

**Farrar Dairy Stream and Wetland Restoration Site
Monitoring Report – MY03
Harnett County, NC**



Submitted to:



NCEEP, 1652 Mail Service Center, Raleigh, NC 27699-1652

December 2011



**Landmark Center II, Suite 220
4601 Six Forks Road
Raleigh, NC 27609
Phone: (919) 278-2512
Fax: (919) 783-9266**

**Project Manager: Tim Morris
Email: tim.morris@kci.com
KCI Project No: 12065438**

TABLE OF CONTENTS

1.0	PROJECT BACKGROUND.....	1
1.1	Project Structure, Restoration Type, and Approach	1
1.1.1	Project Streams	1
1.1.2	Project Wetlands	2
1.2	Location and Setting	3
1.3	Project History and Background.....	6
2.0	PROJECT CONDITIONS AND MONITORING RESULTS.....	9
2.1	Vegetation Assessment	9
2.2	Stream Assessment	9
2.2.1	Bankfull Events.....	10
2.2.2	Quantitative Measures Summary Tables	11
2.3	Wetland Assessment	25
3.0	CONCLUSIONS	26
4.0	MAINTENANCE.....	26

LIST OF TABLES

Table 1.	Project Restoration Components.....	6
Table 2.	Project Activity and Reporting History	7
Table 3.	Project Contact Table.....	7
Table 4.	Project Background Table.....	8
Table 5.	Hydrological (Bankfull) Verifications.....	10
Table 6.	Baseline Stream Summary	11
Table 7.	Morphology and Hydraulic Monitoring Summary	20
Table 8.	Hydrologic Monitoring Results	25
Table 9.	Hydroperiod History	25

LIST OF FIGURES

Figure 1.	Vicinity Map.....	4
Figure 2.	Farrar Dairy Stream and Wetland Restoration Site Map	5

APPENDIX A – VEGETATION DATA

Vegetation Data Tables	28
Stream and Wetland Vegetation Plot Photos	32

APPENDIX B – STREAM AND WETLAND PHOTOS

APPENDIX C – GEOMORPHOLOGIC AND HYDROLOGIC DATA

Stream Cross-Sections
Stream Longitudinal Profiles
Stream Pebble Counts
Stream and Wetland Hydrographs
Precipitation 30-70 Percentile Graph

APPENDIX D – CURRENT CONDITION PLAN VIEW

EXECUTIVE SUMMARY

The Farrar Dairy Stream and Wetland Restoration Site is a full-delivery project that was developed for the North Carolina Ecosystem Enhancement Program (EEP). Construction was completed in March 2009 on the North Prong of Anderson Creek (NPAC), its tributaries, and an associated Coastal Plain Small Stream Swamp wetland community. The project is located within the USGS 8-digit HUC 03030004 and the NCDWQ Sub-basin 03-06-14 in the Cape Fear River Basin. The project restored, enhanced and preserved 13,044 linear feet of channel using a combination of Priority 1 and 2 Approaches, along with Enhancement II, and 112.0 acres of Coastal Plain Small Stream Swamp wetland community, generating 11,881 stream mitigation units and 64.0 wetland mitigation units. The stream design addressed vertical instability problems and a lack of bed variability by stabilizing stream banks, installing in-stream structures, adjusting stream planform, reconnecting the stream to the historic floodplain and replanting the riparian areas with native vegetation. The wetlands were restored by filling ditches, creating microtopography, and planting native trees and shrubs. This report describes the findings from the third year of monitoring that took place in 2011.

The riparian buffer and the restored wetlands were planted with bare root trees and shrubs, and the stream banks were planted with live stakes. Vegetation monitoring plots were established during the as-built survey and included 15 monitoring plots placed throughout the stream buffer and 30 monitoring plots installed in the restored wetland. Vegetation must meet a minimum average density of 260 stems/acre after five years. The third-year monitoring counted an average of 480 stems/acre in the stream plots and 451 stems/acre in the wetland plots. After the third-year monitoring, the vegetation component of the project is on track to meeting the success criterion.

The stream assessment completed during third-year monitoring found the stream to be stable and functioning properly. Channel dimensions have not changed significantly from previous monitoring. Small portions of localized bank erosion have been noted. Beavers have also created a series of beaver dams on the site. These areas have been documented in the Current Condition Plan View. The on-site stream gauges did not record any bankfull events during the third year of monitoring.

During the 2011 monitoring year, wetland hydrology was achieved at six of the seven groundwater monitoring gauges in the restoration area and at the reference gauge. The gauge that did not meet the success criterion in 2011 met the wetland hydrology criterion during the 2010 growing season. To meet the hydrology success criterion, the water table of the restored wetlands must be within 12" of the soil surface continuously for at least 5% (12.5 days) of the 251-day growing season during a year experiencing average rainfall.

The daily rainfall data depicted on the gauge data graphs were obtained from the on-site precipitation gauge. The precipitation gauge was installed at the site after the completion of construction. The daily rainfall data obtained from a local weather station show that the area had average rainfall during the 2011 growing season.

1.0 PROJECT BACKGROUND

Project Goals and Objectives

The goals and objectives of the restoration project are as follows:

Restoration Goals:

- Restore the site's riparian buffers and forested wetlands.
- Create a stable stream and wetland complex through an interconnected floodplain corridor.

Restoration Objectives:

- Connect the new stream planform to its original floodplain.
- Fill and plug ditches in the drained hydric soils to restore saturated hydrologic conditions to the upper soil horizons.
- Plant a functional Coastal Plain Small Swamp Stream community to create an effective riparian buffer and wetland complex.
- Exclude livestock from the riparian and wetland areas with fencing.

1.1 Project Structure, Restoration Type, and Approach

The pre-restoration channel of NPAC had been moved and channelized to maximize the use of an agricultural field adjacent to Powell Farm Road. The other significant hydrologic alterations to the site included ditched wetlands and straightened tributaries that helped convey water through the property. Due to the clearing of the riparian areas, the streams were experiencing significant bank erosion prior to restoration. In addition to the ditching that drained the historic wetlands, ponds were also built to attract migratory waterfowl. The project restored, enhanced and preserved 13,044 linear feet of channel using a combination of Priority 1 and 2 Approaches and Enhancement II, and restored, enhanced, and preserved 111.9 acres of Coastal Plain Small Stream Swamp wetland community, generating 11,881 stream mitigation units and 64.0 wetland mitigation units (Table 1).

1.1.1 Project Streams

The three design reaches of NPAC (Stations 10+00 to 76+00) were restored to C5 channels. Following a Priority 1 approach, the channel was relocated to its historic location and the bed elevation was brought up, reconnecting the stream to the original floodplain. At Station 10+00, the restored channel begins online at the culvert under Powell Farm Road. At Station 21+00, the channel leaves the pre-restoration location and was returned to the adjacent forest in the location of its historic channel. The new channel comes back online at the end of the project at Station 76+00.

T1.1 and T1.2 (Stations 80+00 to 88+25 and Stations 90+00 to 99+80, respectively) were both restored to C5/B5c headwater channels. At the confluence of these two channels, T1 begins. T1 (Stations 100+00 to 108+84) was restored using the same approach as T1.1 and T1.2. A 31'-wide easement exception occurs at Station 101+00, where a ford crossing was installed for the landowner. The restoration created a new planform, profile, and dimension and increased the sinuosity of these previously straightened channels with a combination of Priority 1 and 2 approaches. Grade control structures such as log sills and step pools were installed along the new channels to create a stable profile. This restoration also

created a bankfull bench in entrenched sections and reconnected the stream to the existing floodplain in others.

T2 was divided into two reaches based on the changing slope of the tributary. T2A (Stations 110+00 to 115+00) was restored to a C5/B5c stream and T2B (Stations 115+00 to 120+22) was restored to an E5 stream type. The hydrologic source for the channel is a seep at the top of T2A. The restoration created a new planform, profile, and dimension and increased the sinuosity of the previously straightened channel with a combination of Priority 1 and 2 approaches. Grade control structures such as log sills and step pools were installed along the new channels to create a stable profile. This restoration created a bankfull bench in some places and reconnected the stream to the existing floodplain in others.

T3 (Stations 130+00 to 141+67) is comprised of a single reach that was restored to a C5 channel. This channel was restored using a Priority 1 approach, with a new planform, profile, and dimension being reconnected to the original floodplain. Two drainage ditches that were adjacent to T3 were filled as part of the wetland restoration, reestablishing T3 as the primary hydrologic feature in this area.

T4 is separated into two reaches. The first reach (Stations 150+00 to 151+80) was enhanced (EII) by planting portions of the easement that had been logged and by removing significant amounts of logging debris that had accumulated in the channel, creating unstable conditions. The second reach (Stations 151+80 to 164+20) was preserved. Near Station 162+00, the stream flows out of the easement for approximately 100 feet, but then comes back into the easement. The stationing continues from where the stream left the easement.

1.1.2 Project Wetlands

Wetland Area 1 preserves approximately 46 acres of well-vegetated palustrine forested, scrub-shrub and emergent wetlands that are along the floodplain of the NPAC. The preservation area is dominated by various wetland sedges, rushes and persistent emergent vegetation, but also contains large scrub-shrub alder thickets that are permanently inundated.

Starting from the west and continuing to the east, Wetland Area 2 is located in the general vicinity of Tributary 1. Portions of this area, which is comprised of six wetlands separated by the restored stream, were historically cleared as part of the site's agricultural operations. This area was enhanced through the planting of bare root material. This wetland also borders the restored NPAC channel, and because NPAC has been reconnected to its floodplain, overbank flooding inundates the adjacent wetlands.

Enhancement in Wetland Area 3 took place in the central portion of the site. The wetland includes a shallow pond and adjacent overbank areas of NPAC. Wetland Area 3 is located adjacent to a section of NPAC where overbank flows will have regular access to the floodplain, thus increasing hydrology to the wetlands. This area was planted with wetland trees and shrubs and graded to eliminate the man-made berms that impounded excess surface water.

Wetland Area 4 is located in an area that was heavily manipulated by the landowner to create a series of shallow impoundments intended to attract migratory

waterfowl. Water control structures allowed the landowner to manipulate water levels within the impoundments. These impoundments were regraded to create a mosaic of vegetated wet hummocks throughout the wetland. Wetland W4 serves as a transitional area between the ponded features and the wetland preservation area. This area was planted with bare root seedlings and treated to control invasive species.

Wetland Area 5 includes all of the site's restored wetlands. These areas are within the floodplain of the NPAC and its tributaries, which had historically been hydrologically altered to allow for agricultural production. Four main construction techniques were utilized to restore these wetland areas:

1. Raising the elevation of the NPAC and its tributaries to re-establish an active floodplain connected to the adjacent wetlands.
2. Filling existing ditches and removing tile drains to discourage rapid groundwater discharge to surface water receptors.
3. Scarifying the top 0.5' of organic surface soil to re-establish soil structure and allow for increased surface storage (microtopography). This material was not removed from the site, but simply re-worked to maximize the ability of the surface soils to retain surface and groundwater hydrology.
4. Planting native species of wetland plants and shrubs.

Table 1 below provides a summary of the mitigation actions and units generated from this project.

1.2 Location and Setting

The Farrar Dairy Site is located off of Farrar Dairy Road in southern Harnett County, North Carolina, and is approximately 8.5 miles southwest of Lillington, North Carolina (Figure 1). To reach the site from Raleigh, drive south out of Raleigh on US 401 toward Fuquay-Varina, continuing south from Fuquay-Varina on US-401/US-421 toward Lillington. Turn right onto NC-210 and continue south through Lillington for approximately 6.5 miles to Darroch Road. Turn right onto Darroch Road and continue approximately 3 miles to Powell Farm Road. Turn left onto Powell Farm Road, drive approximately 1.5 miles and the entrance to the site will be on the left through the driveway of the red ranch style home.

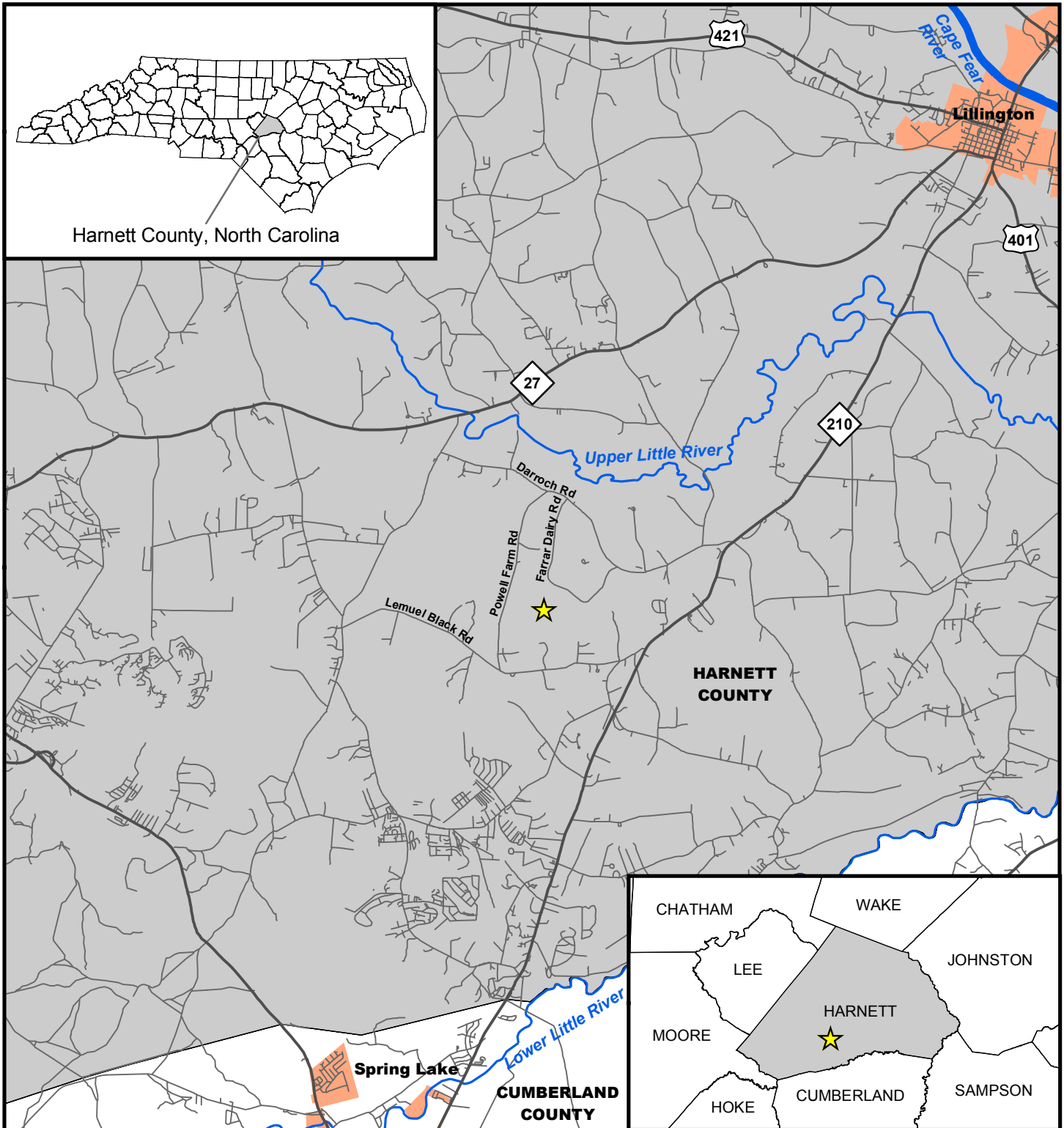








Figure 1. Vicinity Map

-  Project Site Location
-  Major Roads
-  Other Roads
-  Major Rivers
-  Municipalities
-  County Boundaries



1:126,720

1 inch equals 2 miles

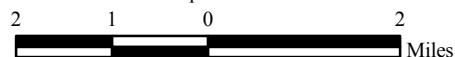




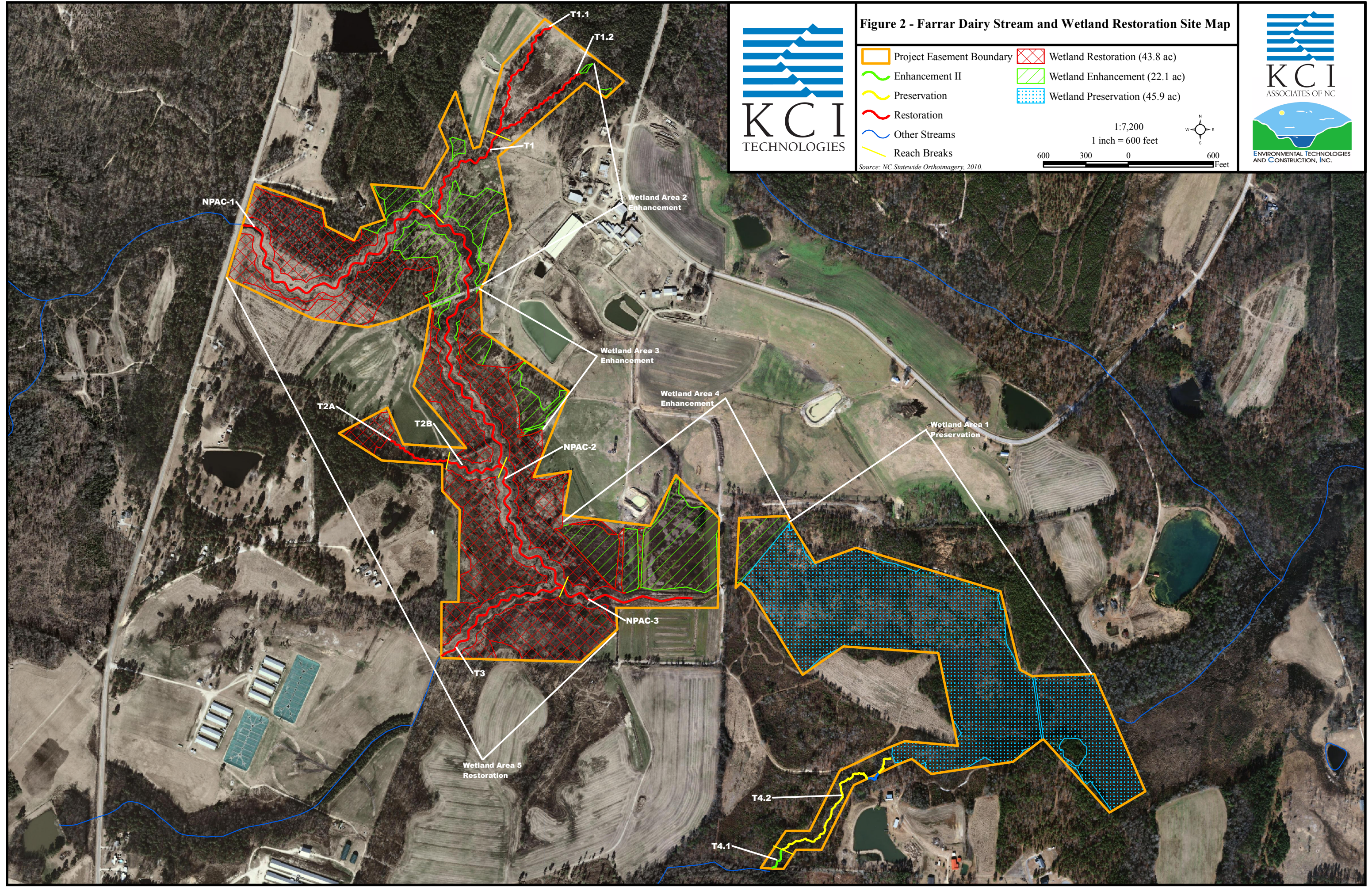
Figure 2 - Farrar Dairy Stream and Wetland Restoration Site Map

Project Easement Boundary	Wetland Restoration (43.8 ac)
Enhancement II	Wetland Enhancement (22.1 ac)
Preservation	Wetland Preservation (45.9 ac)
Restoration	
Other Streams	
Reach Breaks	

Scale: 1:7,200
1 inch = 600 feet

600 300 0 600 Feet

Source: NC Statewide Orthoimagery, 2010.



1.3 Project History and Background

Table 1. Project Restoration Components Farrar Dairy Stream and Wetland Restoration Site						
Project Streams						
Project Segment / Reach ID	Pre- Restoration Feet	Type	Approach	As - Built Footage or Acreage	Stationing	Stream Mitigation Units (SMU)
NPAC	4,565	R	P1	6,746	10+00-77+46	6,714*
T1.1	864	R	P1/2	825	80+00-88+25	825
T1.2	995	R	P1/2	980	90+00-99+80	980
T1	818	R	P1/2	884	100+00-108+84	853*
T2A	977	R	P1/2	500	110+00-115+00	500
T2B		R	P1/2	522	115+00-120+22	522
T3	1,335	R	P1	1,167	130+00-141+67	1,167
T4.1	180	E II	-	180	150+00-151+80	72
T4.2	1,240	P	-	1,240	151+80-164+20	248
TOTAL				13,044		11,881
R = Restoration E = Enhancement II P = Preservation P1 = Priority 1 P2 = Priority 2 * Easement exceptions for landowner ford crossings were excluded for these calculations.						
Project Wetlands						
Project Segment	Type	Acreage	Community Type	Wetland Mitigation Units (WMU)		
Area 1	P	45.93	Coastal Plain Small Stream Swamp	9.19		
Area 2	E	6.88	Coastal Plain Small Stream Swamp	3.44		
Area 3	E	2.57	Coastal Plain Small Stream Swamp	1.29		
Area 4	E	12.67	Coastal Plain Small Stream Swamp	6.34		
Area 5	R	43.8	Coastal Plain Small Stream Swamp	43.8		
TOTAL		111.85		64.06		

Table 2. Project Activity and Reporting History Farrar Dairy Stream and Wetland Restoration		
Activity or Report	Data Collection Complete	Completion or Delivery
Restoration Plan	2007	May 08
Final Design	2007	May 08
Construction	N/A	Mar 09
Planting	N/A	Jan 09
Mitigation Plan / As-Built (Year 0 Monitoring - Baseline)	May 09	Jun 09
Year 1 Monitoring	Dec 09	Dec 09
Year 2 Monitoring	Dec 10	Dec 10
Year 3 Monitoring	Oct 11	Dec 11

Table 3. Project Contact Table Farrar Dairy Stream and Wetland Restoration	
Design Firm	KCI Associates of North Carolina Landmark Center II, Suite 220 4601 Six Forks Rd. Raleigh, NC 27609 Contact: Mr. Tim Morris Phone: (919) 278-2512 Fax: (919) 783-9266
Construction Contractor	Land Mechanics, Inc. 126 Circle G Lane Willow Springs, NC 27592 Contact: Mr. Lloyd Glover Phone: (919) 639-6132 Fax: (919) 639-7079
Planting Contractor	Bruton Nurseries and Landscapes PO Box 1197 Freemont, NC 27830 Contact: Mr. Charlie Bruton Phone: (919) 242-6555
Monitoring Performers	
MY-00 - MY-05	KCI Associates of North Carolina Landmark Center II, Suite 220 4601 Six Forks Rd. Raleigh, NC 27609 Contact: Mr. Adam Spiller Phone: (919) 278-2514 Fax: (919) 783-9266

Table 4. Project Background Table		
Farrar Dairy Stream and Wetland Restoration Site		
Project County	Harnett County	
Physiographic Region	Coastal Plain	
Ecoregion	Sand Hills	
Project River Basin	Cape Fear	
USGS HUC for Project and Reference	03030004110010 (Anderson Creek)	
	03030004150050 (Little Rockfish Creek - reference)	
	03030002050100 (UT to Wilkinson Creek - reference)	
NCDWQ Sub-basin for Project and Reference	03-06-14 (Anderson Creek)	
	03-06-15 (Little Rockfish Creek - reference)	
	03-06-04 (UT to Wilkinson Creek - reference)	
Drainage Area	5.7 sq. mi.	
Stream Order	First and Second Order	
Watershed Type (Rural, Urban, Developing, etc.)	Rural	
Watershed LULC Distribution	Urban	<1%
	Ag-Row Crop	21%
	Ag-Livestock	1%
	Forested	72%
	Water/Wetlands	6%
Watershed impervious cover (%)	3%	
Rosgen Classification of As-built (Stream)	C5 (NPAC)	
	C5/B5c (T1.1, T1.2, T1, T2A, T2B, T3, T4)	
NCDWQ Classification for Project	Class C (Anderson Creek)	
Within EEP Watershed Plan?	No	
Any portion of the project segment upstream of a 303d listed segment?	No	
Reasons for 303d Listing or Stressor	N/A	
Total project acreage of easement	166.9 Acres	
Total planted acreage	93.0 Acres	
WRC Class (Warm, Cool, Cold)	Warm	
Species of concern, endangered etc.	None	
Pre-construction Beaver activity?	Yes	
Dominant Soil Types	Wehadkee loam and Gilead sandy loam	
% of Project Easement Fenced	85%	

2.0 PROJECT CONDITIONS AND MONITORING RESULTS

2.1 Vegetation Assessment

The planted vegetation on the site is growing well. The low base flow throughout the summer months allowed vegetation to become established in the stream channels on T1.1, T1.2, T1, T2, and T3.

There are scattered populations of invasive species at the site, and maintenance actions in 2011 included herbicide treatment.

The monitored vegetation plots revealed that the planted vegetation is growing well with 475 and 445 stems/acre within the stream buffer and wetlands, respectively. There are seven monitoring plots that have calculated planted stem densities less than 260 stems/acre; two in the stream buffer (Plot 3 and 11) and three in the restored wetland (Plot 32, 38, and 45). This is not seen as problematic given the high potential for desirable volunteers to become established in the plots and across the site. Like natural vegetative communities, some areas will have slightly higher densities than others, but the data from the vegetation monitoring plots reveal that the site has an adequate average stem density. To ensure continued vegetative success, the site received supplemental planting in early 2011. The overall vegetation assessment found the site to be on track to meeting the vegetative success criterion.

The vegetative monitoring results are displayed in Appendix A, and the Current Condition Plan View (CCPV). See Section 4.0 for additional maintenance details concerning invasive control and additional planting.

2.2 Stream Assessment

During the 2011 growing season, the tributaries experienced low flow throughout the summer. This allowed vegetation to grow in the channels as described above. Overall, this vegetation is contributing to stream stability by trapping fine materials and rooting into the erosive silt and clay bottom in these channels. Vegetated headwater channels are typical of small stream swamp communities without developed canopies. It is expected that as the channel receive more shade, the herbaceous vegetation in the channel will decrease.

The stream assessment found the project streams to be stable. T1.1 and T1 had experienced isolated bed degradation during the first year of monitoring, but no further migration has been shown since. The additional log sills installed in 2010 in T1 are intact and holding grade. During the third-year site assessment a few of these structures were found to be piping. This is not seen as problematic due to the low flow during the assessment and the short duration that the structures, have been in place. With additional vegetation growing around the channel and the accumulation of fine materials in the pore space of the structures the piping should eventually stop. On NPAC, there are isolated areas of bank erosion, which are depicted in the CCPV. All of these stream features will continue to be monitored to make sure that any observed changes are within the range of variability found in stable stream systems.

The stream monitoring data are described in Appendix B. The stream maintenance from 2011 is described in Section 4.0 and shown in the CCPV.

2.2.1 Bankfull Events

Table 5. Hydrological (Bankfull) Verifications			
Farrar Dairy Stream and Wetland Restoration Site			
Date of Data Collection	Date of Occurrence	Method	Photo Number
3/5/2010	1/21/2010	automated stream gauge	N/A
3/5/2010	2/6/2010	automated stream gauge	N/A

2.2.2 Quantitative Measures Summary Tables

Table 6a. NPAC-1 Baseline Stream Summary																
Farrar Dairy Site																
Parameter	Pre-Existing Condition					Reference Reach(es) Data					Design		As-built			
Dimension - Riffle	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n
Bankfull Width (ft)	13.9	16.9	14.8	24.3	4	19.5	20.3		21.0	2	19.0		18.4	19.6	20.7	4
Floodprone Width (ft)	20	32	24	60	4			300		2	>60		>60	>60	>60	4
Bankfull Mean Depth (ft)	1.2	1.9	2.1	2.2	4			2.3		2	1.6		1.4	1.5	1.6	4
Bankfull Max Depth (ft)	2.5	2.7	2.7	3.0	4	3.0	3.3		3.5	2	2.4		2.3	2.5	2.7	4
Bankfull Cross-Sectional Area (ft ²)	30.0	30.2	30.2	30.2	4	45.4	47.3		49.1	2	30.0		26.5	29.1	32.2	4
Width/Depth Ratio	6.4	10.1	7.3	19.6	4	8.4	8.8		9.1	2	12.0		12.4	13.2	14.4	4
Entrenchment Ratio	1.3	2.3	1.8	4.3	4	14.3	14.9		15.4	2	>3.0		>3.0	>3.0	>3.0	4
Bank Height Ratio	1.0	1.9	2.1	2.5	4			1.0		2	1.0		1.0	1.0	1.0	4
Pattern																
Channel Beltwidth (ft)	*					25			36		35	60	35		60	
Radius of Curvature (ft)	*					22			36		20	35	20		35	
Rc:Bankfull width (ft/ft)	*					1.0			1.8		1.1	1.8	1.0		1.8	
Meander Wavelength (ft)	*					119			325		95	150	95		150	
Meander Width Ratio	*					1.2			1.8		1.8	3.2	1.8		3.1	
Profile																
Riffle Length (ft)													11	24	38	20
Riffle Slope (ft/ft)	0.0030			0.0210		0.0010			0.0080		0.0034	0.0059	0.0007	0.0034	0.0098	20
Pool Length (ft)	8			42		27			81		20	40	9	30	57	20
Pool Spacing (ft)	60			97		68			123		65	95	62	79	99	20
Substrate and Transport Parameters																
SC% / Sa% / G% / C% / B% / Be%	0% / 100% / 0% / 0% / 0% / 0%					6% / 81% / 15% / 0% / 0% / 0%							7% / 57% / 32% / 3% / 0% / 1%			
d16 / d35 / d50 / d84 / d95 (mm)						0.0 / 0.18 / 0.25 / 1.8 / 9.0							0.12 / 0.28 / 0.42 / 11 / 45			
Additional Reach Parameters																
Channel length (ft)	2,179					620					4,541		4,528			
Drainage Area (SM)	3.92					16.48					3.92		3.92			
Rosgen Classification	C/E5					E5					C5		C5			
Sinuosity	1.00					1.30					1.30		1.39			
Water Surface Slope (ft/ft)	0.0040					0.0020					0.0020		0.0020			

*There was no defined pattern for the NPAC due to the stream being channelized.

-The As-built Dimension is from the monitored riffle cross-sections on this reach.

-The As-built Pattern and Profile data were calculated from the monitored longitudinal profile for NPAC, which contains parts of both NPAC 1 and 2.

**Table 6b. NPAC-2 Baseline Stream Summary
Farrar Dairy Site**

Parameter	Pre-Existing Condition					Reference Reach(es) Data					Design		As-built			
Dimension - Riffle	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n
Bankfull Width (ft)			13.2		1	19.5	20.3		21.0	2	19.6		19.5	21.1	22.6	2
Floodprone Width (ft)			>75		1			300		2	>60		>60	>60	>60	2
Bankfull Mean Depth (ft)			2.4		1			2.3		2	1.6		1.6	1.7	1.8	2
Bankfull Max Depth (ft)			3.9		1	3.0	3.3		3.5	2	2.4		2.7	3.1	3.4	2
Bankfull Cross-Sectional Area (ft ²)			31.2		1	45.4	47.3		49.1	2	32.0		35.8	35.9	35.9	2
Width/Depth Ratio			5.6		1	8.4	8.8		9.1	2	12.0		10.6	12.5	14.3	2
Entrenchment Ratio			5.7		1	14.3	14.9		15.4	2	>3.0		>3.0	>3.0	>3.0	2
Bank Height Ratio			1.0		1			1.0		2	1.0		1.0	1.0	1.0	2
Pattern																
Channel Beltwidth (ft)	*					25			36		35	60	35		60	
Radius of Curvature (ft)	*					22			36		20	35	20		35	
Rc:Bankfull width (ft/ft)	*					1.0			1.8		1.0	1.8	1.0		1.7	
Meander Wavelength (ft)	*					119			325		95	150	95		150	
Meander Width Ratio	*					1.2			1.8		1.8	3.1	1.7		2.8	
Profile																
Riffle Length (ft)													7	22	29	7
Riffle Slope (ft/ft)	0.0030			0.0210		0.0010			0.0080		0.0037	0.0075	0.0007	0.0099	0.0236	7
Pool Length (ft)	8			42		27			81		20	40	14	23	41	8
Pool Spacing (ft)	60			97		68			123		50	80	61	74	93	8
Substrate and Transport Parameters																
SC% / Sa% / G% / C% / B% / Be%	0% / 100% / 0% / 0% / 0% / 0%					6% / 81% / 15% / 0% / 0% / 0%							21% / 45% / 31% / 2% / 0% / 0%			
d16 / d35 / d50 / d84 / d95 (mm)						0.0 / 0.18 / 0.25 / 1.8 / 9.0							0.062 / 0.11 / 0.32 / 17 / 35			
Additional Reach Parameters																
Channel length (ft)	985					620					1,185		1,212			
Drainage Area (SM)	4.65					16.48					4.65		4.65			
Rosgen Classification	C/E5					E5					C5		C5			
Sinuosity	1.00					1.30					1.30		1.25			
Water Surface Slope (ft/ft)	0.0040					0.0020					0.0030		0.0039			

*There was no defined pattern for the NPAC due to the stream being channelized.

-The As-built Dimension is from the monitored riffle cross-sections on this reach.

-The As-built Pattern and Profile data were calculated from the monitored longitudinal profile for NPAC, which contains parts of both NPAC 1 and 2.

Table 6c. NPAC-3 Baseline Stream Summary																	
Farrar Dairy Site																	
Parameter	Pre-Existing Condition					Reference Reach(es) Data					Design		As-built				
Dimension - Riffle	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n	
Bankfull Width (ft)			13.2		1	19.5	20.3		21.0	2	21.0			24.2		1	
Floodprone Width (ft)			>75		1			300		2	>60			>60		1	
Bankfull Mean Depth (ft)			2.4		1			2.3		2	1.7			2.3		1	
Bankfull Max Depth (ft)			3.9		1	3.0	3.3		3.5	2	2.6			3.6		1	
Bankfull Cross-Sectional Area (ft ²)			31.2		1	45.4	47.3		49.1	2	36.7			55.8		1	
Width/Depth Ratio			5.6		1	8.4	8.8		9.1	2	12.0			10.5		1	
Entrenchment Ratio			5.7		1	14.3	14.9		15.4	2	>3.0			>3.0		1	
Bank Height Ratio			1.0		1			1.0		2	1.0			1.0		1	
Pattern																	
Channel Beltwidth (ft)	*					25			36		35	60	35		60		
Radius of Curvature (ft)	*					22			36		20	35	22		36		
Rc:Bankfull width (ft/ft)	*					1.0			1.8		1.0	1.7	0.9		1.5		
Meander Wavelength (ft)	*					119			325		105	265	105		265		
Meander Width Ratio	*					1.2			1.8		1.7	2.9	1.4		2.5		
Profile																	
Riffle Length (ft)																	
Riffle Slope (ft/ft)	0.0030			0.0210		0.0010			0.0080		0.0040	0.0054					
Pool Length (ft)	8			42		27			81		10	40					
Pool Spacing (ft)	60			97		68			123		85	145					
Substrate and Transport Parameters																	
SC% / Sa% / G% / C% / B% / Be%	0% / 100% / 0% / 0% / 0% / 0%					6% / 81% / 15% / 0% / 0% / 0%					21% / 45% / 31% / 2% / 0% / 0%						
d16 / d35 / d50 / d84 / d95 (mm)						0.0 / 0.18 / 0.25 / 1.8 / 9.0					0.062 / 0.11 / 0.32 / 17 / 35						
Additional Reach Parameters																	
Channel length (ft)	880					620					998		1,006				
Drainage Area (SM)	4.82					16.48					4.82		4.82				
Rosgen Classification	C/E5					E5					C5		C5				
Sinuosity	1.00					1.30					1.30		1.09				
Water Surface Slope (ft/ft)	0.0040					0.0020					0.0030						

*There was no defined pattern for the NPAC due to the stream being channelized.

-The As-built Dimension is from the monitored riffle cross-sections on this reach.

-The As-built survey was completed on NPAC-3, but the monitored detailed longitudinal profile for NPAC does not run through NPAC-3.

Table 6d. Trib 1.1 Baseline Stream Summary																
Farrar Dairy Site																
Parameter	Pre-Existing Condition					Reference Reach(es) Data					Design		As-built			
Dimension - Riffle	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n
Bankfull Width (ft)	3.5	4.3		5.0	2	7.7	7.9	7.7	8.3	3	4.5		5.9	6.4	6.9	2
Floodprone Width (ft)	6	11		15	2	13	14	13	16	3	>9		16	23	29	2
Bankfull Mean Depth (ft)	0.4	0.5		0.6	2	0.7	0.8	0.8	0.9	3	0.5		0.3	0.4	0.4	2
Bankfull Max Depth (ft)	0.9	1.0		1.1	2	1.1	1.3	1.3	1.4	3	0.7		0.6	0.7	0.7	2
Bankfull Cross-Sectional Area (ft ²)	2.0	2.0		2.0	2	6.1	6.4	6.2	7.0	3	2.0		2.3	2.4	2.4	2
Width/Depth Ratio	6.2	9.4		12.5	2	8.5	9.8	9.6	11.4	3	10.0		15.1	17.5	19.8	2
Entrenchment Ratio	1.7	7.4		13.0	2	1.6	1.9	2.1	2.1	3	>2		2.3	3.6	4.9	2
Bank Height Ratio	1.7	3.1		4.4	2			1.0		3	1.0		1.0	1.0	1.0	2
Pattern																
Channel Beltwidth (ft)	10			21				22			13	17	13		17	
Radius of Curvature (ft)	6			13		11			23		8	13	8		13	
Rc:Bankfull width (ft/ft)	0.7			2.5		1.0			3.0		1.8	2.9	1.3		2.0	
Meander Wavelength (ft)	42			44		49			59		30	45	30		45	
Meander Width Ratio	1.1			4.1		2.0			2.9		2.9	3.8	2.0		2.7	
.																
Riffle Length (ft)	#												8	14	21	22
Riffle Slope (ft/ft)	#					0.0120			0.0280		0.0170	0.0180	0	0.0144	0.0380	22
Pool Length (ft)	#					5			9		2	5	2	5	7	21
Pool Spacing (ft)	#										15	30	19	25	31	21
Substrate and Transport Parameters																
SC% / Sa% / G% / C% / B% / Be%	0% / 100% / 0% / 0% / 0% / 0%					0% / 100% / 0% / 0% / 0% / 0%					13% / 64% / 23% / 0% / 0% / 0%					
d16 / d35 / d50 / d84 / d95 (mm)											0.07 / 0.14 / 0.29 / 8.6 / 15					
Additional Reach Parameters																
Channel length (ft)	864					204					827		825			
Drainage Area (SM)	0.02					0.15					0.02		0.02			
Rosgen Classification	G5					B4c					C5/B5c		C5			
Sinuosity	1.12					1.20					1.13		1.12			
Water Surface Slope (ft/ft)	0.0240					0.0120					0.0140		0.0131			

No flow during survey, therefore these dimensions were not recorded.

