3	10.09	639.11	BED
15.5	10.03	639.17	BNK
16.7	9.65	639.55	BKF RT
19.5	9.58	639.62	GRND
21.5	9.70	639.50	GRND
23.3	9.48	639.72	GRND
24.5	9.14	640.06	GRND
26.3	8.46	640.74	GRND
28.2	7.77	641.43	GRND

Year 2			
Station	FS/BS	Elev.	Desc.
BM	4.08	641.78	IR Lt
HI		645.86	
0	4.23	641.63	GRND
1.7	4.87	640.99	GRND
3.7	5.56	640.30	GRND
6.2	5.62	640.24	GRND
7.7	5.82	640.04	GRND
8.7	6.20	639.66	BKF
9.5	6.12	639.74	BNK
10.3	6.53	639.33	BED
11	6.77	639.09	BED
11.7	6.76	639.10	BED
12.9	6.88	638.98	BED
13.5	6.84	639.02	BED
13.9	6.67	639.19	BED
14.7	6.59	639.27	BNK
15.7	6.51	639.35	BNK
16.7	6.15	639.71	BKF
17.7	6.28	639.58	GRND
19.7	6.17	639.69	GRND
21.7	6.25	639.61	GRND
23.2	6.06	639.80	GRND
24.7	5.57	640.29	GRND
26.7	4.94	640.92	GRND
28.2	4.38	641.48	GRND

Year 3			
Station	FS/BS	Elev.	Desc.
BM	6.17	641.78	IR Lt
HI		647.95	
0	6.34	641.61	GRND
2.7	7.38	640.57	
4.7	7.71	640.24	
6.2	7.73	640.22	
7.2	7.81	640.14	BKF
7.9	8.02	639.93	BNK
8.8	8.24	639.71	
9.5	8.19	639.76	
10.2	8.43	639.52	
10.6	8.75	639.20	TOE
11.3	8.93	639.02	BED
12	8.98	638.97	THL
12.8	8.97	638.98	BED
13.5	8.94	639.01	TOE
14.1	8.64	639.31	BNK
15.4	8.64	639.31	
16.7	8.30	639.65	
17.2	8.30	639.65	BKF
18.7	8.32	639.63	GRND
19.4	8.21	639.74	
21.2	8.40	639.55	
23.2	8.13	639.82	
24.7	7.77	640.18	
28.2	6.47	641.48	

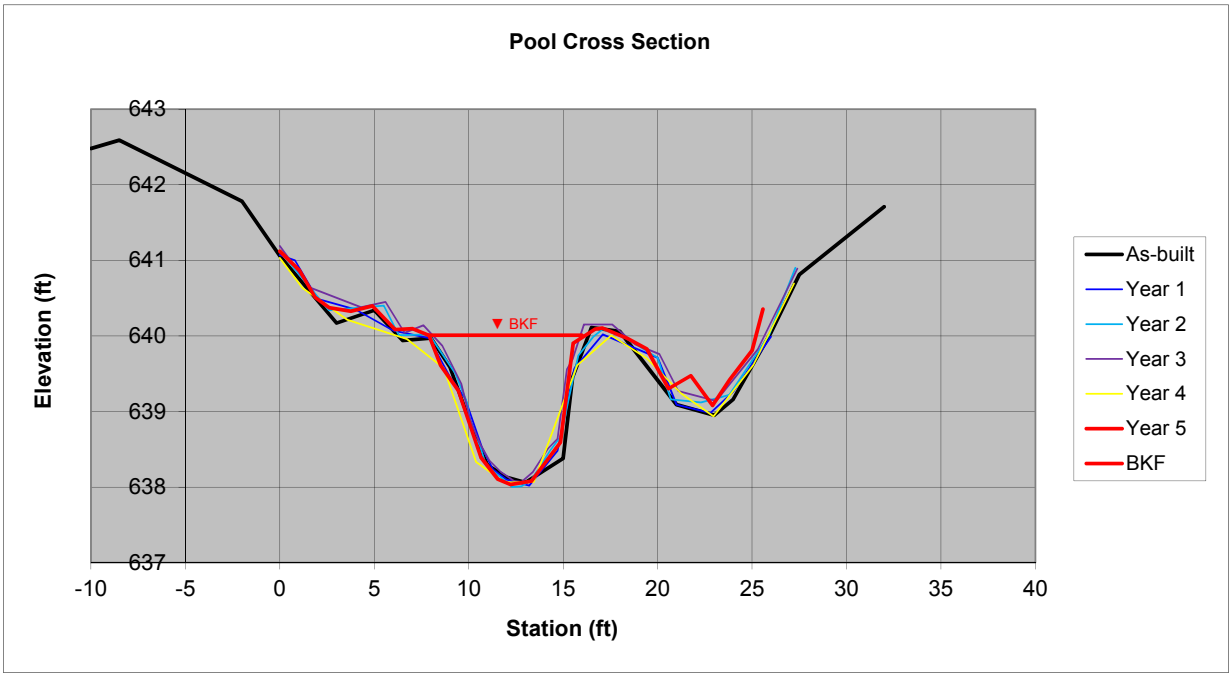
Year 4			
Station	FS/BS	Elev.	Desc.
BM	0.00		IR Lt
HI		0.00	
1.69		640.95	
3.3		640.38	
5.95		640.11	
8.56		639.65	BKF
9.47		639.72	
10.69		638.93	
11.96		638.87	
13.67		638.96	
16.52		639.52	BKF
19.21		639.61	
21.92		639.49	
23.35		639.67	
25.96		640.42	

Year 5			
Station	FS/BS	Elev.	Desc.
BM	0.00	0.00	IR Lt
HI		0.00	
0		641.54	
0.95		641.21	
1.87		640.83	
3.41		640.42	
4.38		640.20	
5.25		640.19	
6.4		640.22	
7.31		640.05	
8.25		639.76	
9.6		639.75	BKF
10.3		639.01	
10.55		638.88	
11.98		639.12	
13.36		638.96	
14.52		639.24	
15.75		639.58	
17.01		639.66	BKF
18.23		639.64	
19.25		639.70	
20.44		639.65	
21.34		639.61	
23.22		639.75	
24.06		640.05	
25.48		640.48	
26.55		640.93	
27.75		641.37	

Holly Grove Stream Restoration Site
Guilford County, NC
Pool Cross Section PL6
Reach 6 - Lower East Branch - Sta 11+33.0

Year 5

Facing Downstream



As-Built		Year 1		Year 2		Year 3		Year 4		Year 5	
Date	1/8/09	Date	10/20/09	Date	10/12/10	Date	10/5/11	Date	9/17/12	Date	9/30/13
Area	10.2	Area	10.0	Area	10.2	Area	10.3	Area	10.5	Area	10.2
Bkf W	8.5	Bkf W	9.2	Bkf W	9.2	Bkf W	10	Bkf W	10.8	Bkf W	9.2
Dmean	1.2	Dmean	1.1	Dmean	1.1	Dmean	1.0	Dmean	1.0	Dmean	1.1
Dmax	1.9	Dmax	2.0	Dmax	2.0	Dmax	2.1	Dmax	1.9	Dmax	2.0
W/d	7.1	W/d	8.5	W/d	8.3	W/d	9.7	W/d	11.1	W/d	8.3

Holly Grove Stream Restoration Site
Guilford County, NC
Pool Cross Section PL6
Reach 6 - Lower East Branch - Sta 11+33.0

As-Built			
Station	FS/BS	Elev.	Desc.
BM	5.02	643.14	BP6 IR Lt
HI		648.16	
-10	5.68	642.48	
-8.5	5.57	642.59	
-2	6.38	641.78	
0	7.10	641.06	
3	7.99	640.17	
5	7.82	640.34	
6.5	8.22	639.94	
8	8.19	639.97	
9	8.57	639.59	
10.5	9.60	638.56	
11	9.87	638.29	
12	10.03	638.13	
13	10.10	638.06	
14	9.94	638.22	
15	9.78	638.38	
15.5	8.71	639.45	
16.5	8.05	640.11	
18	8.10	640.06	
21	9.07	639.09	
23	9.21	638.95	
24	9.00	639.16	
26	8.12	640.04	
27.5	7.35	640.81	
32	6.45	641.71	

Year 1			
Station	FS/BS	Elev.	Desc.
BM	6.06	643.14	BP6 IR Lt
HI		649.20	
0	8.13	641.07	GRND
0.8	8.20	641	GRND
2	8.71	640.49	GRND
4	8.85	640.35	GRND
6	9.13	640.07	GRND
7.9	9.23	639.97	BKF LT
9	9.74	639.46	BNK
9.8	10.02	639.18	BNK
10.7	10.68	638.52	BNK
11.3	10.97	638.23	BED
12	11.10	638.1	BED
13.2	11.18	638.02	BED
14.7	10.72	638.48	BED
15.6	9.63	639.57	BED
17.1	9.18	640.02	BED
20	9.49	639.71	BNK
21	10.11	639.09	LOG
22.8	10.22	638.98	LOG
24	9.94	639.26	BNK
26	9.21	639.99	GRND

Year 2			
Station	FS/BS	Elev.	Desc.
BM	3.25	641.75	IR Lt
HI		645.00	
0	3.88	641.12	GRND
2.6	4.66	640.34	GRND
5.5	4.60	640.40	GRND
6.3	4.99	640.01	GRND
7.9	4.98	640.02	BKF
9.3	5.50	639.50	BNK
9.9	5.88	639.12	BNK
10.2	6.29	638.71	BNK
10.6	6.46	638.54	BED
10.9	6.70	638.30	TOE
11.3	6.79	638.21	BED
12	6.93	638.07	BED
12.3	7.00	638.00	BED
12.8	6.99	638.01	BED
13.3	6.91	638.09	BED
13.8	6.72	638.28	BED
14.3	6.52	638.48	BED
14.9	6.32	638.68	BED
15.3	5.82	639.18	ROOTWAD
15.8	5.26	639.74	ROOTWAD
16.6	5.01	639.99	BNK
17.1	4.91	640.09	BKF
18.3	5.03	639.97	GRND
20	5.29	639.71	GRND
20.7	5.84	639.16	GRND
22.3	5.88	639.12	GRND
23.8	5.78	639.22	GRND
25.9	4.99	640.01	GRND
27.3	4.10	640.90	GRND

Year 3			
Station	FS/BS	Elev.	Desc.
BM	6.00	641.31	IR Lt
HI		647.31	
0	6.12	641.19	GRND
1.6	6.67	640.64	
4.3	6.93	640.38	
5.6	6.86	640.45	
6.6	7.27	640.04	
7.6	7.17	640.14	
8.6	7.44	639.87	BKF
9.6	7.94	639.37	BNK
10.1	8.44	638.87	BNK
10.6	8.74	638.57	TOE
11.1	8.96	638.35	BED
11.7	9.11	638.20	EOW
12.4	9.23	638.08	THL
12.8	9.24	638.07	BED
13.4	9.11	638.20	EOW
14.2	8.80	638.51	BED
14.7	8.67	638.64	TOE
15.2	7.75	639.56	BNK
15.5	7.62	639.69	BKF
16.1	7.16	640.15	GRND
17.6	7.16	640.15	
18.8	7.42	639.89	
20.1	7.55	639.76	
21.1	8.04	639.27	
23.1	8.17	639.14	
25.3	7.49	639.82	
27.4	6.42	640.89	

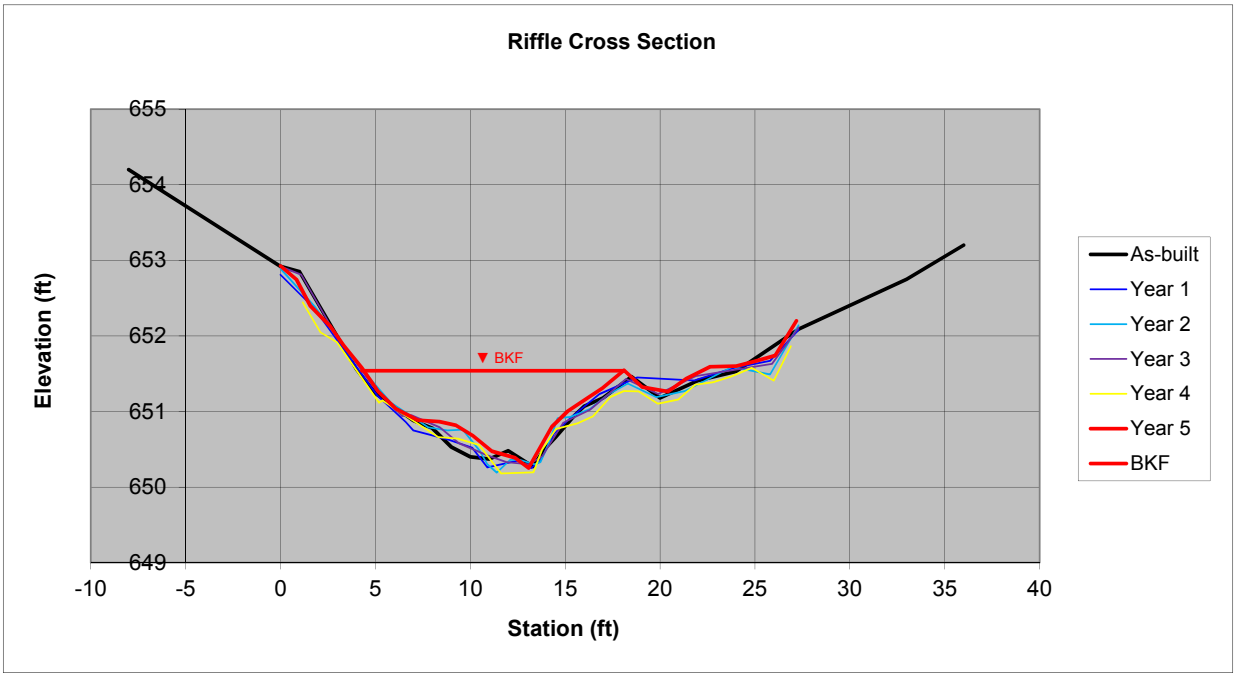
Year 4			
Station	FS/BS	Elev.	Desc.
BM	0.00		IR Lt
HI		0.00	
0		641.03	
1.2		640.63	
3.58		640.21	
6.73		639.96	BKF
8.68		639.57	
10.39		638.33	
11.89		638.06	
13.45		638.07	
15.74		639.61	
17.55		640.01	
19.42		639.70	
21.25		639.24	
22.96		638.94	
25.07		639.62	
27.22		640.69	

Year 5			
Station	FS/BS	Elev.	Desc.
BM	0.00	0.00	IR Lt
HI		0.00	
0.0		641.12	
1.1		640.86	
1.9		640.51	
2.6		640.37	
3.8		640.33	
4.9		640.40	
6.1		640.08	
7.0		640.10	
7.9		640.01	BKF
8.5		639.61	
9.5		639.28	
10.6		638.39	
11.5		638.10	
12.2		638.03	
13.3		638.08	
14.9		638.59	
15.5		639.90	
16.7		640.09	
17.1		640.10	BKF
18.4		639.96	
19.4		639.83	
20.6		639.30	
21.8		639.47	
22.9		639.08	
23.8		639.42	
25.0		639.81	
25.6		640.35	

Holly Grove Stream Restoration Site
Guilford County, NC
Riffle Cross Section RF7
Reach 7 - Southeast Creek - Sta 11+20.6

Year 5

Facing Downstream



As-Built		Year 1		Year 2		Year 3		Year 4		Year 5	
Date	1/8/09	Date	10/20/09	Date	10/12/10	Date	10/5/11	Date	9/17/12	Date	9/30/13
Area	9.4	Area	9.5	Area	7.6	Area	8.8	Area	7.3	Area	9.0
Bkf W	14.5	Bkf W	15	Bkf W	14.5	Bkf W	13.3	Bkf W	12.9	Bkf W	13.8
Dmean	0.6	Dmean	0.6	Dmean	0.5	Dmean	0.7	Dmean	0.6	Dmean	0.7
Dmax	1.2	Dmax	1.2	Dmax	1.2	Dmax	1.1	Dmax	1.1	Dmax	1.3
W/d	22.3	W/d	23.8	W/d	27.7	W/d	20.2	W/d	22.8	W/d	21.2

Holly Grove Stream Restoration Site
Guilford County, NC
Riffle Cross Section RF7
Reach 7 - Southeast Creek - Sta 11+20.6