Table 6e. Trib 1.2 Baseline Stream Summary																	
Farrar Dairy Site																	
Parameter	Pre-Existing Condition					Reference Reach(es) Data					Design		As-built				
Dimension - Riffle	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n	
Bankfull Width (ft)	3.6	5.0		6.4	2	7.7	7.9	7.7	8.3	3	7.6		6.9	7.6	8.3	2	
Floodprone Width (ft)	7	34		60	2	13	14	13	16	3	>15.2		26	36	46	2	
Bankfull Mean Depth (ft)	0.9	1.3		1.6	2	0.7	0.8	0.8	0.9	3	0.8		0.7	0.8	0.8	2	
Bankfull Max Depth (ft)	2.1	2.2		2.2	2	1.1	1.3	1.3	1.4	3	1.2		1.2	1.2	1.2	2	
Bankfull Cross-Sectional Area (ft ²)	5.8	5.8		5.8	2	6.1	6.4	6.2	7.0	3	5.8		5.2	5.5	5.7	2	
Width/Depth Ratio	2.2	4.7		7.1	2	8.5	9.8	9.6	11.4	3	10.0		9.2	10.7	12.1	2	
Entrenchment Ratio	2.0	5.7		9.4	2	1.6	1.9	2.1	2.1	3	>2		3.8	4.7	5.5	2	
Bank Height Ratio	1.1	1.6		2.0	2			1.0		3	1.0		1.0	1.0	1.0	2	
Pattern																	
Channel Beltwidth (ft)	22			34				22			17	26	17		26		
Radius of Curvature (ft)	8			11		11			23		13	20	13		20		
Rc:Bankfull width (ft/ft)	1.4			3.7		1.0			3.0		1.7	2.6	1.7		2.6		
Meander Wavelength (ft)	54			74		49			59		54	75	54		75		
Meander Width Ratio	3.9			11.3		2.0			2.9		2.2	3.4	2.2		3.4		
Profile																	
Riffle Length (ft)	#												21	25	35	14	
Riffle Slope (ft/ft)	#					0.0120			0.0280		0.0150	0.0180	0.0115	0.0178	0.0234	14	
Pool Length (ft)	#					5			9		4	9	3	6	13	14	
Pool Spacing (ft)	#										20	40	29	37	50	14	
Substrate and Transport Parameters																	
SC% / Sa% / G% / C% / B% / Be%	0% / 100% / 0% / 0% / 0% / 0%					0% / 100% / 0% / 0% / 0% / 0%					22% / 76% / 3% / 0% / 0% / 0%						
d16 / d35 / d50 / d84 / d95 (mm)											0.062 / 0.079 / 0.1 / 0.22 / 0.44						
Additional Reach Parameters																	
Channel length (ft)	1,006					620					986		980				
Drainage Area (SM)	0.10					16.48					0.10		0.10				
Rosgen Classification	G5					E5					C5/B5c		C5/B5c				
Sinuosity	1.10					1.30					1.14		1.14				
Water Surface Slope (ft/ft)	0.0130					0.0020					0.0130		0.0142				

No flow during survey, therefore these dimensions were not recorded.

Table 6f. Trib 1 Baseline Stream Summary																	
Farrar Dairy Site																	
Parameter	Pre-Existing Condition					Reference Reach(es) Data					Design		As-built				
Dimension - Riffle	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n	
Bankfull Width (ft)	^					7.7	7.9	7.7	8.3	3	10.0		8.6	9.5	10.3	2	
Floodprone Width (ft)	^					13	14	13	16	3	>20		>60	>60	>60	2	
Bankfull Mean Depth (ft)	^					0.7	0.8	0.8	0.9	3	1.0		0.9	1.0	1.0	2	
Bankfull Max Depth (ft)	^					1.1	1.3	1.3	1.4	3	1.6		1.7	1.8	1.9	2	
Bankfull Cross-Sectional Area (ft ²)	^					6.1	6.4	6.2	7.0	3	10.0		8.2	9.0	9.7	2	
Width/Depth Ratio	^					8.5	9.8	9.6	11.4	3	10.0		9.0	10.0	10.9	2	
Entrenchment Ratio	^					1.6	1.9	2.1	2.1	3	>2		>3.0	>3.0	>3.0	2	
Bank Height Ratio	^							1.0		3	1.0		1.0	1.0	1.0	2	
Pattern																	
Channel Beltwidth (ft)	8			16				22			23	40	23		40		
Radius of Curvature (ft)	6			20		11			23		15	25	15		25		
Rc:Bankfull width (ft/ft)	^					1.0			3.0		1.5	2.5	1.6		2.6		
Meander Wavelength (ft)	22			50		49			59		55	90	55		90		
Meander Width Ratio	^					2.0			2.9		2.3	4.0	2.4		4.2		
Profile																	
Riffle Length (ft)	^												6	24	37	12	
Riffle Slope (ft/ft)	^					0.0120			0.0280		0.0150	0.0180	0.0077	0.0184	0.0350	12	
Pool Length (ft)	^					5			9		5	12	3	9	21	9	
Pool Spacing (ft)	^										35	55	37	46	59	9	
Substrate and Transport Parameters																	
SC% / Sa% / G% / C% / B% / Be%	0% / 100% / 0% / 0% / 0% / 0%					0% / 100% / 0% / 0% / 0% / 0%					22% / 76% / 3% / 0% / 0% / 0%						
d16 / d35 / d50 / d84 / d95 (mm)											0.062 / 0.079 / 0.1 / 0.22 / 0.44						
Additional Reach Parameters																	
Channel length (ft)	370					620					881		884				
Drainage Area (SM)	0.18					16.48					0.18		0.18				
Rosgen Classification	DA5					E5					C5/B5c		C5/B5c				
Sinuosity	1.19					1.30					1.22		1.21				
Water Surface Slope (ft/ft)	0.0100					0.0020					0.0110		0.0112				

^ These existing conditions data were not collected on T1.

Table 6g. Trib 2A Baseline Stream Summary																	
Farrar Dairy Site																	
Parameter	Pre-Existing Condition					Reference Reach(es) Data					Design		As-built				
Dimension - Riffle	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n	
Bankfull Width (ft)			3.6		1	7.7	7.9	7.7	8.3	3	5.0			5.7		1	
Floodprone Width (ft)			4		1	13	14	13	16	3	>10			30		1	
Bankfull Mean Depth (ft)			0.7		1	0.7	0.8	0.8	0.9	3	0.5			0.5		1	
Bankfull Max Depth (ft)			1.0		1	1.1	1.3	1.3	1.4	3	0.8			0.8		1	
Bankfull Cross-Sectional Area (ft ²)			2.5		1	6.1	6.4	6.2	7.0	3	2.5			2.8		1	
Width/Depth Ratio			5.2		1	8.5	9.8	9.6	11.4	3	10.0			11.6		1	
Entrenchment Ratio			1.1		1	1.6	1.9	2.1	2.1	3	>2			5.3		1	
Bank Height Ratio			3.5		1			1.0		3	1.0			1.0		1	
Pattern																	
Channel Beltwidth (ft)	*							22			11	17	11		17		
Radius of Curvature (ft)	*					11			23		8	10	8		10		
Rc:Bankfull width (ft/ft)	*					1.0			3.0		1.6	2.0	1.4		1.8		
Meander Wavelength (ft)	*					49			59		35	45	35		45		
Meander Width Ratio	*					2.0			2.9		2.2	3.4	1.9		3.0		
Profile																	
Riffle Length (ft)	#												8	15	28	17	
Riffle Slope (ft/ft)	#					0.012			0.028		0.016	0.018	#	#	#	#	
Pool Length (ft)	#					5			9		2	6	2	7	28	17	
Pool Spacing (ft)	#										15	25	14	31	70	17	
Substrate and Transport Parameters																	
SC% / Sa% / G% / C% / B% / Be%	0% / 100% / 0% / 0% / 0% / 0%					0% / 100% / 0% / 0% / 0% / 0%					22% / 76% / 3% / 0% / 0% / 0%						
d16 / d35 / d50 / d84 / d95 (mm)											0.062 / 0.079 / 0.1 / 0.22 / 0.44						
Additional Reach Parameters																	
Channel length (ft)	423					620					500		500				
Drainage Area (SM)	0.04					16.48					0.04		0.04				
Rosgen Classification	G5					E5					C5/B5c		C5/B5c				
Sinuosity	1.00					1.30					1.16		1.13				
Water Surface Slope (ft/ft)	0.0260					0.0020					0.0180		#				

No flow during survey, therefore these dimensions were not recorded.

*There was no defined pattern for T2 due to the stream being channelized.

Table 6h. Trib 2B Baseline Stream Summary																	
Farrar Dairy Site																	
Parameter	Pre-Existing Condition					Reference Reach(es) Data					Design		As-built				
Dimension - Riffle	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n	
Bankfull Width (ft)			4.5		1	6.7	7.2	7.1	7.9	3	5.3			5.2		1	
Floodprone Width (ft)			8		1	34	63	68	88	3	>25			>60		1	
Bankfull Mean Depth (ft)			0.6		1	0.7	0.9	0.9	1.0	3	0.5			0.5		1	
Bankfull Max Depth (ft)			0.9		1	1.1	1.2	1.1	1.3	3	0.8			0.8		1	
Bankfull Cross-Sectional Area (ft ²)			2.5		1	5.7	6.1	5.8	6.7	3	2.6			2.5		1	
Width/Depth Ratio			8.1		1	7.4	8.9	8.0	11.3	3	11.0			10.8		1	
Entrenchment Ratio			1.8		1	4.9	8.8	8.6	13	3	>2.4			>3.0		1	
Bank Height Ratio			3.2		1			1.0		3	1.0			1.0		1	
Pattern																	
Channel Beltwidth (ft)	*					15			48		23	40	23		40		
Radius of Curvature (ft)	*					21			47		15	20	15		20		
Rc:Bankfull width (ft/ft)	*					2.7			7.0		2.8	3.8	2.9		3.8		
Meander Wavelength (ft)	*					43			84		70	90	70		90		
Meander Width Ratio	*					1.9			7.2		4.3	7.5	4.4		7.7		
Profile																	
Riffle Length (ft)	#												8	15	28	17	
Riffle Slope (ft/ft)	#										0.0090	0.0170	#	#	#	#	
Pool Length (ft)	#										10	30	2	7	28	17	
Pool Spacing (ft)	#							45			30	40	14	31	70	17	
Substrate and Transport Parameters																	
SC% / Sa% / G% / C% / B% / Be%	0% / 100% / 0% / 0% / 0% / 0%					0% / 100% / 0% / 0% / 0% / 0%					22% / 76% / 3% / 0% / 0% / 0%						
d16 / d35 / d50 / d84 / d95 (mm)						0.28 / 0.37 / 0.44 / 0.82 / 0.97					0.062 / 0.079 / 0.1 / 0.22 / 0.44						
Additional Reach Parameters																	
Channel length (ft)	554					529					509		522				
Drainage Area (SM)	0.04					0.35					0.04		0.04				
Rosgen Classification	G5					E5					E5		E5				
Sinuosity	1.22					1.30					1.22		1.23				
Water Surface Slope (ft/ft)	0.0080					0.0070					0.0080		#				

*There was no defined pattern for T2 due to the stream being channelized.

No flow during survey, therefore these dimensions were not recorded.

Table 6i. Trib 3 Baseline Stream Summary																
Farrar Dairy Site																
Parameter	Pre-Existing Condition					Reference Reach(es) Data					Design		As-built			
Dimension - Riffle	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n
Bankfull Width (ft)	12.3	15.9		19.5	2	19.5	20.3		21.0	2	15.5		14.9	16.7	18.4	2
Floodprone Width (ft)	50			>70	2			300		2	>31		>60	>60	>60	2
Bankfull Mean Depth (ft)	1.0	1.3		1.6	2			2.3		2	1.3		1.2	1.2	1.2	2
Bankfull Max Depth (ft)	2.3	2.8		3.2	2	3.0	3.3		3.5	2	2.0		1.9	1.9	1.9	2
Bankfull Cross-Sectional Area (ft ²)	20.0	20.1		20.1	2	45.4	47.3		49.1	2	20.0		18.4	19.9	21.4	2
Width/Depth Ratio	7.6	13.3		18.9	2	8.4	8.8		9.1	2	12.0		12.1	14.0	15.8	2
Entrenchment Ratio	3.6	3.9		4.1	2	14.3	14.9		15.4	2	>2		>3	>3	>3	2
Bank Height Ratio	1.0	1.2		1.4	2			1.0		2	1.0		1.0	1.0	1.0	2
Pattern																
Channel Beltwidth (ft)	*					25			36		35	45	35		45	
Radius of Curvature (ft)	*					22			36		20	28	20		28	
Rc:Bankfull width (ft/ft)	*					1.0			1.8		1.3	1.8	1.2		1.7	
Meander Wavelength (ft)	*					119			325		80	125	80		125	
Meander Width Ratio	*					1.2			1.8		2.3	2.9	2.1		2.7	
Profile																
Riffle Length (ft)	#												12	21	35	11
Riffle Slope (ft/ft)	#					0.0130			0.0280		0.0020	0.0050	0.0000	0.0023	0.0058	11
Pool Length (ft)	#					3			25		12	20	3	13	21	9
Pool Spacing (ft)	#					30			59		45	70	45	64	115	9
Substrate and Transport Parameters																
SC% / Sa% / G% / C% / B% / Be%	0% / 100% / 0% / 0% / 0% / 0%					6% / 81% / 15% / 0% / 0% / 0%					22% / 76% / 3% / 0% / 0% / 0%					
d16 / d35 / d50 / d84 / d95 (mm)						0.0 / 0.18 / 0.25 / 1.8 / 9.0					0.062 / 0.079 / 0.1 / 0.22 / 0.44					
Additional Reach Parameters																
Channel length (ft)	1,335					620					1,151		1,167			
Drainage Area (SM)	0.39					16.48					0.39		0.39			
Rosgen Classification	C5/E5					E5					C5		C5			
Sinuosity	1.00					1.30					1.17		1.17			
Water Surface Slope (ft/ft)	0.0020					0.0020					0.0030		0.0211			

*There was no defined pattern for T3 due to the stream being channelized.

No flow during survey, therefore these dimensions were not recorded.

Table 7a. Morphology and Hydraulic Monitoring Summary																		
Farrar Dairy Site																		
Parameter	Cross-Section 1 NPAC 1						Cross-Section 2 NPAC 1						Cross-Section 3 NPAC 1					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
Bankfull Width (ft)	19.6	20.0	18.5	19.2			20.9	23.9	24.8	22.3			19.6	16.0	16.0	18.9		
Floodprone Width (ft)	>60	>60	>60	>60			-	-	-	-			>60	>60	>60	>60		
Bankfull Cross-Sectional Area (ft ²)	31.0	31.7	31.6	32.4			29.2	28.8	32.9	31.1			26.6	19.9	19.9	23.4		
Bankfull Mean Depth (ft)	1.6	1.6	1.7	1.7			1.4	1.2	1.3	1.4			1.4	1.2	1.2	1.3		
Bankfull Maximum Depth (ft)	2.4	2.7	2.9	3.2			3.3	3.2	3.3	3.3			2.5	2.0	2.3	2.3		
Width/Depth Ratio	12.4	12.6	10.8	11.4			-	-	-	-			14.4	12.9	12.9	15.3		
Entrenchment Ratio	>3.0	>3.0	>3.0	>3.0			-	-	-	-			>3.0	>3.0	>3.0	>3.0		
Bank Height Ratio	1.0	1.0	1.0	1.0			-	-	-	-			1.0	1.0	1.0	1.0		
Wetted Perimeter (ft)	20.5	20.9	19.6	20.4			22.3	25.0	26.8	20.7			20.5	16.9	17.9	21.7		
Hydraulic Radius (ft)	1.5	1.5	1.6	1.6			1.3	1.2	1.2	1.4			1.3	1.2	1.2	1.2		
Substrate																		
d50 (mm)	0.07	0.06	0.06	0.06			0.09	0.14	0.28	0.06			0.06	0.18	0.062	0.06		
d84 (mm)	0.22	0.11	0.11	0.10			0.65	0.49	3.7	0.26			0.11	0.44	0.09	0.06		

Table 7b. Morphology and Hydraulic Monitoring Summary																		
Farrar Dairy Site																		
Parameter	Cross-Section 4 NPAC 1						Cross-Section 5 NPAC 1						Cross-Section 6 NPAC 1					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
Bankfull Width (ft)	18.9	18.5	18.6	18.3			18.4	18.0	18.0	17.9			20.4	18.6	20.4	21.1		
Floodprone Width (ft)	-	-	-	-			>60	>60	>60	>60			-	-	-	-		
Bankfull Cross-Sectional Area (ft ²)	24.7	26.7	28.7	24.5			26.5	24.6	24.6	26.7			26.6	25.1	28.1	27.2		
Bankfull Mean Depth (ft)	1.3	1.4	1.5	1.3			1.4	1.4	1.4	1.5			1.3	1.5	1.4	1.3		
Bankfull Maximum Depth (ft)	2.8	3.2	3.0	2.7			2.3	2.3	2.9	2.7			3.0	3.1	3.5	3.3		
Width/Depth Ratio	-	-	-	-			12.8	13.1	13.1	12.0			-	-	-	-		
Entrenchment Ratio	-	-	-	-			>3.0	>3.0	>3.0	>3.0			-	-	-	-		
Bank Height Ratio	-	-	-	-			1.0	1.0	1.0	1.0			-	-	-	-		
Wetted Perimeter (ft)	20.9	20.1	20.8	19.6			19.2	22.2	22.0	17.7			22.0	19.9	22.1	22.7		
Hydraulic Radius (ft)	1.2	1.3	1.4	1.3			1.4	1.1	1.1	1.3			1.2	1.3	1.3	1.2		
Substrate																		
d50 (mm)	0.54	0.11	0.10	0.11			0.09	0.09	0.21	0.20			0.12	0.07	0.073	0.06		
d84 (mm)	0.82	0.40	0.34	0.36			0.37	0.38	0.38	0.37			0.29	0.26	0.14	0.06		

Table 7c. Morphology and Hydraulic Monitoring Summary																		
Farrar Dairy Site																		
Parameter	Cross-Section 7						*Cross-Section 8						Cross-Section 9					
	NPAC-1						NPAC-2						NPAC-2					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
Bankfull Width (ft)	20.7	20.0	20.9	20.3			19.5	18.9	19.2	21.2			22.9	22.2	24.7	23.3		
Floodprone Width (ft)	>60	>60	>60	>60			>60	>60	>60	>60			-	-	-	-		
Bankfull Cross-Sectional Area (ft ²)	32.2	30.7	33.6	33.5			35.9	35.0	36.0	28.0			36.0	34.3	36.7	31.9		
Bankfull Mean Depth (ft)	1.6	1.5	1.6	1.7			1.8	1.9	1.9	1.3			1.6	1.5	1.5	1.4		
Bankfull Maximum Depth (ft)	2.7	2.9	3.2	3.4			3.4	3.6	3.9	2.7			3.4	3.2	4.2	3.6		
Width/Depth Ratio	13.3	13.0	13.0	12.3			10.6	10.2	10.2	16.1			-	-	-	-		
Entrenchment Ratio	>3.0	>3.0	>3.0	>3.0			>3.0	>3.0	>3.0	>3.0			-	-	-	-		
Bank Height Ratio	1.0	1.0	1.0	1.0			1.0	1.0	1.0	1.0			-	-	-	-		
Wetted Perimeter (ft)	21.5	21.0	22.1	21.6			24.9	20.6	20.9	22.0			24.5	23.9	27.1	25.1		
Hydraulic Radius (ft)	1.5	1.5	1.5	1.6			1.4	1.7	1.7	1.3			1.5	1.4	1.4	1.3		
Substrate																		
d50 (mm)	0.06	0.06	0.06	0.06			0.06	0.06	0.06	57			0.11	0.29	0.17	1.20		
d84 (mm)	0.10	0.10	0.06	0.06			0.07	0.10	0.09	110			0.66	0.69	0.23	1.80		

* In 2011, a constructed riffle was installed at XS8 due to stream maintenance issues.

Table 7d. Morphology and Hydraulic Monitoring Summary																		
Farrar Dairy Site																		
Parameter	Cross-Section 10						Cross-Section 11						Cross-Section 12					
	NPAC-2						NPAC-3						NPAC-3					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
Bankfull Width (ft)	22.6	21.0	20.2	19.7			24.2	21.6	23.9	23.9			22.3	21.0	22.8	22.7		
Floodprone Width (ft)	>60	>60	>60	>60			>60	>60	>60	>60			-	-	-	-		
Bankfull Cross-Sectional Area (ft ²)	35.8	34.0	31.3	28.0			55.8	53.1	59.8	54.9			42.0	38.0	50.9	49.0		
Bankfull Mean Depth (ft)	1.6	1.6	1.5	1.4			2.3	2.2	2.5	2.3			1.9	1.8	2.2	2.2		
Bankfull Maximum Depth (ft)	2.7	2.8	2.7	2.6			3.6	3.5	4.0	3.6			3.2	3.5	4.5	4.4		
Width/Depth Ratio	14.3	13.0	13.0	13.9			10.5	8.7	9.6	10.4			-	-	-	-		
Entrenchment Ratio	>3.0	>3.0	>3.0	>3.0			>3.0	>3.0	>3.0	>3.0			-	-	-	-		
Bank Height Ratio	1.0	1.0	1.0	1.0			1.0	1.0	1.0	1.0			-	-	-	-		
Wetted Perimeter (ft)	23.7	22.0	21.4	20.7			23.5	23.1	25.8	25.5			23.9	23.0	25.3	24.9		
Hydraulic Radius (ft)	1.5	1.5	1.5	1.4			2.3	2.3	2.3	2.1			1.8	1.7	2.0	2.0		
Substrate																		
d50 (mm)	0.06	0.49	0.35	0.32			0.71	0.29	0.15	0.07			1.40	0.23	0.09	0.08		
d84 (mm)	3.10	9.60	18.0	8.90			0.90	0.44	0.21	0.12			3.00	0.40	0.11	0.11		

Table 7e. Morphology and Hydraulic Monitoring Summary																		
Farrar Dairy Site																		
Parameter	Cross-Section 13						Cross-Section 14						Cross-Section 15					
	T1.1						T1.1						T1.1					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
Bankfull Width (ft)	6.9	8.0	7.2	7.4			7.1	6.9	7.3	7.6			5.9	5.8	6.5	6.0		
Floodprone Width (ft)	16	16	16	16			-	-	-	-			29	30	30	30		
Bankfull Cross-Sectional Area (ft ²)	2.4	2.8	2.8	2.8			5.1	5.2	5.5	5.4			2.3	2.5	2.2	2.1		
Bankfull Mean Depth (ft)	0.3	0.4	0.4	0.4			0.7	0.7	0.8	0.7			0.4	0.4	0.3	0.4		
Bankfull Maximum Depth (ft)	0.7	0.7	0.8	0.7			1.3	1.3	1.5	1.3			0.6	0.7	0.6	0.6		
Width/Depth Ratio	19.8	22.9	18.5	19.6			-	-	-	-			15.1	13.2	13.2	17.1		
Entrenchment Ratio	2.3	2.0	2.2	2.2			-	-	-	-			4.9	5.2	5.2	5.1		
Bank Height Ratio	1.0	1.0	1.0	1.0			-	-	-	-			1.0	1.0	1.1	1.1		
Wetted Perimeter (ft)	7.1	8.2	7.3	7.6			7.7	7.6	8.3	8.2			6.1	6.0	6.0	6.2		
Hydraulic Radius (ft)	0.3	0.3	0.4	0.4			0.7	0.7	0.7	0.7			0.4	0.4	0.4	0.3		
Substrate																		
d50 (mm)	0.06	0.06	0.06	0.06			0.06	0.06	0.06	0.06			0.06	0.06	0.06	0.06		
d84 (mm)	0.07	0.06	0.06	0.06			0.06	37.00	0.06	0.06			0.09	11.00	0.48	0.50		

Table 7f. Morphology and Hydraulic Monitoring Summary																		
Farrar Dairy Site																		
Parameter	Cross-Section 16						Cross-Section 17						Cross-Section 18					
	T1.2						T1.2						T1.2					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
Bankfull Width (ft)	8.9	9.2	9.3	9.0			8.3	8.5	8.5	8.2			6.9	6.9	7.0	6.9		
Floodprone Width (ft)	-	-	-	-			46	46	46	46			26	26	26	26		
Bankfull Cross-Sectional Area (ft ²)	6.4	6.8	6.8	6.4			5.7	5.8	5.7	5.4			5.2	5.1	5.6	5.1		
Bankfull Mean Depth (ft)	0.7	0.7	0.7	0.7			0.7	0.7	0.7	0.7			0.8	0.7	0.8	0.7		
Bankfull Maximum Depth (ft)	1.6	1.4	1.5	1.4			1.2	1.2	1.3	1.1			1.2	1.2	1.3	1.2		
Width/Depth Ratio	-	-	-	-			12.1	12.5	12.7	12.5			9.2	9.3	8.8	9.3		
Entrenchment Ratio	-	-	-	-			5.5	5.4	5.4	5.6			3.8	3.8	3.7	3.8		
Bank Height Ratio	-	-	-	-			1.0	1.0	1.0	1.0			1.0	1.0	1.0	1.0		
Wetted Perimeter (ft)	9.5	9.7	10.9	9.5			8.7	8.9	8.9	8.6			7.5	7.5	7.7	7.5		
Hydraulic Radius (ft)	0.7	0.7	0.7	0.7			0.6	0.7	0.6	0.6			0.7	0.7	0.7	0.7		
Substrate																		
d50 (mm)	0.31	0.12	0.30	0.31			0.06	0.06	0.06	0.06			0.06	0.25	0.28	0.26		
d84 (mm)	0.48	0.35	0.42	0.43			0.08	44.00	0.42	0.37			0.10	0.65	0.42	0.41		

Table 7g. Morphology and Hydraulic Monitoring Summary																		
Farrar Dairy Site																		
Parameter	Cross-Section 19 T1						Cross-Section 20 T1						Cross-Section 21 T1					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
Bankfull Width (ft)	9.5	10.5	9.3	10.6			10.3	9.1	8.9	8.9			8.6	10.1	10.1	11.3		
Floodprone Width (ft)	-	-	-	-			>60	>60	>60	>60			>60	>60	>60	>60		
Bankfull Cross-Sectional Area (ft ²)	10.9	12.0	10.8	11.7			9.7	8.3	8.5	8.1			8.2	9.9	10.3	8.8		
Bankfull Mean Depth (ft)	1.1	1.1	1.2	0.9			0.9	0.9	1.0	0.9			1.0	1.0	1.0	0.8		
Bankfull Maximum Depth (ft)	2.4	2.5	2.3	2.1			1.9	1.8	1.9	1.8			1.7	1.8	1.8	1.6		
Width/Depth Ratio	-	-	-	-			10.9	10.1	12.0	9.8			9.0	10.3	9.9	14.5		
Entrenchment Ratio	-	-	-	-			>3.0	>3.0	>3.0	>3.0			>3.0	>3.0	>3.0	>3.0		
Bank Height Ratio	-	-	-	-			1.0	1.0	1.0	1.0			1.0	1.0	1.0	1.0		
Wetted Perimeter (ft)	10.7	11.8	10.5	15.3			11.2	10.0	11.7	10.9			9.5	10.9	10.9	14.1		
Hydraulic Radius (ft)	1.0	1.0	1.0	0.8			0.9	0.8	0.8	0.8			0.9	0.9	0.9	0.8		
Substrate																		
d50 (mm)	0.06	0.06	0.33	0.33			0.062	0.06	0.06	0.06			0.53	0.06	0.3	0.06		
d84 (mm)	0.12	0.06	0.44	0.44			0.10	0.06	0.33	0.06			2.0	7.3	0.44	0.21		

Table 7h. Morphology and Hydraulic Monitoring Summary																		
Farrar Dairy Site																		
Parameter	Cross-Section 22 T2						Cross-Section 23 T2						Cross-Section 24 T2					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
Bankfull Width (ft)	7.5	7.5	8.9	8.5			5.7	5.9	6.0	6.8			7.1	6.5	7.7	6.9		
Floodprone Width (ft)	-	-	-	-			30	31	31	31			-	-	-	-		
Bankfull Cross-Sectional Area (ft ²)	5.1	5.0	5.5	5.6			2.8	2.8	2.9	3.4			4.2	3.9	4.5	4.1		
Bankfull Mean Depth (ft)	0.7	0.7	0.6	0.7			0.5	0.5	0.5	0.5			0.6	0.6	0.6	0.6		
Bankfull Maximum Depth (ft)	1.1	1.1	1.1	1.1			0.8	0.8	0.8	0.9			1.1	1.0	1.1	1.0		
Width/Depth Ratio	-	-	-	-			11.6	12.8	13.2	13.6			-	-	-	-		
Entrenchment Ratio	-	-	-	-			5.3	5.2	4.0	4.4			-	-	-	-		
Bank Height Ratio	-	-	-	-			1.0	1.0	1.0	1.0			-	-	-	-		
Wetted Perimeter (ft)	7.9	7.9	9.2	9.8			6.0	6.2	6.3	7.1			7.5	6.9	8.2	7.4		
Hydraulic Radius (ft)	0.7	0.6	0.6	0.6			0.5	0.4	0.5	0.5			0.6	0.6	0.5	0.6		
Substrate																		
d50 (mm)	0.06	0.06	0.06	0.06			0.06	0.06	0.06	0.06			0.06	0.06	0.06	0.06		
d84 (mm)	0.06	0.06	0.06	0.06			16	52	0.19	17.0			0.06	0.06	0.06	0.06		

Table 7i. Morphology and Hydraulic Monitoring Summary																		
Farrar Dairy Site																		
Parameter	Cross-Section 25 T2						Cross-Section 26 T3						Cross-Section 27 T3					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
Bankfull Width (ft)	5.2	5.6	6.7	5.9			18.4	17.6	17.6	17.9			19.2	18.9	21.2	19.1		
Floodprone Width (ft)	>60	>60	>60	>60			>60	>60	>60	>60			-	-	-	-		
Bankfull Cross-Sectional Area (ft ²)	2.5	2.7	2.9	2.7			21.4	20.1	15.8	14.7			24.2	22.1	18.3	17.9		
Bankfull Mean Depth (ft)	0.5	0.5	0.4	0.5			1.2	1.1	0.9	0.8			1.3	1.2	0.9	0.9		
Bankfull Maximum Depth (ft)	0.8	0.8	0.8	0.8			1.9	1.8	1.3	1.3			2.5	2.3	1.6	1.6		
Width/Depth Ratio	10.8	11.7	15.5	12.9			15.8	15.5	19.61	21.8			-	-	-	-		
Entrenchment Ratio	>3.0	>3.0	>3.0	>3.0			>3.0	>3.0	>3.0	>3.0			-	-	-	-		
Bank Height Ratio	1.0	1.0	1.0	1.0			1.0	1.0	1.0	1.0			-	-	-	-		
Wetted Perimeter (ft)	5.5	5.9	7.0	6.1			18.9	18.1	18.1	20.7			18.2	19.6	23.9	19.6		
Hydraulic Radius (ft)	0.5	0.5	0.4	0.4			1.1	1.1	0.9	0.9			1.3	1.1	0.9	0.9		
Substrate																		
d50 (mm)	0.06	0.06	0.06	0.06			0.06	0.09	0.14	0.06			0.06	0.06	0.07	0.06		
d84 (mm)	0.06	0.06	0.06	0.06			0.09	0.18	0.21	0.10			0.10	0.08	0.10	0.09		

Table 7j. Morphology and Hydraulic Monitoring Summary													
Farrar Dairy Site													
Parameter	Cross-Section 28 T3						Cross-Section 29 T3						
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5	
Bankfull Width (ft)	23.3	23.3	23.5	23.8			14.9	15.4	15.3	14.8			
Floodprone Width (ft)	-	-	-	-			>60	>60	>60	>60			
Bankfull Cross-Sectional Area (ft ²)	29.1	29.4	22.5	21.9			18.4	19.4	18.2	15.9			
Bankfull Mean Depth (ft)	1.2	1.3	1.0	0.9			1.2	1.3	1.2	1.1			
Bankfull Maximum Depth (ft)	2.6	2.7	1.4	1.4			1.9	2.0	1.9	1.7			
Width/Depth Ratio	-	-	-	-			12.1	12.2	12.9	13.8			
Entrenchment Ratio	-	-	-	-			>3.0	>3.0	>3.0	>3.0			
Bank Height Ratio	-	-	-	-			1.0	1.0	1.0	1.0			
Wetted Perimeter (ft)	23.9	24.1	25.1	28.4			15.6	16.1	15.9	15.3			
Hydraulic Radius (ft)	1.2	1.2	1.0	0.8			1.2	1.2	1.1	1.0			
Substrate													
d50 (mm)	0.06	0.06	0.08	0.07			0.06	0.06	0.06	0.06			
d84 (mm)	0.06	0.06	0.11	0.10			0.06	0.06	0.46	0.08			

2.3 Wetland Assessment

The maximum number of consecutive days that the groundwater was within 12 inches of the surface was determined for each groundwater gauge. This number was converted into a percentage of the 251-day growing season (March 11 to November 16). Table 8 presents the hydrological monitoring results for 2011. The wetland gauges used to monitor site hydrology were installed in March 2009. During the third year of monitoring, wetland hydrology was achieved at all of the gauges on the site except for gauge 6 (Table 8). Based on these data, the majority of the site has exceeded the minimum duration of 12.5 consecutive days (5% of the growing season) with the water table within 12 inches of the soil surface for the 2011 growing season (Appendix C). Climatic data for the 2011 growing season were analyzed in comparison to historical data to determine whether 2011 was a normal year in terms of climatic conditions. The historical data were collected from the NRCS, Water and Climate Center, "Climate Analysis for Wetlands by County" website. This evaluation concluded that 2011 was a normal year for rainfall. Rainfall was within the 30th to 70th percentiles for the months of March, April, May, September, and November. Rainfall was less than the 30th percentile threshold in January, February, June, July, October, and December, and was greater than the 70th percentile threshold in August (Appendix C).

Gauge #	Hydroperiod				Max. No. of Consecutive Days / Exact Hydroperiod Percentage	Dates Meeting Success
	<5%	5% - 8%	8% - 12.5%	>12.5%		
1				X	60 / 24%	March 11 - May 9
2				X	148 / 59%	June 21 - Nov 16
3		X			14 / 6%	March 13 - April 12
4		X			15 / 6%	March 26 - April 13
5				X	52 / 21%	March 11 - May 1
6	X				None	
7			X		19 / 8%	March 26 - April 13
Ref				X	251 / 100%	March 11 - Nov 16

Gauge #	Pre-Restoration	Year 1	Year 2	Year 3	Year 4	Year 5
1	<5%	>12.5%	>12.5%	>12.5%		
2	<5%	8%-12.5%	<5%	>12.5%		
3	<5%	8%-12.5%	8%-12.5%	5%-8%		
4	<5%	8%-12.5%	<5%	5%-8%		
5	<5%	8%-12.5%	>12.5%	>12.5%		
6	<5%	5%-8%	>12.5%	<5%		
7	<5%	8%-12.5%	>12.5%	8%-12.5%		
Ref	>12.5%	>12.5%	>12.5%	>12.5%		

3.0 CONCLUSIONS

The stream is functioning as designed and has not developed any significant problems. The monitored cross-sections and profiles indicate some changes over the course of monitoring, but the stream in these areas is not trending towards instability. Any feature changes will be tracked to see if the stream is moving beyond its expected variability. There were not any bankfull events in the third monitoring year.

The hydrology data in Section 2.3 indicate that only one gauge did not demonstrate wetland hydrology in 2011. This gauge did attain wetland hydrology in the previous monitoring year. Future monitoring will determine if these areas are having consistent hydrologic deficiencies or if 2011 was not a typical hydrologic year for this part of the site.

The planted vegetation has been doing well, with some plots experiencing more mortality than others. This mortality can be attributed to normal losses after the initial planting as well as aggressive growth from the site's herbaceous vegetation. The site also has vigorous volunteers, which will increase the overall vegetation success of the site. The vegetation is on track to meeting the success criteria in the stream and wetland for the third year of monitoring.

4.0 MAINTENANCE

Stream and vegetation maintenance actions were completed in 2011. The stream maintenance addressed areas of bed degradation and bank erosion as discussed in the Monitoring Year 2 report. Constructed riffles were installed at Stations 57+58, 58+47, 59+13, 59+84, and 60+50 and bank grading and matting installation occurred at Stations 55+30, 56+80, 60+60, and 61+60. These maintenance areas have exhibited stability throughout the growing season. The bank repairs have not shown any signs of erosion, and the constructed riffles are functioning, with native material washing into the riffle and a stable riffle slope.

The vegetation maintenance included planting additional 5,900 bare-root trees in various locations throughout the site that were found to have low densities of planted trees. Invasive control was conducted with herbicide application targeting smartweed (*Polygonum sp.*), curly doc (*Rumex crispus*), and cockle burs (*Xanthium strumarium*). Future monitoring will determine if additional planting and invasive control is needed.

The presence of beaver dams at the site has also been a persistent maintenance action item. In 2011 numerous beaver dams were removed from the site. The dams will continue to be removed as they are built.

Appendix A

Vegetation Data

**Table A1. Stream Riparian Buffer Stem Density and Species Count by Plot
Farrar Dairy Stream and Wetland Restoration**

Species	Plot #															Total (Year 3)
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
<i>Asimina triloba</i>					1											1
<i>Betula nigra</i>	3	1		4		2	3	5	10			2	6	6	4	46
<i>Celtis laevigata</i>	2	1	1				1	3								8
<i>Cephalanthus occidentalis</i>	1	4			2	1			4						5	17
<i>Cornus amomum</i>	11			4	3	7	3	1						3	2	34
<i>Diospyros virginiana</i>	1	1	3							2		1				8
<i>Fraxinus pennsylvanica</i>		4		1	4		2	4				5	2	2	1	25
<i>Magnolia virginiana</i>														1		1
<i>Platanus occidentalis</i>										3						3
<i>Quercus alba</i>										6						6
<i>Quercus laurifolia</i>		1	2			1										4
<i>Quercus lyrata</i>										1						1
<i>Quercus michauxii</i>					1											1
<i>Quercus palustris</i>					2											2
<i>Salix nigra</i>				1			2									3
<i>Salix sericea</i>				1			6				5		3			15
<i>Sambucus canadensis</i>													1			1
Unknown					1										1	2
Total (Year 3)	18	12	6	11	13	11	17	13	14	12	5	8	12	12	12	176
Average Density (Stems/Acre)	720	480	240	440	560	440	680	520	560	480	200	320	480	480	520	
Total Density (Stems/Acre)														475		

**Table A2. Wetland Stem Density and Species Count by Plot
Farrar Dairy Stream and Wetland Restoration**

Species	Plot #																												Total (Year 3)		
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43		44	45
<i>Betula nigra</i>		1																													1
<i>Callicarpa americana</i>							1																								1
<i>Cephalanthus occidentalis</i>																															0
<i>Cornus amomum</i>	1	1	1	2	2				2		1							5							1	6	3	1			26
<i>Diospyros virginiana</i>		7	3	1																											11
<i>Fraxinus pennsylvanica</i>	1			3	5	1	6	4		1	4	2		4	8	4			4		1	7		3	7	2	3	2	3		75
<i>Quercus sp.</i>		1		1															1										1		4
<i>Quercus falcata</i>							1	1			1					1			1	3	2	2	1								13
<i>Quercus laurifolia</i>				4		2	3	3		1	2										1					3	4	5			28
<i>Quercus lyrata</i>										1	2							3	1		3	1									11
<i>Quercus michauxii</i>	1		1		1	4	2	2				2	7	6	3	1	3	1			3			2	2		4		5	2	52
<i>Quercus pagoda</i>		3		6	2	2	5	5								2				3	1		1								30
<i>Quercus palustris</i>	1		5	2	1	3	3	3		4	2					1		1					1					1	3		31
<i>Quercus phellos</i>	5			5	2			1	8	4	1	6	2				3			1	4		1	3	4						50
<i>Unknown</i>																								1							1
Total (Year 3)	9	13	10	24	13	12	21	19	10	11	13	10	9	10	11	9	6	10	7	7	15	10	4	9	14	11	14	10	11	2	334
Average Density (Stems/Acre)	360	520	400	960	520	480	840	760	400	440	520	400	360	400	440	360	240	400	280	280	600	400	160	360	560	440	560	400	440	80	
																							Total Density (Stems/Acre)					445			

Table A3. Riparian Buffer Vegetation History (stems/acre)										
Farrar Dairy Site										
Plot Number	MY-00	MY-01	MY-02		MY-03		MY-04		MY-05	
	planted	planted	planted	total	planted	total	planted	total	planted	total
1	880	840	840	840	720	1,578				
2	720	560	520	1,000	486	1,133				
3	320	400	440	5,720	243	2,226				
4	840	400	520	3,960	445	1,983				
5	760	640	680	2,240	567	890				
6	560	440	440	480	445	445				
7	840	720	680	840	688	1,174				
8	560	560	560	560	526	607				
9	600	600	600	600	567	647				
10	520	520	480	560	486	567				
11	680	360	240	440	202	1,214				
12	520	240	320	320	324	364				
13	720	480	480	600	486	1,295				
14	520	480	480	680	486	769				
15	560	520	520	520	526	607				
Buffer Average	640	517	520	1,291	480	1,033				

Table A4. Wetland Vegetation History (stems/acre)**Farrar Dairy Site**

Plot Number	MY-00	MY-01	MY-02		MY-03		MY-04		MY-05	
	planted	planted	planted	total	planted	total	planted	total	planted	total
16	400	400	360	400	364	890				
17	560	520	520	520	526	809				
18	400	400	400	480	405	890				
19	1000	960	920	1040	971	1,012				
20	520	520	480	480	526	1,012				
21	520	480	480	6080	486	4,168				
22	840	840	880	6280	850	8,134				
23	920	800	760	3320	769	5,949				
24	520	480	400	480	405	567				
25	440	440	440	680	445	890				
26	520	520	520	560	526	668				
27	480	480	480	920	405	647				
28	480	400	400	800	364	688				
29	520	560	440	920	405	850				
30	440	440	440	480	445	931				
31	440	400	360	480	364	526				
32	400	400	400	400	243	364				
33	440	400	400	400	405	486				
34	480	360	320	360	283	324				
35	400	360	280	320	283	324				
36	640	640	640	640	607	607				
37	480	440	400	560	405	567				
38	520	280	280	280	162	283				
39	520	440	440	440	364	486				
40	600	600	560	600	567	607				
41	600	440	440	440	445	526				
42	680	560	560	560	567	567				
43	480	400	400	400	405	688				
44	560	400	480	480	445	445				
45	480	320	120	160	81	81				
Wetland Average	543	489	467	999	451	1,166				

Stream and Wetland Vegetation Plot Photos



Vegetation Plot 1 – MY-03 – 6/14/11



Vegetation Plot 2 – MY-03 – 6/14/11



Vegetation Plot 3 – MY-03 – 6/14/11



Vegetation Plot 4 – MY-03 – 6/23/11



Vegetation Plot 5 – MY-03 – 6/24/11



Vegetation Plot 6 – MY-03 – 6/15/11



Vegetation Plot 7 – MY-03 – 6/24/11



Vegetation Plot 8 – MY-03 – 6/15/11



Vegetation Plot 9 – MY-03 – 6/22/11



Vegetation Plot 10 – MY-03 – 6/14/11



Vegetation Plot 11 – MY-03 – 6/14/11



Vegetation Plot 12 – MY-03 – 6/23/11



Vegetation Plot 13 – MY-03 – 6/15/11



Vegetation Plot 14 – MY-03 – 6/23/11



Vegetation Plot 15 – MY-03 – 6/15/11



Vegetation Plot 16 – MY-03 – 6/14/11



Vegetation Plot 17 – MY-03 – 6/14/11



Vegetation Plot 18 – MY-03 – 6/14/11



Vegetation Plot 19 – MY-03 – 6/14/11



Vegetation Plot 20 – MY-03 – 8/9/11



Vegetation Plot 21 – MY-03 – 8/9/11



Vegetation Plot 22 – MY-03 – 6/23/11



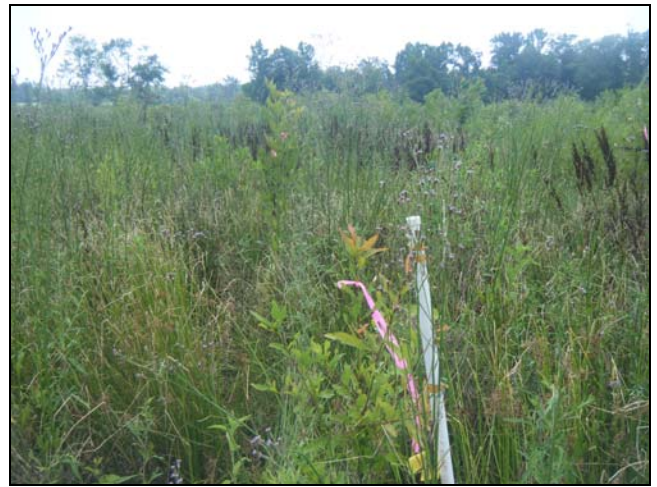
Vegetation Plot 23 – MY-03 – 6/23/11



Vegetation Plot 24 – MY-03 – 6/22/11



Vegetation Plot 25 – MY-03 – 6/22/11



Vegetation Plot 26 – MY-03 – 6/22/11



Vegetation Plot 27 – MY-03 – 6/22/11



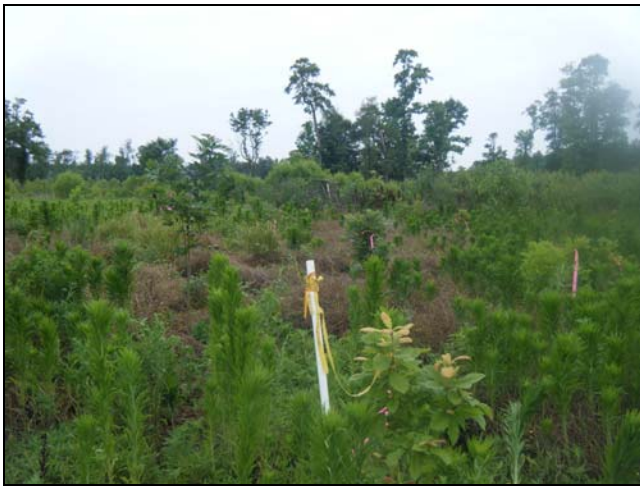
Vegetation Plot 28 – MY-03 – 6/22/11



Vegetation Plot 29 – MY-03 – 6/22/11



Vegetation Plot 30 – MY-03 – 6/22/11



Vegetation Plot 31 – MY-03 – 6/22/11



Vegetation Plot 32 – MY-03 – 6/22/11



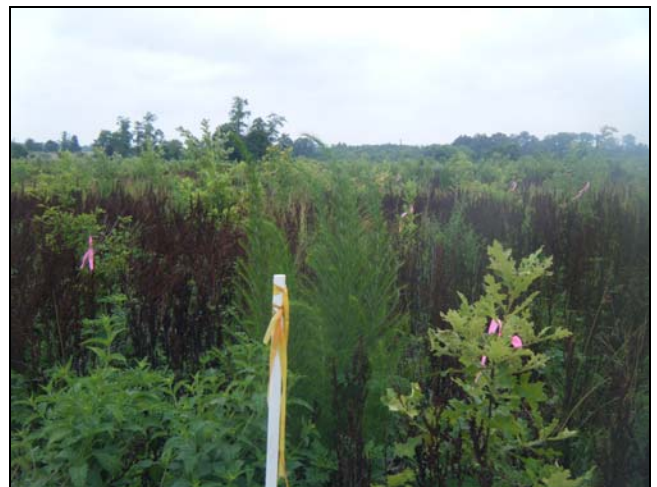
Vegetation Plot 33 – MY-03 – 6/24/11



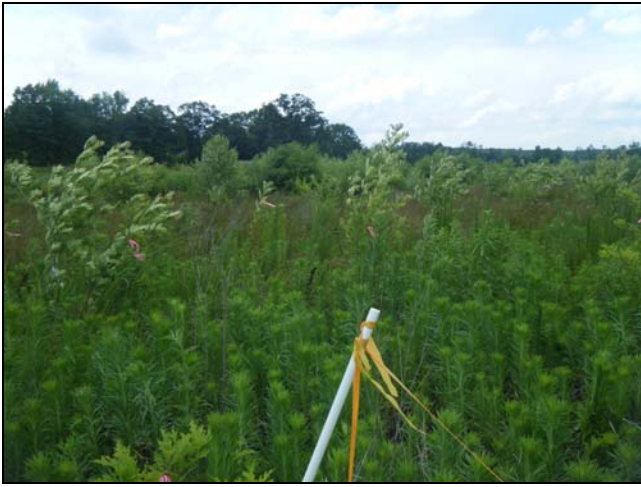
Vegetation Plot 34 – MY-03 – 6/24/11



Vegetation Plot 35 – MY-03 – 6/24/11



Vegetation Plot 36 – MY-03 – 6/24/11



Vegetation Plot 37 – MY-03 – 6/23/11



Vegetation Plot 38 – MY-03 – 6/23/11



Vegetation Plot 39 – MY-03 – 6/15/11



Vegetation Plot 40 – MY-03 – 6/15/11



Vegetation Plot 41 – MY-03 – 6/15/11



Vegetation Plot 42 – MY-03 – 6/15/11



Vegetation Plot 43 – MY-03 – 6/15/11



Vegetation Plot 44 – MY-03 – 6/15/11



Vegetation Plot 45 – MY-03 – 6/15/11

Appendix B

Stream and Wetland Photos

Stream and Wetland Photo Points



PP 1 – MY-03 – 12/20/11



PP 2 – MY-03 – 12/20/11



PP 3 – MY-03 – 12/20/11



PP 4 – MY-03 – 12/20/11



PP 5 – MY-03 – 12/20/11



PP 6 – MY-03 – 12/20/11



PP 7 – MY-03 – 12/20/11



PP 8 – MY-03 – 12/20/11



PP 9 – MY-03 – 12/20/11



PP 10 – MY-03 – 12/20/11



PP 11 – MY-03 – 12/20/11



PP 12 – MY-03 – 12/20/11



PP 13 – MY-03 – 12/20/11



PP 14 – MY-03 – 12/20/11



PP 15 – MY-03 – 12/20/11



PP 16 – MY-03 – 12/20/11



PP 17 – MY-03 – 12/20/11



PP 18 – MY-03 – 12/20/11



PP 19 – MY-03 – 12/20/11



PP 20 – MY-03 – 12/20/11



PP 21 – MY-03 – 12/20/11



PP 22 – MY-03 – 12/20/11



PP 23 – MY-03 – 12/20/11



PP 24 – MY-03 – 12/20/11



PP 25 – MY-03 – 12/20/11



PP 26 – MY-03 – 12/20/11



PP 27 – MY-03 – 12/20/11



PP 28 – MY-03 – 12/20/11



PP 29 – MY-03 – 12/20/11



PP 30 – MY-03 – 12/20/11



PP 31 – MY-03 – 12/20/11



PP 32 – MY-03 – 12/20/11

Appendix C

Geomorphologic and Hydrologic Data

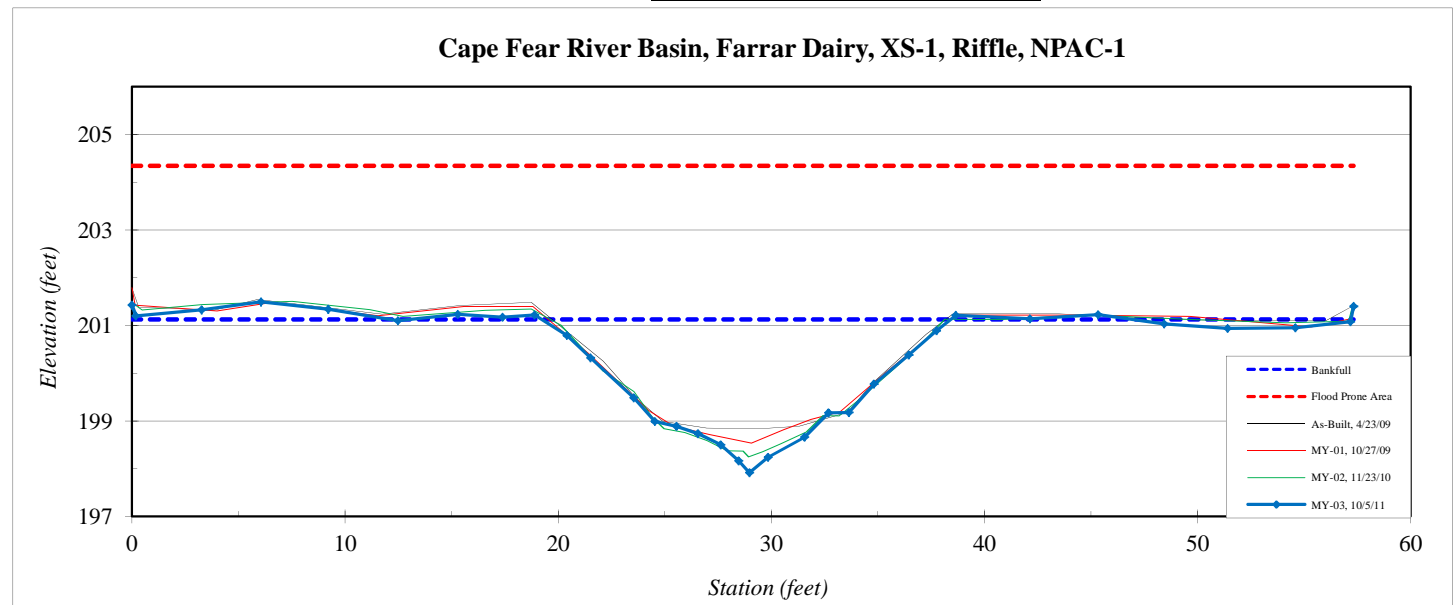
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-1, Riffle, NPAC-1
Drainage Area (sq mi):	3.92
Date:	10/5/2011
Field Crew:	A. French, M. Koss

Station	Elevation
0.0	201.43
0.2	201.20
3.3	201.33
6.1	201.50
9.2	201.34
12.5	201.10
15.3	201.24
17.4	201.17
18.9	201.22
20.4	200.79
21.5	200.33
23.5	199.49
24.5	198.99
25.5	198.89
26.6	198.73
27.6	198.50
28.5	198.17
29.0	197.92
29.8	198.24
31.6	198.66
32.7	199.17
33.6	199.18
34.8	199.77
36.5	200.38
37.8	200.89
38.7	201.21
42.1	201.14
45.3	201.23
48.4	201.03
51.4	200.94
54.6	200.95
57.2	201.08
57.3	201.40

SUMMARY DATA	
Bankfull Elevation:	201.1
Bankfull Cross-Sectional Area:	32.4
Bankfull Width:	19.2
Flood Prone Area Elevation:	204.3
Flood Prone Width:	>60
Max Depth at Bankfull:	3.2
Mean Depth at Bankfull:	1.7
W / D Ratio:	11.4
Entrenchment Ratio:	>3.0
Bank Height Ratio:	1.0



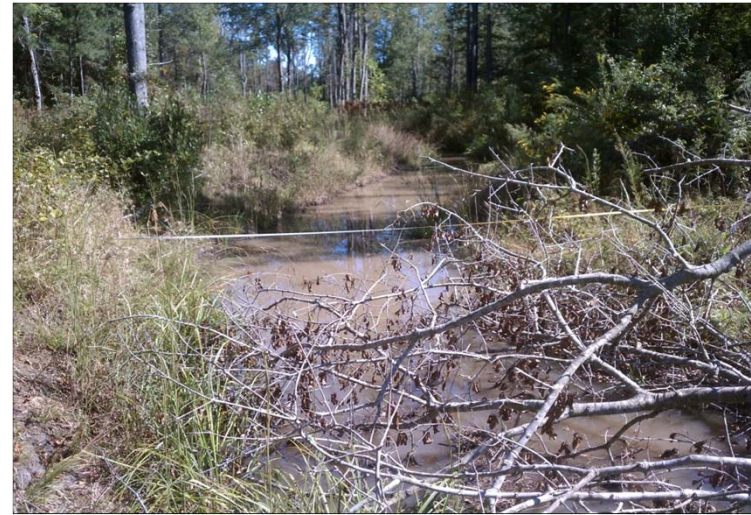
Stream Type C5



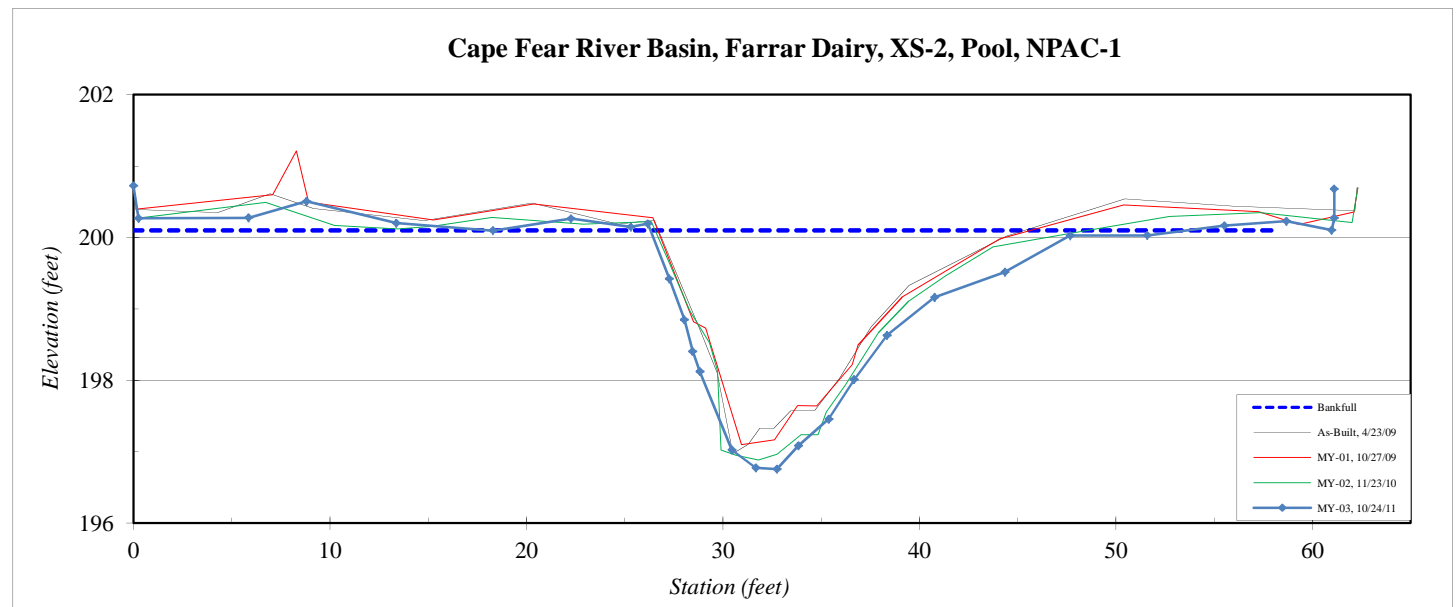
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-2, Pool, NPAC-1
Drainage Area (sq mi):	3.92
Date:	10/24/2011
Field Crew:	A. French, A. Helms

Station	Elevation
0.0	200.28
2.9	200.51
5.8	200.20
10.4	200.10
15.3	200.27
19.3	200.15
22.3	200.20
23.2	199.42
24.3	198.85
25.0	198.41
25.5	198.12
25.8	197.03
27.5	196.78
28.7	196.76
29.8	197.08
30.8	197.46
32.4	198.01
33.7	198.63
35.4	199.16
37.8	199.52
41.4	200.03
44.7	200.03
48.6	200.17
52.5	200.23
55.7	200.10
58.0	200.28
58.1	200.68

SUMMARY DATA	
Bankfull Elevation:	200.1
Bankfull Cross-Sectional Area:	31.1
Bankfull Width:	22.3
Flood Prone Area Elevation:	-
Flood Prone Width:	-
Max Depth at Bankfull:	3.3
Mean Depth at Bankfull:	1.4
W / D Ratio:	-
Entrenchment Ratio:	-
Bank Height Ratio:	-



Stream Type	C5
--------------------	----



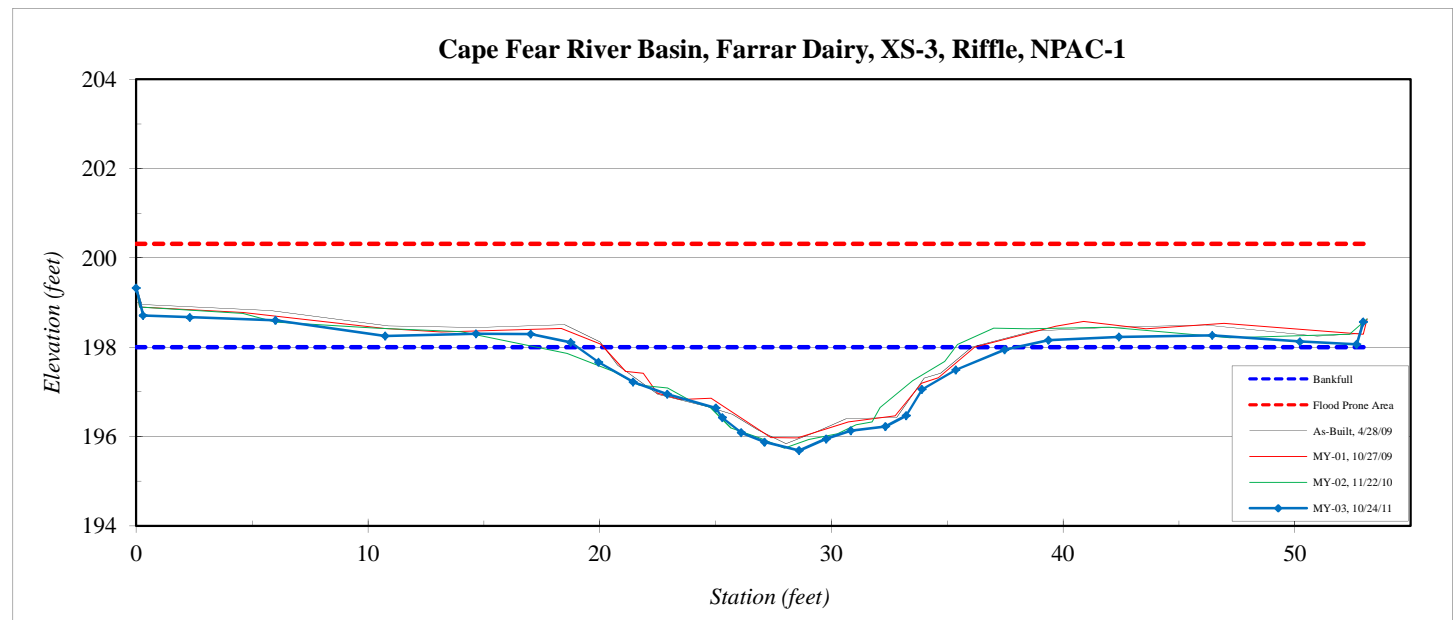
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-3, Riffle, NPAC-1
Drainage Area (sq mi):	3.92
Date:	10/24/2011
Field Crew:	A. French, A. Helms

Station	Elevation
0.0	199.33
0.3	198.71
2.3	198.67
6.0	198.60
10.8	198.25
14.7	198.30
17.0	198.30
18.8	198.11
20.0	197.67
21.4	197.22
22.9	196.95
25.0	196.64
25.3	196.43
26.1	196.09
27.1	195.88
28.6	195.69
29.8	195.95
30.8	196.13
32.3	196.23
33.2	196.47
33.9	197.05
35.4	197.49
37.5	197.94
39.4	198.16
42.4	198.23
46.4	198.27
50.2	198.13
52.7	198.06
53.0	198.56

SUMMARY DATA	
Bankfull Elevation:	198.0
Bankfull Cross-Sectional Area:	23.4
Bankfull Width:	18.9
Flood Prone Area Elevation:	200.3
Flood Prone Width:	>60
Max Depth at Bankfull:	2.3
Mean Depth at Bankfull:	1.2
W / D Ratio:	15.3
Entrenchment Ratio:	>3.0
Bank Height Ratio:	1.0



Stream Type	C5
--------------------	----



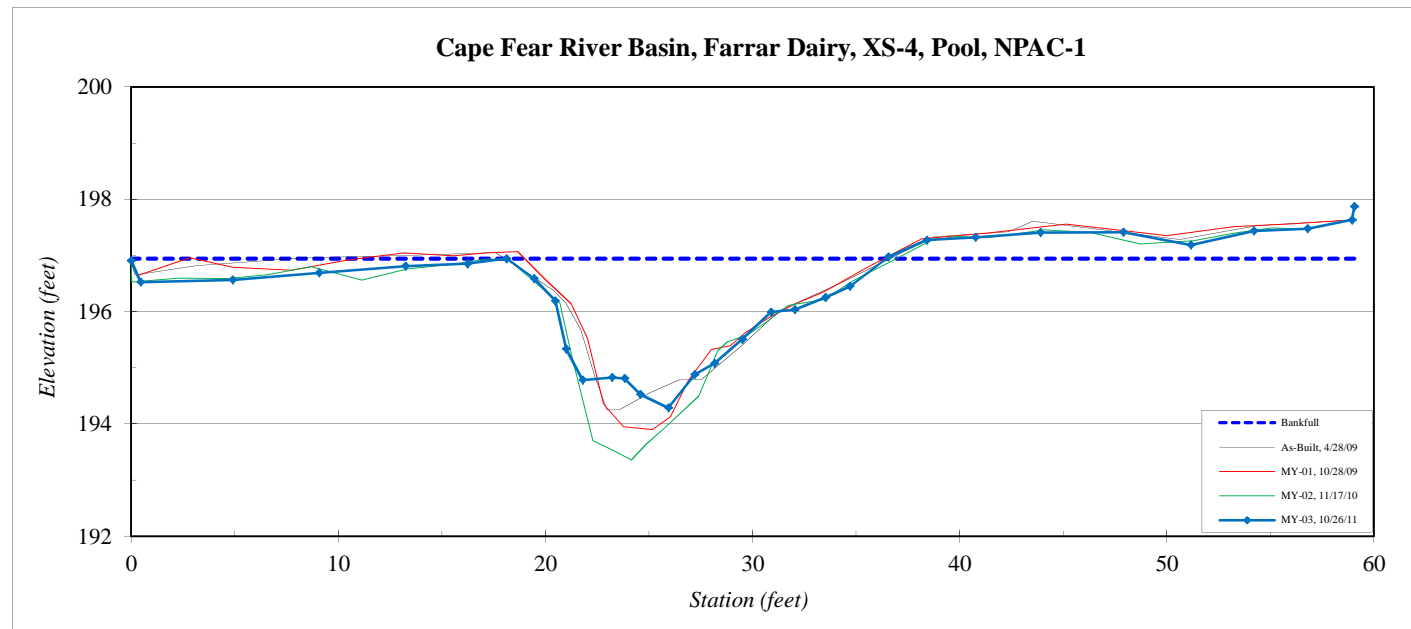
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-4, Pool, NPAC-1
Drainage Area (sq mi):	4.10
Date:	10/26/2011
Field Crew:	A. French, A. Helms



Stream Type C5

Station	Elevation
0.0	196.91
0.5	196.52
4.9	196.56
9.1	196.69
13.2	196.81
16.2	196.85
18.1	196.94
19.5	196.59
20.5	196.19
21.0	195.33
21.8	194.78
23.2	194.83
23.8	194.81
24.6	194.53
25.9	194.29
27.2	194.88
28.2	195.08
29.5	195.51
30.9	195.99
32.0	196.03
33.5	196.25
34.7	196.45
36.6	196.97
38.4	197.27
40.8	197.32
43.9	197.41
47.9	197.41
51.2	197.18
54.2	197.43
56.8	197.47
58.9	197.63
59.1	197.87

SUMMARY DATA	
Bankfull Elevation:	196.9
Bankfull Cross-Sectional Area:	24.5
Bankfull Width:	18.3
Flood Prone Area Elevation:	-
Flood Prone Width:	-
Max Depth at Bankfull:	2.7
Mean Depth at Bankfull:	1.3
W / D Ratio:	-
Entrenchment Ratio:	-
Bank Height Ratio:	-



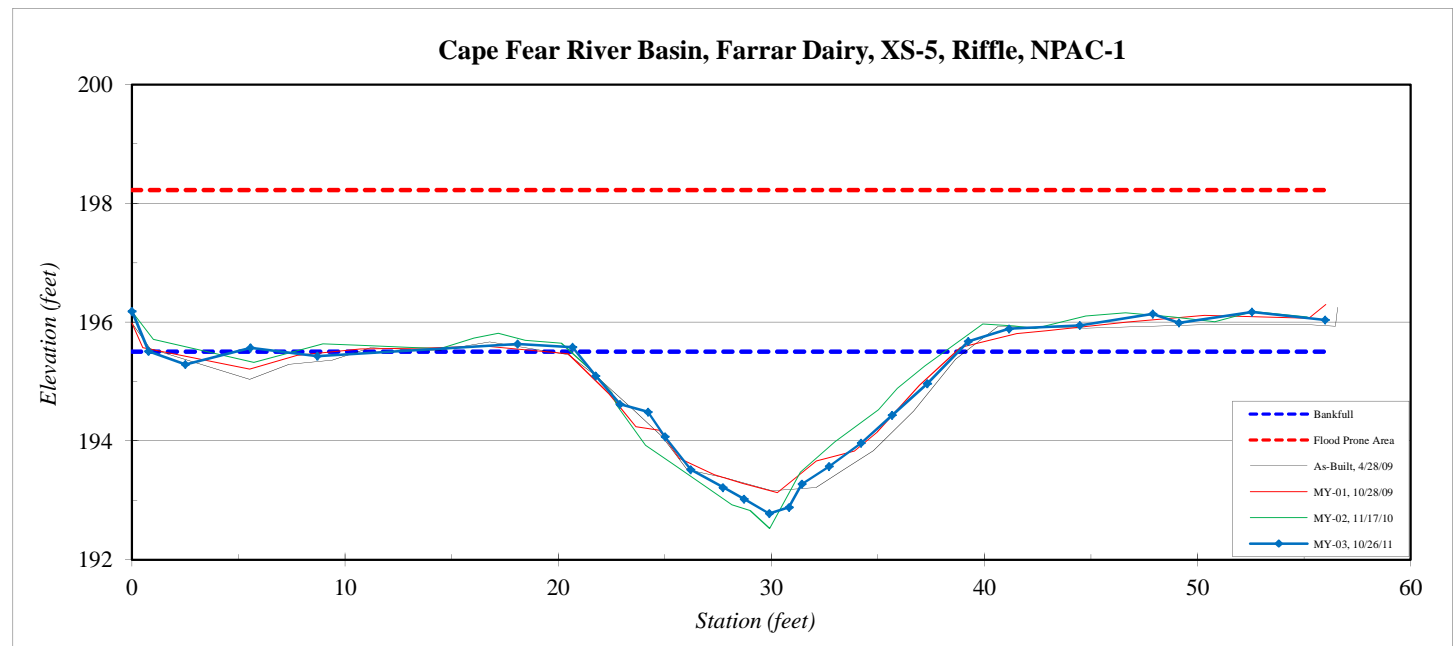
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-5, Riffle, NPAC-1
Drainage Area (sq mi):	4.10
Date:	10/26/2011
Field Crew:	A. French, A. Helms

Station	Elevation
0.0	196.18
0.8	195.51
3.5	195.29
6.6	195.57
9.7	195.43
12.1	195.63
14.7	195.58
15.8	195.09
16.9	194.62
18.2	194.49
19.0	194.07
20.2	193.51
21.7	193.22
22.7	193.02
23.9	192.78
24.8	192.88
25.4	193.27
26.7	193.57
28.2	193.96
29.7	194.43
31.3	194.96
33.2	195.68
35.2	195.89
38.5	195.94
41.9	196.14
45.5	195.99
49.1	196.17
52.6	196.04
56.0	195.79

SUMMARY DATA	
Bankfull Elevation:	195.5
Bankfull Cross-Sectional Area:	26.7
Bankfull Width:	17.9
Flood Prone Area Elevation:	198.2
Flood Prone Width:	>60
Max Depth at Bankfull:	2.7
Mean Depth at Bankfull:	1.5
W / D Ratio:	12.0
Entrenchment Ratio:	>3.0
Bank Height Ratio:	1.0



Stream Type	C5
--------------------	----



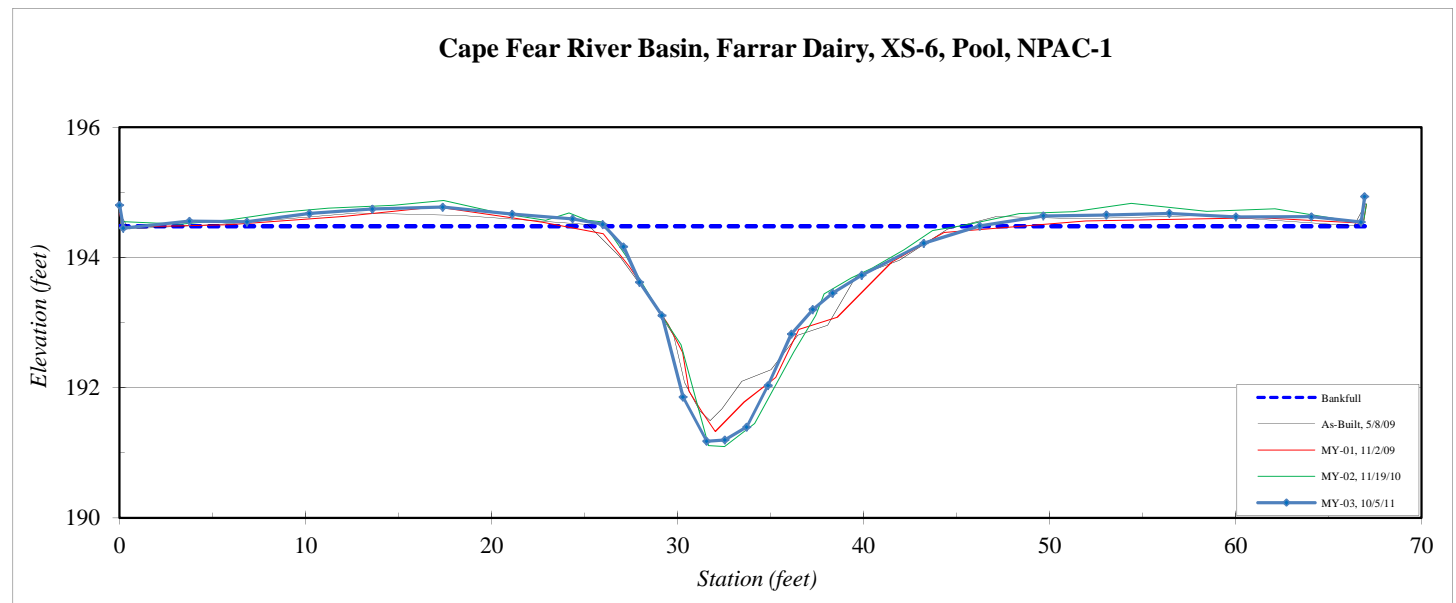
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-6, Pool, NPAC-1
Drainage Area (sq mi):	4.1
Date:	10/5/2011
Field Crew:	A. French, M. Koss



Station	Elevation
0.0	194.80
0.2	194.45
3.8	194.56
6.9	194.55
10.2	194.68
13.6	194.75
17.4	194.78
21.1	194.67
24.4	194.59
26.0	194.51
27.1	194.16
28.0	193.62
29.2	193.11
30.3	191.86
31.6	191.18
32.5	191.20
33.7	191.40
34.9	192.03
36.1	192.82
37.3	193.20
38.3	193.45
39.9	193.73
43.2	194.22
46.2	194.48
49.7	194.64
53.1	194.66
56.4	194.68
60.0	194.63
64.1	194.63
66.7	194.55
66.9	194.94

SUMMARY DATA	
Bankfull Elevation:	194.5
Bankfull Cross-Sectional Area:	27.2
Bankfull Width:	21.1
Flood Prone Area Elevation:	-
Flood Prone Width:	-
Max Depth at Bankfull:	3.3
Mean Depth at Bankfull:	1.3
W / D Ratio:	-
Entrenchment Ratio:	-
Bank Height Ratio:	-