As-Built

Station	FS/BS	Elev.	Desc.
BM	7.17	653.43	BP7 IR Lt
HI		660.60	
-8	6.40	654.20	
0	7.68	652.92	
1	7.75	652.85	
4	9.04	651.56	
5	9.36	651.24	
7	9.72	650.88	
8	9.82	650.78	
9	10.07	650.53	
10	10.20	650.40	
11	10.23	650.37	
12	10.12	650.48	
13.3	10.33	650.27	
13.9	10.10	650.50	
14.5	9.94	650.66	
15.5	9.65	650.95	
16	9.53	651.07	
17	9.42	651.18	
18.5	9.14	651.46	
20	9.42	651.18	
22	9.19	651.41	
24	9.07	651.53	
27.3	8.51	652.09	
33	7.85	652.75	
36	7.40	653.20	

Year 1

Station	FS/BS	Elev.	Desc.
BM	5.15	653.43	BP7 IR Lt
HI		658.58	
0	5.77	652.81	GRND
1.8	6.22	652.36	GRND
3.8	6.92	651.66	GRND
5.1	7.37	651.21	GRND
6.6	7.72	650.86	BKF LT
7	7.83	650.75	
8.8	7.95	650.63	
10.1	8.06	650.52	
10.9	8.32	650.26	
12.5	8.23	650.35	
13.2	8.33	650.25	
13.7	8.23	650.35	
14.4	7.88	650.70	
15.3	7.66	650.92	BKF RT
16.8	7.35	651.23	GRND
18.8	7.13	651.45	GRND
21.8	7.17	651.41	GRND
23.8	7.01	651.57	GRND
25.8	6.91	651.67	GRND
27.3	6.50	652.08	GRND

Year 2

Station	FS/BS	Elev.	Desc.
BM	5.27	653.16	IR Lt
HI		658.43	
0	5.54	652.89	GRND
1.8	6.04	652.39	GRND
3.8	6.73	651.70	GRND
5.8	7.31	651.12	GRND
7.8	7.64	650.79	GRND
8.8	7.68	650.75	GRND
9.6	7.67	650.76	BKF
10.5	7.95	650.48	BNK
10.9	8.13	650.30	EOW
11.4	8.24	650.19	BED
12.1	8.07	650.36	BED
12.6	8.07	650.36	BED
13.4	8.13	650.30	BED
13.7	8.10	650.33	EOW
14.1	7.88	650.55	BNK
14.6	7.52	650.91	BKF
15.3	7.50	650.93	GRND
16.3	7.40	651.03	GRND
17.3	7.20	651.23	GRND
18.3	7.06	651.37	GRND
19.8	7.24	651.19	GRND
21.3	7.16	651.27	GRND
23.8	6.84	651.59	GRND
25.8	6.94	651.49	GRND
27.3	6.29	652.14	GRND

Year 3

Station	FS/BS	Elev.	Desc.
BM	2.97	653.16	IR Lt
HI		656.13	
0	3.21	652.92	GRND
1.1	3.32	652.81	
2.9	4.11	652.02	
4.9	4.80	651.33	
6.4	5.19	650.94	
6.9	5.18	650.95	
8.4	5.34	650.79	BKF
9.4	5.55	650.58	BNK
10.9	5.71	650.42	EOW
11.9	5.80	650.33	BED
13.1	5.83	650.30	THL
13.8	5.72	650.41	EOW
14.9	5.28	650.85	BNK/BKF
16.3	5.11	651.02	GRND
17.2	4.92	651.21	
18.2	4.70	651.43	
19.9	4.90	651.23	
21.9	4.66	651.47	
25.9	4.50	651.63	
27.3	4.02	652.11	

Year 4

Station	FS/BS	Elev.	Desc.
BM	0.00	100.00	IR Lt
HI		100.00	
1.2		652.44	
2.1		652.05	
3.0		651.92	
5.2		651.12	
5.4		651.15	BKF
8.3		650.66	
9.3		650.64	
10.5		650.56	
11.6		650.18	
13.3		650.19	
13.8		650.50	
14.5		650.77	
15.7		650.84	
16.5		650.93	
17.4		651.19	
18.1		651.27	BKF
18.9		651.27	
19.9		651.10	
21.0		651.16	
21.9		651.35	
22.8		651.39	
23.8		651.46	
24.8		651.58	
26.0		651.41	
26.9		651.86	

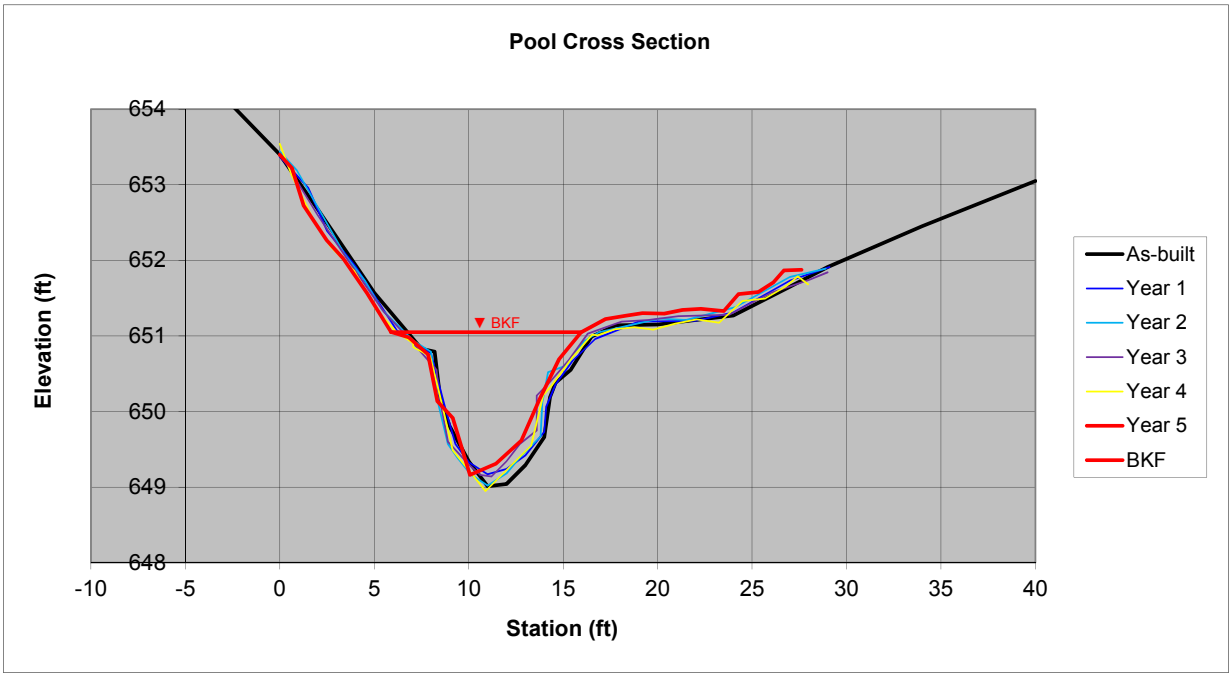
Year 5

Station	FS/BS	Elev.	Desc.
BM	0.00	0.00	IR Lt
HI		0.00	
0		652.92	
0.84		652.75	
1.57		652.40	
2.62		652.13	
3.32		651.88	
4.29		651.58	
5.14		651.27	BKF
6.09		651.04	
7.23		650.89	
8.37		650.87	
9.25		650.82	
10.14		650.68	
11.14		650.47	
12.36		650.39	
13.08		650.25	
14.31		650.80	
15.13		651.00	
16.17		651.18	
16.96		651.31	
18.1		651.54	BKF
19.06		651.32	
20.42		651.26	
21.37		651.43	
22.64		651.59	
24.02		651.60	
25.00		651.66	
26.07		651.74	
27.19		652.20	

Holly Grove Stream Restoration Site
Guilford County, NC
Pool Cross Section PL7
Reach 7 - Southeast Creek - Sta 11+32.3

Year 5

Facing Downstream



As-Built		Year 1		Year 2		Year 3		Year 4		Year 5	
Date	1/8/09	Date	10/20/09	Date	10/12/10	Date	10/5/11	Date	9/17/12	Date	9/30/13
Area	10.5	Area	9.6	Area	9.6	Area	9.9	Area	10.0	Area	9.3
Bkf W	9.5	Bkf W	9.7	Bkf W	9.8	Bkf W	9.3	Bkf W	9.4	Bkf W	9.12
Dmean	1.1	Dmean	1.0	Dmean	1.0	Dmean	1.1	Dmean	1.1	Dmean	1.0
Dmax	2.0	Dmax	1.8	Dmax	1.9	Dmax	1.9	Dmax	2.1	Dmax	1.9
W/d	8.6	W/d	9.8	W/d	10.0	W/d	8.7	W/d	8.8	W/d	8.9

Holly Grove Stream Restoration Site
Guilford County, NC
Pool Cross Section PL7
Reach 7 - Southeast Creek - Sta 11+32.3

As-Built			
Station	FS/BS	Elev.	Desc.
BM	7.17	653.43	BP7 IR Lt
HI		660.60	
-4	6.17	654.43	
0	7.20	653.40	
2	7.92	652.68	
5	9.03	651.57	
7.5	9.77	650.83	
8.2	9.81	650.79	
8.5	10.45	650.15	
9	10.80	649.80	
10	11.26	649.34	
11	11.59	649.01	
12	11.56	649.04	
13	11.31	649.29	
14	10.94	649.66	
14.3	10.41	650.19	
14.6	10.22	650.38	
15.4	10.05	650.55	
16.5	9.61	650.99	
17.8	9.46	651.14	
20	9.45	651.15	
24	9.33	651.27	
27	8.95	651.65	
29	8.69	651.91	
34	8.15	652.45	
40	7.55	653.05	
		660.60	

Year 1			
Station	FS/BS	Elev.	Desc.
BM	5.15	653.43	BP7 IR Lt
HI		658.58	
0	5.21	653.37	GRND
1.5	5.62	652.96	GRND
2.5	6.19	652.39	GRND
4	6.66	651.92	GRND
6.2	7.51	651.07	GRND
8	7.81	650.77	LOG
8.7	8.48	650.1	EOW
9.3	9.01	649.57	
10	9.25	649.33	
11	9.41	649.17	
12	9.34	649.24	
13	9.16	649.42	
14	8.85	649.73	
14.1	8.52	650.06	EOW
14.6	8.22	650.36	
15.5	7.91	650.67	BKF RT
16.7	7.62	650.96	GRND
19	7.39	651.19	GRND
22	7.38	651.2	GRND
24	7.27	651.31	GRND
27	6.85	651.73	GRND
29.1	6.67	651.91	GRND

Year 2			
Station	FS/BS	Elev.	Desc.
BM	4.94	652.34	IR Lt
HI		657.28	
0	3.84	653.44	GRND
0.9	4.09	653.19	GRND
3.4	5.19	652.09	GRND
4.5	5.55	651.73	GRND
5.4	5.93	651.35	GRND
7.1	6.35	650.93	GRND
8	6.49	650.79	LOG
8.4	7.19	650.09	LOG/EOW
8.9	7.71	649.57	BED
9.4	7.89	649.39	BED
10.1	8.11	649.17	BED
11	8.26	649.02	BED
12	8.10	649.18	BED
12.7	7.89	649.39	BED
13.8	7.61	649.67	BED
13.9	7.16	650.12	EOW
14.2	6.76	650.52	BNK
15.2	6.67	650.61	BNK
16.1	6.35	650.93	BNK
16.9	6.23	651.05	BKF
20.1	6.05	651.23	GRND
21.5	6.07	651.21	GRND
24.1	5.90	651.38	GRND
27	5.50	651.78	GRND
28.9	5.39	651.89	GRND

Year 3			
Station	FS/BS	Elev.	Desc.
BM	6.60	653.53	IR Lt
HI		660.13	
0	6.71	653.42	GRND
2	7.53	652.60	
3.5	8.09	652.04	
5.5	8.81	651.32	
7	9.21	650.92	
8.3	9.58	650.55	BKF
8.4	9.87	650.26	WS
8.9	10.53	649.60	TOE
10	10.83	649.30	BED
10.6	10.97	649.16	THAL
11.2	10.99	649.14	BED
12	10.79	649.34	BED
12.7	10.56	649.57	BED
13.6	10.38	649.75	BED
13.6	9.92	650.21	WS
14.3	9.74	650.39	BNK
15.3	9.45	650.68	BNK
16.3	9.10	651.03	BKF
18.1	8.94	651.19	GRND
19.5	8.92	651.21	
21.1	8.87	651.26	
23.8	8.85	651.28	
26	8.56	651.57	
28	8.39	651.74	
29	8.29	651.84	

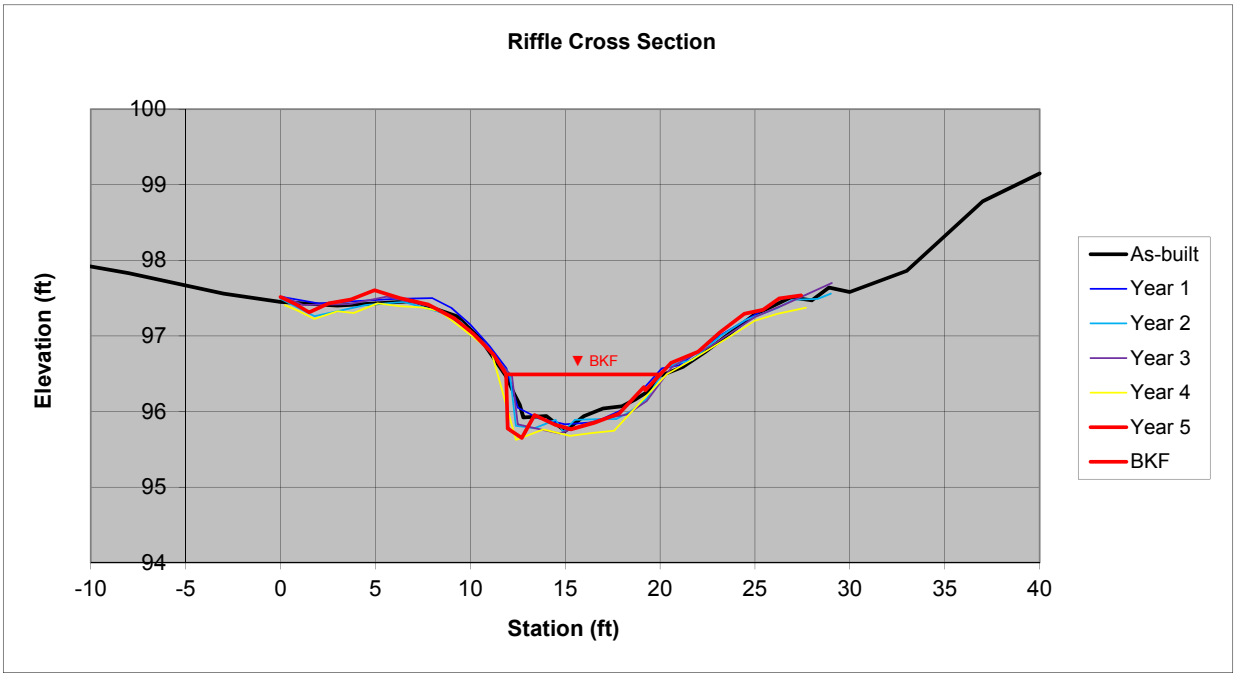
Year 4			
Station	FS/BS	Elev.	Desc.
BM	0.00	100.00	IR Lt
HI		100.00	
0.0		653.54	
0.6		653.13	
1.8		652.55	
2.7		652.17	
3.9		651.86	
5.1		651.35	
6.2		651.05	
7.1		650.91	BKF
7.1		650.85	
8.0		650.73	
8.5		650.22	
9.2		649.49	
10.9		648.95	
13.3		649.55	
14.0		650.22	
14.4		650.35	
15.5		650.72	
16.5		651.01	BKF
16.8		651.01	
17.7		651.09	
18.8		651.11	
19.8		651.08	
20.9		651.16	
22.1		651.22	
23.3		651.17	
24.5		651.46	
25.7		651.49	
26.8		651.65	
27.4		651.79	
28.0		651.68	