Stream Type C5



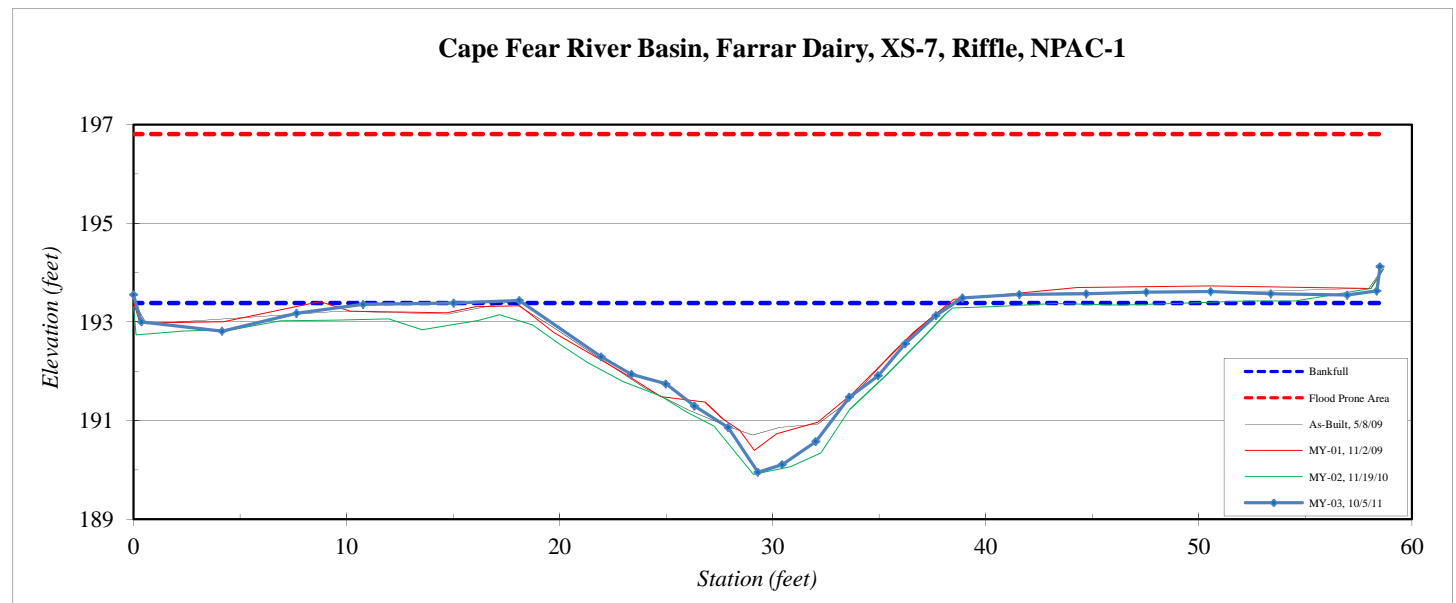
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-7, Riffle, NPAC-1
Drainage Area (sq mi):	4.1
Date:	10/5/2011
Field Crew:	A. French, M. Koss

Station	Elevation
0.00	193.55
0.4	193.00
4.2	192.81
7.7	193.17
10.8	193.36
15.0	193.38
18.1	193.43
22.0	192.30
23.4	191.94
25.0	191.75
26.3	191.30
27.9	190.86
29.3	189.95
30.4	190.11
32.0	190.57
33.6	191.48
34.9	191.91
36.2	192.56
37.7	193.13
38.9	193.49
41.6	193.56
44.7	193.57
47.5	193.60
50.6	193.61
53.4	193.57
57.0	193.55
58.3	193.63
58.5	194.12

SUMMARY DATA	
Bankfull Elevation:	193.4
Bankfull Cross-Sectional Area:	33.5
Bankfull Width:	20.3
Flood Prone Area Elevation:	196.8
Flood Prone Width:	>60
Max Depth at Bankfull:	3.4
Mean Depth at Bankfull:	1.7
W / D Ratio:	12.3
Entrenchment Ratio:	>3.0
Bank Height Ratio:	1.0



Stream Type	C5
--------------------	----



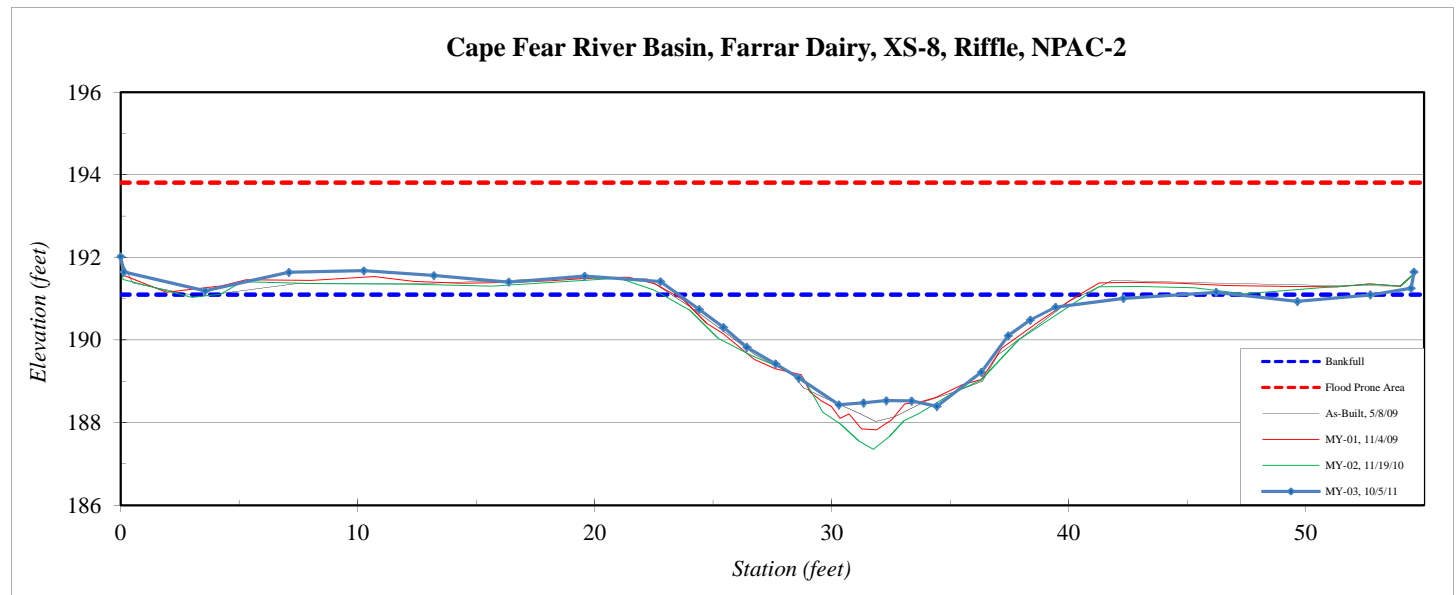
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-8, Riffle, NPAC-2
Drainage Area (sq mi):	4.1
Date:	10/5/2011
Field Crew:	A. French, M. Koss



Station	Elevation
0.0	192.02
0.1	191.65
3.6	191.19
7.1	191.64
10.3	191.68
13.2	191.56
16.4	191.40
19.6	191.54
22.8	191.41
24.4	190.74
25.4	190.31
26.4	189.83
27.6	189.43
28.6	189.08
30.3	188.44
31.3	188.48
32.3	188.53
33.4	188.53
34.4	188.39
36.3	189.22
37.4	190.10
38.4	190.49
39.4	190.79
42.3	191.01
46.2	191.16
49.6	190.94
52.7	191.09
54.4	191.25
54.6	191.64

SUMMARY DATA	
Bankfull Elevation:	191.1
Bankfull Cross-Sectional Area:	28.0
Bankfull Width:	21.2
Flood Prone Area Elevation:	193.8
Flood Prone Width:	>60
Max Depth at Bankfull:	2.7
Mean Depth at Bankfull:	1.3
W / D Ratio:	16.1
Entrenchment Ratio:	>3.0
Bank Height Ratio:	1.0

Stream Type	C5
--------------------	----



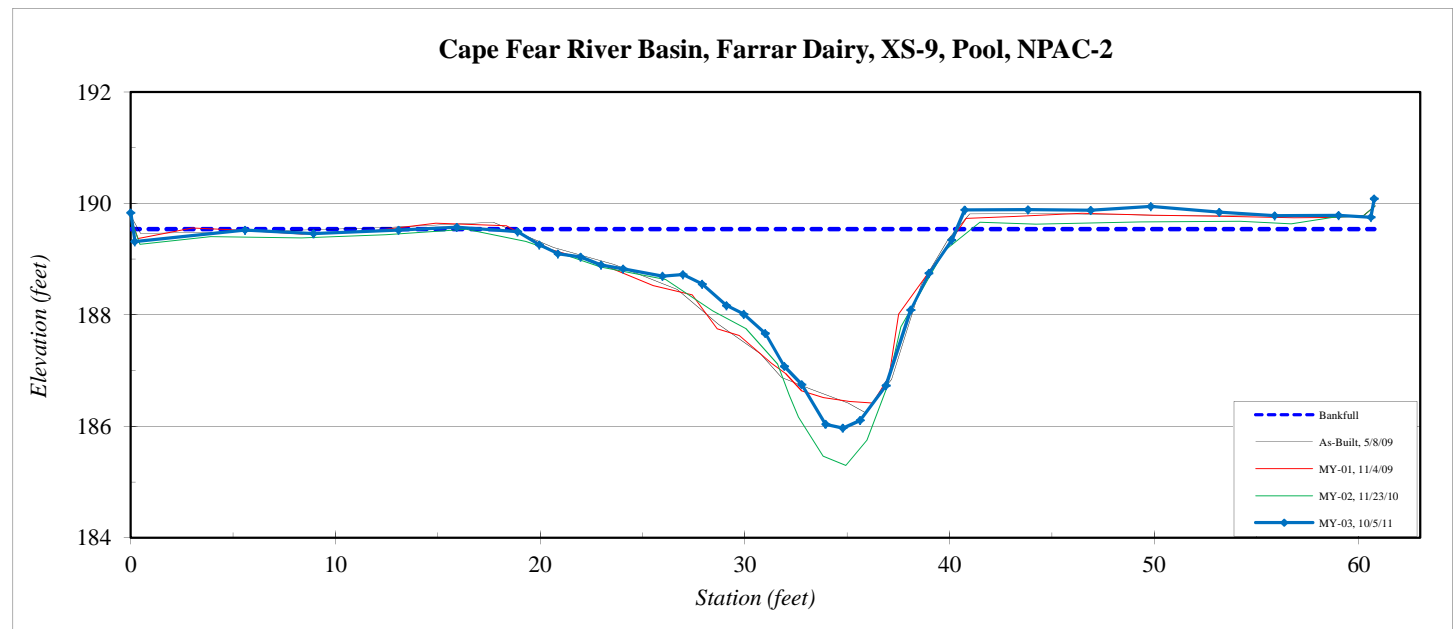
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-9, Pool, NPAC-2
Drainage Area (sq mi):	4.65
Date:	10/5/2011
Field Crew:	A. French, M. Koss

Station	Elevation
0.0	189.83
0.2	189.32
5.6	189.52
8.9	189.46
13.1	189.52
15.9	189.57
18.9	189.49
20.0	189.26
20.9	189.10
22.0	189.04
23.0	188.90
24.1	188.82
26.0	188.70
27.0	188.72
27.9	188.55
29.1	188.16
30.0	188.01
31.0	187.67
31.9	187.08
32.8	186.75
33.9	186.04
34.8	185.97
35.6	186.11
36.9	186.73
38.1	188.08
39.0	188.74
40.1	189.34
40.8	189.88
43.8	189.89
46.9	189.88
49.8	189.95
53.2	189.84
55.9	189.78
59.0	189.79
60.6	189.75
60.7	190.08

SUMMARY DATA	
Bankfull Elevation:	189.5
Bankfull Cross-Sectional Area:	31.9
Bankfull Width:	23.3
Flood Prone Area Elevation:	-
Flood Prone Width:	-
Max Depth at Bankfull:	3.6
Mean Depth at Bankfull:	1.4
W / D Ratio:	-
Entrenchment Ratio:	-
Bank Height Ratio:	-



Stream Type	C5
--------------------	----



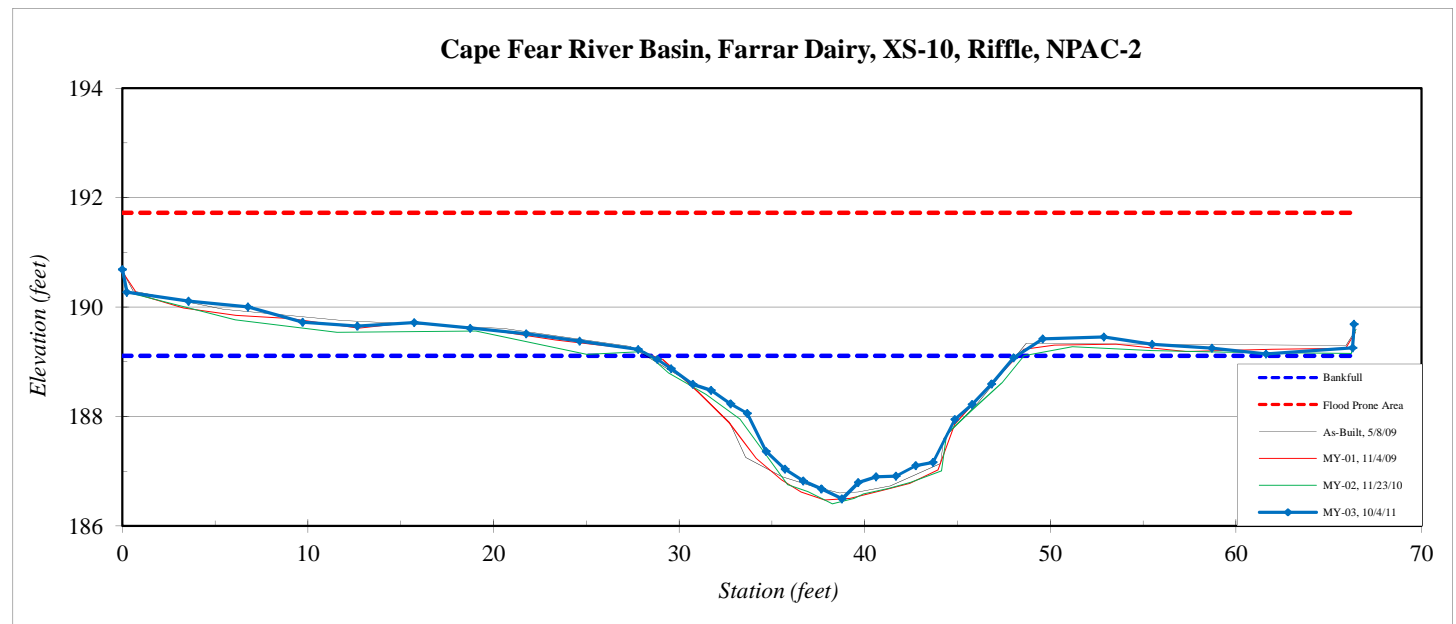
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-10, Riffle, NPAC-2
Drainage Area (sq mi):	4.65
Date:	10/4/2011
Field Crew:	A. French, M. Koss

Station	Elevation
0.0	190.69
0.2	190.27
3.6	190.11
6.8	190.00
9.7	189.72
12.7	189.65
15.7	189.72
18.7	189.62
21.8	189.51
24.6	189.38
27.8	189.23
28.8	189.05
29.6	188.88
30.7	188.59
31.7	188.48
32.8	188.23
33.7	188.06
34.7	187.36
35.7	187.04
36.7	186.82
37.7	186.68
38.8	186.50
39.6	186.80
40.6	186.90
41.7	186.91
42.8	187.10
43.7	187.16
44.9	187.95
45.8	188.22
46.8	188.59
48.0	189.08
49.6	189.42
52.9	189.46
55.5	189.32
58.7	189.25

SUMMARY DATA	
Bankfull Elevation:	189.1
Bankfull Cross-Sectional Area:	28.0
Bankfull Width:	19.7
Flood Prone Area Elevation:	191.7
Flood Prone Width:	>60
Max Depth at Bankfull:	2.6
Mean Depth at Bankfull:	1.4
W / D Ratio:	13.9
Entrenchment Ratio:	>3.0
Bank Height Ratio:	1.0



Stream Type	C5
--------------------	----



*Other shots not included due to space

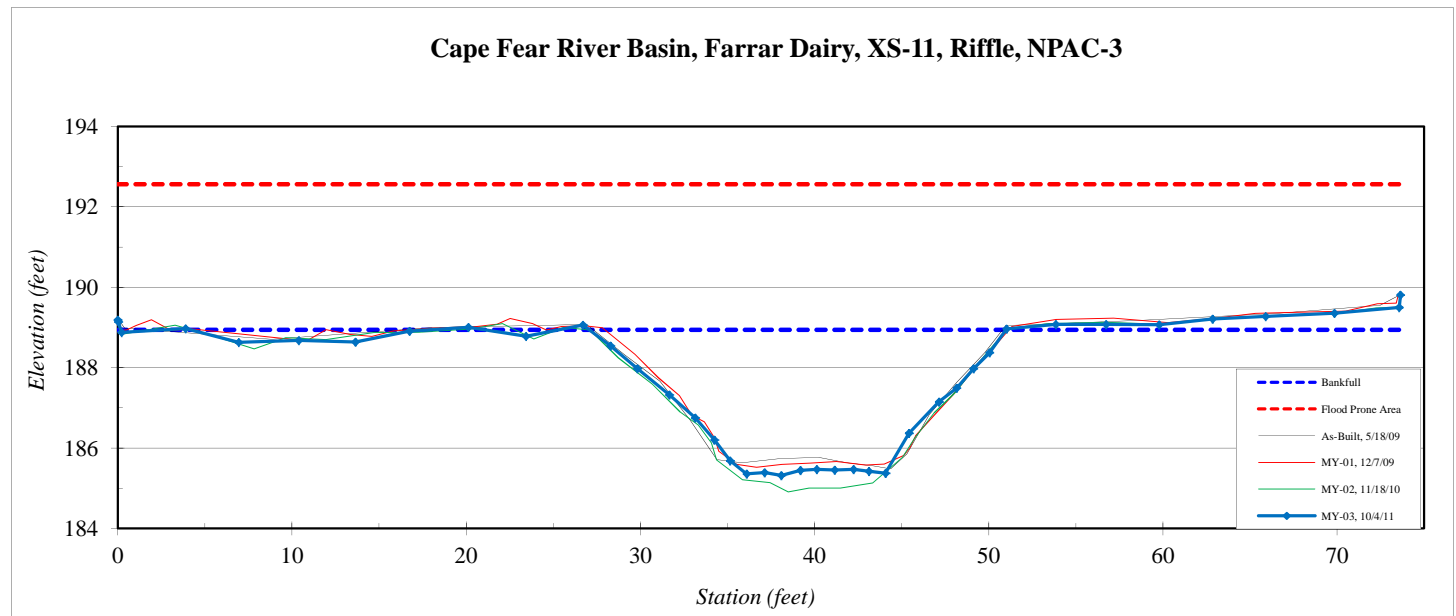
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-11, Riffle, NPAC-3
Drainage Area (sq mi):	4.82
Date:	10/4/2011
Field Crew:	A. French, M. Koss



Station	Elevation
0.0	189.19
0.0	189.14
0.2	188.88
3.9	188.97
6.9	188.63
10.4	188.68
13.6	188.64
16.7	188.91
20.1	189.01
23.4	188.79
26.7	189.06
28.3	188.54
29.8	187.98
31.7	187.33
33.1	186.76
34.3	186.21
35.2	185.69
36.1	185.36
37.1	185.39
38.1	185.32
39.2	185.45
40.1	185.47
41.2	185.45
42.2	185.47
43.1	185.42
44.1	185.37
45.4	186.37
47.1	187.15
48.2	187.50
49.1	187.98
50.1	188.38
51.0	188.96
53.8	189.08
56.7	189.08
59.8	189.07

SUMMARY DATA	
Bankfull Elevation:	188.9
Bankfull Cross-Sectional Area:	54.9
Bankfull Width:	23.9
Flood Prone Area Elevation:	192.6
Flood Prone Width:	>60
Max Depth at Bankfull:	3.6
Mean Depth at Bankfull:	2.3
W / D Ratio:	10.4
Entrenchment Ratio:	>3.0
Bank Height Ratio:	1.0

Stream Type	C5
--------------------	----



*Other shots not included due to space

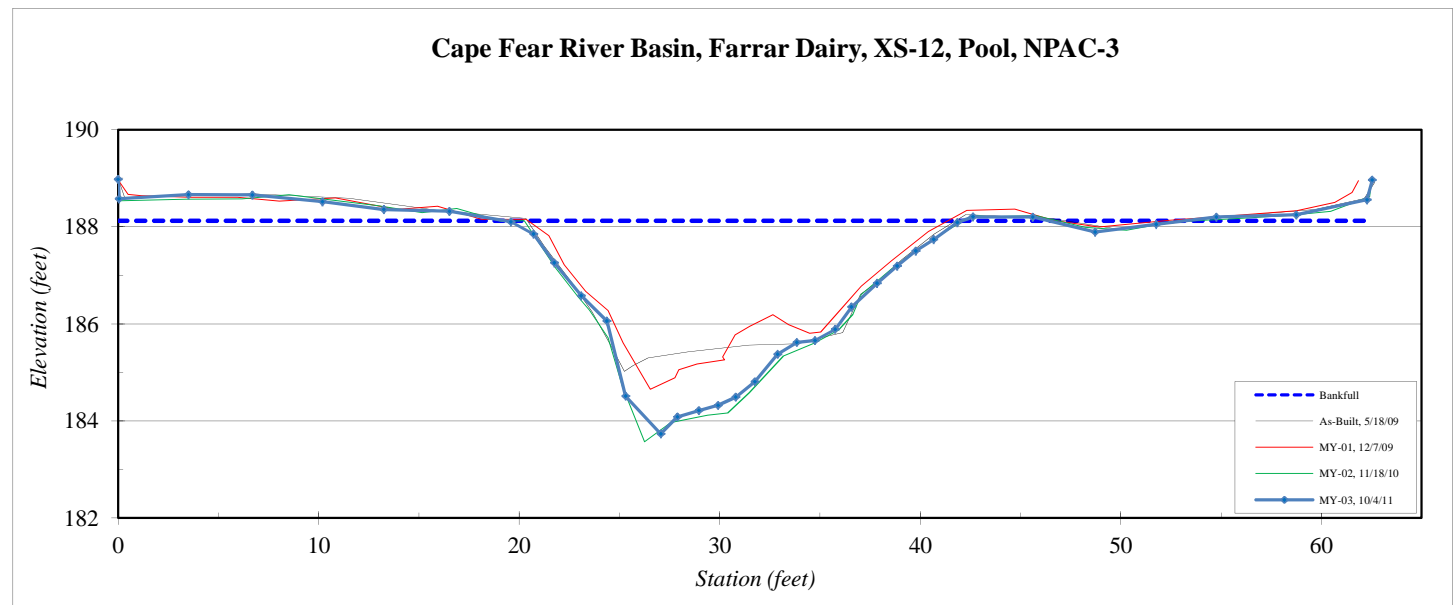
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-12, Pool, NPAC-3
Drainage Area (sq mi):	4.82
Date:	10/4/2011
Field Crew:	A. French, M. Koss

Station	Elevation
0.0	188.98
0.1	188.58
3.5	188.66
6.7	188.65
10.2	188.52
13.3	188.36
16.5	188.32
19.6	188.10
20.7	187.85
21.8	187.26
23.1	186.58
24.4	186.06
25.3	184.51
27.1	183.73
27.9	184.08
29.0	184.21
29.9	184.32
30.8	184.49
31.7	184.81
32.9	185.38
33.8	185.62
34.7	185.66
35.8	185.89
36.6	186.35
37.9	186.84
38.9	187.19
39.8	187.50
40.7	187.74
41.8	188.09
42.6	188.21
45.6	188.20
48.7	187.89
51.8	188.05
54.8	188.20

SUMMARY DATA	
Bankfull Elevation:	188.1
Bankfull Cross-Sectional Area:	49.0
Bankfull Width:	22.7
Flood Prone Area Elevation:	-
Flood Prone Width:	-
Max Depth at Bankfull:	4.4
Mean Depth at Bankfull:	2.2
W / D Ratio:	-
Entrenchment Ratio:	-
Bank Height Ratio:	-



Stream Type	C5
--------------------	----



*Other shots not included due to space

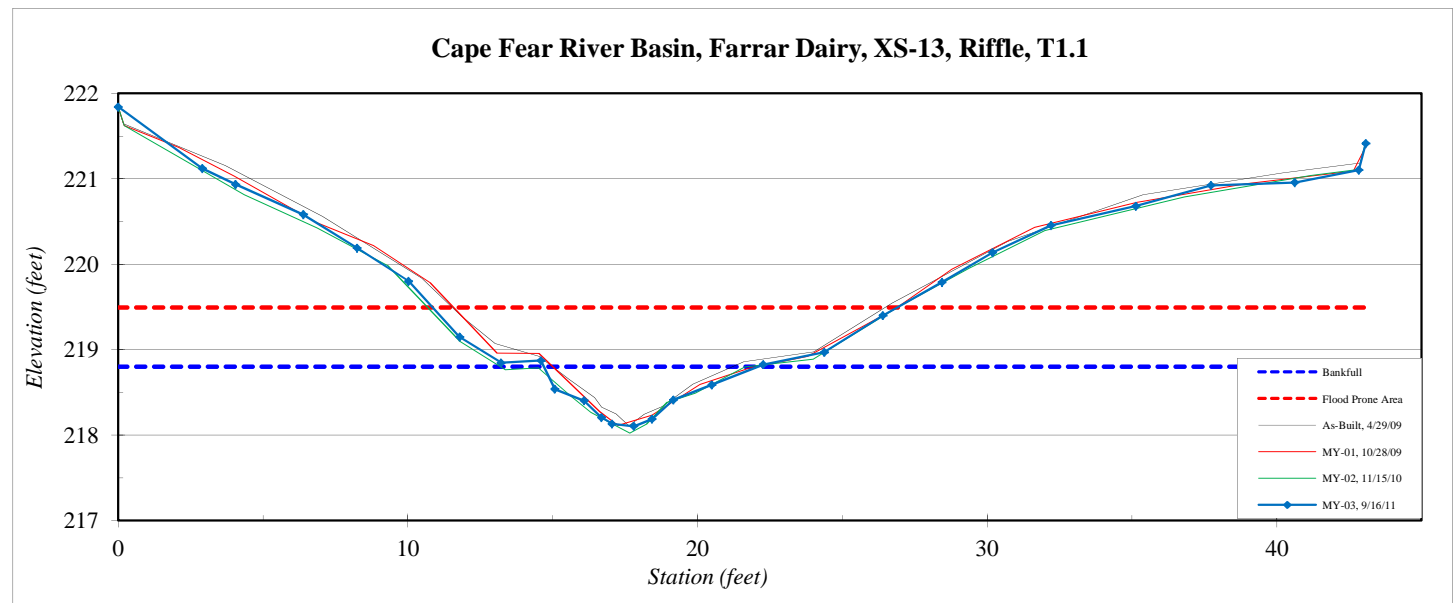
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-13, Riffle, T1.1
Drainage Area (sq mi):	0.02
Date:	9/16/2011
Field Crew:	A. French, J. Anders

Station	Elevation
0.0	221.84
2.9	221.12
4.0	220.94
6.4	220.58
8.2	220.19
10.0	219.80
11.8	219.15
13.2	218.85
14.6	218.87
15.1	218.54
16.1	218.40
16.7	218.21
17.1	218.13
17.8	218.10
18.4	218.19
19.2	218.41
20.5	218.59
22.3	218.83
24.4	218.97
26.4	219.40
28.4	219.79
30.2	220.14
32.2	220.46
35.1	220.68
37.7	220.92
40.6	220.96
42.8	221.10
43.1	221.42

SUMMARY DATA	
Bankfull Elevation:	218.8
Bankfull Cross-Sectional Area:	2.8
Bankfull Width:	7.4
Flood Prone Area Elevation:	219.5
Flood Prone Width:	16
Max Depth at Bankfull:	0.7
Mean Depth at Bankfull:	0.4
W / D Ratio:	19.6
Entrenchment Ratio:	2.2
Bank Height Ratio:	1.0



Stream Type	C5
--------------------	----



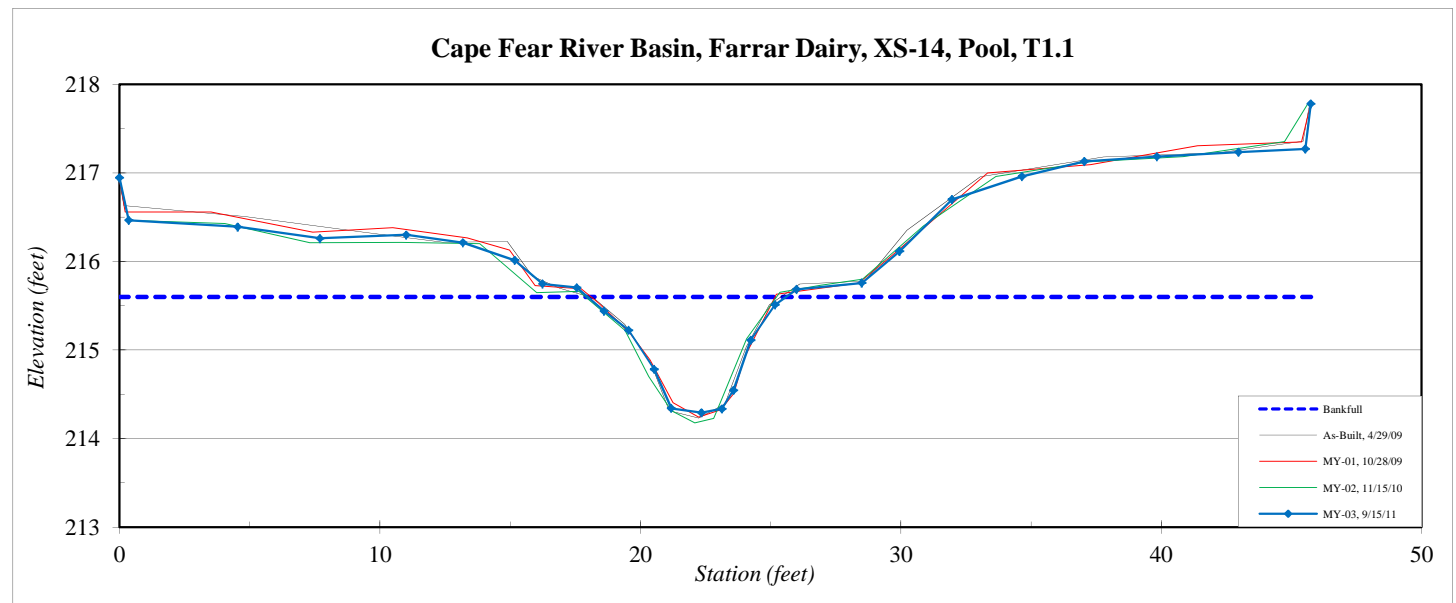
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-14, Pool, T1.1
Drainage Area (sq mi):	0.02
Date:	9/16/2011
Field Crew:	A. French, J. Anders

Station	Elevation
0.0	216.95
0.4	216.47
4.5	216.39
7.7	216.26
11.0	216.30
13.2	216.21
15.2	216.01
16.2	215.75
17.6	215.71
18.6	215.44
19.5	215.22
20.5	214.78
21.2	214.34
22.4	214.29
23.1	214.33
23.6	214.55
24.2	215.11
25.2	215.51
26.0	215.69
28.5	215.76
30.0	216.11
32.0	216.70
34.6	216.96
37.0	217.13
39.8	217.19
43.0	217.23
45.5	217.27
45.7	217.78

SUMMARY DATA	
Bankfull Elevation:	215.6
Bankfull Cross-Sectional Area:	5.4
Bankfull Width:	7.6
Flood Prone Area Elevation:	-
Flood Prone Width:	-
Max Depth at Bankfull:	1.3
Mean Depth at Bankfull:	0.7
W / D Ratio:	-
Entrenchment Ratio:	-
Bank Height Ratio:	-



Stream Type C5



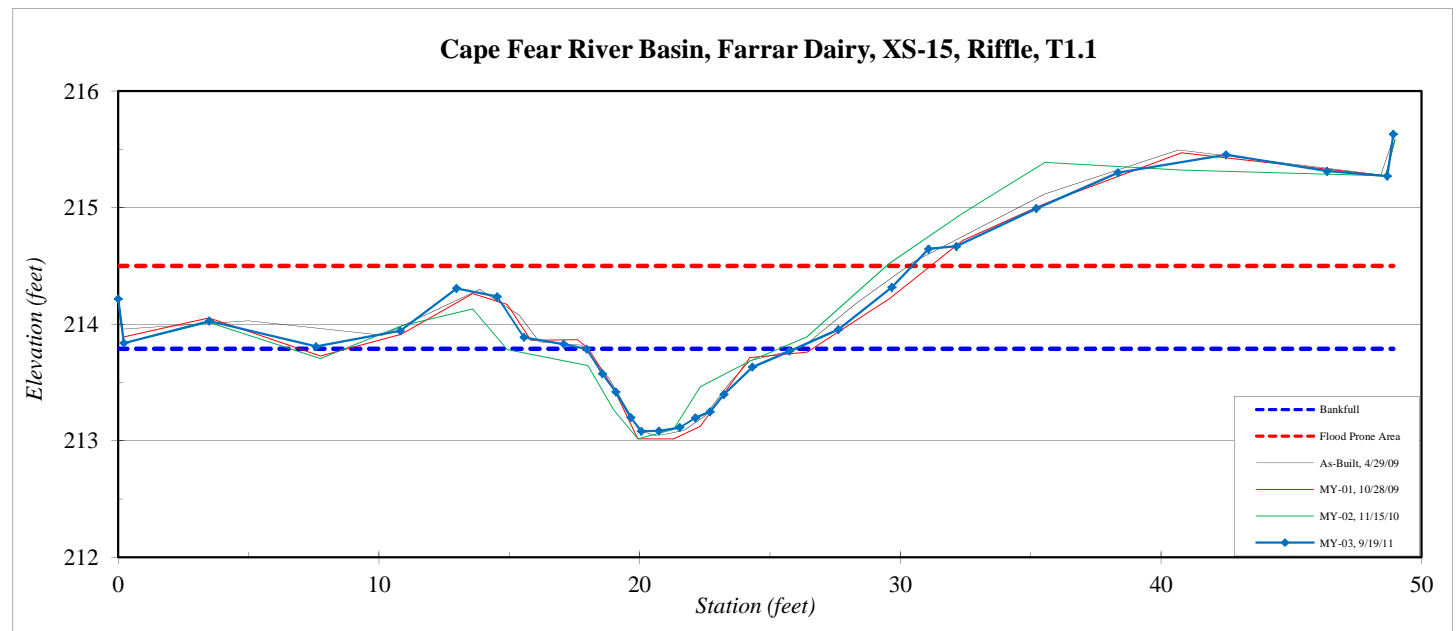
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-15, Riffle, T1.1
Drainage Area (sq mi):	0.02
Date:	9/19/2011
Field Crew:	A. French, J. Anders

Station	Elevation
0.0	214.22
0.2	213.84
3.5	214.03
7.6	213.81
10.8	213.94
13.0	214.31
14.5	214.24
15.6	213.89
17.1	213.83
18.0	213.79
18.6	213.57
19.1	213.42
19.7	213.20
20.1	213.08
20.7	213.09
21.5	213.11
22.1	213.20
22.7	213.25
23.2	213.40
24.3	213.63
25.7	213.77
27.6	213.95
29.7	214.32
31.1	214.65
32.2	214.67
35.2	214.99
38.4	215.30
42.5	215.45
46.4	215.31
48.7	215.27
48.9	215.63

SUMMARY DATA	
Bankfull Elevation:	213.8
Bankfull Cross-Sectional Area:	1.9
Bankfull Width:	6.1
Flood Prone Area Elevation:	214.5
Flood Prone Width:	30
Max Depth at Bankfull:	0.7
Mean Depth at Bankfull:	0.3
W / D Ratio:	19.6
Entrenchment Ratio:	5.0
Bank Height Ratio:	1.0



Stream Type	C5
--------------------	----



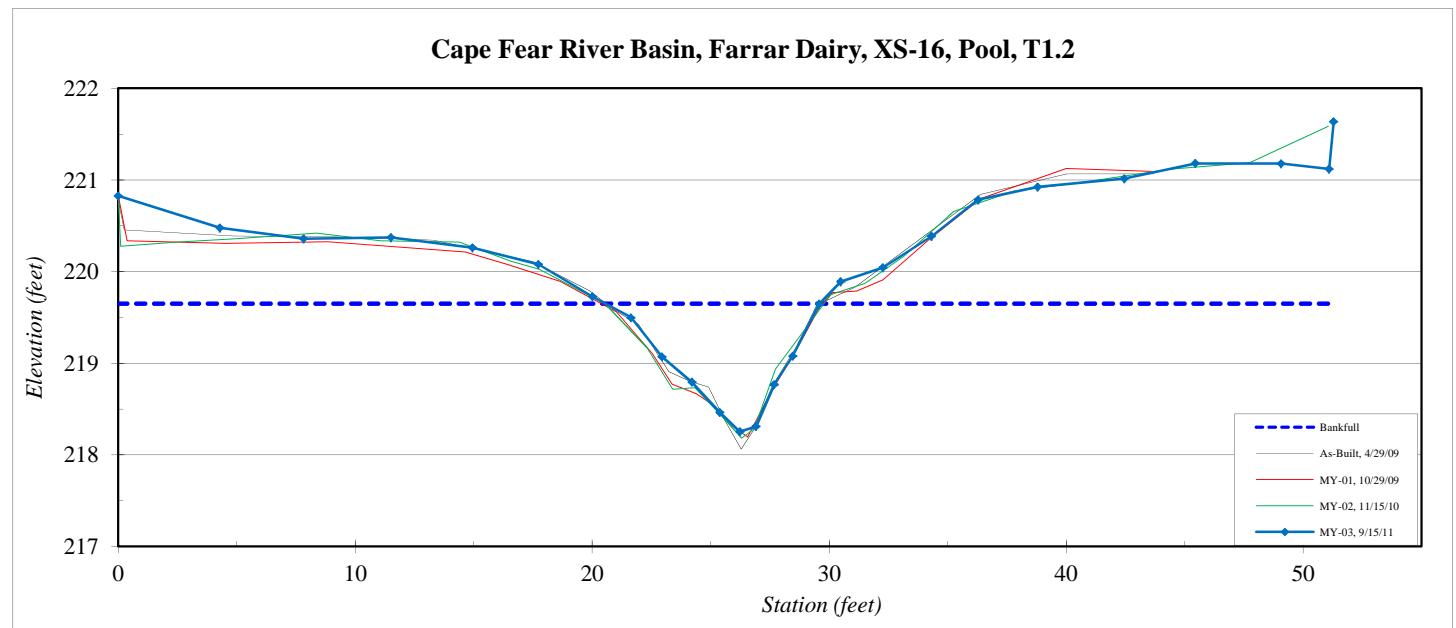
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-16, Pool, T1.2
Drainage Area (sq mi):	0.10
Date:	9/15/2011
Field Crew:	A. French, J. Anders