Year 5			
Station	FS/BS	Elev.	Desc.
BM	0.00	0.00	IR Lt
HI		0.00	
0		653.40	
0.65		653.22	
1.27		652.72	
2.48		652.27	
3.35		652.02	
4.62		651.56	
5.88		651.05	
6.83		650.98	BKF
7.85		650.76	
8.34		650.13	
9.16		649.91	
10.07		649.16	
11.44		649.31	
12.79		649.62	
13.76		650.17	
14.79		650.69	
15.95		651.05	BKF
17.24		651.22	
18.32		651.27	
19.2		651.30	
20.35		651.30	
21.32		651.34	
22.29		651.36	
23.5		651.33	
24.28		651.55	
25.33		651.58	
26.13		651.71	
26.69		651.87	
27.62		651.87	

Holly Grove Stream Restoration Site
Guilford County, NC
Riffle Cross Section RF8
Reach 8 - Southwest Creek - Sta 11+49.9

Year 5

Facing Downstream



As-Built		Year 1		Year 2		Year 3		Year 4		Year 5	
Date	1/8/09	Date	10/20/09	Date	10/12/10	Date	10/5/11	Date	9/17/12	Date	9/30/13
Area	3.4	Area	4.4	Area	4.9	Area	5.3	Area	5.1	Area	4.4
Bkf W	8	Bkf W	8.2	Bkf W	8.4	Bkf W	9	Bkf W	8.9	Bkf W	8.7
Dmean	0.4	Dmean	0.5	Dmean	0.6	Dmean	0.6	Dmean	0.6	Dmean	0.5
Dmax	0.7	Dmax	0.7	Dmax	0.8	Dmax	0.9	Dmax	0.9	Dmax	0.8
W/d	18.6	W/d	15.2	W/d	14.5	W/d	15.2	W/d	15.5	W/d	17.2

Holly Grove Stream Restoration Site
Guilford County, NC
Riffle Cross Section RF8
Reach 8 - Southwest Creek - Sta 11+49.9

As-Built

Station	FS/BS	Elev.	Desc.
BM	2.51	98.99	Stump
HI		101.50	
-15	3.36	98.14	
-8	3.67	97.83	
-3	3.94	97.56	
0	4.05	97.45	
3	4.10	97.40	
7	4.04	97.46	
9.3	4.24	97.26	
10.6	4.56	96.94	
11.9	5.04	96.46	
12.3	5.26	96.24	
12.6	5.41	96.09	
12.8	5.58	95.92	
14	5.56	95.94	
15	5.76	95.74	
16	5.56	95.94	
17	5.46	96.04	
18	5.43	96.07	
18.7	5.34	96.16	
19.4	5.23	96.27	
19.9	5.04	96.46	
21.2	4.91	96.59	
22.4	4.71	96.79	
24.9	4.23	97.27	
26.9	3.99	97.51	
28	4.03	97.47	
28.9	3.86	97.64	
30	3.92	97.58	
33	3.64	97.86	
37	2.72	98.78	
40	2.35	99.15	

Year 1

Station	FS/BS	Elev.	Desc.
BM	3.78	100.42	BP8 IR Rt
HI		104.20	
0	6.68	97.52	GRND
2	6.77	97.43	GRND
6	6.71	97.49	GRND
8	6.70	97.50	GRND
9	6.83	97.37	GRND
10	7.05	97.15	GRND
11	7.33	96.87	BKF
11.9	7.63	96.57	BNK
12.5	8.15	96.05	BED
13.6	8.29	95.91	BED
15	8.37	95.83	BED
16.6	8.34	95.86	BED
18	8.18	96.02	BED
19	7.93	96.27	BNK
20.1	7.63	96.57	BKF
21	7.59	96.61	GRND
23	7.22	96.98	GRND
26	6.77	97.43	GRND

Year 2

Station	FS/BS	Elev.	Desc.
BM	5.42	97.59	IR Lt
HI		103.01	
0	5.52	97.49	GRND
1.8	5.75	97.26	GRND
4.5	5.60	97.41	GRND
6.5	5.56	97.45	GRND
8.5	5.70	97.31	GRND
9.5	5.82	97.19	GRND
11.1	6.21	96.80	GRND
11.5	6.36	96.65	GRND
11.9	6.46	96.55	BKF
12.1	6.54	96.47	BNK
12.4	7.20	95.81	TOE
13.4	7.23	95.78	BED
14.5	7.12	95.89	BED
14.9	7.28	95.73	BED
15.5	7.12	95.89	BED
16.8	7.11	95.90	BED
17.7	7.11	95.90	BED
18.5	7.00	96.01	BED
19.3	6.84	96.17	BED
19.8	6.63	96.38	BNK
20.3	6.44	96.57	BNK
20.8	6.38	96.63	BKF
21.7	6.33	96.68	GRND
23.2	6.01	97.00	GRND
24.5	5.80	97.21	GRND
26.2	5.64	97.37	GRND
27	5.53	97.48	GRND
28.3	5.52	97.49	GRND
29	5.45	97.56	GRND

Year 3

Station	FS/BS	Elev.	Desc.
BM	5.11	97.60	IR Lt
HI		102.71	
0.1	5.19	97.52	GRND
1.2	5.30	97.41	
3.6	5.29	97.42	
5.6	5.19	97.52	
8.1	5.33	97.38	
10	5.64	97.07	
10.9	5.84	96.87	BKF
11.6	6.08	96.63	BNK
12.2	6.24	96.47	
12.5	6.88	95.83	TOE
13.4	6.93	95.78	BED
14.7	7.00	95.71	THL
16	6.88	95.83	BED
16.9	6.81	95.90	
18.25	6.75	95.96	TOE
19.3	6.57	96.14	BNK
20.6	6.13	96.58	BKF
21.1	6.05	96.66	GRND
22.7	5.84	96.87	
25	5.46	97.25	
26.6	5.29	97.42	
29.05	5.01	97.70	

Year 4

Station	FS/BS	Elev.	Desc.
BM	0.00	100.00	IR Lt
HI		100.00	
0.24		97.41	
0.89		97.34	
1.78		97.23	
3.01		97.33	
3.85		97.30	
5.12		97.43	
6.33		97.39	
7.44		97.38	
8.39		97.33	
9.71		97.07	
11.1		96.80	BKF
12.41		95.62	
13.84		95.76	
15.27		95.68	
16.43		95.72	
17.58		95.75	
18.85		96.09	
20.37		96.49	BKF
21.71		96.69	
23.81		97.01	
25		97.20	
26.19		97.29	
27.69		97.37	

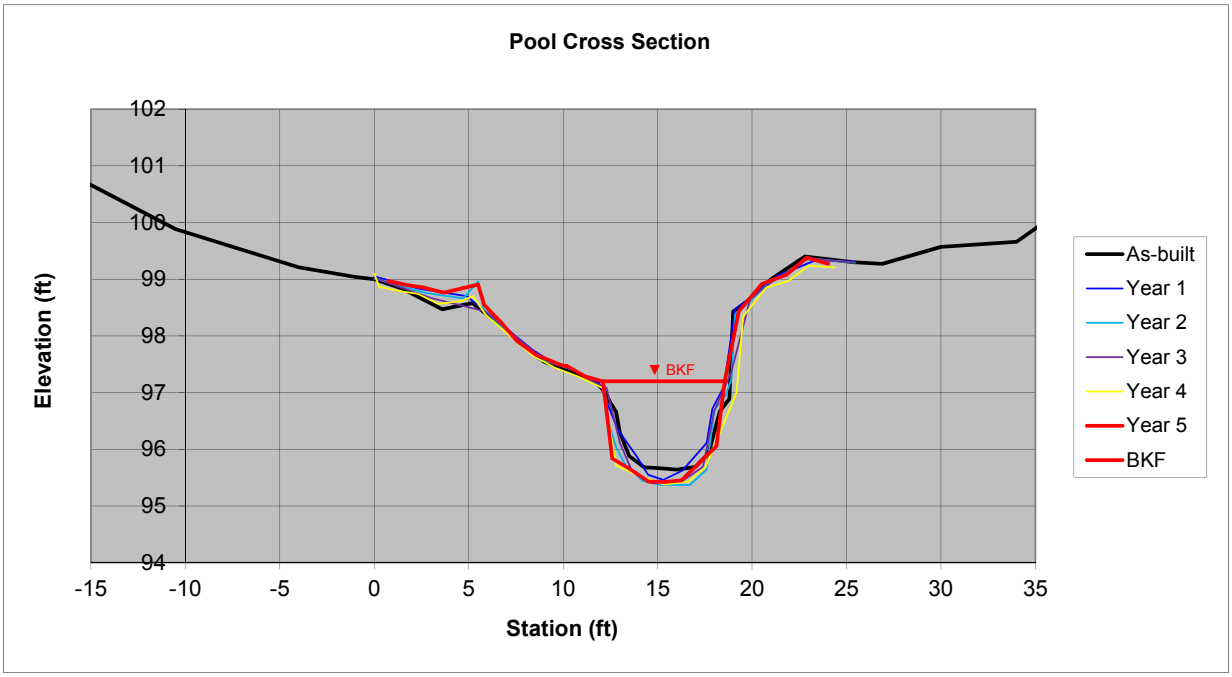
Year 5

Station	FS/BS	Elev.	Desc.
BM	0.00	0.00	IR Lt
HI		0.00	
0		97.52	
0.79		97.42	
1.51		97.31	
2.54		97.43	
3.7		97.48	
4.95		97.60	
6.31		97.50	
7.77		97.41	
9.18		97.23	
10.16		97.03	
11.23		96.75	
11.89		96.49	BKF
11.97		95.77	
12.71		95.65	
13.39		95.95	
14.46		95.83	
15.3		95.76	
16.54		95.85	
17.84		95.97	
19.15		96.32	
19.23		96.28	
20.58		96.64	BKF
22		96.79	
23.14		97.04	
24.44		97.29	
25.43		97.35	
26.28		97.50	
27.43		97.54	

Holly Grove Stream Restoration Site
Guilford County, NC
Pool Cross Section PL8
Reach 8 - Southwest Creek - Sta 100+78.5

Year 5

Facing Downstream



As-Built		Year 1		Year 2		Year 3		Year 4		Year 5	
Date	1/8/09	Date	10/20/09	Date	10/12/10	Date	10/5/11	Date	9/17/12	Date	9/30/13
Area	7.9	Area	7.4	Area	9.1	Area	8.6	Area	9.2	Area	9.3
Bkf W	7.1	Bkf W	6.6	Bkf W	7.2	Bkf W	7.5	Bkf W	7.1	Bkf W	6.4
Dmean	1.1	Dmean	1.1	Dmean	1.3	Dmean	1.1	Dmean	1.3	Dmean	1.5
Dmax	1.6	Dmax	1.7	Dmax	1.8	Dmax	1.8	Dmax	1.7	Dmax	1.8
W/d	6.4	W/d	5.9	W/d	5.7	W/d	6.5	W/d	5.5	W/d	4.4

Holly Grove Stream Restoration Site
Guilford County, NC
Pool Cross Section PL8
Reach 8 - Southwest Creek - Sta 100+78.5

As-Built			
Station	FS/BS	Elev.	Desc.
BM	5.31	98.99	Stump
HI		104.30	
-17	3.29	101.01	
-10.5	4.42	99.88	
-4	5.09	99.21	
-1	5.26	99.04	
0	5.30	99.00	
1.5	5.47	98.83	
3.6	5.83	98.47	
5.2	5.72	98.58	
6	5.93	98.37	
9	6.76	97.54	
11	7.00	97.30	
11.7	7.11	97.19	
12.2	7.28	97.02	
12.5	7.48	96.82	
12.8	7.64	96.66	
13	8.00	96.30	
13.5	8.42	95.88	
14.3	8.62	95.68	
15	8.63	95.67	
16	8.66	95.64	
17	8.61	95.69	
17.7	8.37	95.93	
18.3	7.63	96.67	
18.8	7.41	96.89	
19	5.87	98.43	
19.9	5.65	98.65	
21	5.30	99.00	
22.8	4.9	99.40	
25.4	5	99.30	
26.9	5.03	99.27	
30	4.73	99.57	
34	4.64	99.66	
36	4.17	100.13	
40	4.06	100.24	

Year 1			
Station	FS/BS	Elev.	Desc.
BM	3.78	100.42	BP8 IR Rt
HI		104.20	
0	5.15	99.05	GRND
2.4	5.37	98.83	GRND
4.9	5.50	98.7	GRND
8.4	6.45	97.75	GRND
9.4	6.66	97.54	GRND
10.9	6.85	97.35	GRND
11.9	7.03	97.17	BKF
12.9	7.86	96.34	BNK
13.9	8.33	95.87	BED
14.5	8.65	95.55	BED
15.3	8.74	95.46	BED
16.3	8.58	95.62	BED
17.6	8.09	96.11	BED
17.9	7.48	96.72	ROOTWAD
18.5	7.10	97.1	ROOT
19.1	5.73	98.47	TOB
19.9	5.53	98.67	GRND
21.4	5.13	99.07	GRND
23.4	4.86	99.34	GRND
25.4	4.89	99.31	GRND

Year 2			
Station	FS/BS	Elev.	Desc.
BM	5.61	99.09	IR Lt
HI		104.70	
0	5.69	99.01	GRND
2.7	5.94	98.76	GRND
4.7	6.04	98.66	GRND
5.5	5.74	98.96	LOG
5.8	6.24	98.46	GRND
8.7	7.12	97.58	GRND
9.7	7.20	97.50	BKF
10.7	7.33	97.37	BNK
11.7	7.54	97.16	BNK
12.2	7.64	97.06	BNK
12.4	8.23	96.47	BED
12.8	8.66	96.04	EOW
13.3	8.98	95.72	BED
14.2	9.26	95.44	BED
15.2	9.33	95.37	BED
16.7	9.33	95.37	BED
17.6	9.06	95.64	BED
18	8.01	96.69	BNK
18.6	7.75	96.95	BNK
18.9	7.47	97.23	BNK
19.1	6.32	98.38	GRND
19.7	6.15	98.55	GRND
20.7	5.82	98.88	GRND
23	5.33	99.37	GRND
25.45	5.41	99.29	GRND

Year 3			
Station	FS/BS	Elev.	Desc.
BM	5.13	99.09	IR Lt
HI		104.22	
0	5.20	99.02	GRND
3	5.55	98.67	
5.9	5.79	98.43	
8.7	6.57	97.65	
9.5	6.72	97.50	
9.9	6.75	97.47	BKF
10.6	6.83	97.39	BNK
11.4	7.01	97.21	
12.3	7.14	97.08	
13	8.10	96.12	TOE
13.6	8.57	95.65	BED
14.7	8.82	95.40	
15.5	8.82	95.40	THL
16.3	8.78	95.44	BED
17.4	8.53	95.69	TOE
18	7.54	96.68	BNK
18.9	6.86	97.36	
19.9	5.57	98.65	
21.1	5.25	98.97	GRND
23	4.86	99.36	
25.4	4.92	99.30	

Year 4			
Station	FS/BS	Elev.	Desc.
BM	0.00	100.00	IR Lt
HI		100.00	
0.0		99.10	
0.3		98.87	
1.3		98.79	
2.3		98.74	
3.4		98.57	
4.6		98.62	
5.2		98.70	
5.9		98.37	
6.9		98.07	
8.4		97.65	
9.6		97.44	
10.7		97.29	
12.1		97.08	BKF
12.8		95.71	
14.1		95.51	
15.4		95.38	
16.7		95.43	
17.5		95.69	
19.2		97.00	
19.5		98.34	
20.8		98.85	
21.9		98.97	
23.0		99.24	
24.4		99.21	

Year 5			
Station	FS/BS	Elev.	Desc.
BM	0.00	0.00	IR Lt
HI		0.00	
0.75		98.97	
1.78		98.89	
2.58		98.86	
3.69		98.76	
5.5		98.91	
5.82		98.55	
6.75		98.22	
7.53		97.92	
8.57		97.67	
10		97.47	
10.19		97.47	
11.17		97.29	
12.11		97.20	BKF
12.6		95.84	
13.41		95.68	
14.52		95.43	
15.36		95.43	
16.26		95.45	
18.11		96.06	
18.55		97.20	BKF
19.3		98.44	
20.53		98.92	
21.83		99.08	
22.88		99.38	
24.03		99.27	

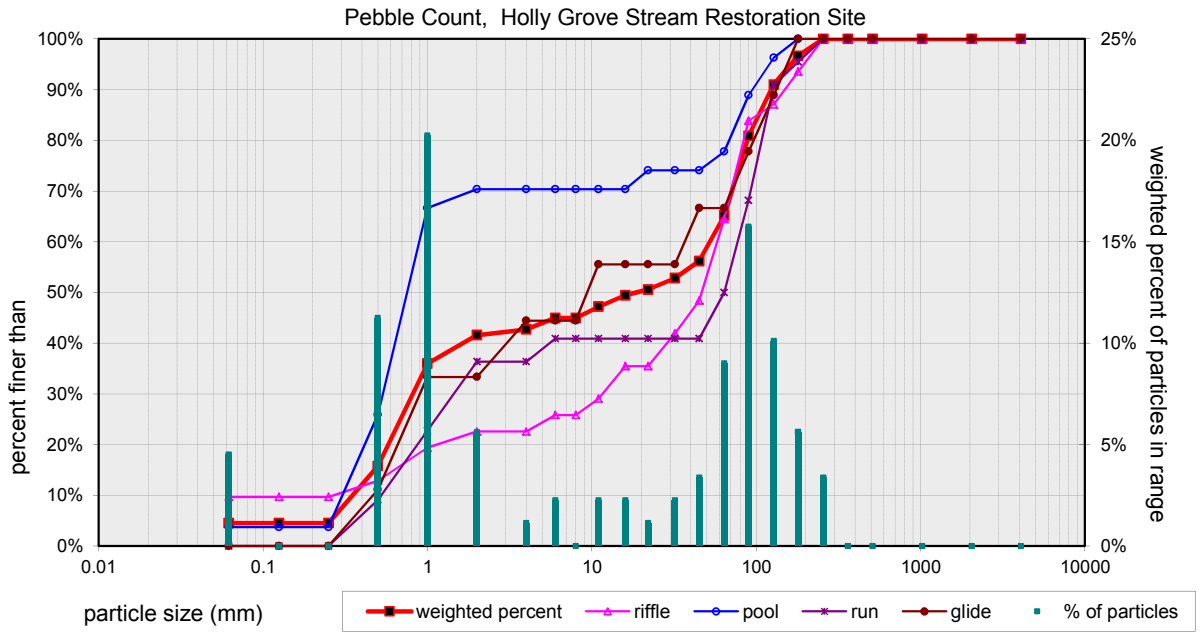
Pebble Count Weighted by Channel Feature

Percent Riffle:	32.7	Percent Run:	23.7
Percent Pool:	33.7	Percent Glide:	9.9

Material	Size Range (mm)		weighted
silt/clay	0	0.062	4.0
very fine sand	0.062	0.13	0.0
fine sand	0.13	0.25	0.0
medium sand	0.25	0.5	9.9
coarse sand	0.5	1	17.8
very coarse sand	1	2	4.9
very fine gravel	2	4	1.0
fine gravel	4	6	2.0
fine gravel	6	8	0.0
medium gravel	8	11	2.0
medium gravel	11	16	2.0
coarse gravel	16	22	1.0
coarse gravel	22	32	2.0
very coarse gravel	32	45	3.0
very coarse gravel	45	64	7.9
small cobble	64	90	13.9
medium cobble	90	128	8.9
large cobble	128	180	5.0
very large cobble	180	256	3.0
small boulder	256	362	0.0
small boulder	362	512	0.0
medium boulder	512	1024	0.0
large boulder	1024	2048	0.0
very large boulder	2048	4096	0.0
weighted particle count:			88.1

bedrock		11.9
clay hardpan		0.0
detritus/wood		0.0
artificial		0.0
weighted total count:		100

Holly Grove Stream Restoration Site
Guilford County, NC
Buckhorn Creek: Reach 1
Note: **Reach Data 1**



based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	0.505	0.97	18.7	64	100	163	21.2	7.1	14.1

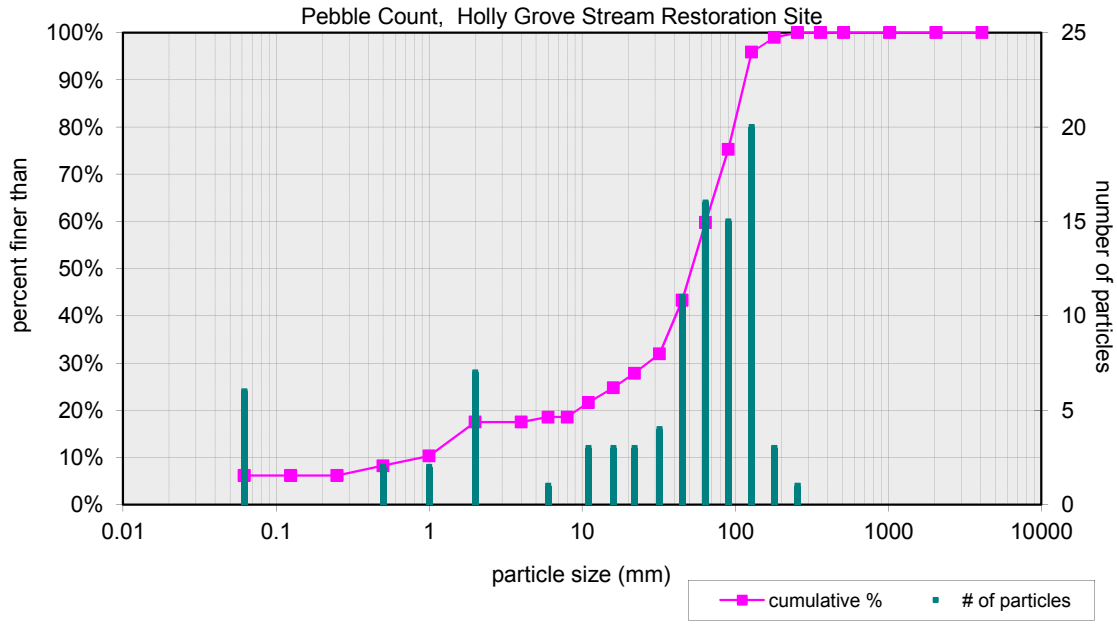
based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	4%	33%	21%	31%	0%	12%	0%	0%	0%

Pebble Count of Channel Reach

Material	Size Range (mm)		Count
silt/clay	0	0.062	6
very fine sand	0.062	0.13	
fine sand	0.13	0.25	
medium sand	0.25	0.5	2
coarse sand	0.5	1	2
very coarse sand	1	2	7
very fine gravel	2	4	
fine gravel	4	6	1
fine gravel	6	8	
medium gravel	8	11	3
medium gravel	11	16	3
coarse gravel	16	22	3
coarse gravel	22	32	4
very coarse gravel	32	45	11
very coarse gravel	45	64	16
small cobble	64	90	15
medium cobble	90	128	20
large cobble	128	180	3
very large cobble	180	256	1
small boulder	256	362	
small boulder	362	512	
medium boulder	512	1024	
large boulder	1024	2048	
very large boulder	2048	4096	
		total particle count:	97

bedrock			3
clay hardpan			
detritus/wood			
artificial			
		total count:	100

Holly Grove Stream Restoration Site
Guilford County, NC
Buckhorn Creek: Reach 1
Note: **Riffle RF1**



based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	1.727	35.06	51.9	72	104	126	16.0	13.4	7.8

based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	6%	11%	41%	39%	0%	3%	0%	0%	0%

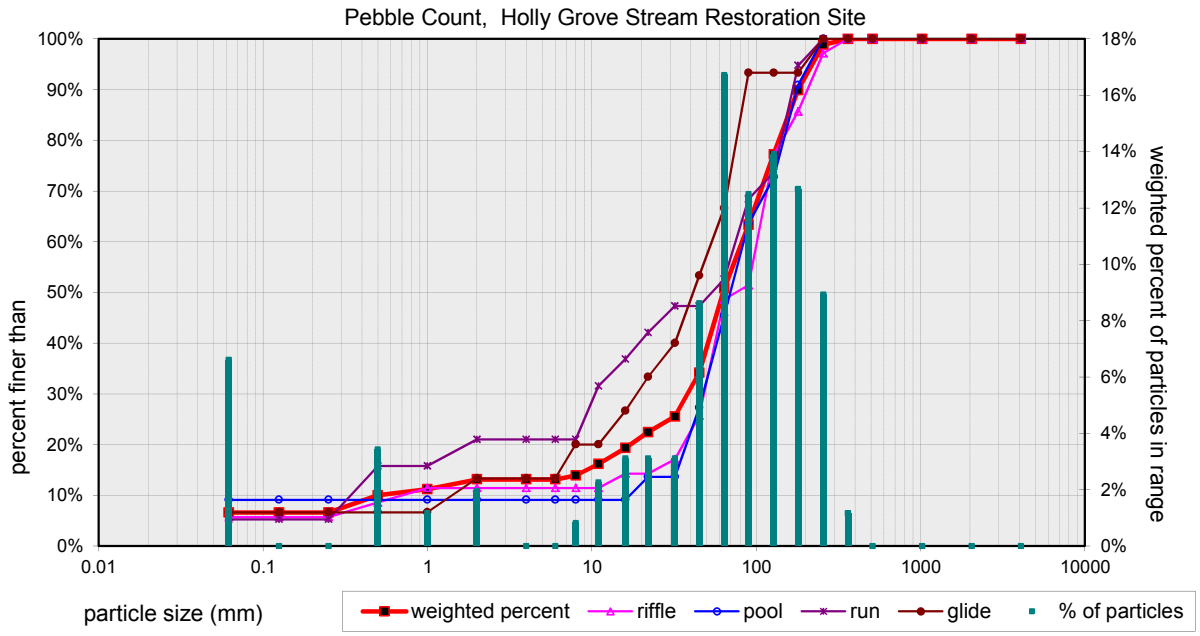
Pebble Count Weighted by Channel Feature

Percent Riffle:	39	Percent Run:	20
Percent Pool:	25	Percent Glide:	16

Material	Size Range (mm)		weighted
silt/clay	0	0.062	6.2
very fine sand	0.062	0.13	0.0
fine sand	0.13	0.25	0.0
medium sand	0.25	0.5	3.2
coarse sand	0.5	1	1.1
very coarse sand	1	2	1.8
very fine gravel	2	4	0.0
fine gravel	4	6	0.0
fine gravel	6	8	0.8
medium gravel	8	11	2.1
medium gravel	11	16	2.9
coarse gravel	16	22	2.9
coarse gravel	22	32	2.9
very coarse gravel	32	45	8.0
very coarse gravel	45	64	15.6
small cobble	64	90	11.6
medium cobble	90	128	13.0
large cobble	128	180	11.8
very large cobble	180	256	8.3
small boulder	256	362	1.1
small boulder	362	512	0.0
medium boulder	512	1024	0.0
large boulder	1024	2048	0.0
very large boulder	2048	4096	0.0
weighted particle count:			93.3

bedrock		6.7
clay hardpan		0.0
detritus/wood		0.0
artificial		0.0
weighted total count:		100

Holly Grove Stream Restoration Site
Guilford County, NC
Buckhorn Creek: Reach 2
Note: **Reach Data 2**



based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	10.693	45.82	62.9	94	153	220	4.2	40.5	3.8

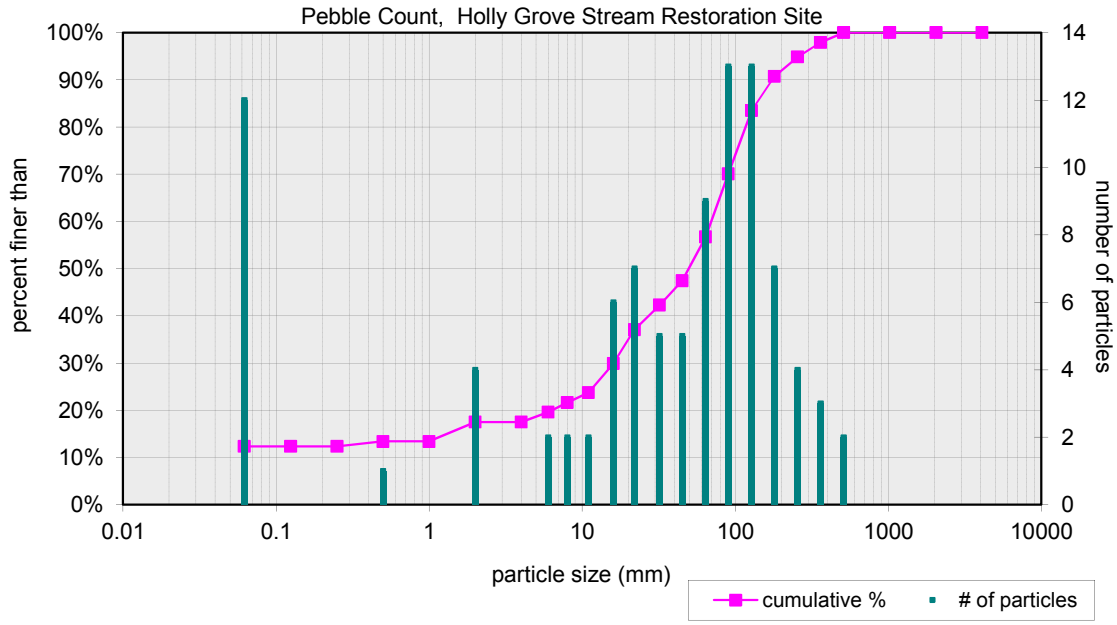
based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	6%	6%	35%	45%	1%	7%	0%	0%	0%

Pebble Count of Channel Reach

Material	Size Range (mm)		Count
silt/clay	0	0.062	12
very fine sand	0.062	0.13	
fine sand	0.13	0.25	
medium sand	0.25	0.5	1
coarse sand	0.5	1	
very coarse sand	1	2	4
very fine gravel	2	4	
fine gravel	4	6	2
fine gravel	6	8	2
medium gravel	8	11	2
medium gravel	11	16	6
coarse gravel	16	22	7
coarse gravel	22	32	5
very coarse gravel	32	45	5
very coarse gravel	45	64	9
small cobble	64	90	13
medium cobble	90	128	13
large cobble	128	180	7
very large cobble	180	256	4
small boulder	256	362	3
small boulder	362	512	2
medium boulder	512	1024	
large boulder	1024	2048	
very large boulder	2048	4096	
		total particle count:	97

bedrock		3
clay hardpan		
detritus/wood		
artificial		
	total count:	100

Holly Grove Stream Restoration Site
Guilford County, NC
Buckhorn Creek: Reach 2
Note: **Riffle RF2**



based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	1.548	20.04	49.6	79	131	260	17.4	14.2	9.2

based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	12%	5%	38%	37%	5%	3%	0%	0%	0%

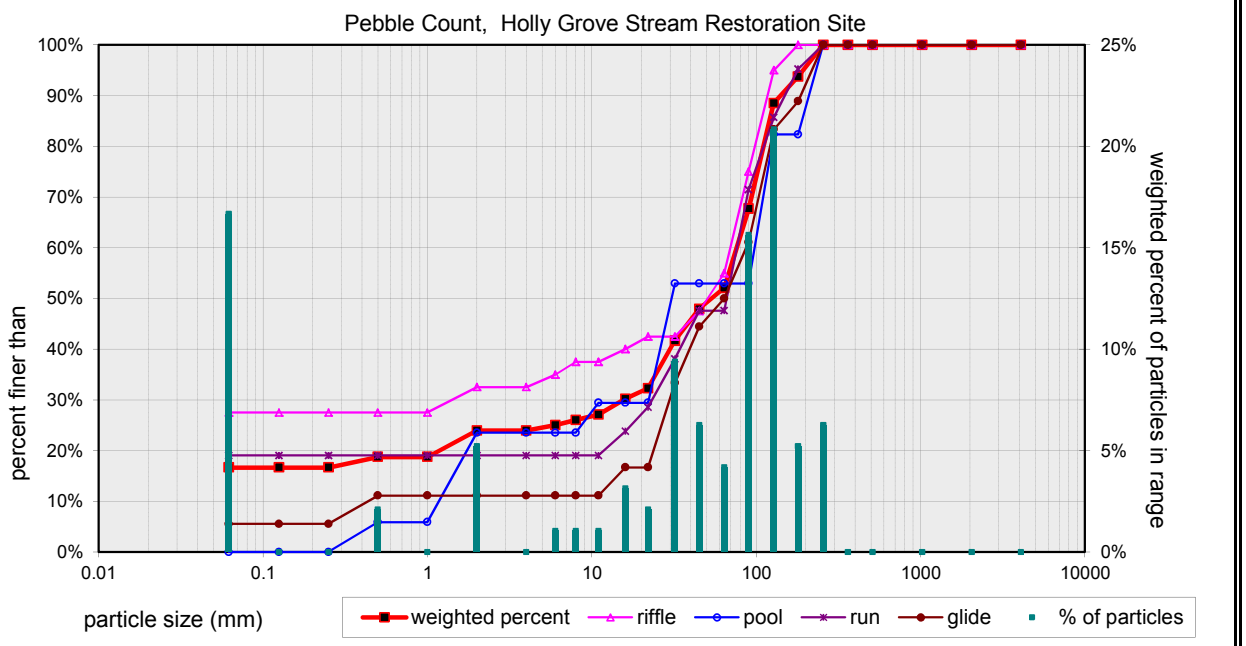
Pebble Count Weighted by Channel Feature