Station	Elevation
0.0	220.83
4.3	220.48
7.8	220.36
11.5	220.37
15.0	220.26
17.7	220.08
20.0	219.73
21.6	219.50
22.9	219.07
24.2	218.79
25.4	218.46
26.2	218.25
26.9	218.31
27.7	218.77
28.5	219.08
29.6	219.65
30.5	219.89
32.3	220.04
34.3	220.39
36.3	220.78
38.8	220.92
42.5	221.01
45.4	221.18
49.1	221.18
51.1	221.12
51.3	221.63

SUMMARY DATA	
Bankfull Elevation:	219.7
Bankfull Cross-Sectional Area:	6.4
Bankfull Width:	9.0
Flood Prone Area Elevation:	-
Flood Prone Width:	-
Max Depth at Bankfull:	1.4
Mean Depth at Bankfull:	0.7
W / D Ratio:	-
Entrenchment Ratio:	-
Bank Height Ratio:	-



Stream Type	C5
--------------------	----



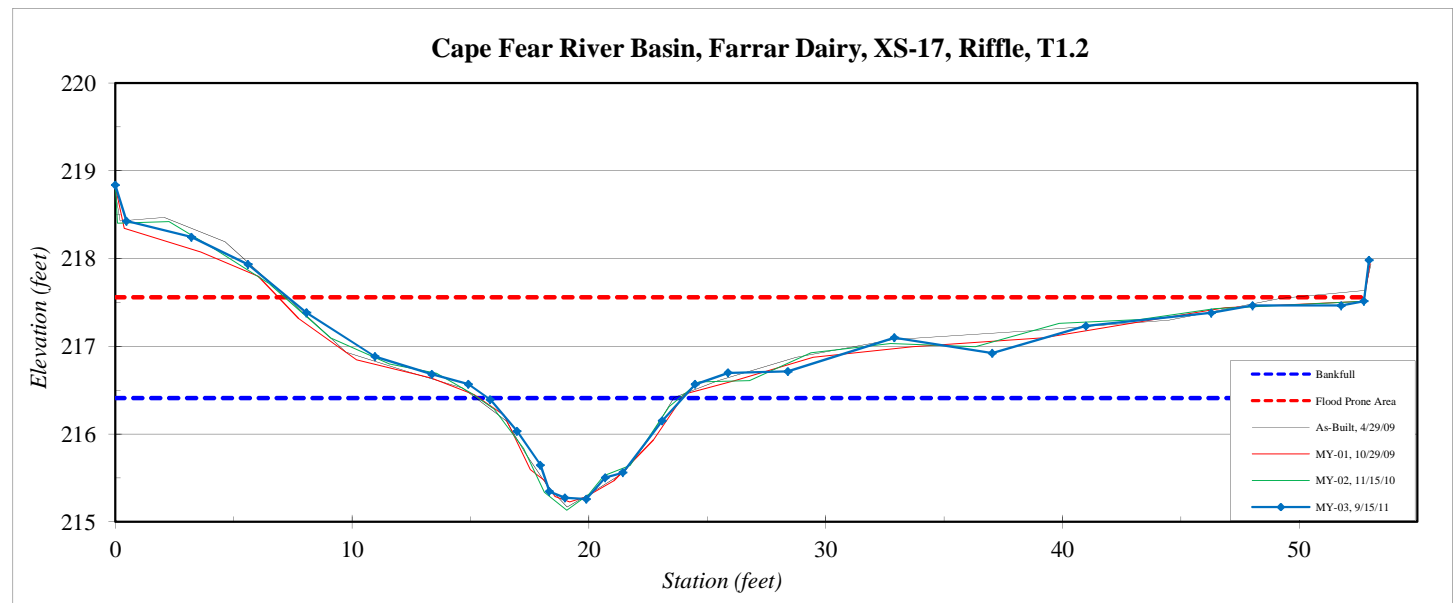
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-17, Riffle, T1.2
Drainage Area (sq mi):	0.10
Date:	9/15/2011
Field Crew:	A. French, J. Anders

Station	Elevation
0.0	218.84
0.5	218.43
3.2	218.25
5.6	217.93
8.1	217.38
11.0	216.88
13.4	216.68
14.9	216.57
15.8	216.39
17.0	216.03
18.0	215.65
18.3	215.35
19.0	215.28
19.9	215.26
20.7	215.51
21.4	215.56
23.1	216.15
24.5	216.57
25.9	216.70
28.4	216.72
32.9	217.10
37.0	216.92
41.0	217.23
46.3	217.38
48.0	217.47
51.8	217.47
52.7	217.51
53.0	217.98

SUMMARY DATA	
Bankfull Elevation:	216.4
Bankfull Cross-Sectional Area:	5.4
Bankfull Width:	8.2
Flood Prone Area Elevation:	217.6
Flood Prone Width:	46
Max Depth at Bankfull:	1.1
Mean Depth at Bankfull:	0.7
W / D Ratio:	12.5
Entrenchment Ratio:	5.6
Bank Height Ratio:	1.0



Stream Type	C5
--------------------	----



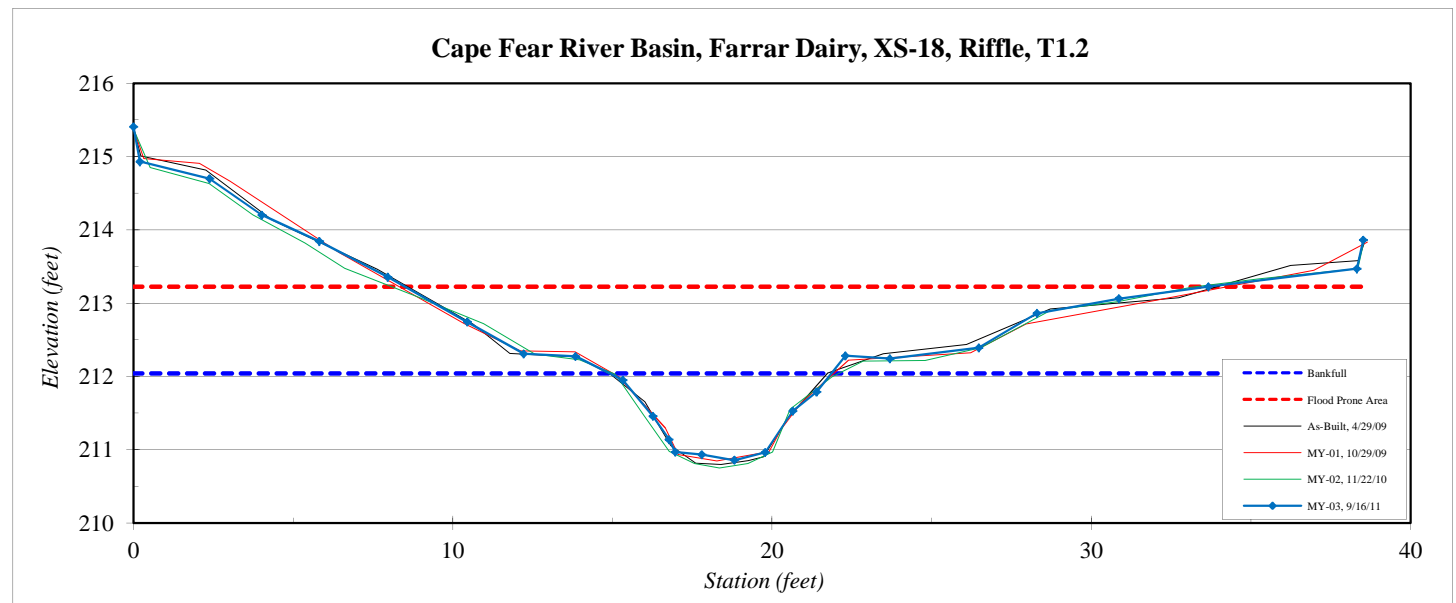
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-18, Riffle, T1.2
Drainage Area (sq mi):	0.10
Date:	9/16/2011
Field Crew:	A. French, J. Anders

Station	Elevation
0.0	215.41
0.2	214.93
2.4	214.70
4.0	214.20
5.8	213.84
8.0	213.36
10.5	212.74
12.2	212.31
13.8	212.27
15.3	211.95
16.3	211.46
16.8	211.14
17.0	210.97
17.8	210.93
18.8	210.86
19.8	210.96
20.6	211.53
21.4	211.79
22.3	212.28
23.7	212.24
26.5	212.39
28.3	212.86
30.9	213.06
33.7	213.22
38.3	213.47
38.5	213.86

SUMMARY DATA	
Bankfull Elevation:	212.0
Bankfull Cross-Sectional Area:	5.1
Bankfull Width:	6.9
Flood Prone Area Elevation:	213.2
Flood Prone Width:	26
Max Depth at Bankfull:	1.2
Mean Depth at Bankfull:	0.7
W / D Ratio:	9.3
Entrenchment Ratio:	3.8
Bank Height Ratio:	1.0



Stream Type	E5
--------------------	----



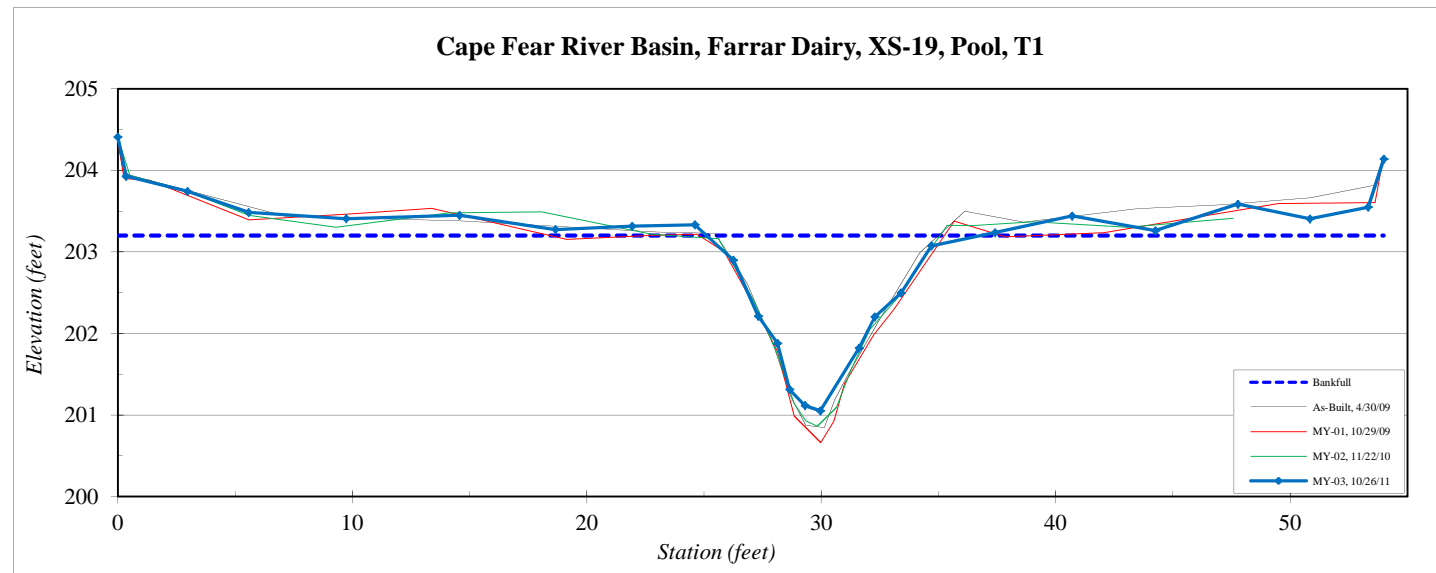
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-19, Pool, T1
Drainage Area (sq mi):	0.18
Date:	10/26/2011
Field Crew:	A. French, A. Helms



Stream Type	E5
--------------------	----

Station	Elevation
0.0	204.41
0.4	203.93
3.0	203.74
5.6	203.49
9.7	203.41
14.6	203.45
18.7	203.27
21.9	203.32
24.6	203.33
26.3	202.90
27.3	202.21
28.1	201.88
28.7	201.31
29.3	201.12
30.0	201.05
31.6	201.82
32.3	202.20
33.4	202.50
34.7	203.07
37.4	203.24
40.7	203.44
44.3	203.26
47.8	203.59
50.8	203.41
53.3	203.55
54.0	204.14

SUMMARY DATA	
Bankfull Elevation:	203.2
Bankfull Cross-Sectional Area:	10.6
Bankfull Width:	11.7
Flood Prone Area Elevation:	-
Flood Prone Width:	-
Max Depth at Bankfull:	2.1
Mean Depth at Bankfull:	0.9
W / D Ratio:	-
Entrenchment Ratio:	-
Bank Height Ratio:	-



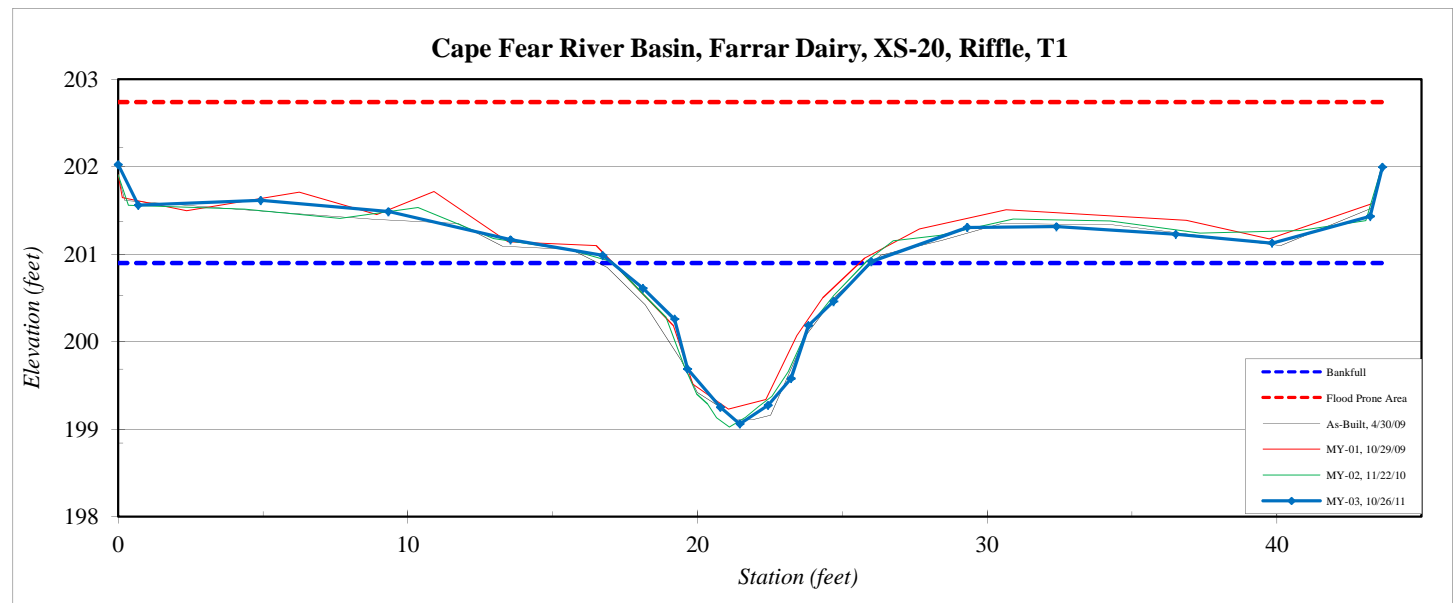
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-20, Riffle, T1
Drainage Area (sq mi):	0.18
Date:	10/26/2011
Field Crew:	A. French, A. Helms

Station	Elevation
0.0	202.02
0.7	201.56
4.9	201.61
9.3	201.49
13.5	201.17
16.7	200.99
18.1	200.61
19.2	200.26
19.7	199.69
20.8	199.25
21.5	199.06
22.4	199.27
23.2	199.58
23.8	200.19
24.7	200.46
26.0	200.92
29.3	201.31
32.4	201.32
36.5	201.23
39.8	201.13
43.2	201.43
43.6	201.99

SUMMARY DATA	
Bankfull Elevation:	200.9
Bankfull Cross-Sectional Area:	8.1
Bankfull Width:	8.9
Flood Prone Area Elevation:	202.7
Flood Prone Width:	>60
Max Depth at Bankfull:	1.8
Mean Depth at Bankfull:	0.9
W / D Ratio:	9.8
Entrenchment Ratio:	>3.0
Bank Height Ratio:	1.0



Stream Type	E5
--------------------	----



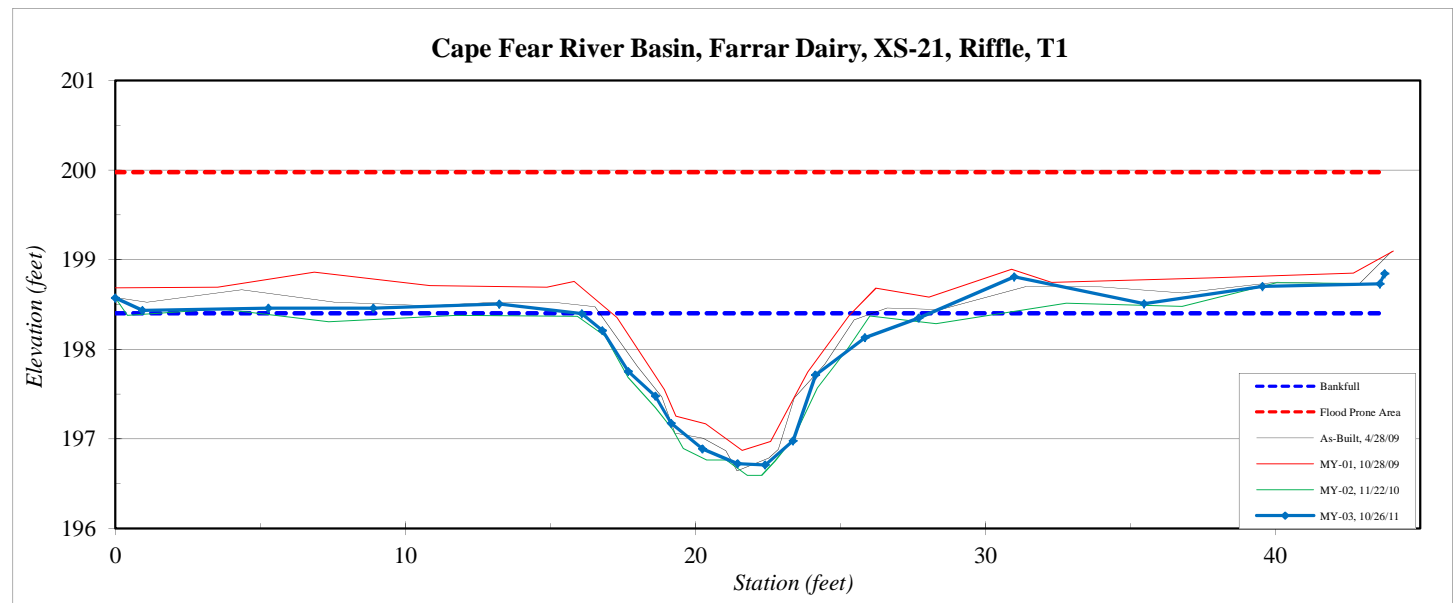
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-21, Riffle, T1
Drainage Area (sq mi):	0.18
Date:	10/26/2011
Field Crew:	A. French, A. Helms

Station	Elevation
0.0	198.77
0.9	198.64
5.3	198.66
8.9	198.66
13.2	198.70
16.1	198.60
16.8	198.41
17.7	197.95
18.6	197.68
19.2	197.37
20.2	197.09
21.5	196.82
22.4	196.91
23.4	197.08
24.1	197.81
25.9	198.13
27.7	198.35
31.0	198.81
35.5	198.51
39.6	198.70
43.6	198.73
43.8	198.84

SUMMARY DATA	
Bankfull Elevation:	198.4
Bankfull Cross-Sectional Area:	8.8
Bankfull Width:	11.3
Flood Prone Area Elevation:	200.0
Flood Prone Width:	>60
Max Depth at Bankfull:	1.6
Mean Depth at Bankfull:	0.8
W / D Ratio:	14.5
Entrenchment Ratio:	>3.0
Bank Height Ratio:	1.0



Stream Type	E5
--------------------	----



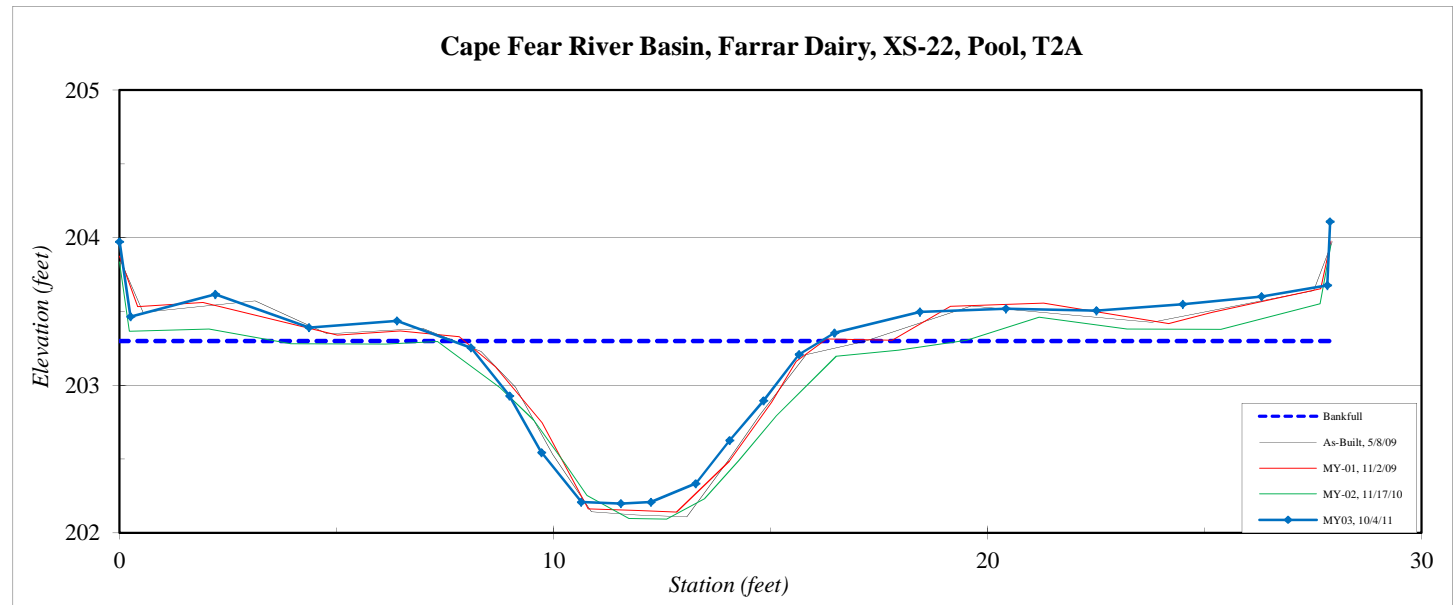
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-22, Pool, T2A
Drainage Area (sq mi):	0.04
Date:	10/4/2011
Field Crew:	A. French, M. Koss

Station	Elevation
0.0	203.97
0.3	203.46
2.2	203.62
4.4	203.39
6.4	203.44
8.1	203.25
9.0	202.93
9.7	202.54
10.6	202.21
11.6	202.20
12.2	202.21
13.3	202.33
14.1	202.63
14.8	202.89
15.7	203.21
16.5	203.36
18.4	203.50
20.4	203.52
22.5	203.51
24.5	203.55
26.3	203.60
27.8	203.68
27.9	204.11

SUMMARY DATA	
Bankfull Elevation:	203.3
Bankfull Cross-Sectional Area:	5.6
Bankfull Width:	8.5
Flood Prone Area Elevation:	-
Flood Prone Width:	-
Max Depth at Bankfull:	1.1
Mean Depth at Bankfull:	0.7
W / D Ratio:	-
Entrenchment Ratio:	-
Bank Height Ratio:	-



Stream Type	C5
--------------------	----



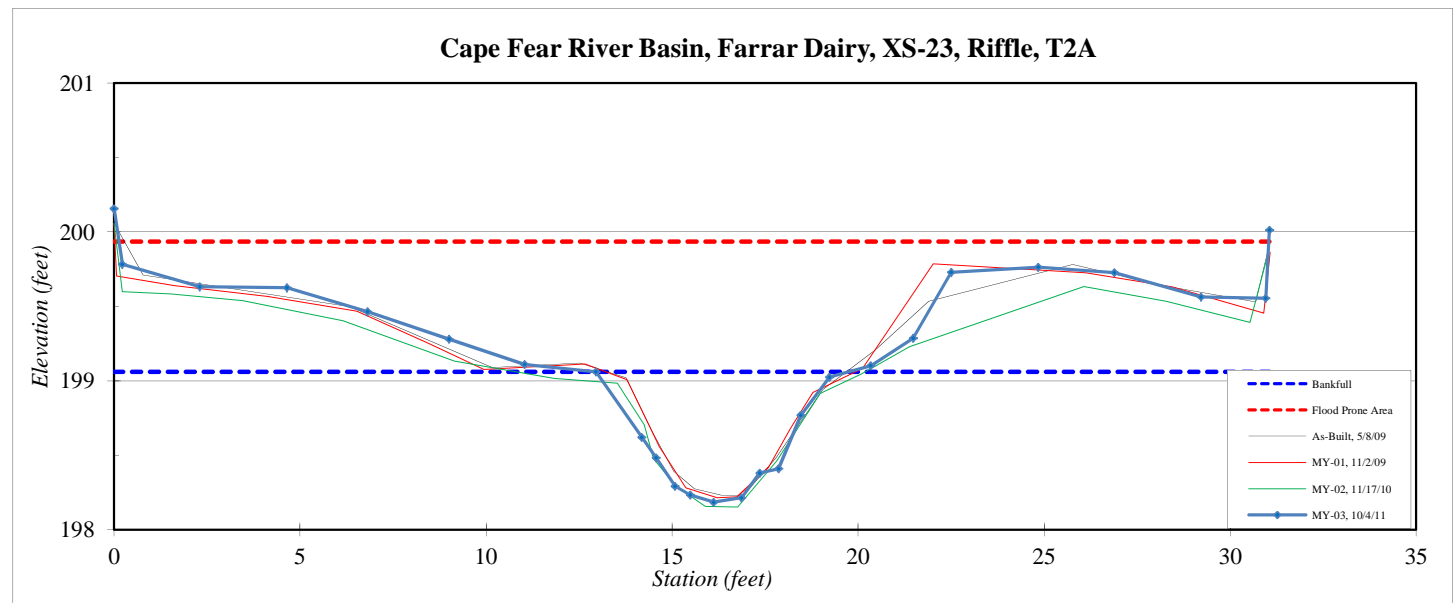
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-23, Riffle, T2A
Drainage Area (sq mi):	0.04
Date:	10/4/2011
Field Crew:	A. French, M. Koss

Station	Elevation
0.0	200.16
0.2	199.78
2.3	199.63
4.7	199.63
6.8	199.47
9.0	199.28
11.0	199.11
13.0	199.06
14.2	198.62
14.6	198.48
15.1	198.29
15.5	198.23
16.1	198.19
16.9	198.22
17.4	198.38
17.9	198.41
18.5	198.77
19.2	199.03
20.3	199.10
21.5	199.29
22.5	199.73
24.8	199.76
26.9	199.73
29.2	199.56
31.0	199.55
31.1	200.01

SUMMARY DATA	
Bankfull Elevation:	199.1
Bankfull Cross-Sectional Area:	3.4
Bankfull Width:	6.8
Flood Prone Area Elevation:	199.9
Flood Prone Width:	30
Max Depth at Bankfull:	0.9
Mean Depth at Bankfull:	0.5
W / D Ratio:	13.6
Entrenchment Ratio:	4.4
Bank Height Ratio:	1.0



Stream Type C5



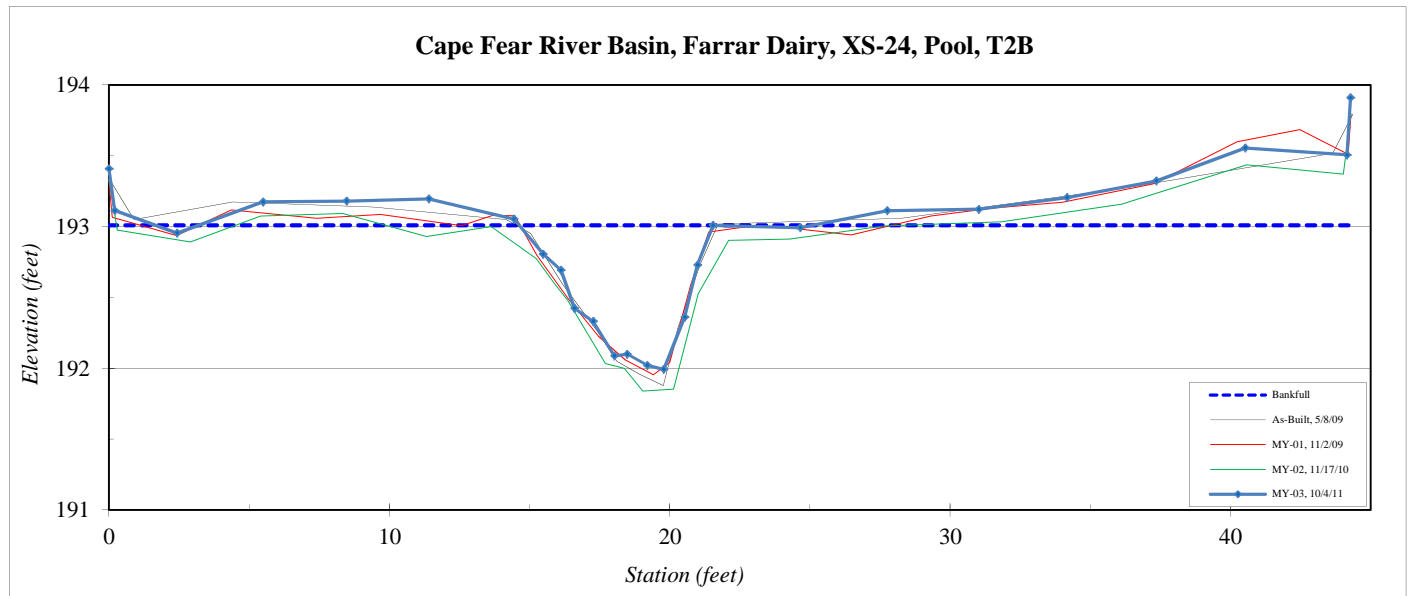
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-24, Pool, T2B
Drainage Area (sq mi):	0.04
Date:	10/4/2011
Field Crew:	A. French, M. Koss



Station	Elevation
0.0	193.41
0.2	193.11
2.4	192.95
5.5	193.17
8.5	193.18
11.4	193.20
14.4	193.05
15.5	192.81
16.1	192.69
16.6	192.42
17.3	192.33
18.0	192.09
18.5	192.10
19.2	192.02
19.8	191.99
20.5	192.36
21.0	192.73
21.5	193.01
24.7	192.99
27.8	193.11
31.0	193.12
34.2	193.21
37.4	193.32
40.5	193.55
44.2	193.51
44.3	193.91

SUMMARY DATA	
Bankfull Elevation:	193.0
Bankfull Cross-Sectional Area:	4.1
Bankfull Width:	6.9
Flood Prone Area Elevation:	-
Flood Prone Width:	-
Max Depth at Bankfull:	1.0
Mean Depth at Bankfull:	0.6
W / D Ratio:	-
Entrenchment Ratio:	-
Bank Height Ratio:	-

Stream Type	C5
--------------------	----



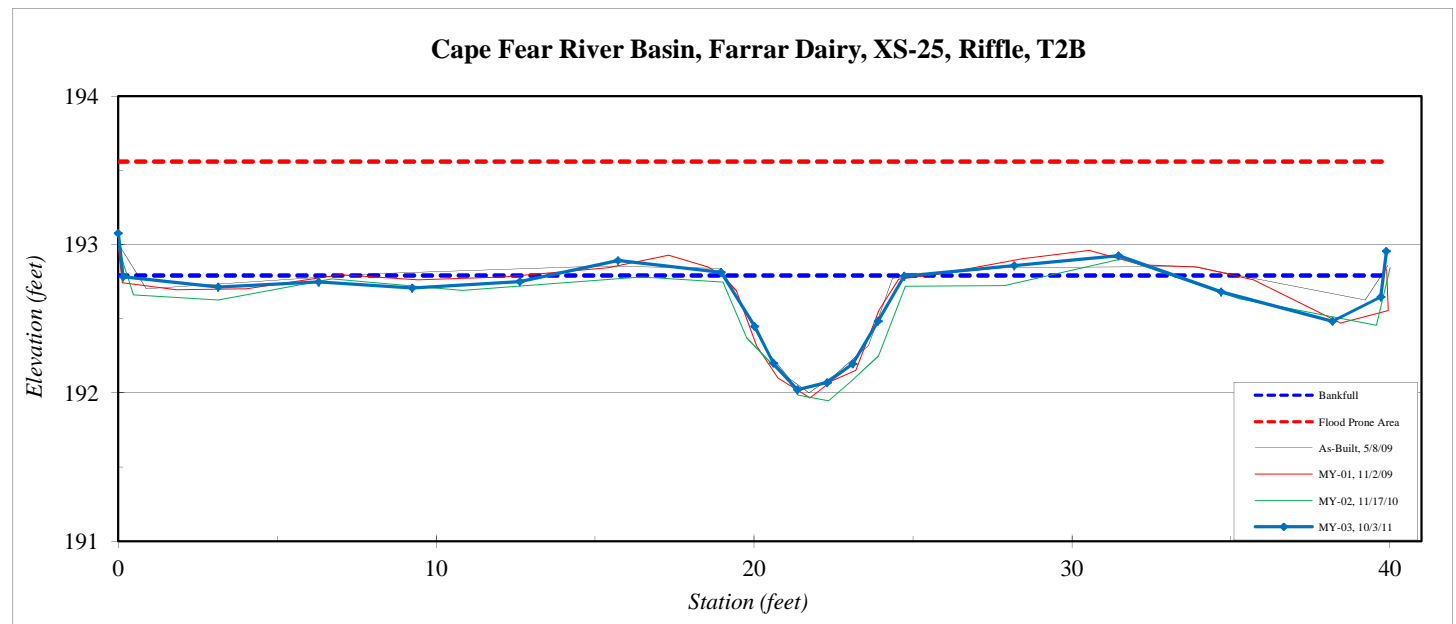
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-25, Riffle, T2B
Drainage Area (sq mi):	0.04
Date:	10/3/2011
Field Crew:	A. French, M. Koss

Station	Elevation
0.0	193.08
0.2	192.78
3.2	192.71
6.3	192.75
9.3	192.71
12.6	192.75
15.7	192.89
19.0	192.81
20.0	192.45
20.6	192.20
21.4	192.02
22.3	192.07
23.1	192.20
23.9	192.48
24.7	192.79
28.2	192.86
31.5	192.93
34.7	192.68
38.2	192.48
39.7	192.65
39.9	192.96

SUMMARY DATA	
Bankfull Elevation:	192.8
Bankfull Cross-Sectional Area:	2.7
Bankfull Width:	5.9
Flood Prone Area Elevation:	193.6
Flood Prone Width:	>40
Max Depth at Bankfull:	0.8
Mean Depth at Bankfull:	0.5
W / D Ratio:	12.9
Entrenchment Ratio:	6.8
Bank Height Ratio:	1.0



Stream Type C5



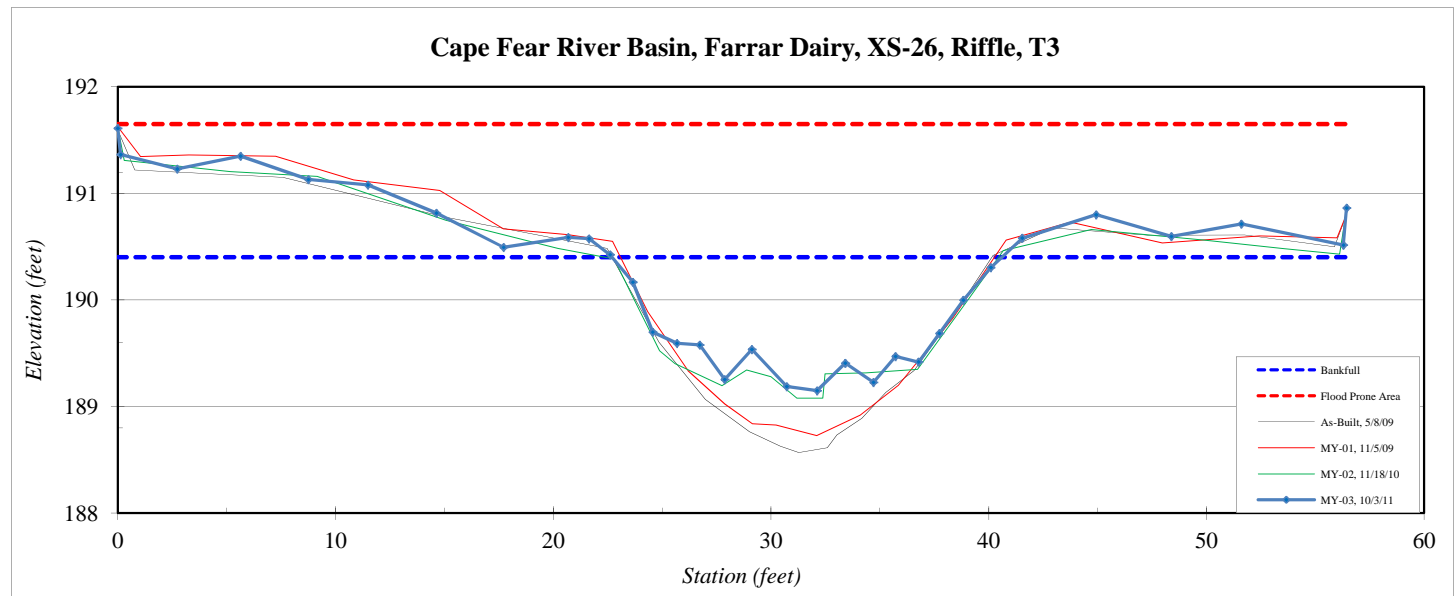
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-26, Riffle, T3
Drainage Area (sq mi):	0.39
Date:	10/3/2011
Field Crew:	A. French, M. Koss