Percent Riffle:	40	Percent Run:	21
Percent Pool:	21	Percent Glide:	18

Material	Size Range (mm)		weighted
silt/clay	0	0.062	16.0
very fine sand	0.062	0.13	0.0
fine sand	0.13	0.25	0.0
medium sand	0.25	0.5	2.0
coarse sand	0.5	1	0.0
very coarse sand	1	2	5.0
very fine gravel	2	4	0.0
fine gravel	4	6	1.0
fine gravel	6	8	1.0
medium gravel	8	11	1.0
medium gravel	11	16	3.0
coarse gravel	16	22	2.0
coarse gravel	22	32	9.0
very coarse gravel	32	45	6.0
very coarse gravel	45	64	4.0
small cobble	64	90	15.0
medium cobble	90	128	20.0
large cobble	128	180	5.0
very large cobble	180	256	6.0
small boulder	256	362	0.0
small boulder	362	512	0.0
medium boulder	512	1024	0.0
large boulder	1024	2048	0.0
very large boulder	2048	4096	0.0
weighted particle count:			96.0

bedrock		4.0
clay hardpan		0.0
detritus/wood		0.0
artificial		0.0
weighted total count:		100

Holly Grove Stream Restoration Site
Guilford County, NC
Buckhorn Creek: Reach 3
Note: **Reach Data 3**



based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	0.062	24.52	53.7	85	119	193	433.9	2.7	43.7

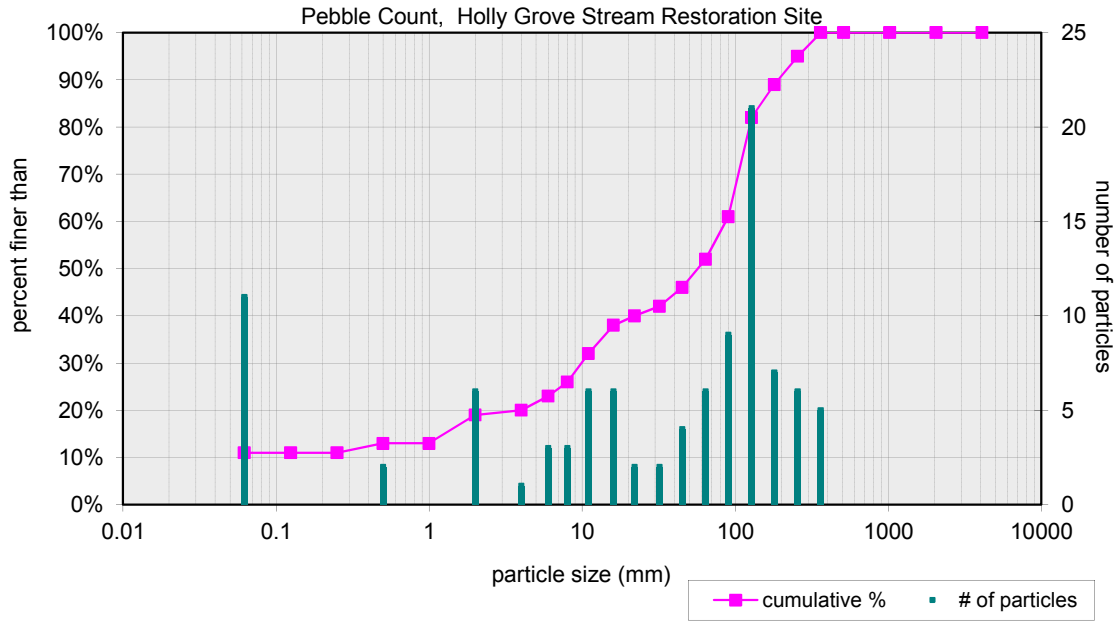
based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	16%	7%	27%	46%	0%	4%	0%	0%	0%

Pebble Count of Channel Reach

Material	Size Range (mm)		Count
silt/clay	0	0.062	11
very fine sand	0.062	0.13	
fine sand	0.13	0.25	
medium sand	0.25	0.5	2
coarse sand	0.5	1	
very coarse sand	1	2	6
very fine gravel	2	4	1
fine gravel	4	6	3
fine gravel	6	8	3
medium gravel	8	11	6
medium gravel	11	16	6
coarse gravel	16	22	2
coarse gravel	22	32	2
very coarse gravel	32	45	4
very coarse gravel	45	64	6
small cobble	64	90	9
medium cobble	90	128	21
large cobble	128	180	7
very large cobble	180	256	6
small boulder	256	362	5
small boulder	362	512	
medium boulder	512	1024	
large boulder	1024	2048	
very large boulder	2048	4096	
		total particle count:	100

bedrock		
clay hardpan		
detritus/wood		
artificial		
	total count:	100

Holly Grove Stream Restoration Site
Guilford County, NC
Buckhorn Creek: Reach 3
Note: **Riffle RF3**



based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	1.414	13.27	56.9	96	141	256	21.4	14.1	10.0

based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	11%	8%	33%	43%	5%	0%	0%	0%	0%

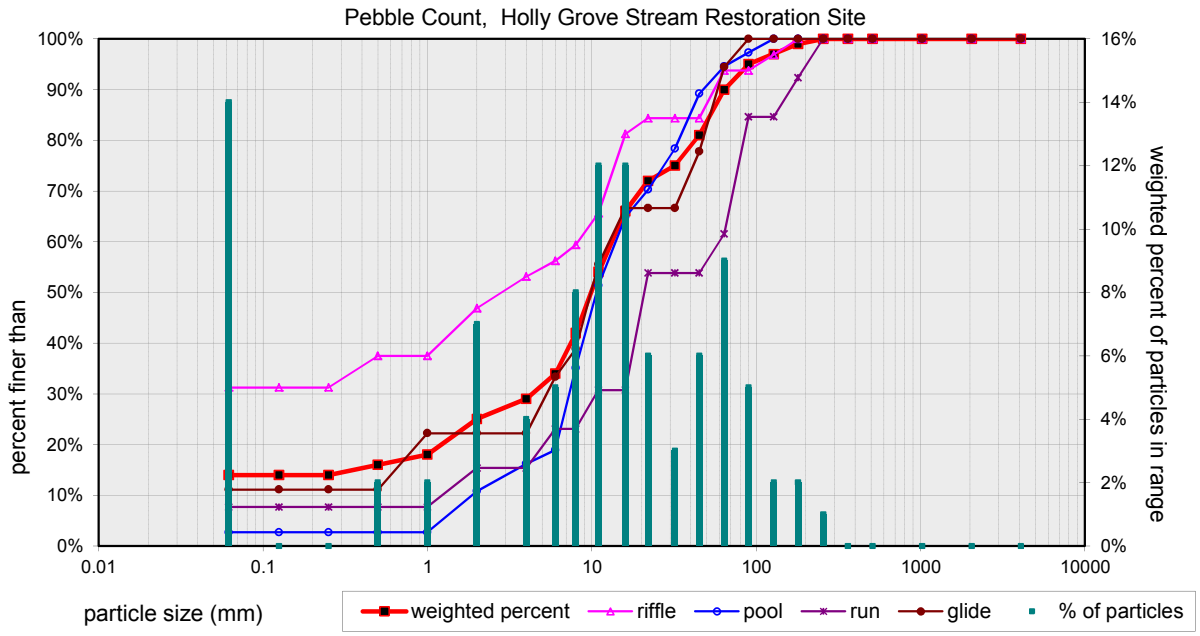
Pebble Count Weighted by Channel Feature

Percent Riffle:	32	Percent Run:	13
Percent Pool:	37	Percent Glide:	18

Material	Size Range (mm)		weighted
silt/clay	0	0.062	14.0
very fine sand	0.062	0.13	0.0
fine sand	0.13	0.25	0.0
medium sand	0.25	0.5	2.0
coarse sand	0.5	1	2.0
very coarse sand	1	2	7.0
very fine gravel	2	4	4.0
fine gravel	4	6	5.0
fine gravel	6	8	8.0
medium gravel	8	11	12.0
medium gravel	11	16	12.0
coarse gravel	16	22	6.0
coarse gravel	22	32	3.0
very coarse gravel	32	45	6.0
very coarse gravel	45	64	9.0
small cobble	64	90	5.0
medium cobble	90	128	2.0
large cobble	128	180	2.0
very large cobble	180	256	1.0
small boulder	256	362	0.0
small boulder	362	512	0.0
medium boulder	512	1024	0.0
large boulder	1024	2048	0.0
very large boulder	2048	4096	0.0
weighted particle count:			100.0

bedrock		0.0
clay hardpan		0.0
detritus/wood		0.0
artificial		0.0
weighted total count:		100

Holly Grove Stream Restoration Site
Guilford County, NC
Middle Branch: Reach 4
Note: **Reach Data 4**



based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	0.500	6.22	9.9	16	51	90	12.5	5.0	10.1

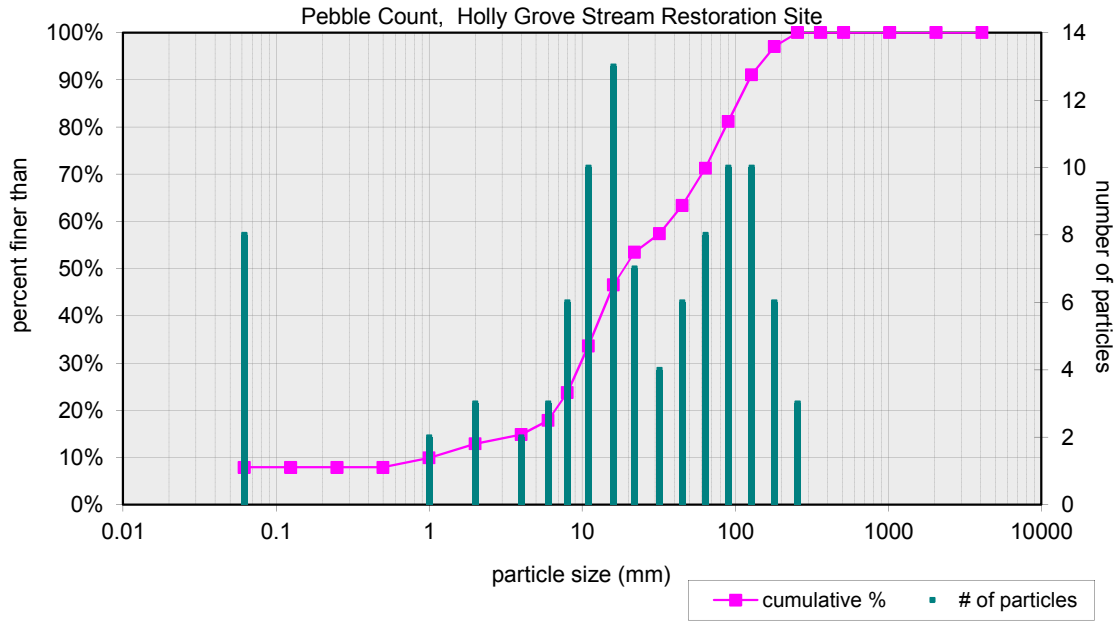
based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	14%	11%	65%	10%	0%	0%	0%	0%	0%

Pebble Count of Channel Reach

Material	Size Range (mm)		Count
silt/clay	0	0.062	8
very fine sand	0.062	0.13	
fine sand	0.13	0.25	
medium sand	0.25	0.5	
coarse sand	0.5	1	2
very coarse sand	1	2	3
very fine gravel	2	4	2
fine gravel	4	6	3
fine gravel	6	8	6
medium gravel	8	11	10
medium gravel	11	16	13
coarse gravel	16	22	7
coarse gravel	22	32	4
very coarse gravel	32	45	6
very coarse gravel	45	64	8
small cobble	64	90	10
medium cobble	90	128	10
large cobble	128	180	6
very large cobble	180	256	3
small boulder	256	362	
small boulder	362	512	
medium boulder	512	1024	
large boulder	1024	2048	
very large boulder	2048	4096	
		total particle count:	101

bedrock		
clay hardpan		
detritus/wood		
artificial		
	total count:	101

Holly Grove Stream Restoration Site
Guilford County, NC
Middle Branch: Reach 4
Note: **Riffle RF4**



based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	4.679	11.44	18.8	48	99	160	4.7	21.6	4.6

based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	8%	5%	58%	29%	0%	0%	0%	0%	0%

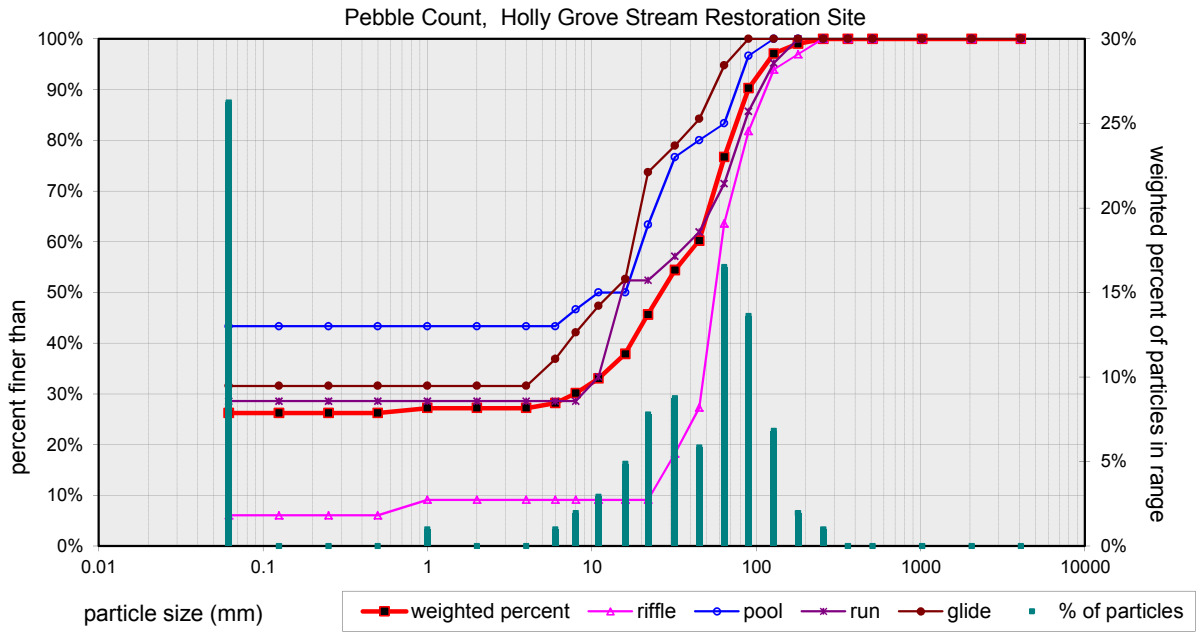
Pebble Count Weighted by Channel Feature

Percent Riffle:	32	Percent Run:	20.4
Percent Pool:	29.2	Percent Glide:	18.4

Material	Size Range (mm)		weighted
silt/clay	0	0.062	26.2
very fine sand	0.062	0.13	0.0
fine sand	0.13	0.25	0.0
medium sand	0.25	0.5	0.0
coarse sand	0.5	1	1.0
very coarse sand	1	2	0.0
very fine gravel	2	4	0.0
fine gravel	4	6	1.0
fine gravel	6	8	1.9
medium gravel	8	11	2.9
medium gravel	11	16	4.9
coarse gravel	16	22	7.8
coarse gravel	22	32	8.7
very coarse gravel	32	45	5.8
very coarse gravel	45	64	16.5
small cobble	64	90	13.6
medium cobble	90	128	6.8
large cobble	128	180	1.9
very large cobble	180	256	1.0
small boulder	256	362	0.0
small boulder	362	512	0.0
medium boulder	512	1024	0.0
large boulder	1024	2048	0.0
very large boulder	2048	4096	0.0
weighted particle count:			100.0

bedrock		0.0
clay hardpan		0.0
detritus/wood		0.0
artificial		0.0
weighted total count:		100

Holly Grove Stream Restoration Site
Guilford County, NC
Middle Branch: Reach 5
Note: **Reach Data 5**



based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	0.062	12.81	26.5	50	77	115	215.3	2.2	35.2

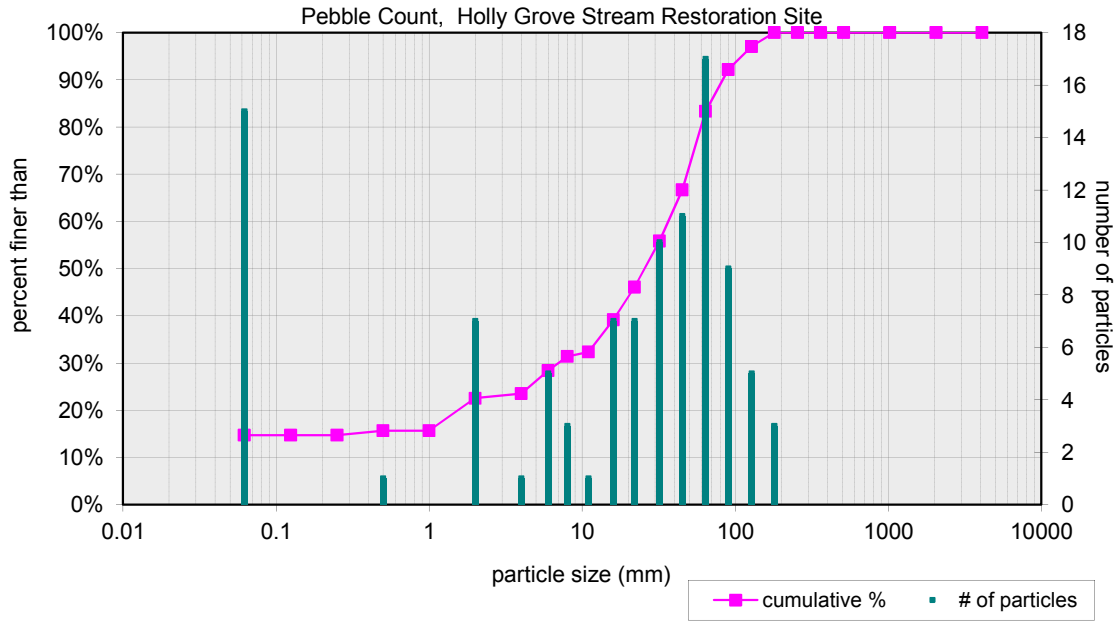
based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	26%	1%	49%	23%	0%	0%	0%	0%	0%

Pebble Count of Channel Reach

Material	Size Range (mm)		Count
silt/clay	0	0.062	15
very fine sand	0.062	0.13	
fine sand	0.13	0.25	
medium sand	0.25	0.5	1
coarse sand	0.5	1	
very coarse sand	1	2	7
very fine gravel	2	4	1
fine gravel	4	6	5
fine gravel	6	8	3
medium gravel	8	11	1
medium gravel	11	16	7
coarse gravel	16	22	7
coarse gravel	22	32	10
very coarse gravel	32	45	11
very coarse gravel	45	64	17
small cobble	64	90	9
medium cobble	90	128	5
large cobble	128	180	3
very large cobble	180	256	
small boulder	256	362	
small boulder	362	512	
medium boulder	512	1024	
large boulder	1024	2048	
very large boulder	2048	4096	
	total particle count:		102

bedrock			
clay hardpan			
detritus/wood			
artificial			
	total count:		102

Holly Grove Stream Restoration Site
Guilford County, NC
Middle Branch: Reach 5
Note: **Riffle RF5**



based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	1.032	12.71	25.6	43	66	110	13.7	8.2	8.0

based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	15%	8%	61%	17%	0%	0%	0%	0%	0%

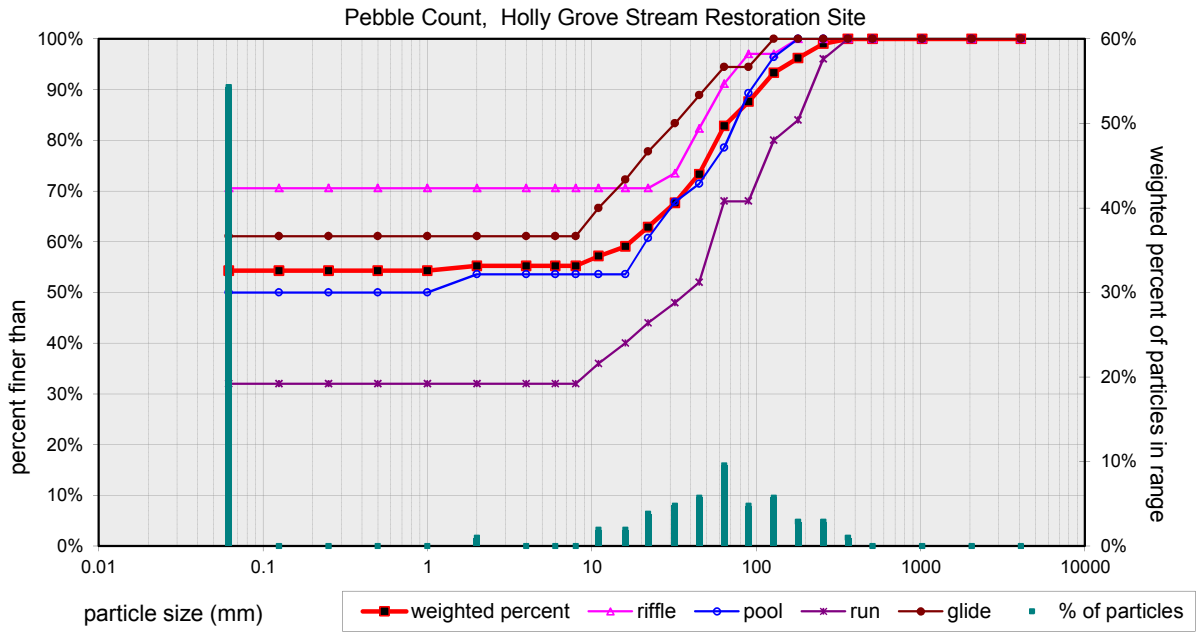
Pebble Count Weighted by Channel Feature

Percent Riffle:	32.4	Percent Run:	23.8
Percent Pool:	26.6	Percent Glide:	17.2

Material	Size Range (mm)		weighted
silt/clay	0	0.062	54.3
very fine sand	0.062	0.13	0.0
fine sand	0.13	0.25	0.0
medium sand	0.25	0.5	0.0
coarse sand	0.5	1	0.0
very coarse sand	1	2	1.0
very fine gravel	2	4	0.0
fine gravel	4	6	0.0
fine gravel	6	8	0.0
medium gravel	8	11	1.9
medium gravel	11	16	1.9
coarse gravel	16	22	3.8
coarse gravel	22	32	4.8
very coarse gravel	32	45	5.7
very coarse gravel	45	64	9.5
small cobble	64	90	4.8
medium cobble	90	128	5.7
large cobble	128	180	2.9
very large cobble	180	256	2.9
small boulder	256	362	1.0
small boulder	362	512	0.0
medium boulder	512	1024	0.0
large boulder	1024	2048	0.0
very large boulder	2048	4096	0.0
weighted particle count:			100.0

bedrock		0.0
clay hardpan		0.0
detritus/wood		0.0
artificial		0.0
weighted total count:		100

Holly Grove Stream Restoration Site
Guilford County, NC
East Branch: Reach 6
Note: **Reach Data 6**



based on sediment particles only	size percent less than (mm) D16	D35	D50	D65	D84	D95	particle size distribution gradation	geo mean	std dev
	0.062	0.06	0.1	26	69	156	560.2	2.1	33.5

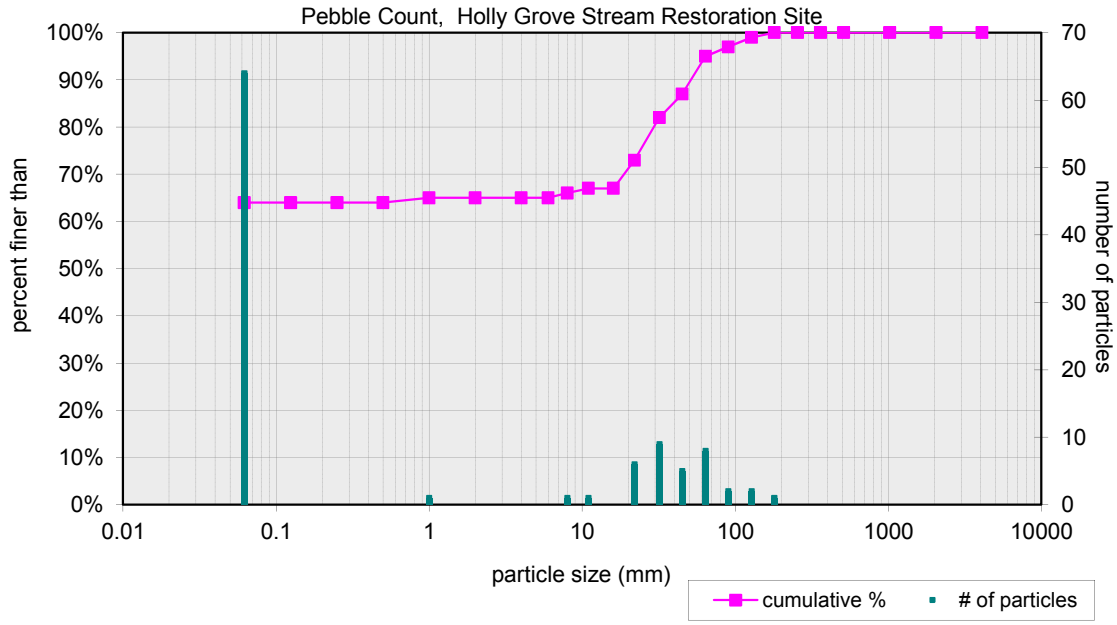
based on total count	percent by substrate type silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	54%	1%	28%	16%	1%	0%	0%	0%	0%

Pebble Count of Channel Reach

Material	Size Range (mm)		Count
silt/clay	0	0.062	64
very fine sand	0.062	0.13	
fine sand	0.13	0.25	
medium sand	0.25	0.5	
coarse sand	0.5	1	1
very coarse sand	1	2	
very fine gravel	2	4	
fine gravel	4	6	
fine gravel	6	8	1
medium gravel	8	11	1
medium gravel	11	16	
coarse gravel	16	22	6
coarse gravel	22	32	9
very coarse gravel	32	45	5
very coarse gravel	45	64	8
small cobble	64	90	2
medium cobble	90	128	2
large cobble	128	180	1
very large cobble	180	256	
small boulder	256	362	
small boulder	362	512	
medium boulder	512	1024	
large boulder	1024	2048	
very large boulder	2048	4096	
		total particle count:	100

bedrock		
clay hardpan		
detritus/wood		
artificial		
	total count:	100

Holly Grove Stream Restoration Site
Guilford County, NC
East Branch: Reach 6
Note: **Riffle RF6**



based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	0.062	0.06	0.1	6	37	64	296.3	1.5	24.3

based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	64%	1%	30%	5%	0%	0%	0%	0%	0%

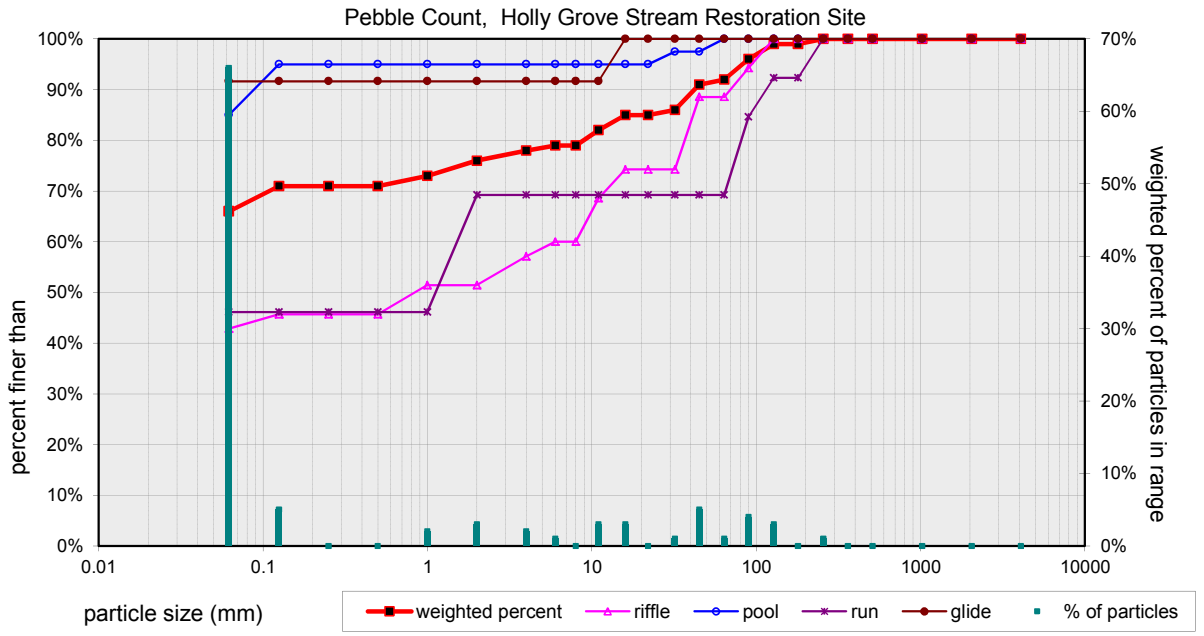
Pebble Count Weighted by Channel Feature

Percent Riffle:	35	Percent Run:	13
Percent Pool:	40	Percent Glide:	12

Material	Size Range (mm)		weighted
silt/clay	0	0.062	66.0
very fine sand	0.062	0.13	5.0
fine sand	0.13	0.25	0.0
medium sand	0.25	0.5	0.0
coarse sand	0.5	1	2.0
very coarse sand	1	2	3.0
very fine gravel	2	4	2.0
fine gravel	4	6	1.0
fine gravel	6	8	0.0
medium gravel	8	11	3.0
medium gravel	11	16	3.0
coarse gravel	16	22	0.0
coarse gravel	22	32	1.0
very coarse gravel	32	45	5.0
very coarse gravel	45	64	1.0
small cobble	64	90	4.0
medium cobble	90	128	3.0
large cobble	128	180	0.0
very large cobble	180	256	1.0
small boulder	256	362	0.0
small boulder	362	512	0.0
medium boulder	512	1024	0.0
large boulder	1024	2048	0.0
very large boulder	2048	4096	0.0
weighted particle count:			100.0

bedrock		0.0
clay hardpan		0.0
detritus/wood		0.0
artificial		0.0
weighted total count:		100

Holly Grove Stream Restoration Site
Guilford County, NC
Southeast Creek: Reach 7
Note: **Reach Data 7**



based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	0.062	0.06	0.1	0	14	83	114.4	0.9	15.1