Station	Elevation
0.0	191.61
0.1	191.37
2.7	191.23
5.6	191.35
8.8	191.13
11.5	191.08
14.6	190.82
17.7	190.49
20.7	190.59
21.6	190.58
22.6	190.42
23.7	190.17
24.6	189.70
25.7	189.59
26.7	189.58
27.9	189.26
29.1	189.54
30.7	189.19
32.1	189.15
33.4	189.41
34.7	189.23
35.7	189.47
36.8	189.42
37.7	189.69
38.8	190.00
40.1	190.31
41.5	190.58
44.9	190.80
48.4	190.60
51.6	190.71
56.3	190.52
56.4	190.87

SUMMARY DATA	
Bankfull Elevation:	190.4
Bankfull Cross-Sectional Area:	14.7
Bankfull Width:	17.9
Flood Prone Area Elevation:	191.7
Flood Prone Width:	>60
Max Depth at Bankfull:	1.3
Mean Depth at Bankfull:	0.8
W / D Ratio:	21.8
Entrenchment Ratio:	>3.0
Bank Height Ratio:	1.0

Stream Type	C5
--------------------	----



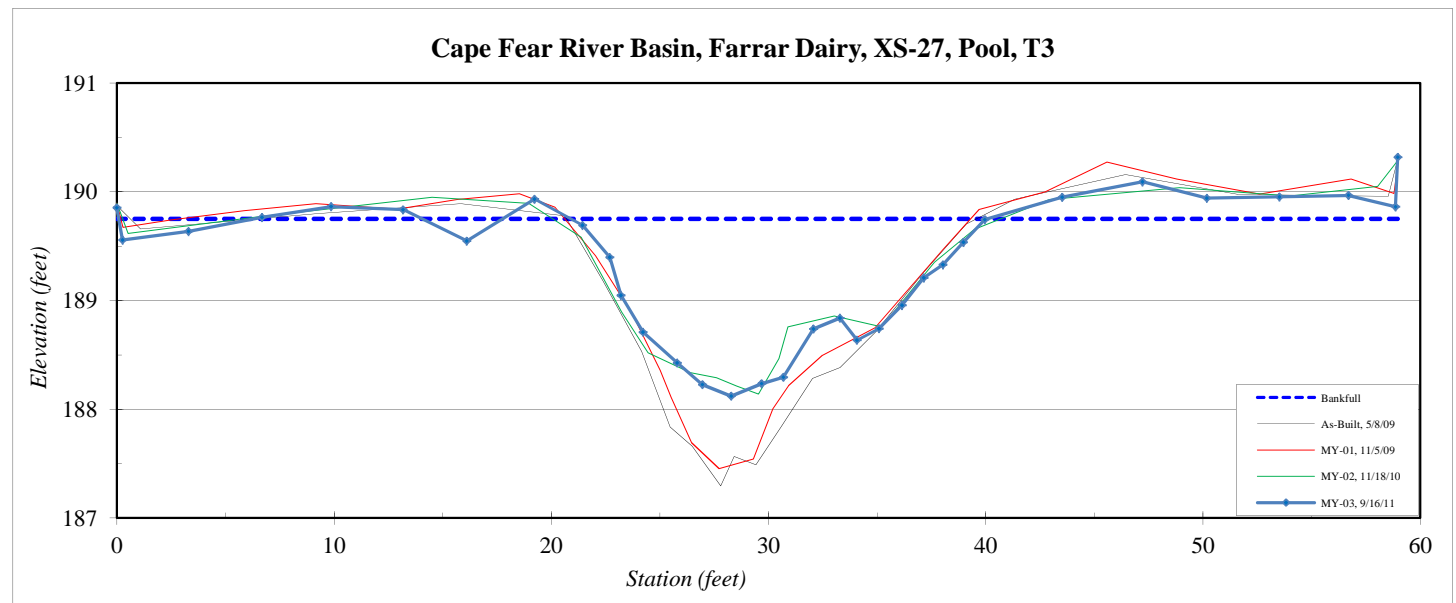
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-27, Pool, T3
Drainage Area (sq mi):	0.39
Date:	9/16/2011
Field Crew:	A. French, J. Anders

Station	Elevation
0.0	189.85
0.3	189.56
3.3	189.64
6.7	189.77
9.9	189.86
13.2	189.84
16.1	189.55
19.2	189.93
21.4	189.69
22.7	189.40
23.2	189.05
24.2	188.71
25.8	188.43
27.0	188.23
28.3	188.12
29.7	188.24
30.7	188.29
32.1	188.74
33.3	188.84
34.1	188.64
35.1	188.74
36.1	188.96
37.1	189.21
38.0	189.33
39.0	189.54
40.0	189.75
43.5	189.95
47.2	190.09
50.2	189.94
53.5	189.95
56.7	189.97
58.9	189.86
59.0	190.32

SUMMARY DATA	
Bankfull Elevation:	189.8
Bankfull Cross-Sectional Area:	17.9
Bankfull Width:	19.1
Flood Prone Area Elevation:	-
Flood Prone Width:	-
Max Depth at Bankfull:	1.6
Mean Depth at Bankfull:	0.9
W / D Ratio:	-
Entrenchment Ratio:	-
Bank Height Ratio:	-



Stream Type C5



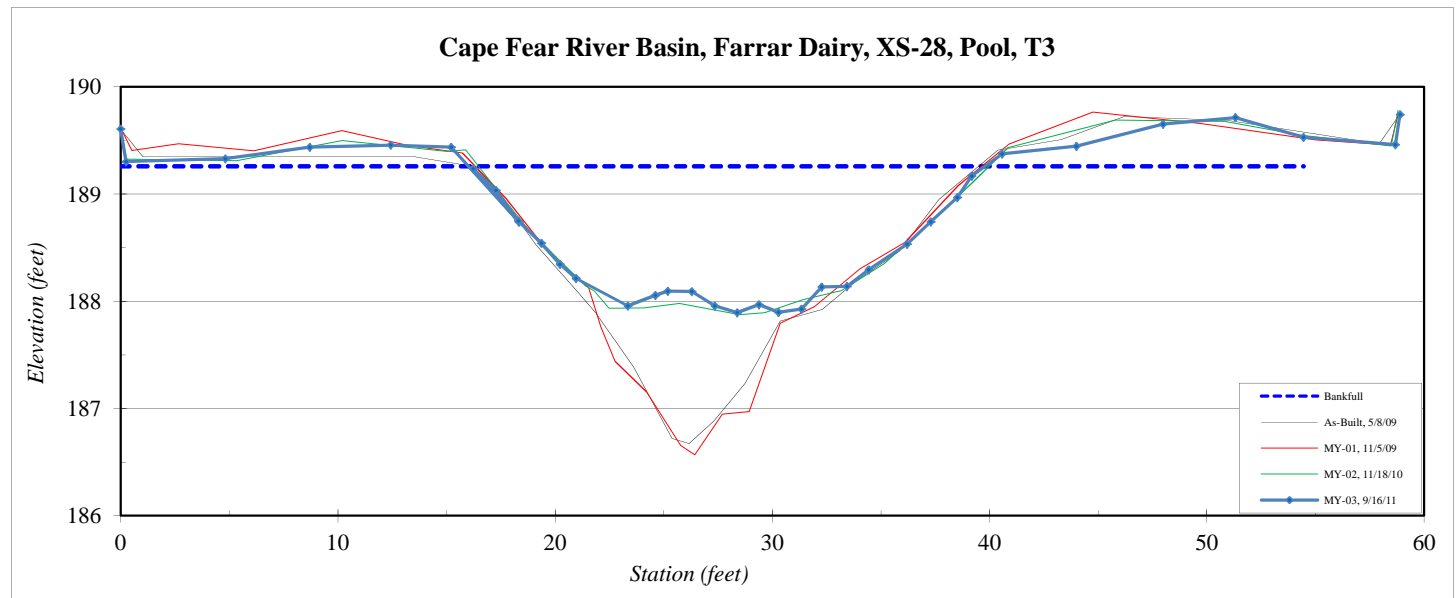
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-28, Pool, T3
Drainage Area (sq mi):	0.39
Date:	9/16/2011
Field Crew:	A. French, J. Anders



Station	Elevation
0.0	189.61
0.2	189.30
4.8	189.33
8.7	189.44
12.4	189.46
15.2	189.44
18.3	188.74
16.2	189.24
17.3	189.04
18.3	188.75
19.4	188.54
20.2	188.35
21.0	188.21
23.3	187.96
24.6	188.06
25.2	188.09
26.3	188.09
27.4	187.96
28.4	187.90
29.4	187.97
30.3	187.90
31.3	187.93
32.3	188.13
33.4	188.14
34.4	188.29
36.2	188.53
37.3	188.74
38.5	188.97
39.2	189.17
40.6	189.38
44.0	189.45
48.0	189.65
51.3	189.71
54.5	189.53

SUMMARY DATA	
Bankfull Elevation:	189.3
Bankfull Cross-Sectional Area:	21.9
Bankfull Width:	23.8
Flood Prone Area Elevation:	-
Flood Prone Width:	-
Max Depth at Bankfull:	1.4
Mean Depth at Bankfull:	0.9
W / D Ratio:	-
Entrenchment Ratio:	-
Bank Height Ratio:	-

Stream Type C5



*Other shots not included due to space

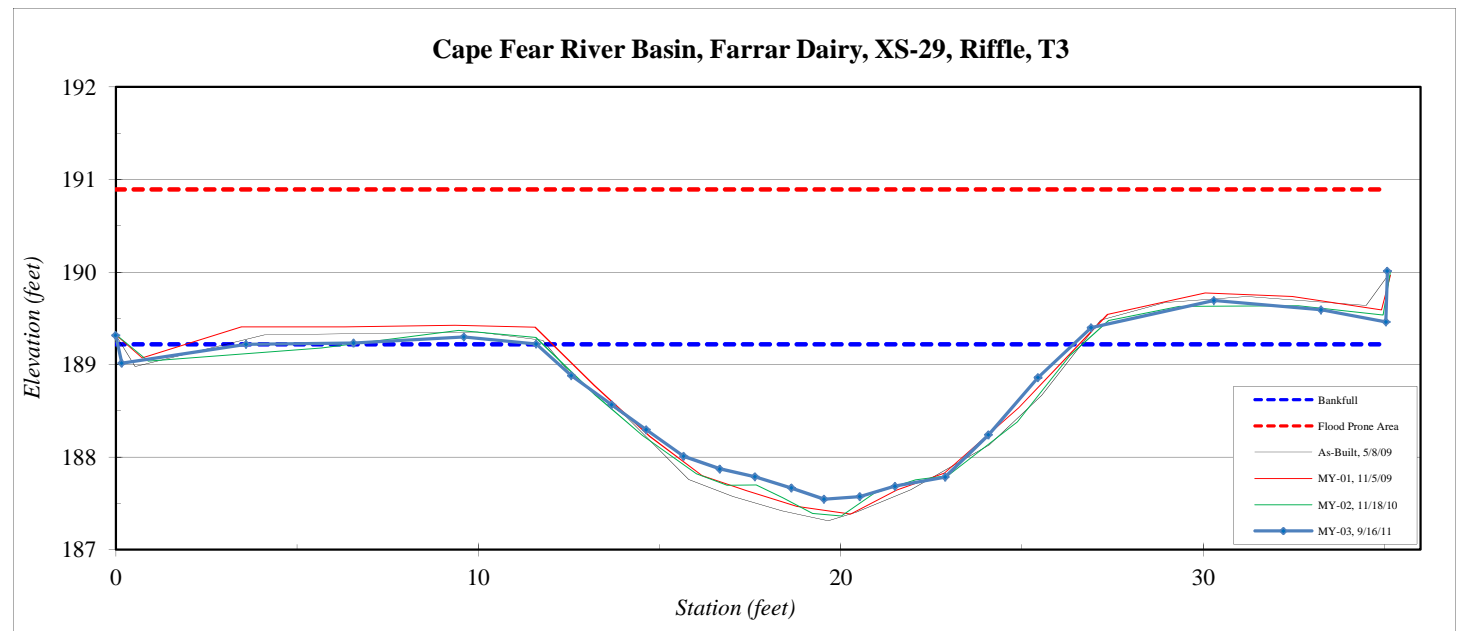
River Basin:	Cape Fear
Watershed:	Farrar Dairy
XS ID	XS-29, Riffle, T3
Drainage Area (sq mi):	0.39
Date:	9/16/2011
Field Crew:	A. French, J. Anders



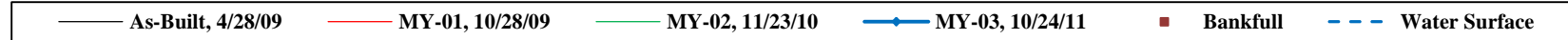
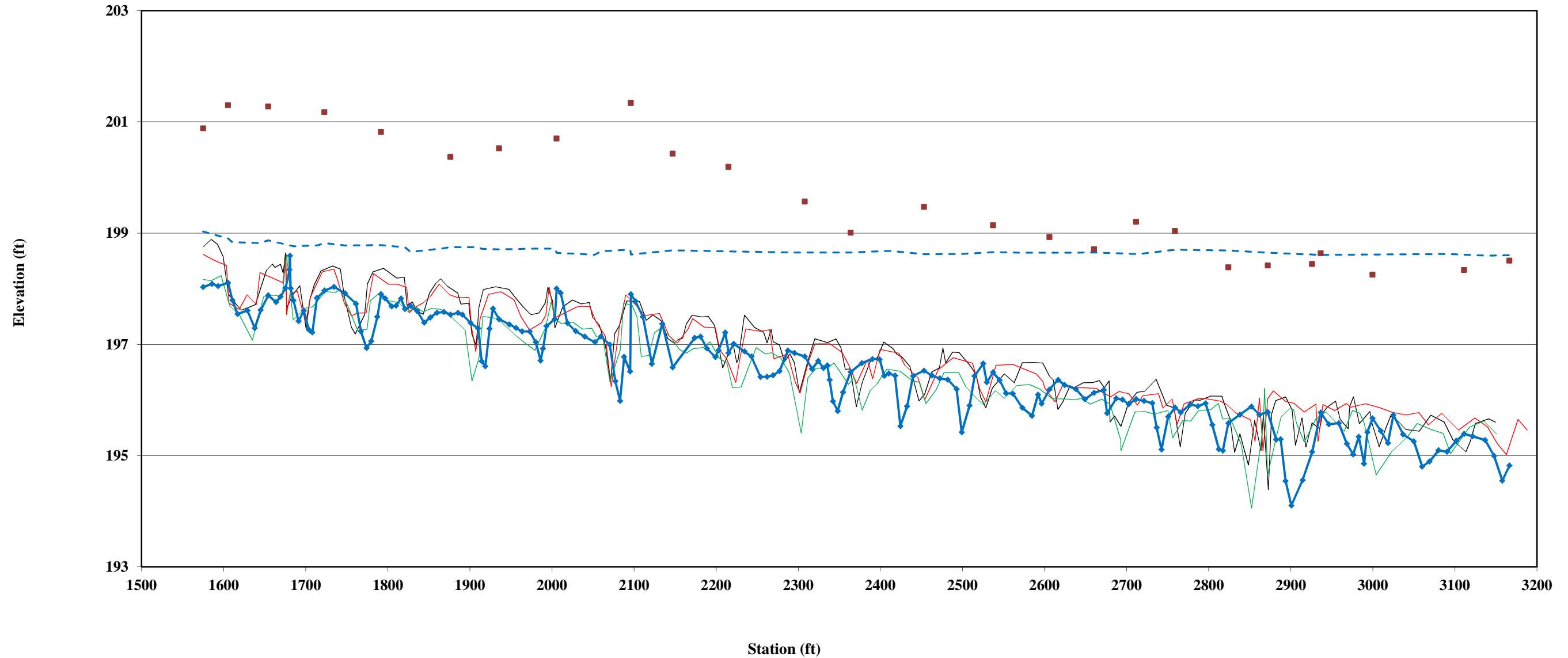
Station	Elevation
0.0	189.32
0.2	189.02
3.6	189.22
6.6	189.23
9.6	189.30
11.6	189.22
12.6	188.88
13.7	188.57
14.6	188.30
15.7	188.01
16.7	187.87
17.6	187.79
18.6	187.67
19.5	187.55
20.5	187.57
21.5	187.69
22.9	187.78
24.1	188.24
25.4	188.86
26.9	189.40
30.3	189.69
33.3	189.59
35.0	189.46
35.1	190.01

SUMMARY DATA	
Bankfull Elevation:	189.2
Bankfull Cross-Sectional Area:	15.9
Bankfull Width:	14.8
Flood Prone Area Elevation:	190.9
Flood Prone Width:	>60
Max Depth at Bankfull:	1.7
Mean Depth at Bankfull:	1.1
W / D Ratio:	13.8
Entrenchment Ratio:	>3.0
Bank Height Ratio:	1.0

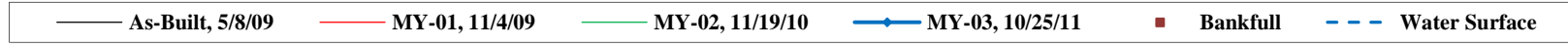
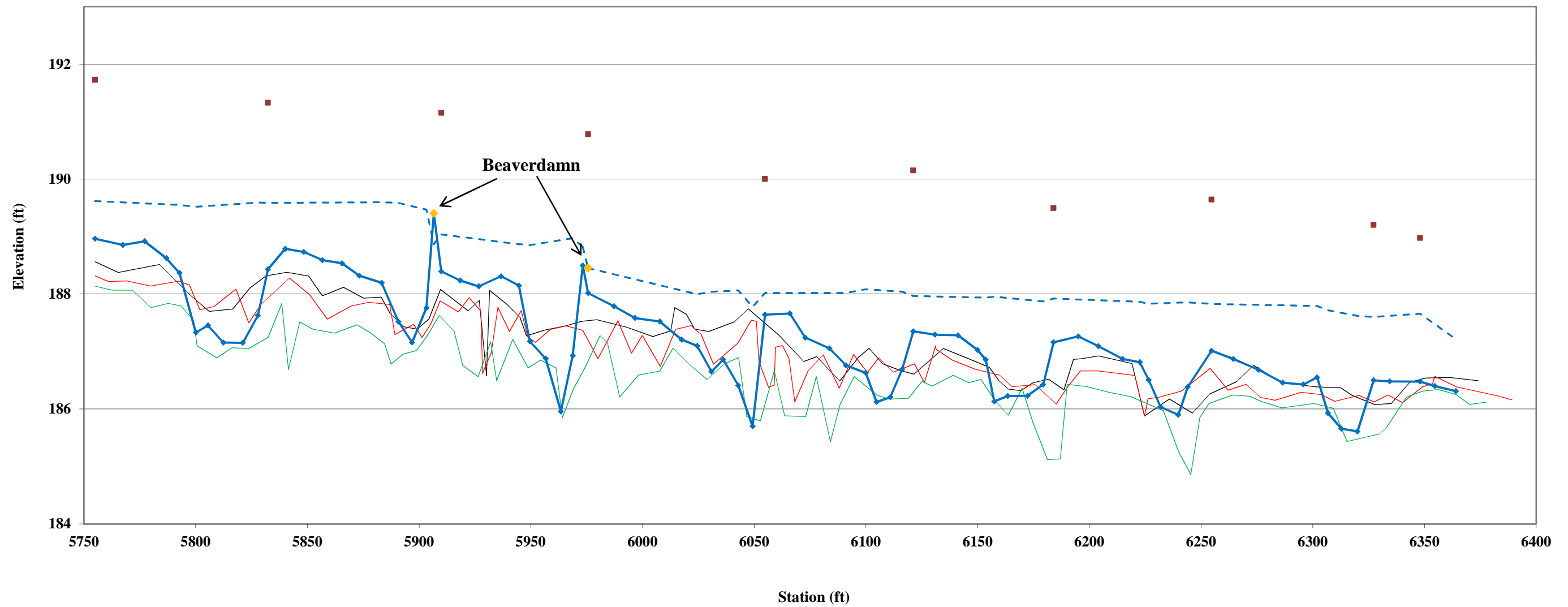
Stream Type C5



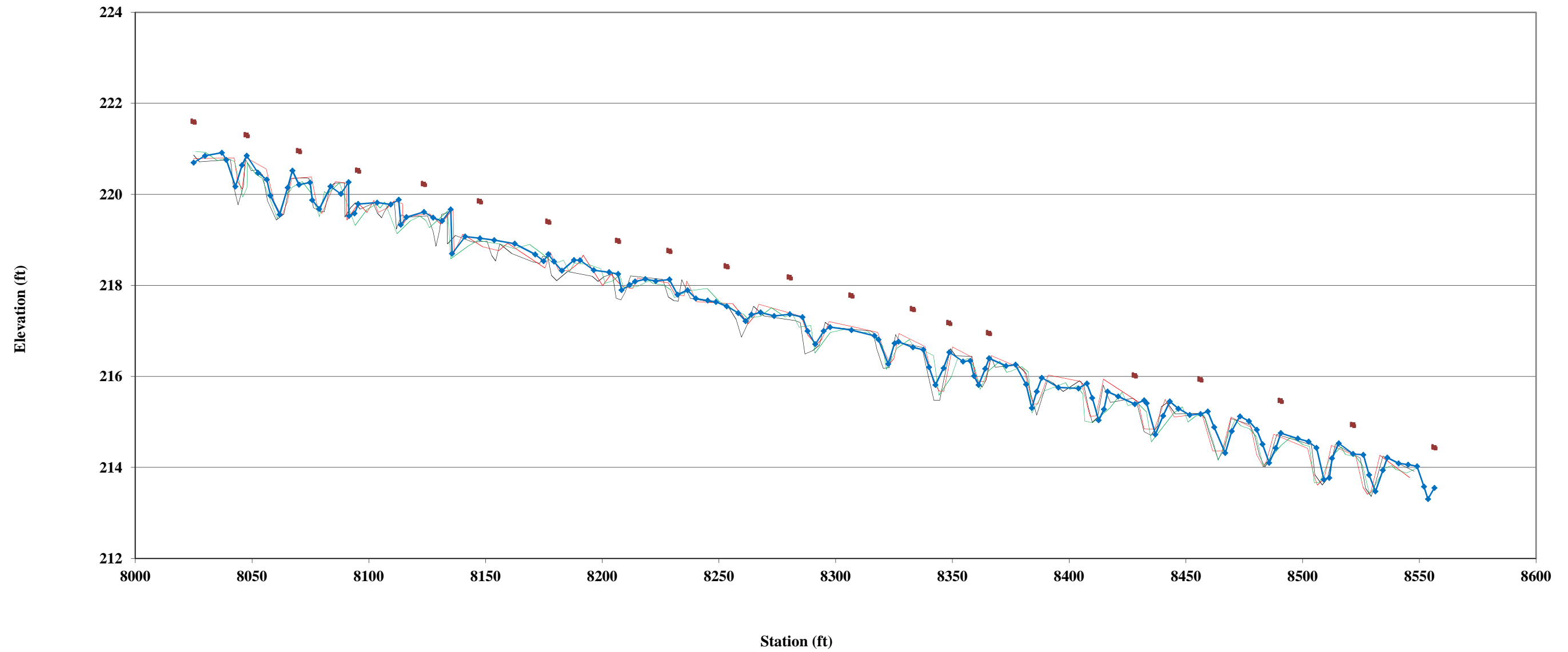
Farrar Dairy Longitudinal Profile
NPAC-1 MY-03
Stations 15+75 - 31+75



Farrar Dairy Longitudinal Profile
NPAC-2 MY-03
Stations 57+55 - 63+77



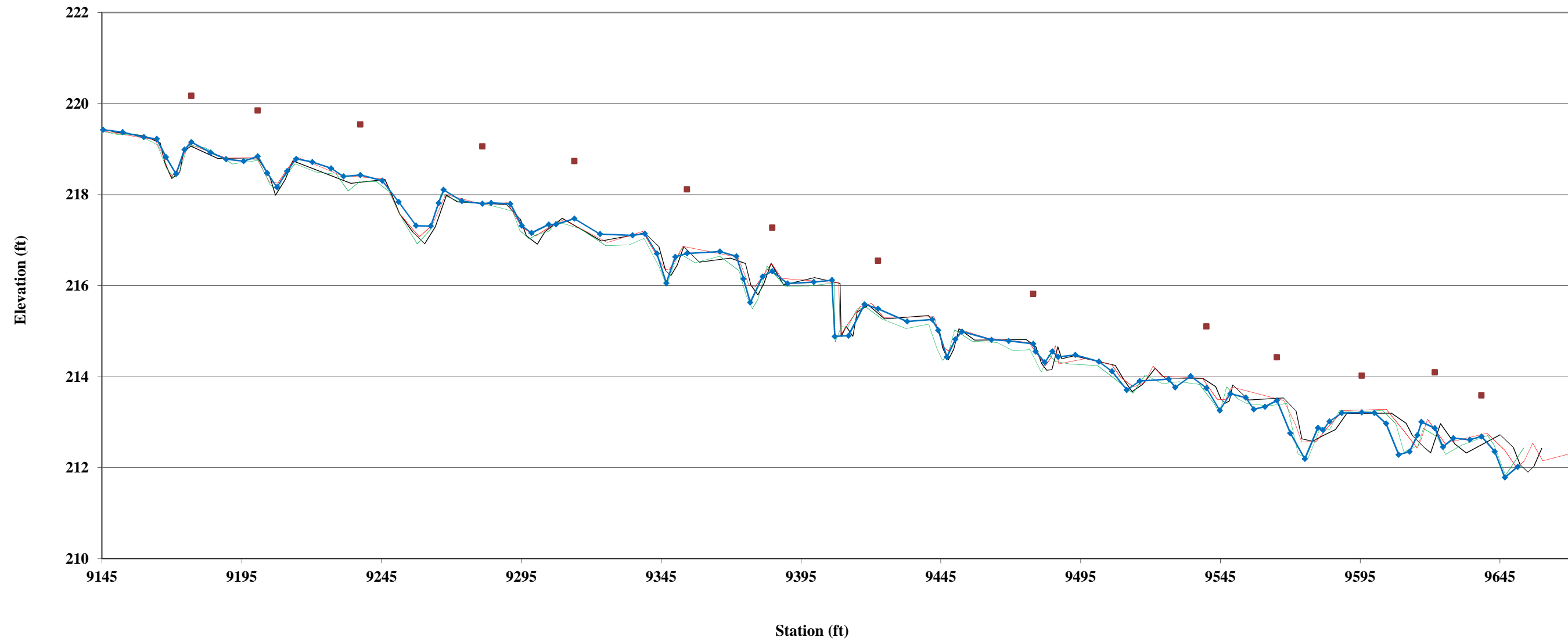
**Farrar Dairy Longitudinal Profile
Tributary 1.1 MY-03
Stations 80+25 - 85+75**



As-Built, 4/29/09 MY-01, 10/27/09 MY-02, 11/15/10 MY-03, 9/19/11 Bankfull

*No WS due to no flow in channel during survey.

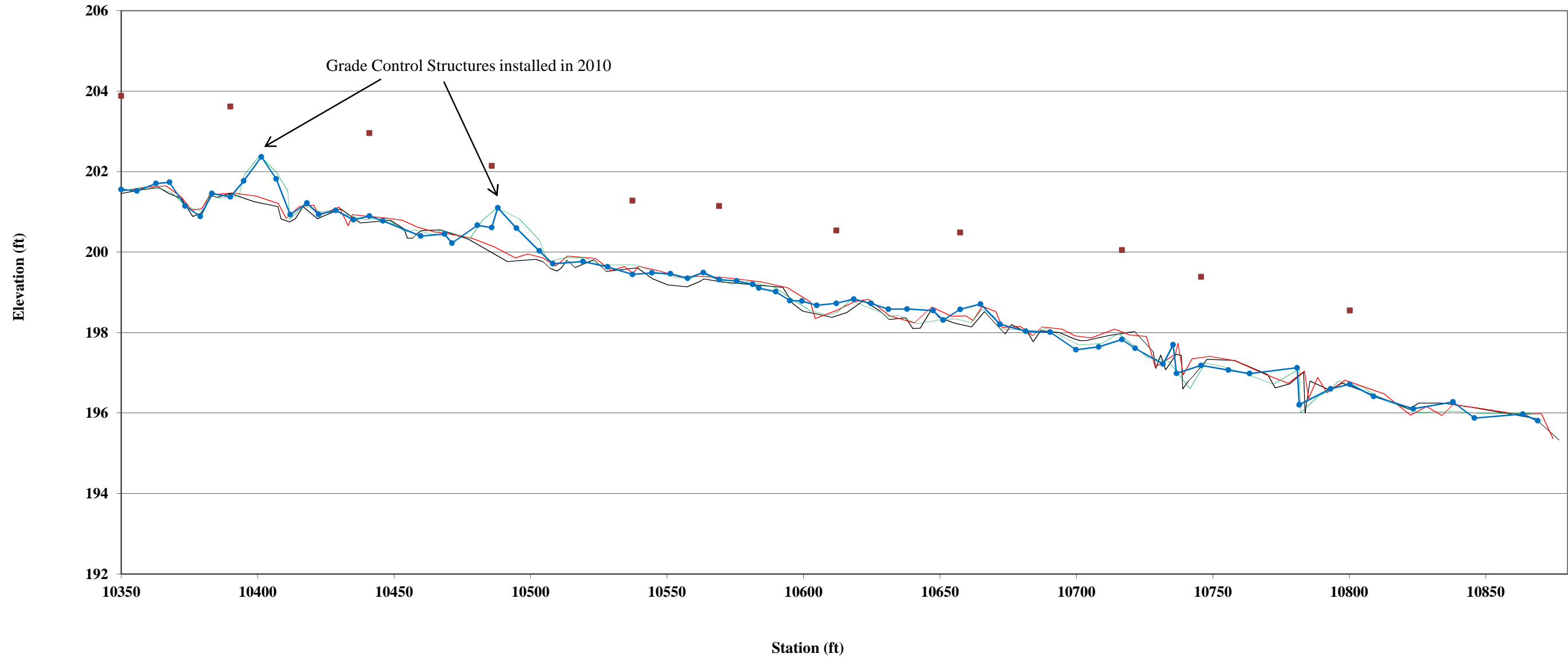
Farrar Dairy Longitudinal Profile
Tributary 1.2 MY-03
Stations 91+45 - 96+70



As-Built, 4/29/09 MY-01, 10/29/09 MY-02, 11/16/10 MY-03, 9/16/11 Bankfull

*No WS due to no flow in channel during survey.

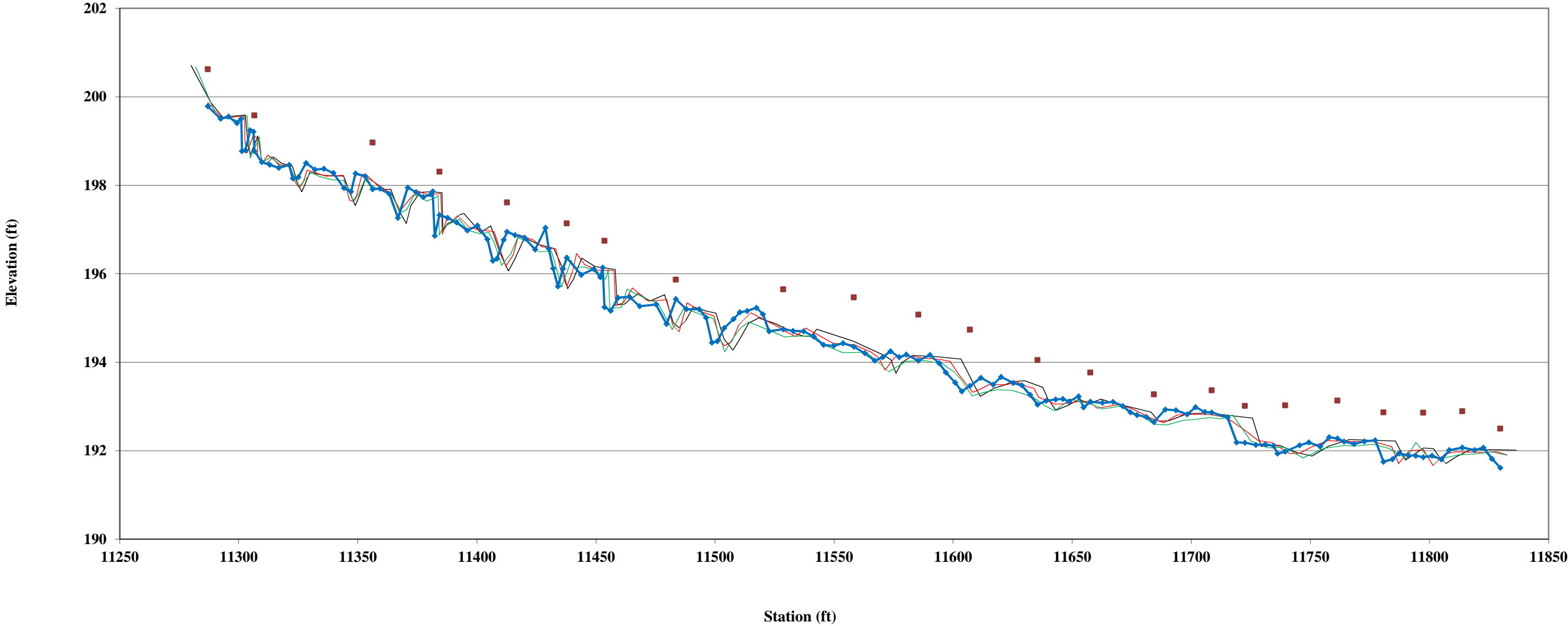
**Farrar Dairy Longitudinal Profile
Tributary 1 MY-03
Stations 103+50 - 108+77**



— As-Built, 4/30/09 — MY-01, 10/29/09 — MY-02, 11/22/10 —●— MY-03, 10/26/11 ■ Bankfull

*No WS due to no flow in channel during survey.

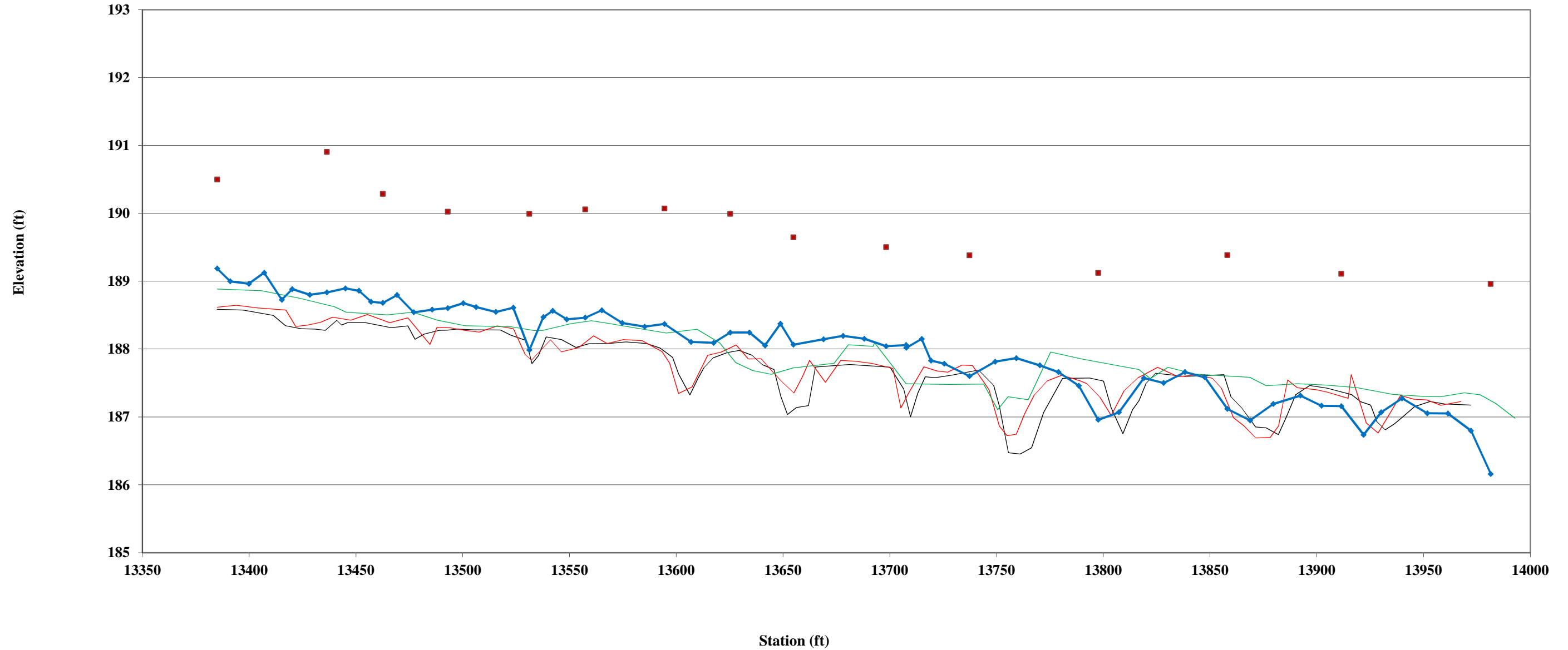
Farrar Dairy Longitudinal Profile
Tributary 2 MY-03
Stations 112+80 - 118+37



As-Built, 5/8/09 MY-01, 11/2/09 MY-02, 11/17/10 MY-03, 10/4/11 Bankfull

*No WS due to no flow in channel during survey.

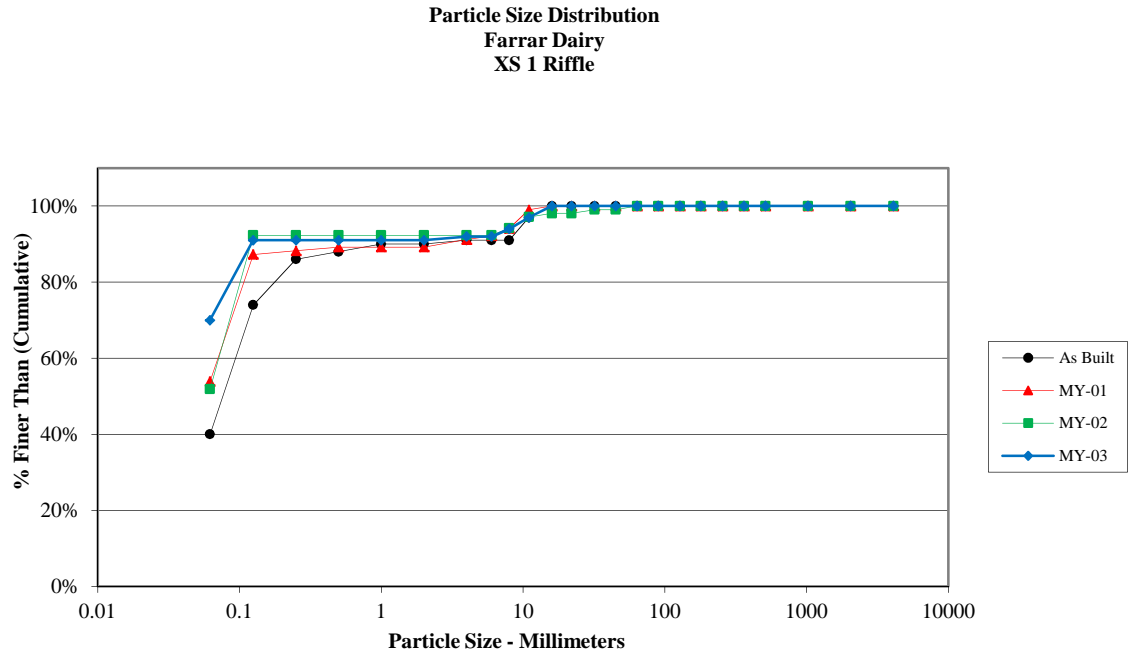
**Farrar Dairy Longitudinal Profile
Tributary 3 MY-03
Stations 133+85 - 139+73**



— As-Built, 5/8/09
— MY-01, 11/5/09
— MY-02, 11/18/10
—●— MY-03, 10/5/11
■ Bankfull

*No WS due to no flow in channel during survey.