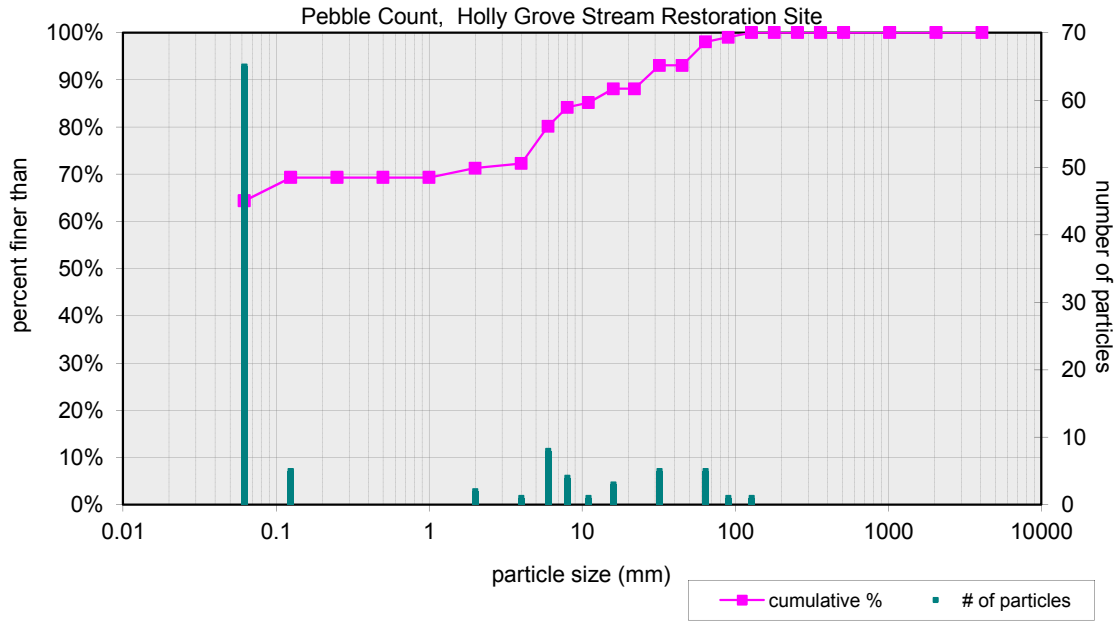
based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	66%	10%	16%	8%	0%	0%	0%	0%	0%

Pebble Count of Channel Reach

Material	Size Range (mm)		Count
silt/clay	0	0.062	65
very fine sand	0.062	0.13	5
fine sand	0.13	0.25	
medium sand	0.25	0.5	
coarse sand	0.5	1	
very coarse sand	1	2	2
very fine gravel	2	4	1
fine gravel	4	6	8
fine gravel	6	8	4
medium gravel	8	11	1
medium gravel	11	16	3
coarse gravel	16	22	
coarse gravel	22	32	5
very coarse gravel	32	45	
very coarse gravel	45	64	5
small cobble	64	90	1
medium cobble	90	128	1
large cobble	128	180	
very large cobble	180	256	
small boulder	256	362	
small boulder	362	512	
medium boulder	512	1024	
large boulder	1024	2048	
very large boulder	2048	4096	
		total particle count:	101

bedrock		
clay hardpan		
detritus/wood		
artificial		
	total count:	101

Holly Grove Stream Restoration Site
Guilford County, NC
Southeast Creek: Reach 7
Note: **Riffle RF7**



based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	0.062	0.06	0.1	0	8	52	64.3	0.7	11.3

based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	64%	7%	27%	2%	0%	0%	0%	0%	0%

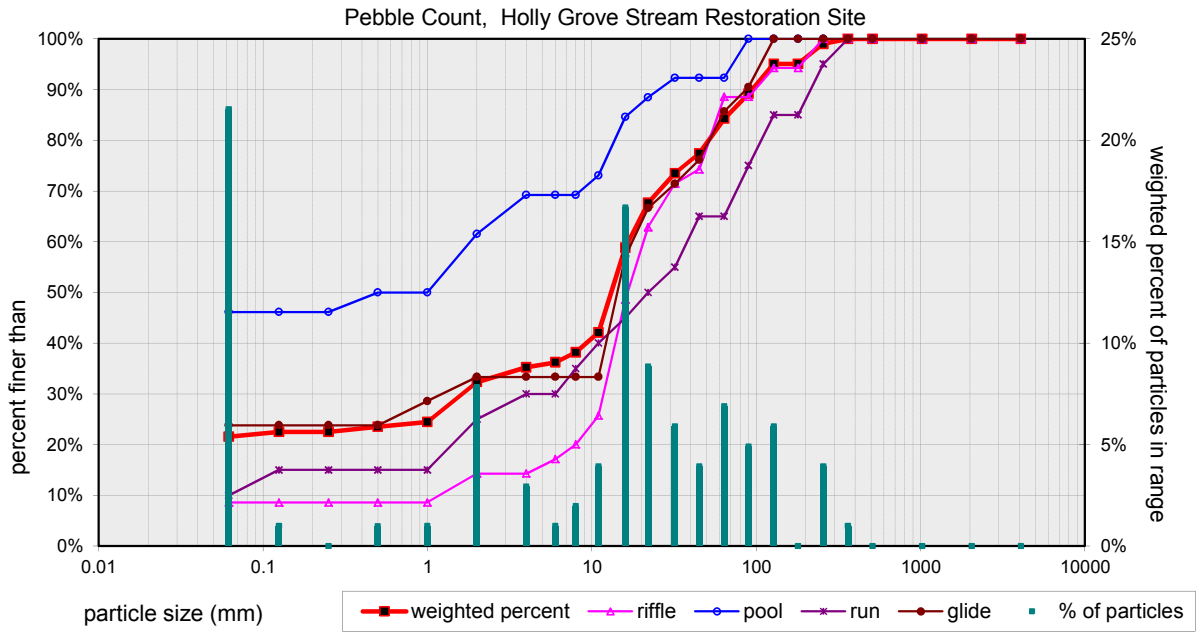
Pebble Count Weighted by Channel Feature

Percent Riffle:	34.4	Percent Run:	19.6
Percent Pool:	25.4	Percent Glide:	20.6

Material	Size Range (mm)		weighted
silt/clay	0	0.062	21.5
very fine sand	0.062	0.13	1.0
fine sand	0.13	0.25	0.0
medium sand	0.25	0.5	1.0
coarse sand	0.5	1	1.0
very coarse sand	1	2	7.8
very fine gravel	2	4	2.9
fine gravel	4	6	1.0
fine gravel	6	8	2.0
medium gravel	8	11	3.9
medium gravel	11	16	16.7
coarse gravel	16	22	8.8
coarse gravel	22	32	5.9
very coarse gravel	32	45	3.9
very coarse gravel	45	64	6.9
small cobble	64	90	4.9
medium cobble	90	128	5.9
large cobble	128	180	0.0
very large cobble	180	256	3.9
small boulder	256	362	1.0
small boulder	362	512	0.0
medium boulder	512	1024	0.0
large boulder	1024	2048	0.0
very large boulder	2048	4096	0.0
weighted particle count:			100.0

bedrock		0.0
clay hardpan		0.0
detritus/wood		0.0
artificial		0.0
weighted total count:		100

Holly Grove Stream Restoration Site
Guilford County, NC
Southwest Creek: Reach 8
Note: **Reach Data 8**



based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	0.062	3.77	13.1	20	63	127	108.3	2.0	31.9

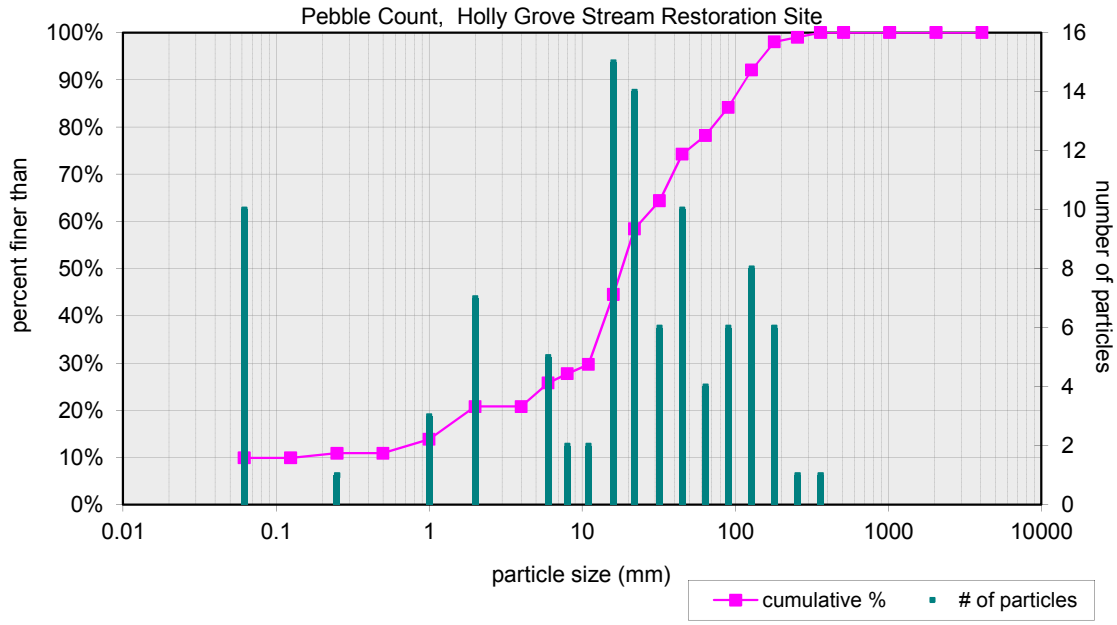
based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	22%	11%	52%	15%	1%	0%	0%	0%	0%

Pebble Count of Channel Reach

Material	Size Range (mm)		Count
silt/clay	0	0.062	10
very fine sand	0.062	0.13	
fine sand	0.13	0.25	1
medium sand	0.25	0.5	
coarse sand	0.5	1	3
very coarse sand	1	2	7
very fine gravel	2	4	
fine gravel	4	6	5
fine gravel	6	8	2
medium gravel	8	11	2
medium gravel	11	16	15
coarse gravel	16	22	14
coarse gravel	22	32	6
very coarse gravel	32	45	10
very coarse gravel	45	64	4
small cobble	64	90	6
medium cobble	90	128	8
large cobble	128	180	6
very large cobble	180	256	1
small boulder	256	362	1
small boulder	362	512	
medium boulder	512	1024	
large boulder	1024	2048	
very large boulder	2048	4096	
	total particle count:		101

bedrock			
clay hardpan			
detritus/wood			
artificial			
	total count:		101

Holly Grove Stream Restoration Site
Guilford County, NC
Southwest Creek: Reach 8
Note: **Riffle RF8**



based on sediment particles only	size percent less than (mm)						particle size distribution		
	D16	D35	D50	D65	D84	D95	gradation	geo mean	std dev
	1.238	12.57	18.1	33	89	151	9.8	10.5	8.5

based on total count	percent by substrate type								
	silt/clay	sand	gravel	cobble	boulder	bedrock	hardpan	wood/det	artificial
	10%	11%	57%	21%	1%	0%	0%	0%	0%

Erosion Rate Calculations

Project:	1024-HLGR	Date:	9/24/2013
Stream:	Buckhorn 1	Crew:	MM,CE,GG
Reach/Description:	1	Page: 1	Of: 7

Feature	Units							
Reach Name		1	2	3	4	5	6	
Station/Location		R1	R1	R1	R1	R1	R1	
Photo No.								
Reach Length	ft	1000	1000	1000	1100	100	80	
Bank	RT-LT-Both	Both	Both	Both	Both	LT	RT	
Bank Height	ft	2	2	2	2	2	2	
Bankfull Height	ft	2	2	2	2	2	2	
Root Depth	ft	0.5	0.5	0.5	0.5	0.4	0.3	
Root Density	%	90%	90%	90%	90%	90%	90%	
Bank Angle	Degrees	50	50	50	50	45	55	
Surface Protection	%	90%	90%	90%	90%	60%	60%	
Bank Material	C-G-S-SC	SC	SC	SC	SC	SC	SC	
Stratification	N-M-E	N	N	N	N	N	N	
Thalweg Position	C-OC-Toe	C	C	C	C	C	C	
D_{TOE}/D_{MEAN}	<1 or >1	<1	<1	<1	<1	<1	<1	
Local Slope > Avg	Yes-No	No	No	No	No	No	No	
BEHI Calculation								
Bnk Ht / Bkf Ht		1.00	1.00	1.00	1.00	1.00	1.00	
BEHI Score		1.00	1.00	1.00	1.00	1.00	1.00	
Root Depth / Bnk Ht		0.25	0.25	0.25	0.25	0.20	0.15	
BEHI Score		7.00	7.00	7.00	7.00	7.60	8.20	
Bank Angle		50	50	50	50	45	55	
BEHI Score		3.50	3.50	3.50	3.50	3.25	3.75	
Surface Protection		90%	90%	90%	90%	60%	60%	
BEHI Score		0.86	0.86	0.86	0.86	3.43	3.43	
Bank Material Adjustment		0	0	0	0	0	0	
Stratification Adjustment		0	0	0	0	0	0	
Total BEHI Score		19.36	19.36	19.36	19.36	22.88	24.58	
Rating		Low	Low	Low	Low	Moderate	Moderate	
NBS Calculation								
Thalweg Position Score		1	1	1	1	1	1	
Toe Depth Ratio Score		0	0	0	0	0	0	
Local Slope Score		0	0	0	0	0	0	
Total NBS Rating		1	1	1	1	1	1	
WARSS NBS Rating		1	1	1	1	1	1	
Rating		Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	
Erosion Rate Prediction								
NC or CO		NC						
Erosion Rate (ft/yr)		0.00	0.00	0.00	0.00	0.02	0.02	**Sheet Total**
Erosion Total (ft^3/yr)		2.0	2.0	2.0	2.2	3.4	2.7	14.3

Erosion Rate Calculations

Project:	1024-HLGR	Date:	9/24/2013
Stream:	Buckhorn 2	Crew:	MM,CE,GG
Reach/Description:	2	Page: 2	Of: 7

Feature	Units							
Reach Name		1	2	3	4	5	6	
Station/Location		R2	R2	R2				
Photo No.								
Reach Length	ft	500	250	250	500			
Bank	RT-LT-Both	Both	Both	Both	Both			
Bank Height	ft	2.3	2.3	2.3	2.3			
Bankfull Height	ft	2.3	2.3	2.3	2.3			
Root Depth	ft	0.7	0.7	0.7	0.7			
Root Density	%	90%	90%	90%	90%			
Bank Angle	Degrees	55	55	55	55			
Surface Protection	%	90%	90%	90%	90%			
Bank Material	C-G-S-SC	SC	SC	SC	SC			
Stratification	N-M-E	N	N	N	N			
Thalweg Position	C-OC-Toe	C	C	C	C			
D_{TOE}/D_{MEAN}	<1 or >1	<1	<1	<1	<1			
Local Slope > Avg	Yes-No	No	No	No	No			
BEHI Calculation								
Bnk Ht / Bkf Ht		1.00	1.00	1.00	1.00			
BEHI Score		1.00	1.00	1.00	1.00			
Root Depth / Bnk Ht		0.30	0.30	0.30	0.30			
BEHI Score		6.35	6.35	6.35	6.35			
Bank Angle		55	55	55	55			
BEHI Score		3.75	3.75	3.75	3.75			
Surface Protection		90%	90%	90%	90%			
BEHI Score		0.86	0.86	0.86	0.86			
Bank Material Adjustment		0	0	0	0			
Stratification Adjustment		0	0	0	0			
Total BEHI Score		18.30	18.30	18.30	18.30			
Rating		Low	Low	Low	Low			
NBS Calculation								
Thalweg Position Score		1	1	1	1			
Toe Depth Ratio Score		0	0	0	0			
Local Slope Score		0	0	0	0			
Total NBS Rating		1	1	1	1	0	0	
WARSS NBS Rating		1	1	1	1			
Rating		Very Low	Very Low	Very Low	Very Low			
Erosion Rate Prediction								
NC or CO		NC						
Erosion Rate (ft/yr)		0.0	0.0	0.0	0.0			**Sheet Total**
Erosion Total (ft^3/yr)		1.2	0.6	0.6	1.2			3.5

Erosion Rate Calculations

Project:	1024-HLGR	Date:	9/24/2013
Stream:	Buckhorn 3	Crew:	MM,CE,GG
Reach/Description:	3	Page: 3	Of: 7