Cross-Section 1 Riffle - MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	70
Very Fine	.062 - .125	S	21
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		1
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	2
Medium	8 - 11.3	A	3
Medium	11.3 - 16	V	3
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100
Note:			

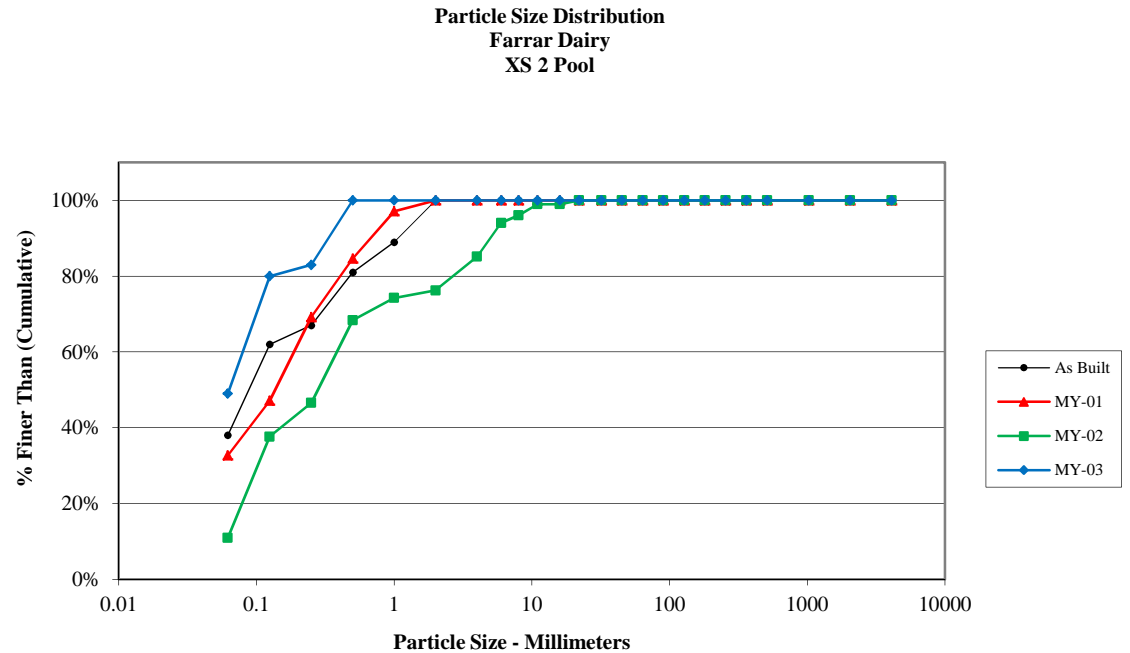


Size (mm)	
D16	0.062
D35	0.062
D50	0.062
D65	0.062
D84	0.099
D95	8.9

Size Distribution	
mean	0.1
dispersion	1.3
skewness	0.23

Type	
silt/clay	70%
sand	21%
gravel	9%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 2 Pool - MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	49
Very Fine	.062 - .125	S	31
Fine	.125 - .25	A	3
Medium	.25 - .50	N	17
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
	Total		100
Note:			

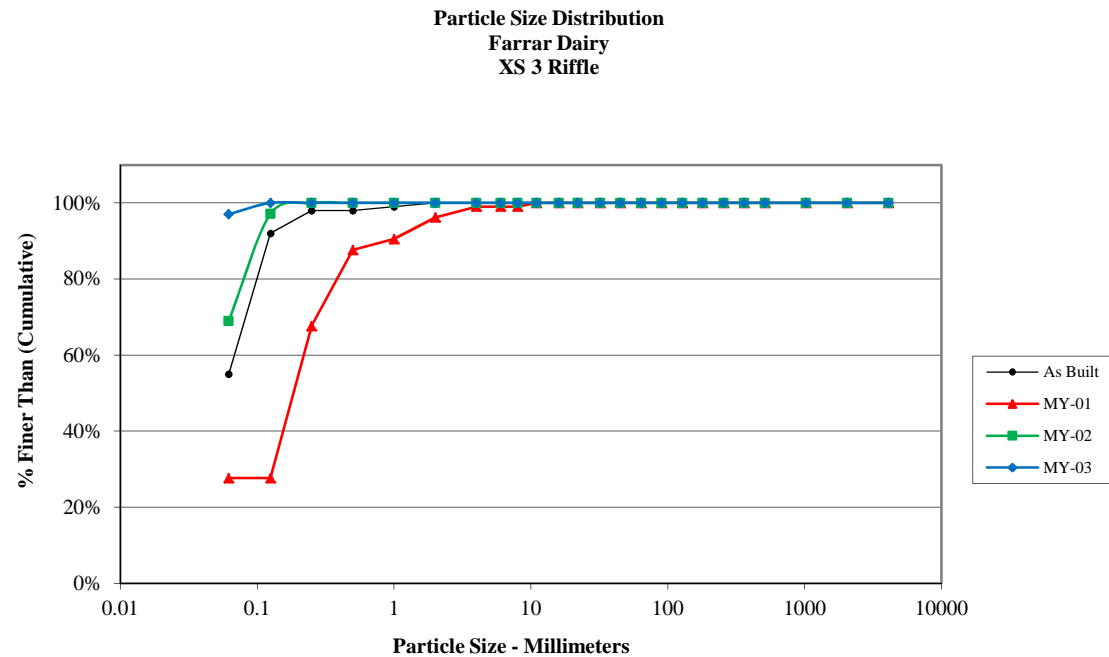


Size (mm)	
D16	0.062
D35	0.062
D50	0.063
D65	0.089
D84	0.26
D95	0.41

Size Distribution	
mean	0.1
dispersion	2.6
skewness	0.39

Type	
silt/clay	49%
sand	51%
gravel	0%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 3 Riffle - MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	97
Very Fine	.062 - .125	S	3
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100
Note:			

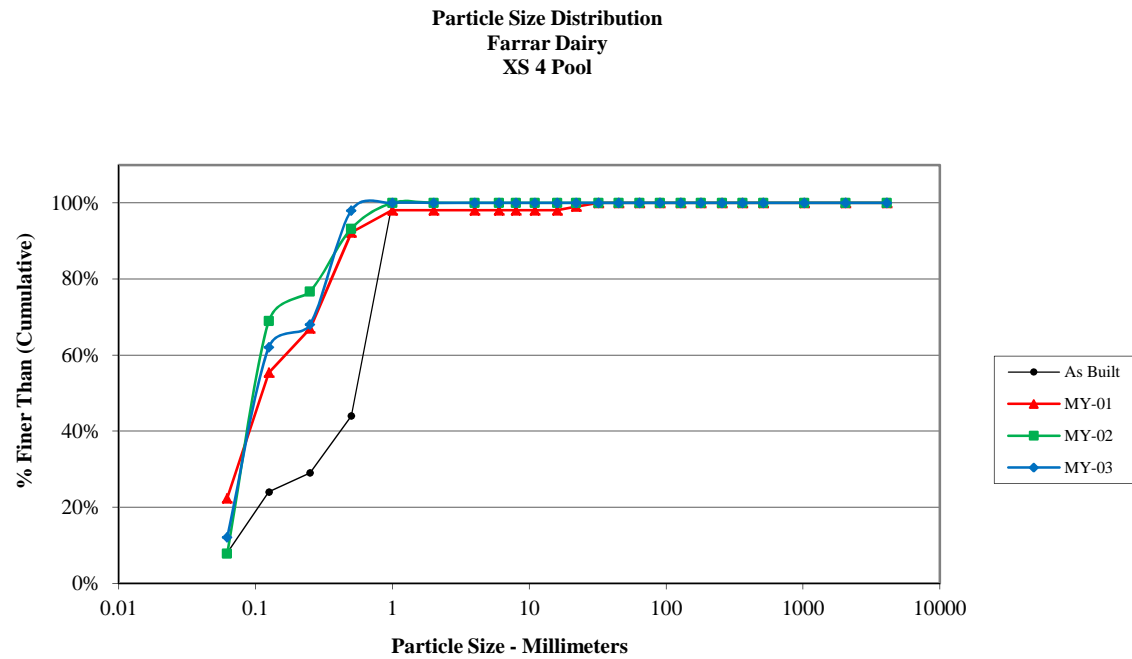


Size (mm)	
D16	0.062
D35	0.062
D50	0.062
D65	0.062
D84	0.062
D95	0.062

Size Distribution	
mean	0.1
dispersion	1.0
skewness	-

Type	
silt/clay	97%
sand	3%
gravel	0%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 4 Pool -MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	12
Very Fine	.062 - .125	S	50
Fine	.125 - .25	A	6
Medium	.25 - .50	N	30
Coarse	.50 - 1	D	2
Very Coarse	1 - 2	S	
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
	Total		100
Note:			

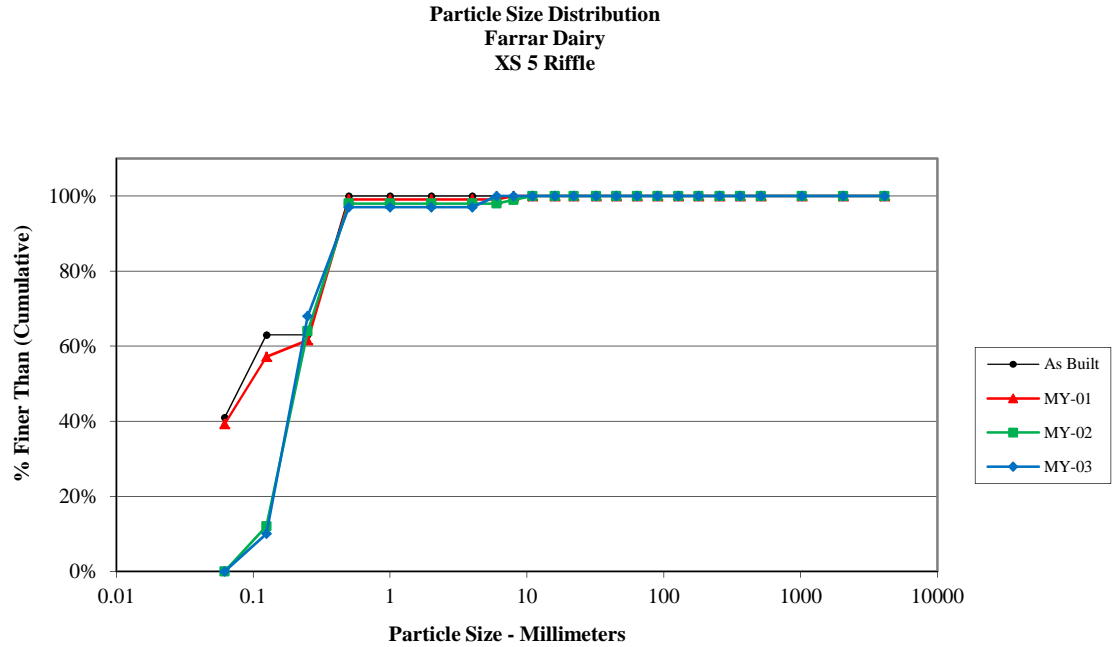


Size (mm)	
D16	0.066
D35	0.086
D50	0.11
D65	0.18
D84	0.36
D95	0.47

Size Distribution	
mean	0.2
dispersion	2.5
skewness	0.17

Type	
silt/clay	12%
sand	88%
gravel	0%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 5 Riffle - MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	10
Fine	.125 - .25	A	58
Medium	.25 - .50	N	29
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		
Fine	4 - 5.7	G	3
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100
Note:			

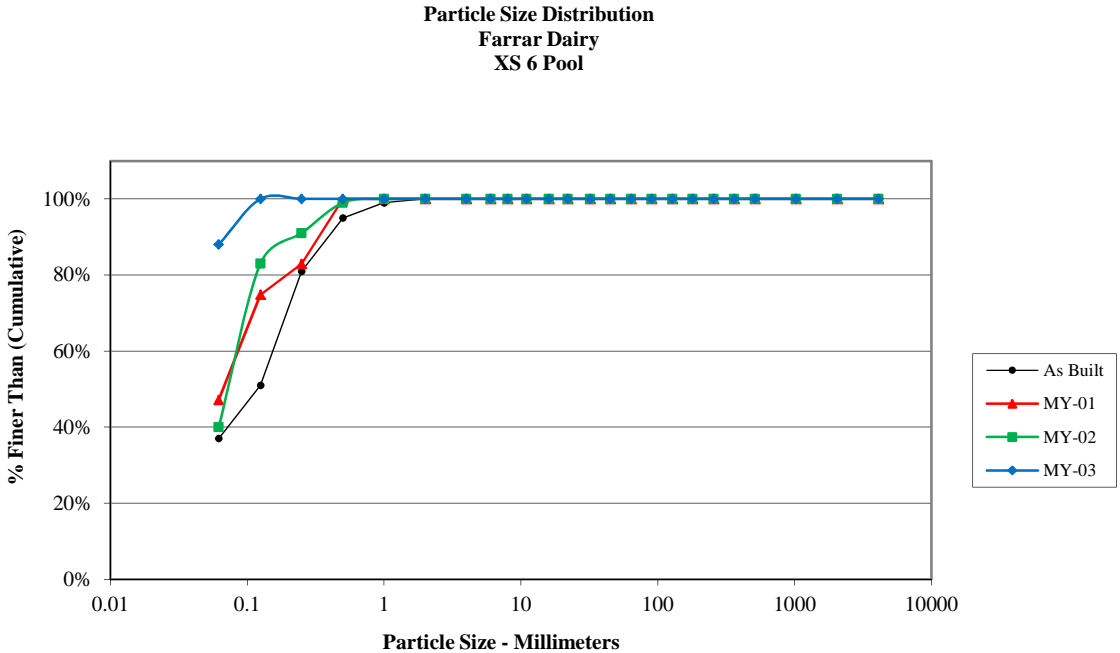


Size (mm)	
D16	0.13
D35	0.17
D50	0.20
D65	0.24
D84	0.37
D95	0.48

Size Distribution	
mean	0.2
dispersion	1.7
skewness	0.06

Type	
silt/clay	0%
sand	97%
gravel	3%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 6 Pool -MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	88
Very Fine	.062 - .125	S	12
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100
Note:			

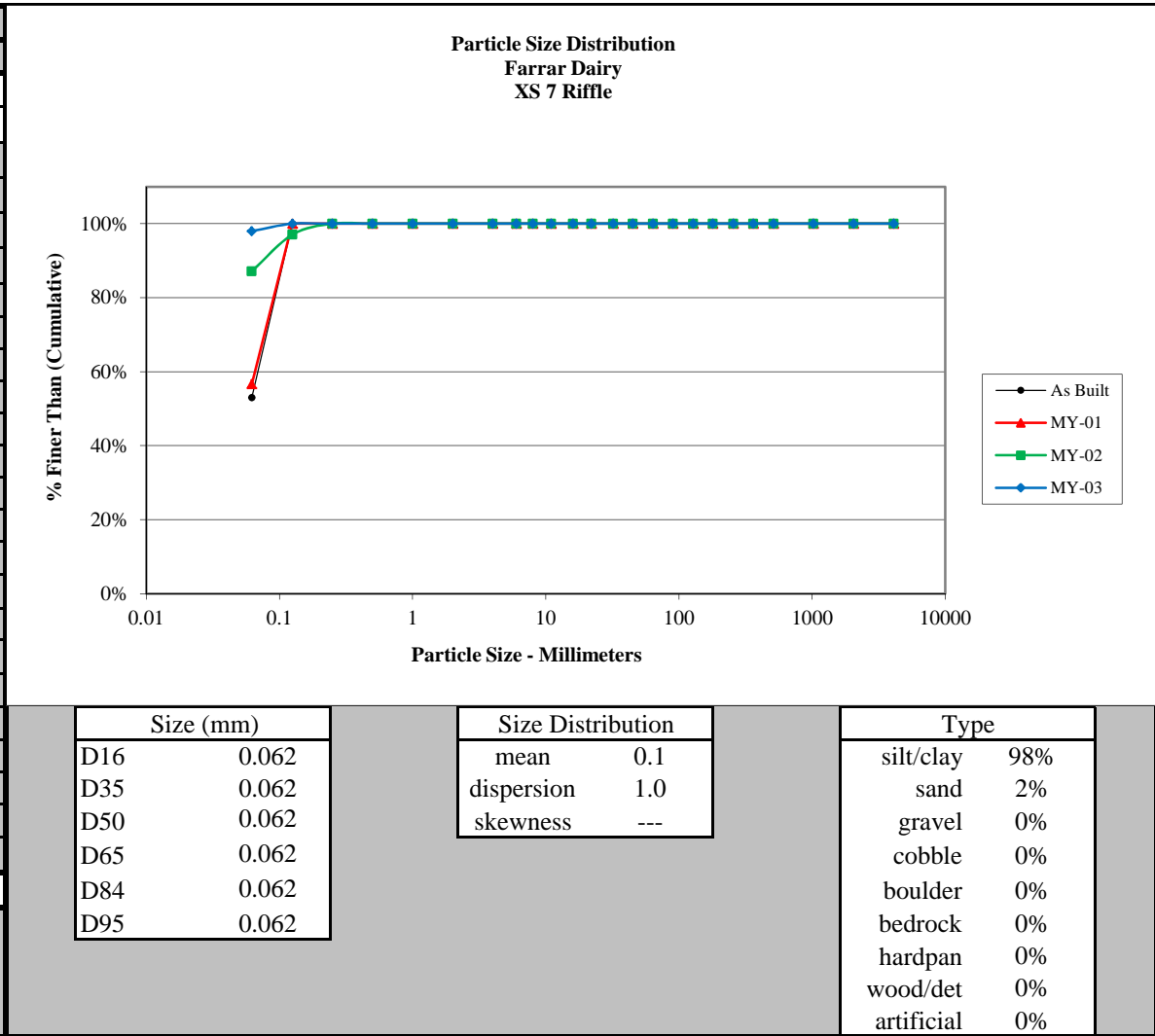


Size (mm)	
D16	0.062
D35	0.062
D50	0.062
D65	0.062
D84	0.062
D95	0.093

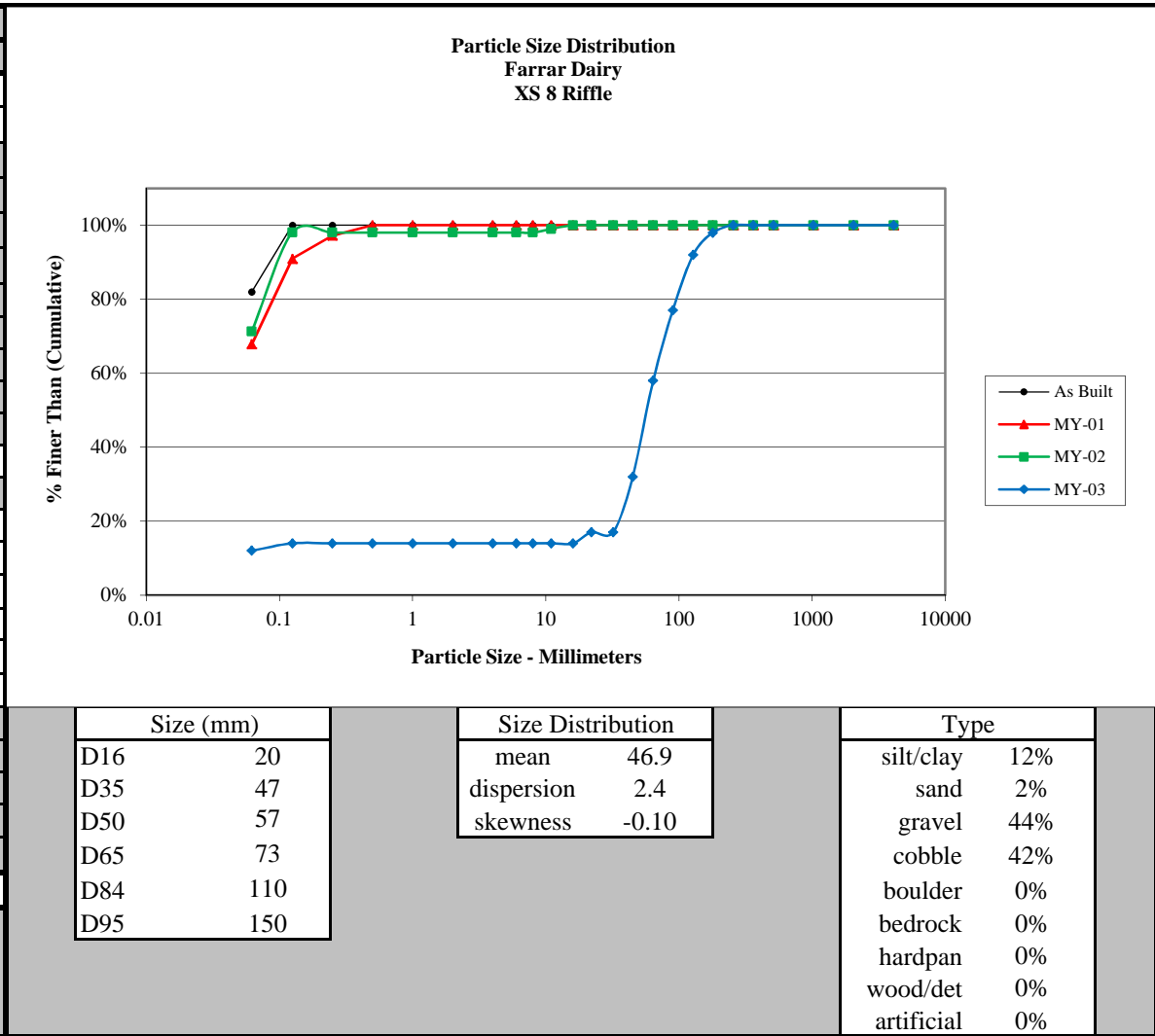
Size Distribution	
mean	0.1
dispersion	1.0
skewness	-

Type	
silt/clay	88%
sand	12%
gravel	0%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

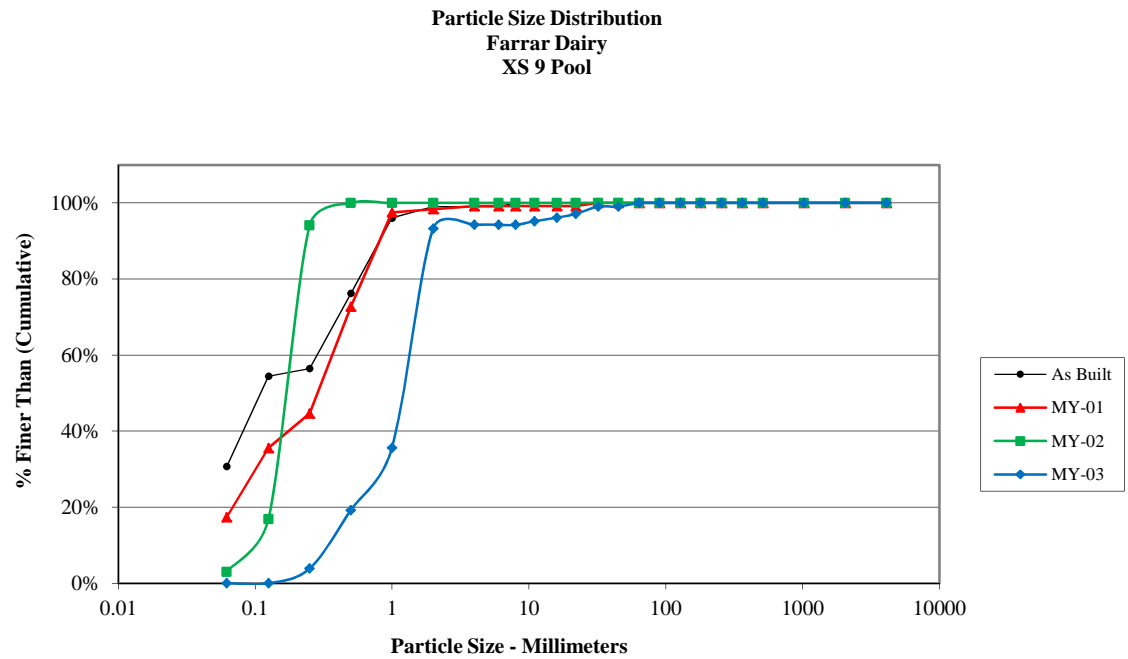
Cross-Section 7 Riffle - MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	98
Very Fine	.062 - .125	S	2
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100
Note:			



Cross-Section 8 Riffle -MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	12
Very Fine	.062 - .125	S	2
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	3
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	15
Very Coarse	45 - 64		26
Small	64 - 90	C	19
Small	90 - 128	O	15
Large	128 - 180	B	6
Large	180 - 256	L	2
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100
Note:			



Cross-Section 9 Pool - MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	4
Medium	.25 - .50	N	16
Coarse	.50 - 1	D	17
Very Coarse	1 - 2	S	60
Very Fine	2 - 4		1
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	1
Medium	11.3 - 16	V	1
Coarse	16 - 22.6	E	1
Coarse	22.6 - 32	L	2
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		1
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	104
Note:			

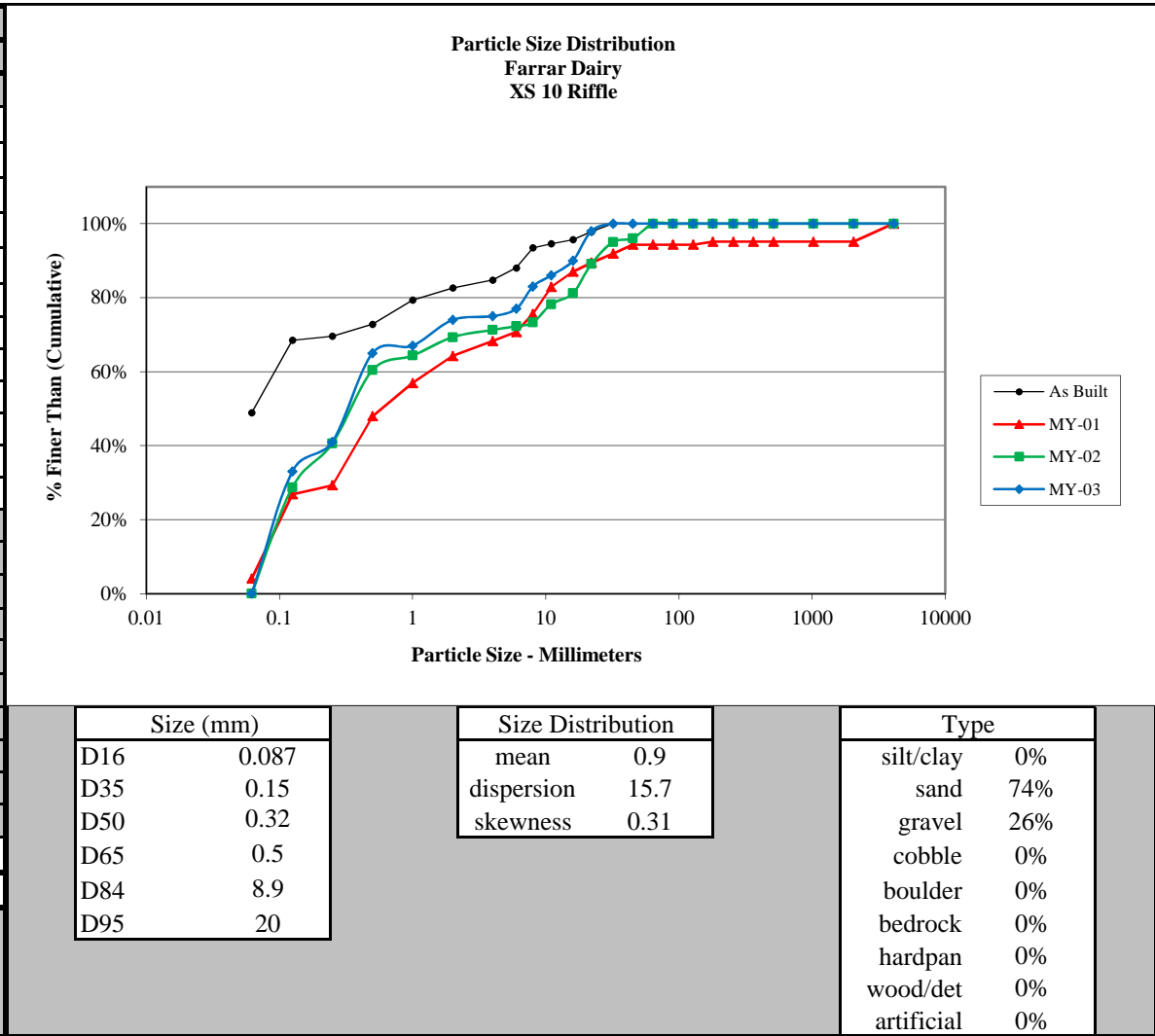


Size (mm)	
D16	0.43
D35	0.98
D50	1.2
D65	1.4
D84	1.8
D95	10

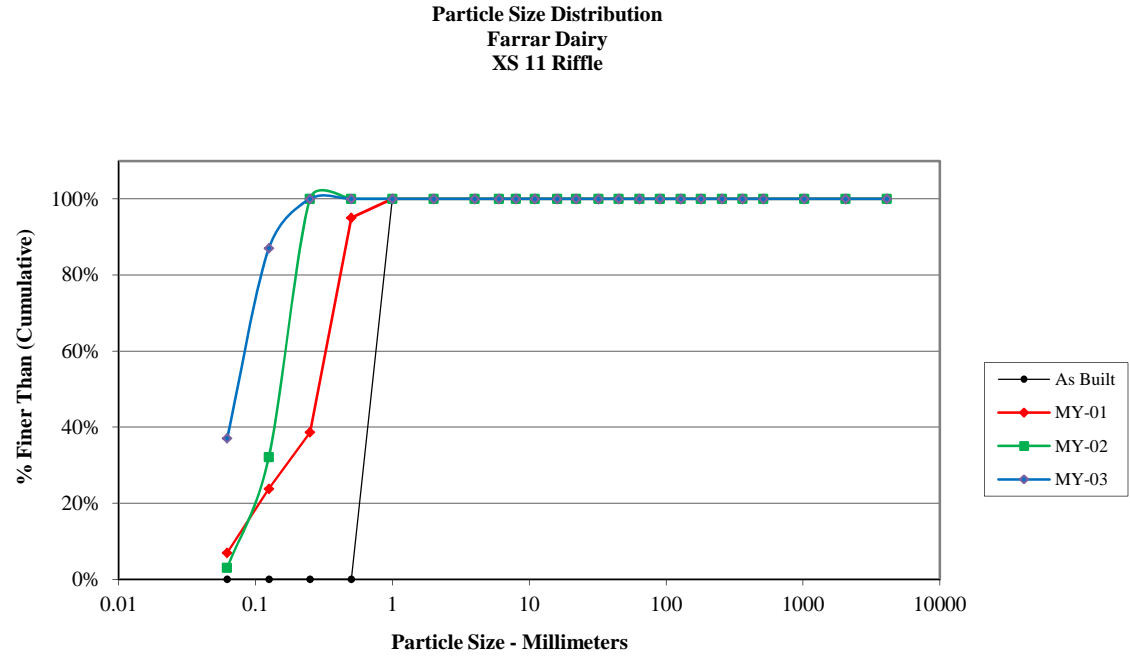
Size Distribution	
mean	0.9
dispersion	2.1
skewness	-0.17

Type	
silt/clay	0%
sand	93%
gravel	7%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 10 Riffle - MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	33
Fine	.125 - .25	A	8
Medium	.25 - .50	N	24
Coarse	.50 - 1	D	2
Very Coarse	1 - 2	S	7
Very Fine	2 - 4		1
Fine	4 - 5.7	G	2
Fine	5.7 - 8	R	6
Medium	8 - 11.3	A	3
Medium	11.3 - 16	V	4
Coarse	16 - 22.6	E	8
Coarse	22.6 - 32	L	2
Very Coarse	32 - 45		
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100
Note:			



Cross-Section 11 Riffle - MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	37
Very Fine	.062 - .125	S	50
Fine	.125 - .25	A	13
Medium	.25 - .50	N	
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100
Note:			

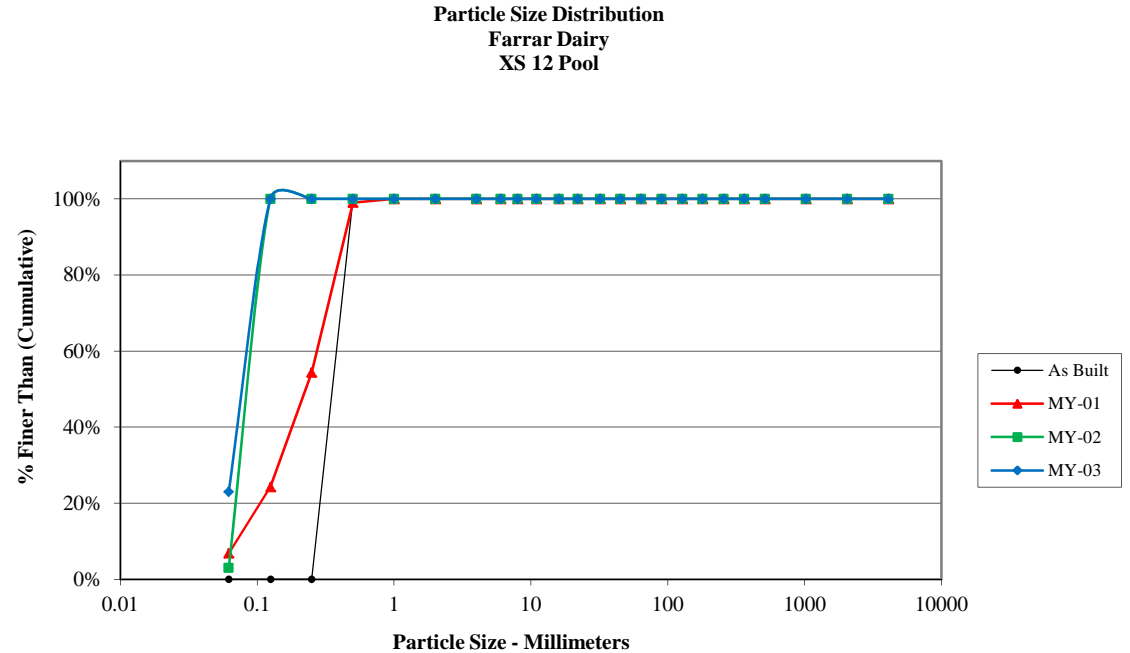


Size (mm)	
D16	0.062
D35	0.062
D50	0.074
D65	0.092
D84	0.12
D95	0.19

Size Distribution	
mean	0.1
dispersion	1.4
skewness	0.12

Type	
silt/clay	37%
sand	63%
gravel	0%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 12 Pool - MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	23
Very Fine	.062 - .125	S	77
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
	Total		100
Note:			

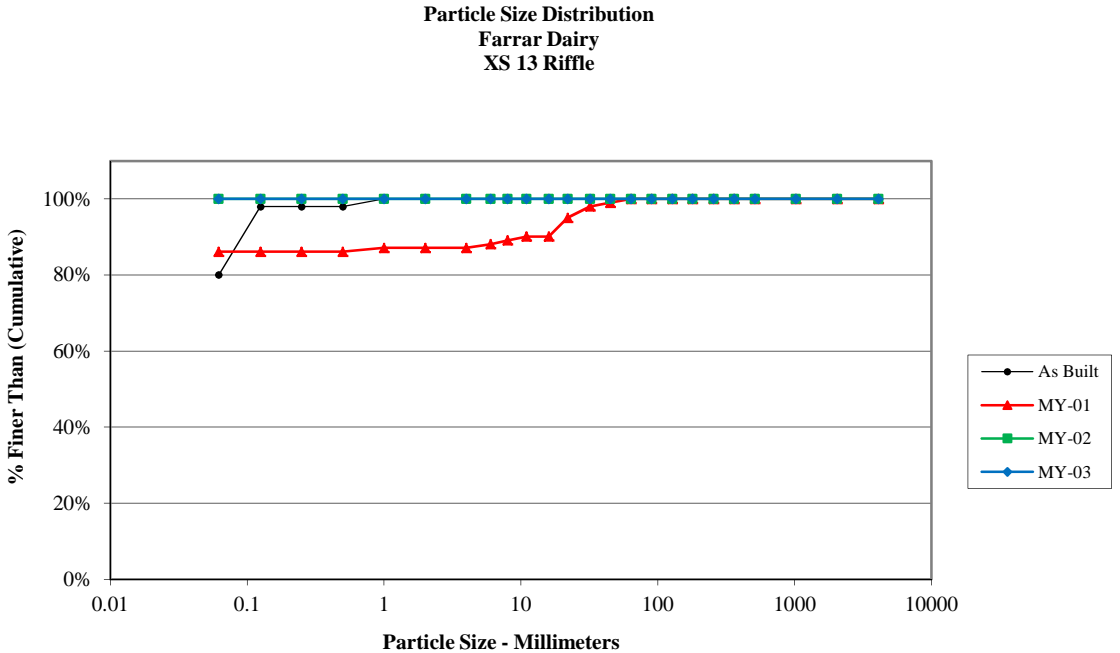


Size (mm)	
D16	0.062
D35	0.069
D50	0.079
D65	0.091
D84	0.11
D95	0.12

Size Distribution	
mean	0.1
dispersion	1.3
skewness	0.04

Type	
silt/clay	23%
sand	77%
gravel	0%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 13 Riffle - MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	100
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100
Note:			