Feature	Units							
Reach Name		1	2	3	4	5		
Station/Location		R3	R3	R3	R3	R3		
Photo No.								
Reach Length	ft	1000	1000	270	400	400		
Bank	RT-LT-Both	Both	Both	Both	Both	Both		
Bank Height	ft	2.3	2.3	2.3	2.3	2.3		
Bankfull Height	ft	2.3	2.5	2.5	2.5	2.5		
Root Depth	ft	0.5	0.5	0.5	0.3	0.7		
Root Density	%	90%	90%	90%	90%	90%		
Bank Angle	Degrees	25	25	25	20	60		
Surface Protection	%	90%	90%	90%	80%	80%		
Bank Material	C-G-S-SC	SC	SC	SC	SC	SC		
Stratification	N-M-E	N	N	N	N	N		
Thalweg Position	C-OC-Toe	C	C	C	C	C		
D_{TOE}/D_{MEAN}	<1 or >1	<1	<1	<1	<1	<1		
Local Slope > Avg	Yes-No	No	No	No	No	No		
BEHI Calculation								
Bnk Ht / Bkf Ht		1.00	0.92	0.92	0.92	0.92		
BEHI Score		1.00	1.00	1.00	1.00	1.00		
Root Depth / Bnk Ht		0.22	0.22	0.22	0.13	0.30		
BEHI Score		7.39	7.39	7.39	8.43	6.35		
Bank Angle		25	25	25	20	60		
BEHI Score		2.25	2.25	2.25	2.00	4.00		
Surface Protection		90%	90%	90%	80%	80%		
BEHI Score		0.86	0.86	0.86	1.71	1.71		
Bank Material Adjustment		0	0	0	0	0		
Stratification Adjustment		0	0	0	0	0		
Total BEHI Score		18.89	18.89	18.89	21.58	19.41		
Rating		Low	Low	Low	Moderate	Low		
NBS Calculation								
Thalweg Position Score		1	1	1	1	1		
Toe Depth Ratio Score		0	0	0	0	0		
Local Slope Score		0	0	0	0	0		
Total NBS Rating		1	1	1	1	1	0	
WARSS NBS Rating		1	1	1	1	1		
Rating		Very Low	Very Low	Very Low	Very Low	Very Low		
Erosion Rate Prediction								
NC or CO		NC						
Erosion Rate (ft/yr)		0.0	0.0	0.0	0.0	0.0		**Sheet Total**
Erosion Total (ft^3/yr)		2.3	2.3	0.6	15.6	0.9		21.7

Erosion Rate Calculations

Project:	1024-HLGR	Date:	9/24/2013
Stream:	Middle Branch	Crew:	MM,CE,GG
Reach/Description:	4,5	Page: 4	Of: 7

Feature	Units							
Reach Name		1	2	3	4	5		
Station/Location		R1	R1	R1	R1	R1		
Photo No.								
Reach Length	ft	400	50	500	500	346		
Bank	RT-LT-Both	Both	Both	Both	Both	Both		
Bank Height	ft	1.2	1.2	1.2	1.2	1.2		
Bankfull Height	ft	1.2	1.2	1.2	1.2	1.2		
Root Depth	ft	0.6	0.5	0.6	0.6	0.6		
Root Density	%	80%	75%	80%	80%	80%		
Bank Angle	Degrees	45	45	45	45	45		
Surface Protection	%	80%	75%	80%	80%	80%		
Bank Material	C-G-S-SC	SC	SC	SC	SC	SC		
Stratification	N-M-E	N	N	N	N	N		
Thalweg Position	C-OC-Toe	C	C	C	C	C		
D_{TOE}/D_{MEAN}	<1 or >1	<1	<1	<1	<1	<1		
Local Slope > Avg	Yes-No	No	No	No	No	No		
BEHI Calculation								
Bnk Ht / Bkf Ht		1.00	1.00	1.00	1.00	1.00		
BEHI Score		1.00	1.00	1.00	1.00	1.00		
Root Depth / Bnk Ht		0.50	0.42	0.50	0.50	0.50		
BEHI Score		4.00	5.00	4.00	4.00	4.00		
Bank Angle		45	45	45	45	45		
BEHI Score		3.25	3.25	3.25	3.25	3.25		
Surface Protection		80%	75%	80%	80%	80%		
BEHI Score		1.71	2.14	1.71	1.71	1.71		
Bank Material Adjustment		0	0	0	0	0		
Stratification Adjustment		0	0	0	0	0		
Total BEHI Score		15.11	17.28	15.11	15.11	15.11		
Rating		Low	Low	Low	Low	Low		
NBS Calculation								
Thalweg Position Score		1	1	1	1	1		
Toe Depth Ratio Score		0	0	0	0	0		
Local Slope Score		0	0	0	0	0		
Total NBS Rating		1	1	1	1	1	0	
WARSS NBS Rating		1	1	1	1	1		
Rating		Very Low	Very Low	Very Low	Very Low	Very Low		
Erosion Rate Prediction								
NC or CO		NC						
Erosion Rate (ft/yr)		0.0	0.0	0.0	0.0	0.0		**Sheet Total**
Erosion Total (ft^3/yr)		0.5	0.1	0.6	0.6	0.4		2.2

Erosion Rate Calculations

Project:	1024-HLGR	Date:	9/24/2013
Stream:	Lower East Branch	Crew:	MM,CE,GG
Reach/Description:	6	Page: 5	Of: 7

Feature	Units							
Reach Name		1	2	3	4			
Station/Location								
Photo No.								
Reach Length	ft	250	250	250	323			
Bank	RT-LT-Both	Both	Both	Both	Both			
Bank Height	ft	1.2	1.2	1.2	1.2			
Bankfull Height	ft	1.2	1.2	1.2	1.2			
Root Depth	ft	0.4	0.4	0.4	0.4			
Root Density	%	80%	80%	80%	80%			
Bank Angle	Degrees	40	40	40	40			
Surface Protection	%	90%	90%	90%	90%			
Bank Material	C-G-S-SC	SC	SC	SC	SC			
Stratification	N-M-E	N	N	N	N			
Thalweg Position	C-OC-Toe	C	C	C	C			
D_{TOE}/D_{MEAN}	<1 or >1	<1	<1	<1	<1			
Local Slope > Avg	Yes-No	No	No	No	No			
BEHI Calculation								
Bnk Ht / Bkf Ht		1.00	1.00	1.00	1.00			
BEHI Score		1.00	1.00	1.00	1.00			
Root Depth / Bnk Ht		0.33	0.33	0.33	0.33			
BEHI Score		6.00	6.00	6.00	6.00			
Bank Angle		40	40	40	40			
BEHI Score		3.00	3.00	3.00	3.00			
Surface Protection		90%	90%	90%	90%			
BEHI Score		0.86	0.86	0.86	0.86			
Bank Material Adjustment		0	0	0	0			
Stratification Adjustment		0	0	0	0			
Total BEHI Score		17.30	17.30	17.30	17.30			
Rating		Low	Low	Low	Low			
NBS Calculation								
Thalweg Position Score		1	1	1	1			
Toe Depth Ratio Score		0	0	0	0			
Local Slope Score		0	0	0	0			
Total NBS Rating		1	1	1	1	0	0	
WARSS NBS Rating		1	1	1	1			
Rating		Very Low	Very Low	Very Low	Very Low			
Erosion Rate Prediction								
NC or CO		NC						
Erosion Rate (ft/yr)		0.00	0.00	0.00	0.00			**Sheet Total**
Erosion Total (ft^3/yr)		0.3	0.3	0.3	0.4			1.3

Erosion Rate Calculations

Project:	1024-HLGR	Date:	9/24/2013
Stream:	SouthEast Branch	Crew:	MM,CE,GG
Reach/Description:	7	Page: 6	Of: 7

Feature	Units							
Reach Name		1	2	3				
Station/Location								
Photo No.								
Reach Length	ft	100	100	163				
Bank	RT-LT-Both	Both	Both	Both				
Bank Height	ft	1.2	1.2	1.2				
Bankfull Height	ft	1.2	1.2	1.2				
Root Depth	ft	0.4	0.4	0.4				
Root Density	%	90%	90%	90%				
Bank Angle	Degrees	40	40	40				
Surface Protection	%	95%	95%	95%				
Bank Material	C-G-S-SC	SC	SC	SC				
Stratification	N-M-E	N	N	N				
Thalweg Position	C-OC-Toe	C	C	C				
D_{TOE}/D_{MEAN}	<1 or >1	<1	<1	<1				
Local Slope > Avg	Yes-No	No	No	No				
BEHI Calculation								
Bnk Ht / Bkf Ht		1.00	1.00	1.00				
BEHI Score		1.00	1.00	1.00				
Root Depth / Bnk Ht		0.33	0.33	0.33				
BEHI Score		6.00	6.00	6.00				
Bank Angle		40	40	40				
BEHI Score		3.00	3.00	3.00				
Surface Protection		95%	95%	95%				
BEHI Score		0.43	0.43	0.43				
Bank Material Adjustment		0	0	0				
Stratification Adjustment		0	0	0				
Total BEHI Score		16.43	16.43	16.43				
Rating		Low	Low	Low				
NBS Calculation								
Thalweg Position Score		1	1	1				
Toe Depth Ratio Score		0	0	0				
Local Slope Score		0	0	0				
Total NBS Rating		1	1	1	0	0	0	
WARSS NBS Rating		1	1	1				
Rating		Very Low	Very Low	Very Low				
Erosion Rate Prediction								
NC or CO		NC						
Erosion Rate (ft/yr)		0.0	0.0	0.0				**Sheet Total**
Erosion Total (ft^3/yr)		0.1	0.1	0.2				0.4

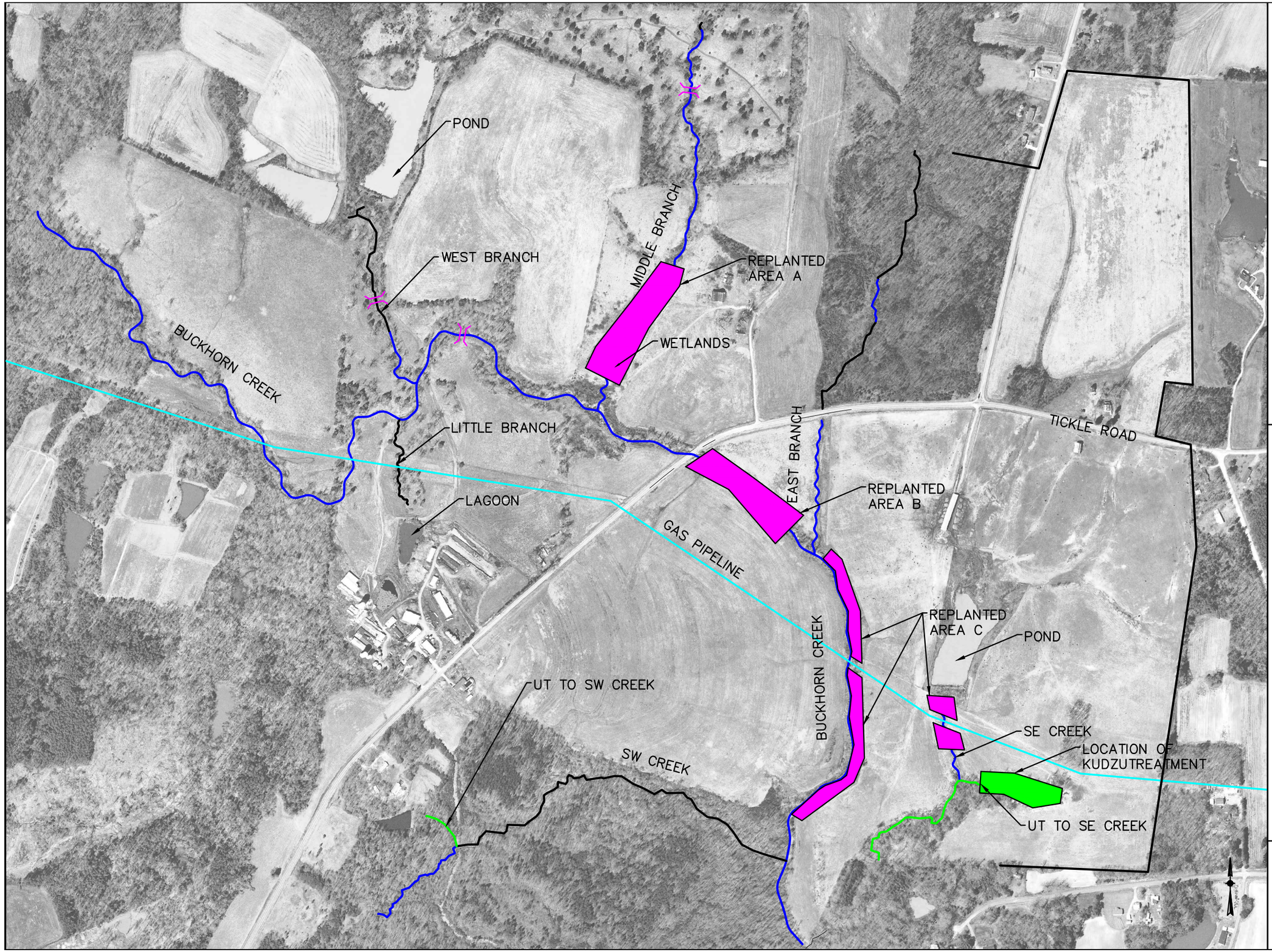
Erosion Rate Calculations

Project:	1024-HLGR	Date:	9/24/2013
Stream:	SouthWest Branch	Crew:	MM,CE,GG
Reach/Description:	8	Page: 7	Of: 7

Feature	Units							
Reach Name		1	2	3	4			
Station/Location								
Photo No.								
Reach Length	ft	50	250	250	173			
Bank	RT-LT-Both	Both	Both	Both	Both			
Bank Height	ft	1.2	1.2	1.2	1.2			
Bankfull Height	ft	1.2	1.2	1.2	1.2			
Root Depth	ft	0.5	0.7	0.7	0.7			
Root Density	%	70%	45%	45%	45%			
Bank Angle	Degrees	45	60	60	60			
Surface Protection	%	75%	60%	60%	60%			
Bank Material	C-G-S-SC	SC	SC	SC	SC			
Stratification	N-M-E	N	N	N	N			
Thalweg Position	C-OC-Toe	C	C	C	C			
D_{TOE}/D_{MEAN}	<1 or >1	<1	<1	<1	<1			
Local Slope > Avg	Yes-No	No	No	No	No			
BEHI Calculation								
Bnk Ht / Bkf Ht		1.00	1.00	1.00	1.00			
BEHI Score		1.00	1.00	1.00	1.00			
Root Depth / Bnk Ht		0.42	0.58	0.58	0.58			
BEHI Score		5.00	3.58	3.58	3.58			
Bank Angle		45	60	60	60			
BEHI Score		3.25	4.00	4.00	4.00			
Surface Protection		75%	60%	60%	60%			
BEHI Score		2.14	3.43	3.43	3.43			
Bank Material Adjustment		0	0	0	0			
Stratification Adjustment		0	0	0	0			
Total BEHI Score		17.50	18.51	18.51	18.51			
Rating		Low	Low	Low	Low			
NBS Calculation								
Thalweg Position Score		1	1	1	1			
Toe Depth Ratio Score		0	0	0	0			
Local Slope Score		0	0	0	0			
Total NBS Rating		1	1	1	1	0	0	
WARSS NBS Rating		1	1	1	1			
Rating		Very Low	Very Low	Very Low	Very Low			
Erosion Rate Prediction								
NC or CO		NC						
Erosion Rate (ft/yr)		0.0	0.0	0.0	0.0			**Sheet Total**
Erosion Total (ft^3/yr)		0.1	0.3	0.3	0.2			0.9

APPENDIX C

REMEDIAL ACTION MAP



PREPARED FOR:

Ecosystem Enhancement Program

PREPARED BY:

RESTORATION SYSTEMS, LLC

AND BY:

Wolf Creek Engineering

LEGEND

- STREAM RESTORATION
- STREAM PRESERVATION
- STREAM ENHANCEMENT
- WETLANDS
- FORD
- PROPERTY BOUNDARY
- GAS PIPELINE
- REPLANTED AREAS
- KUDZU TREATMENT

SCALE

200 0 200 400 600 800

FEET

REMEDIAL ACTION MAP

HOLLY GROVE RESTORATION SITE
GUILFORD COUNTY, NORTH CAROLINA
EEP Contract #: D06028-B