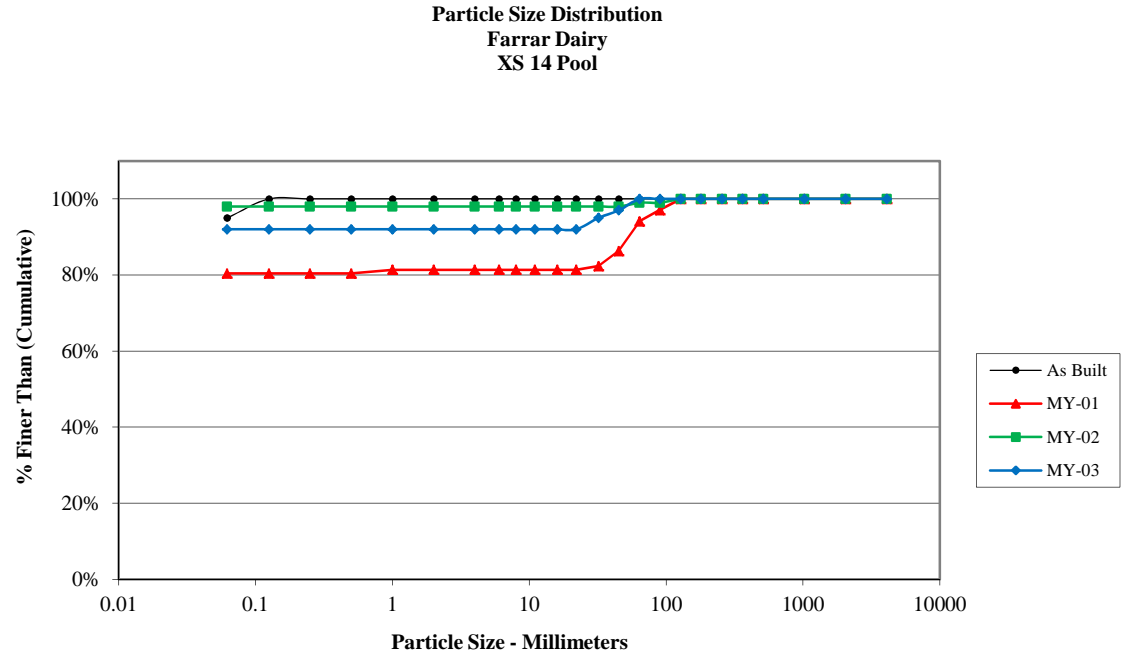


Size (mm)	
D16	0.062
D35	0.062
D50	0.062
D65	0.062
D84	0.062
D95	0.062

Size Distribution	
mean	0.1
dispersion	1.0
skewness	---

Type	
silt/clay	100%
sand	0%
gravel	0%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 14 Pool - MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	92
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	3
Very Coarse	32 - 45	S	2
Very Coarse	45 - 64		3
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100
Note:			

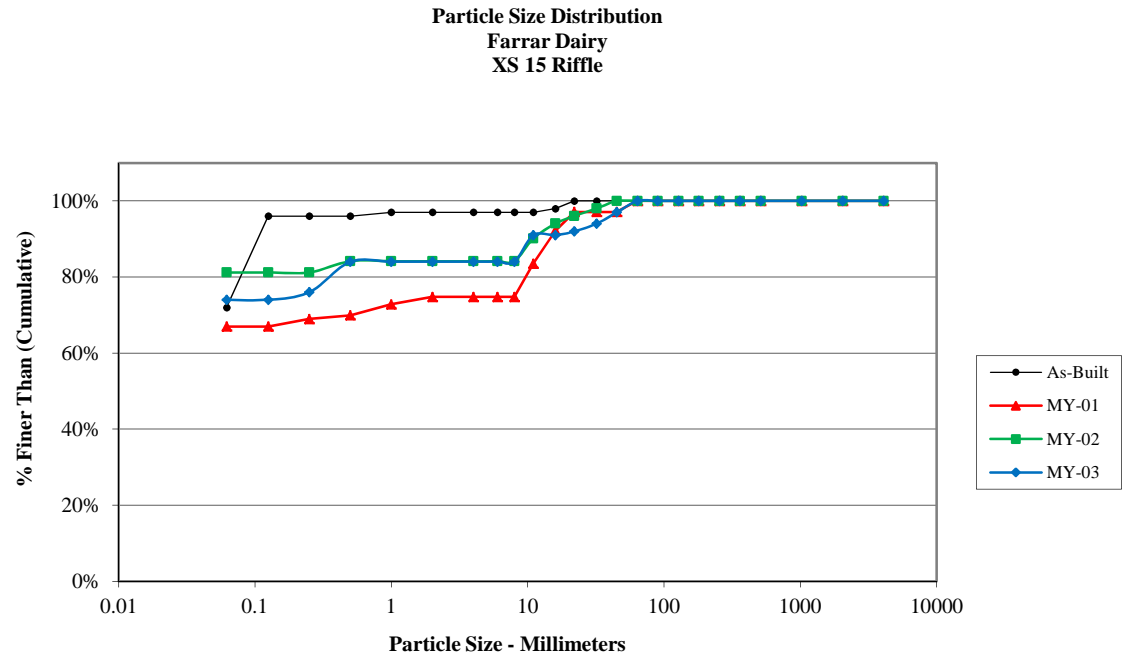


Size (mm)	
D16	0.062
D35	0.062
D50	0.062
D65	0.062
D84	0.062
D95	32

Size Distribution	
mean	0.1
dispersion	1.0
skewness	---

Type	
silt/clay	92%
sand	0%
gravel	8%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 15 Riffle - MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	74
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	2
Medium	.25 - .50	N	8
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	7
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	1
Coarse	22.6 - 32	L	2
Very Coarse	32 - 45	S	3
Very Coarse	45 - 64		3
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100
Note:			

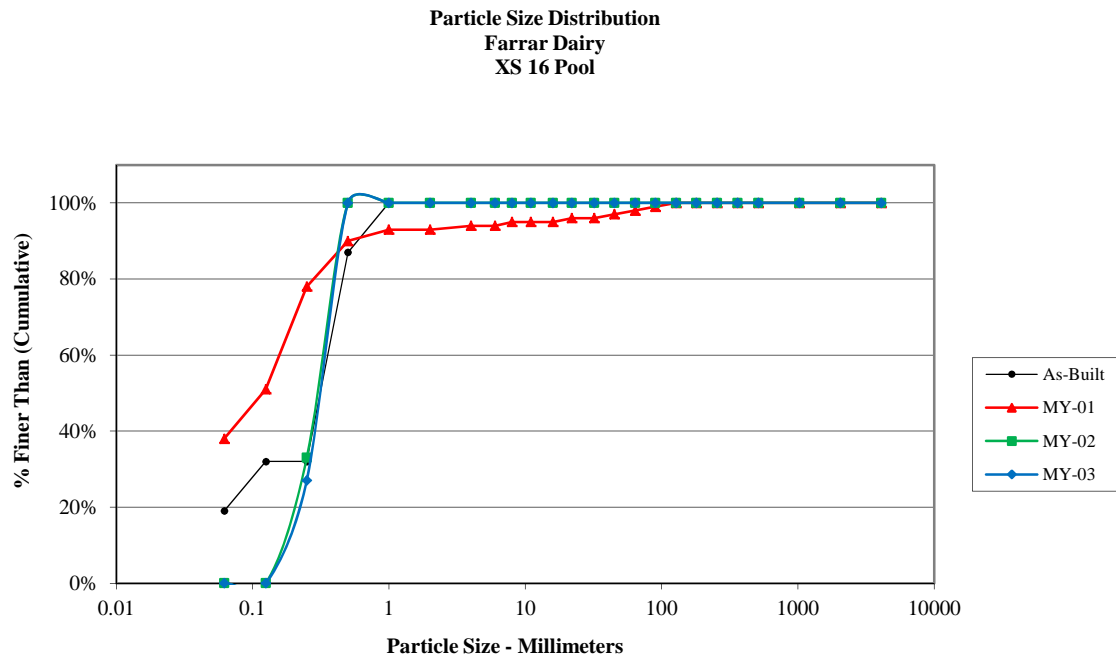


Size (mm)	
D16	0.062
D35	0.062
D50	0.062
D65	0.062
D84	0.5
D95	36

Size Distribution	
mean	0.2
dispersion	4.5
skewness	0.48

Type	
silt/clay	74%
sand	10%
gravel	16%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 16 Pool -MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	27
Medium	.25 - .50	N	73
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
	Total		100
Note:			

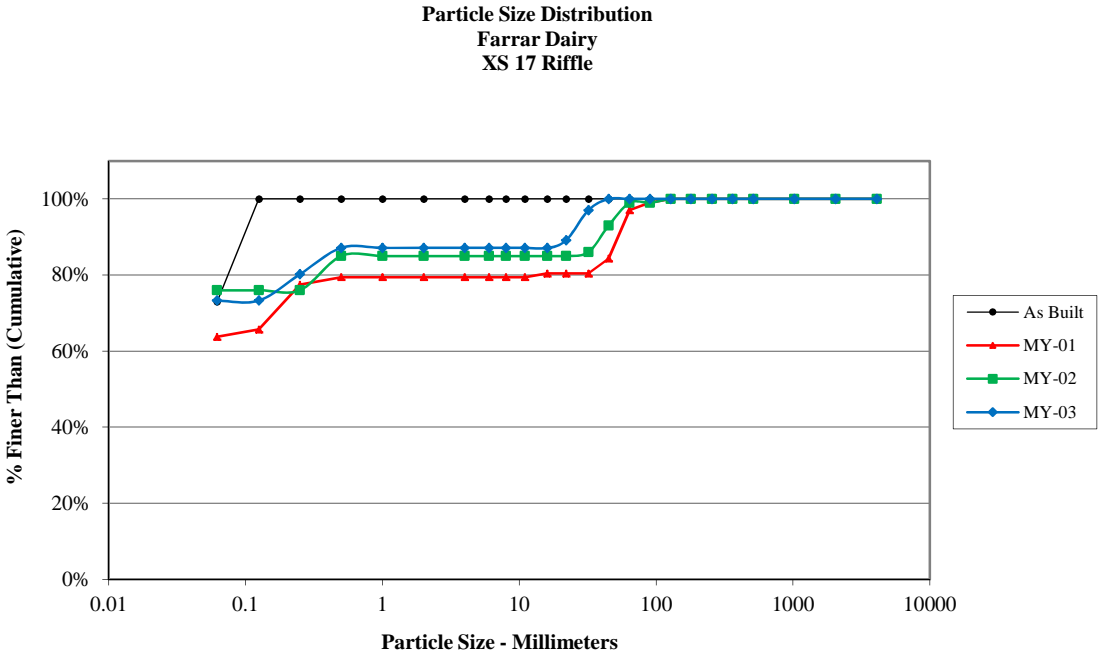


Size (mm)	
D16	0.19
D35	0.27
D50	0.31
D65	0.36
D84	0.43
D95	0.48

Size Distribution	
mean	0.3
dispersion	1.5
skewness	-0.06

Type	
silt/clay	0%
sand	100%
gravel	0%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 17 Riffle - MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	74
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	7
Medium	.25 - .50	N	7
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	2
Coarse	22.6 - 32	L	8
Very Coarse	32 - 45	S	3
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
	Total		101
Note:			

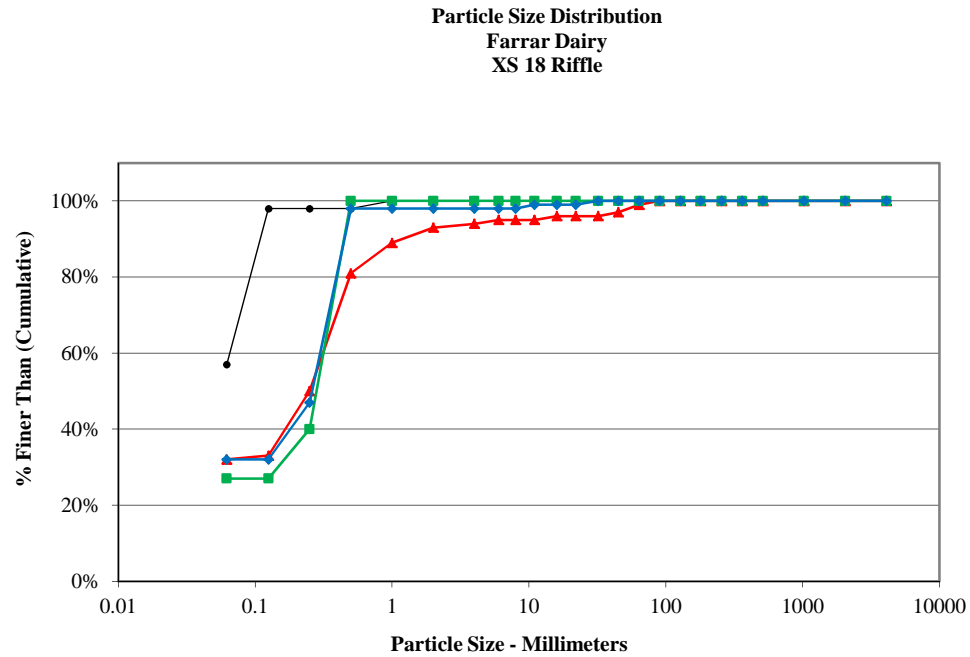


Size (mm)	
D16	0.062
D35	0.062
D50	0.062
D65	0.062
D84	0.37
D95	29

Size Distribution	
mean	0.2
dispersion	3.5
skewness	0.44

Type	
silt/clay	73%
sand	14%
gravel	13%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 18 Riffle - MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	32
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	15
Medium	.25 - .50	N	51
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	1
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	1
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
	Total		100
Note:			

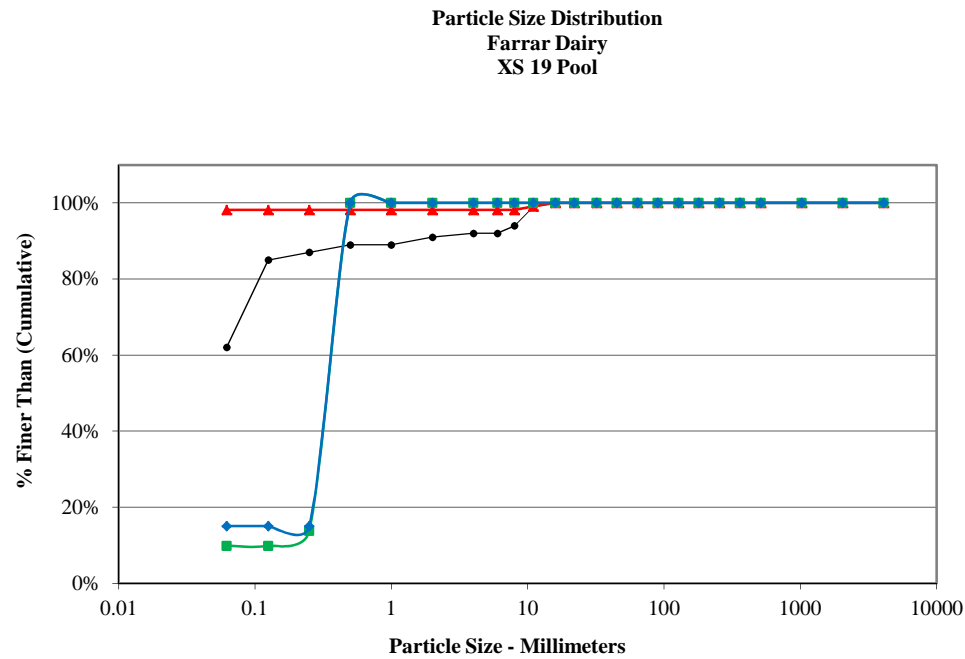


Size (mm)	
D16	0.062
D35	0.14
D50	0.26
D65	0.32
D84	0.41
D95	0.48

Size Distribution	
mean	0.2
dispersion	2.9
skewness	-0.23

Type	
silt/clay	32%
sand	66%
gravel	2%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 19 Pool - MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	15
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	85
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
	Total		100
Note:			

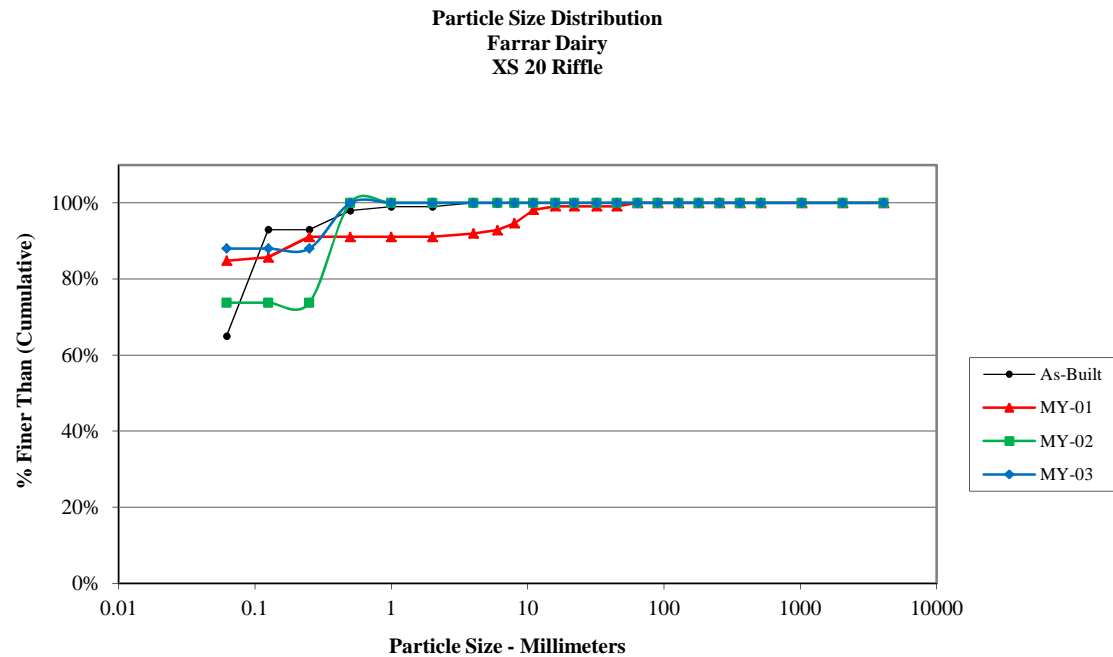


Size (mm)	
D16	0.25
D35	0.29
D50	0.33
D65	0.38
D84	0.44
D95	0.48

Size Distribution	
mean	0.3
dispersion	1.3
skewness	0.00

Type	
silt/clay	15%
sand	85%
gravel	0%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 20 Riffle - MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	88
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	12
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
	Total		100
Note:			

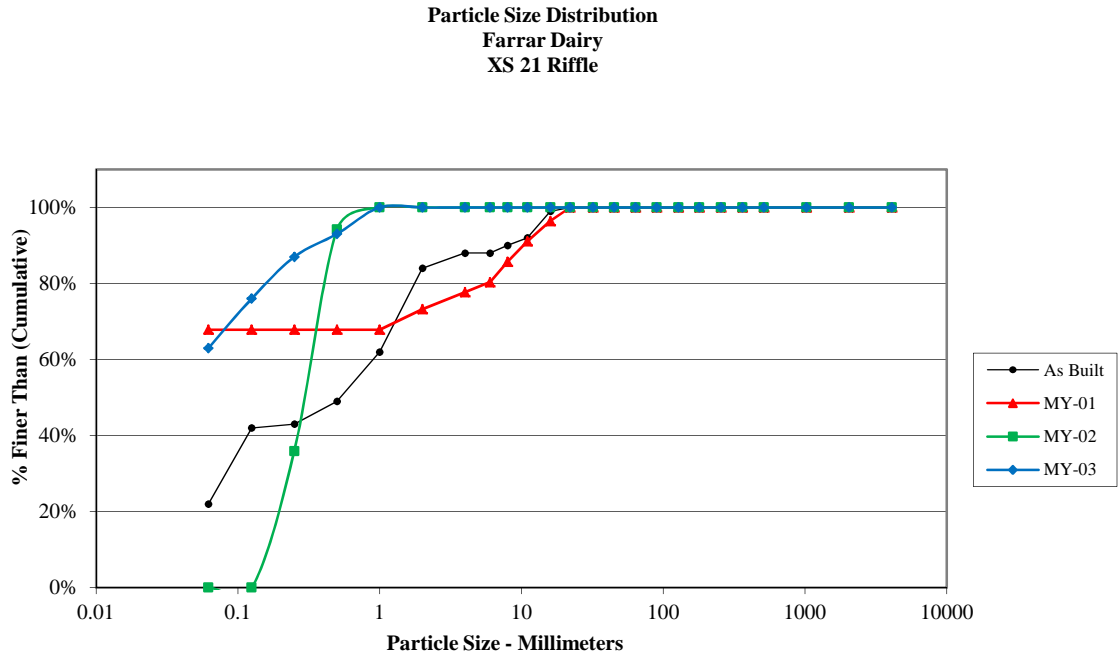


Size (mm)	
D16	0.062
D35	0.062
D50	0.062
D65	0.062
D84	0.062
D95	0.37

Size Distribution	
mean	0.1
dispersion	1.0
skewness	---

Type	
silt/clay	88%
sand	12%
gravel	0%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 21 Riffle - MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	63
Very Fine	.062 - .125	S	13
Fine	.125 - .25	A	11
Medium	.25 - .50	N	6
Coarse	.50 - 1	D	7
Very Coarse	1 - 2	S	
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100
Note:			

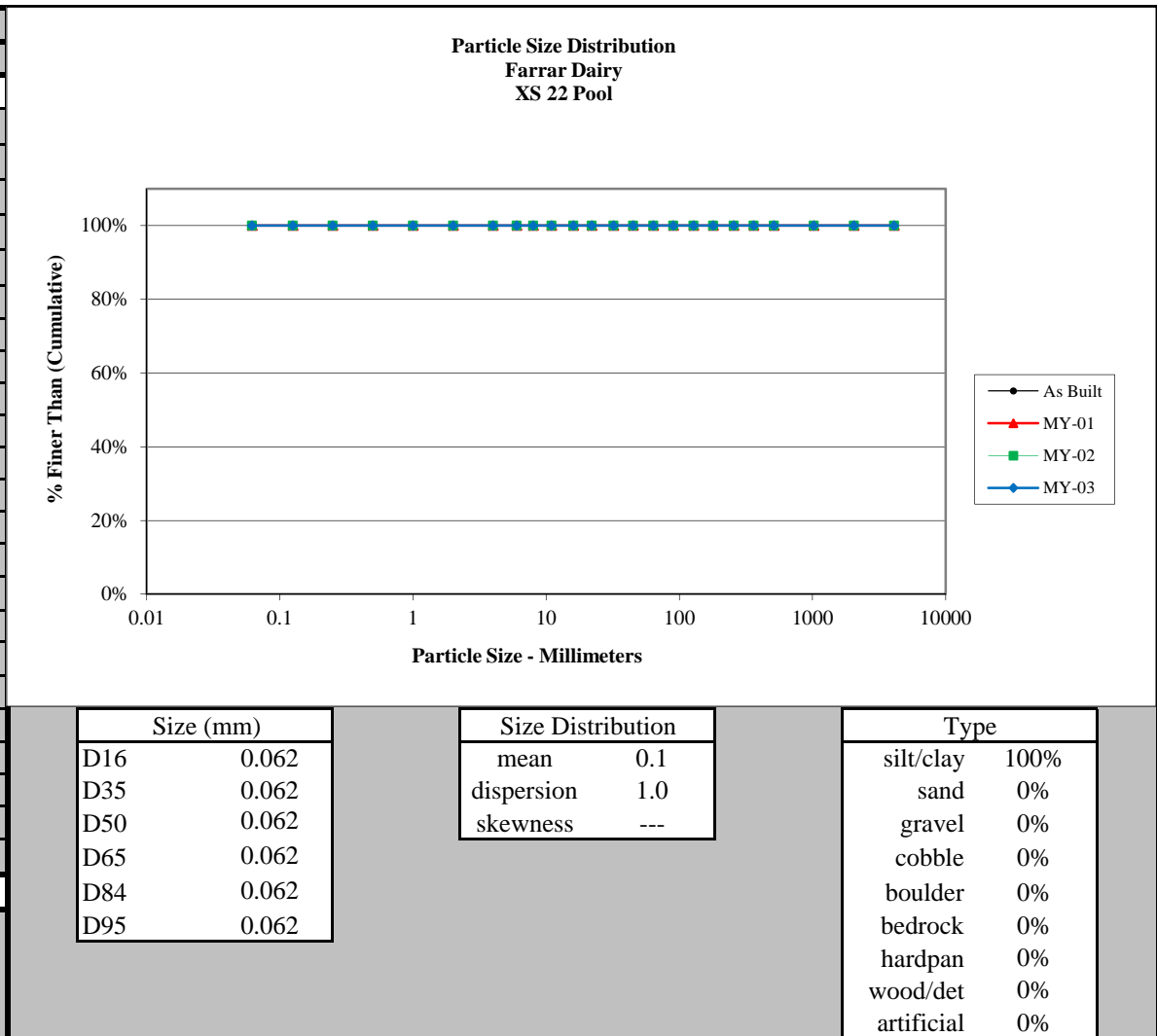


Size (mm)	
D16	0.062
D35	0.062
D50	0.062
D65	0.069
D84	0.21
D95	0.61

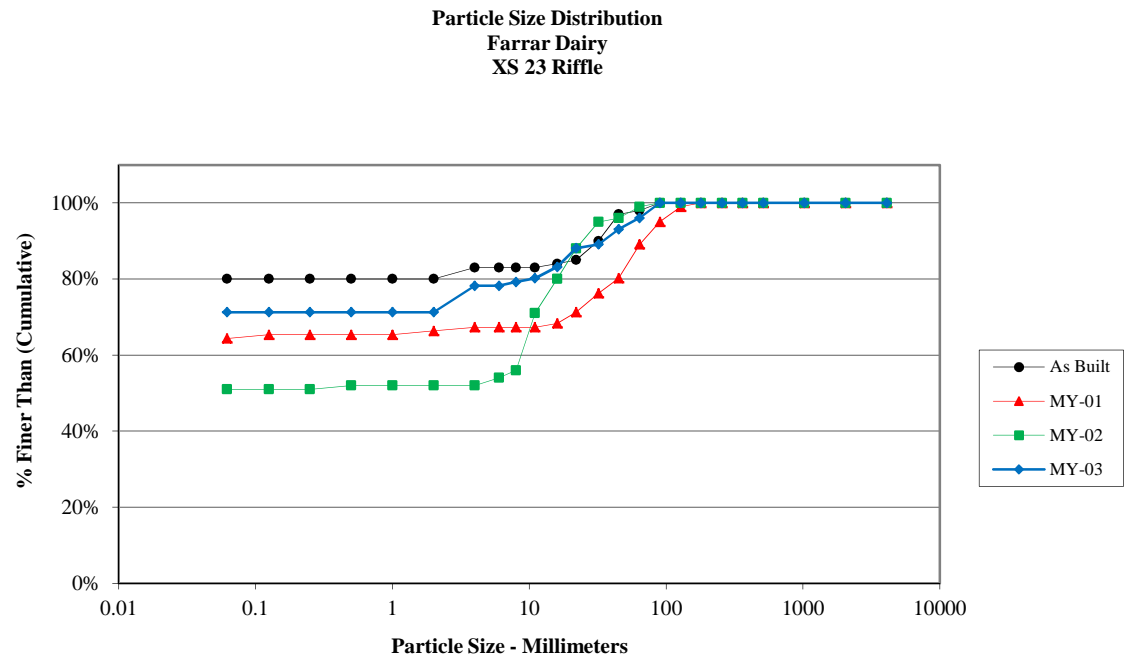
Size Distribution	
mean	0.1
dispersion	2.2
skewness	0.36

Type	
silt/clay	63%
sand	37%
gravel	0%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 22 Pool - MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	100
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100
Note:			



Cross-Section 23 Riffle - MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	72
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		7
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	1
Medium	8 - 11.3	A	1
Medium	11.3 - 16	V	3
Coarse	16 - 22.6	E	5
Coarse	22.6 - 32	L	1
Very Coarse	32 - 45	S	4
Very Coarse	45 - 64		3
Small	64 - 90	C	4
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	101
Note:			

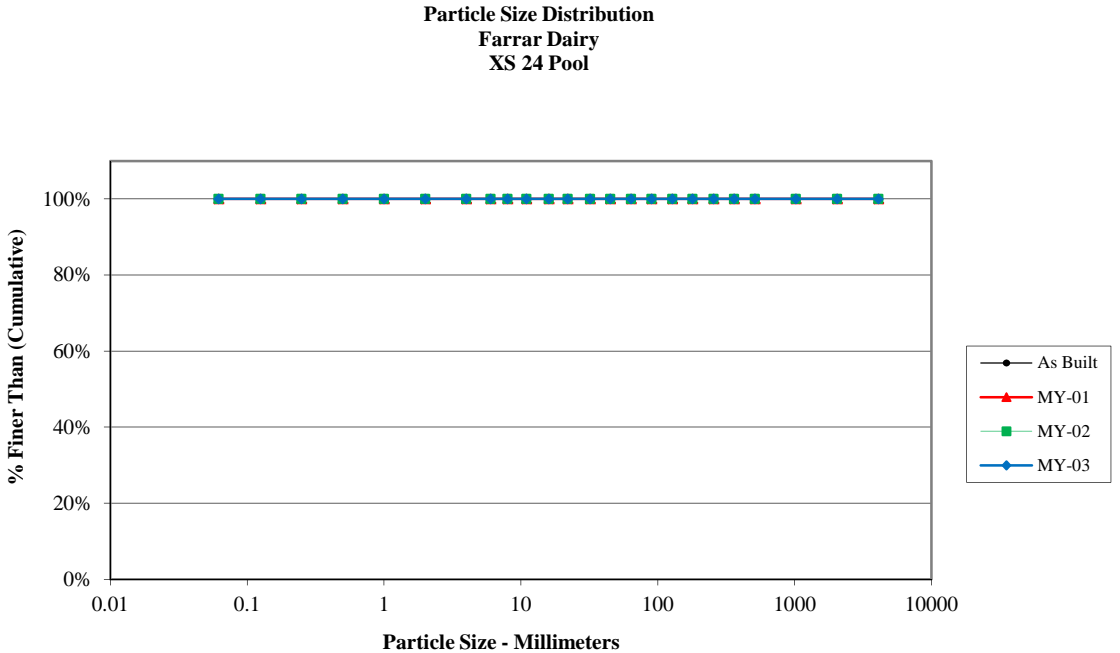


Size (mm)	Count
D16	0.062
D35	0.062
D50	0.062
D65	0.062
D84	17
D95	57

Size Distribution	
mean	1.0
dispersion	137.6
skewness	0.78

Type	
silt/clay	71%
sand	0%
gravel	25%
cobble	4%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 24 Pool - MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	100
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100
Note:			

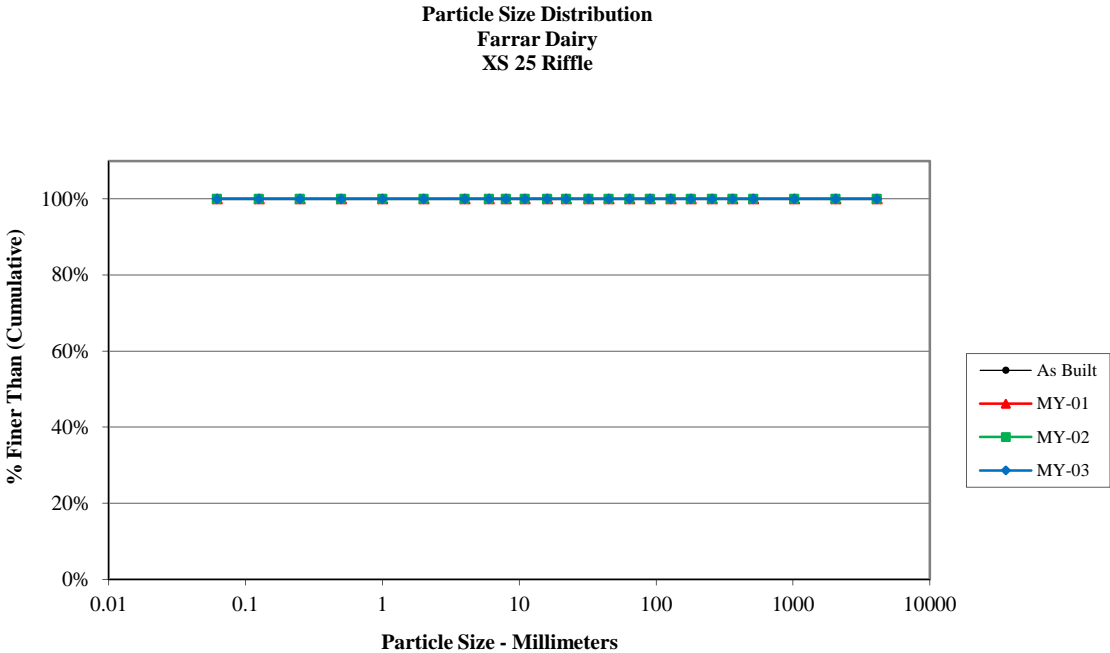


Size (mm)	
D16	0.062
D35	0.062
D50	0.062
D65	0.062
D84	0.062
D95	0.062

Size Distribution	
mean	0.1
dispersion	1.0
skewness	---

Type	
silt/clay	100%
sand	0%
gravel	0%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 25 Riffle - MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	100
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100
Note:			

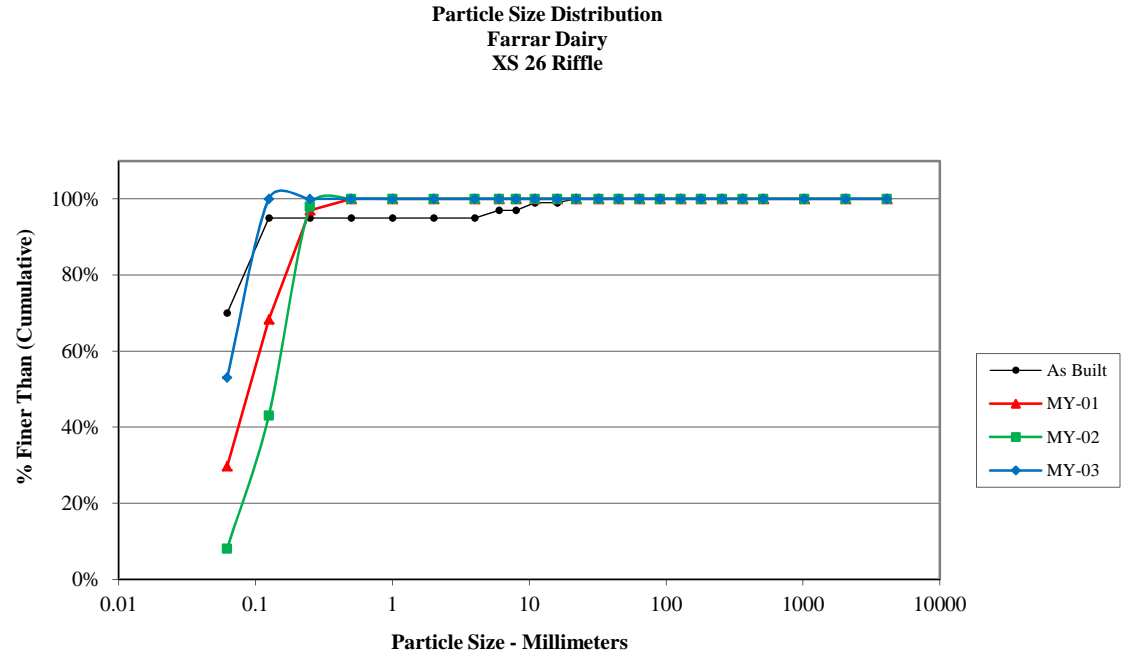


Size (mm)	
D16	0.062
D35	0.062
D50	0.062
D65	0.062
D84	0.062
D95	0.062

Size Distribution	
mean	0.1
dispersion	1.0
skewness	---

Type	
silt/clay	100%
sand	0%
gravel	0%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 26 Riffle - MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	53
Very Fine	.062 - .125	S	47
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
	Total		100
Note:			

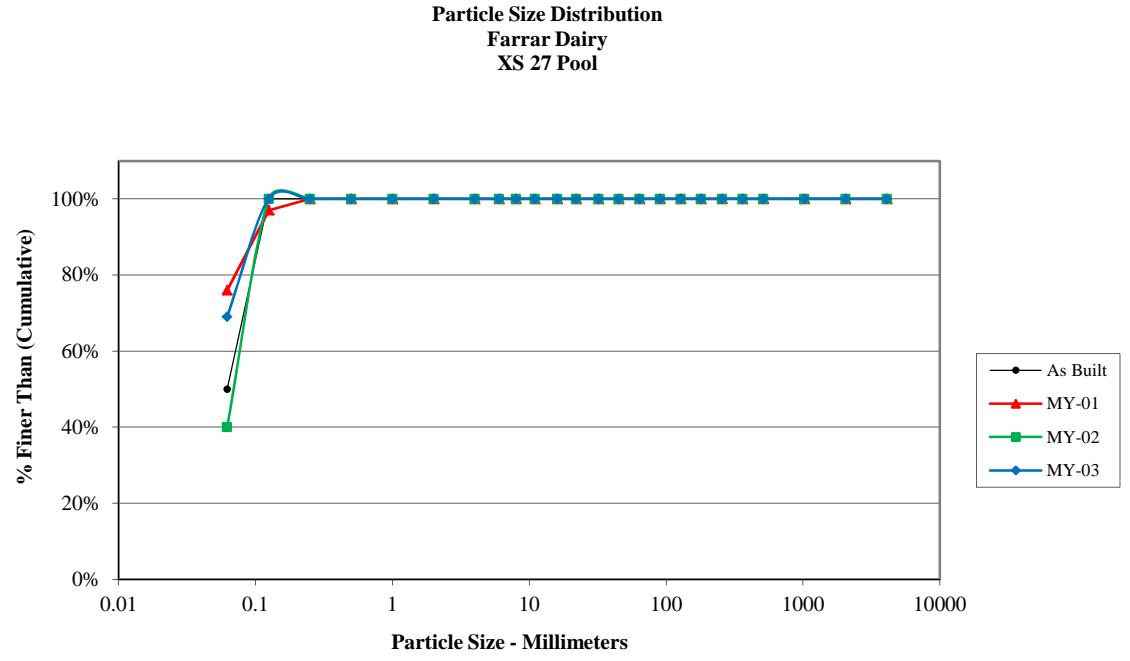


Size (mm)	
D16	0.062
D35	0.062
D50	0.062
D65	0.074
D84	0.098
D95	0.12

Size Distribution	
mean	0.1
dispersion	1.3
skewness	0.22

Type	
silt/clay	53%
sand	47%
gravel	0%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 27 Pool - MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	69
Very Fine	.062 - .125	S	31
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100
Note:			

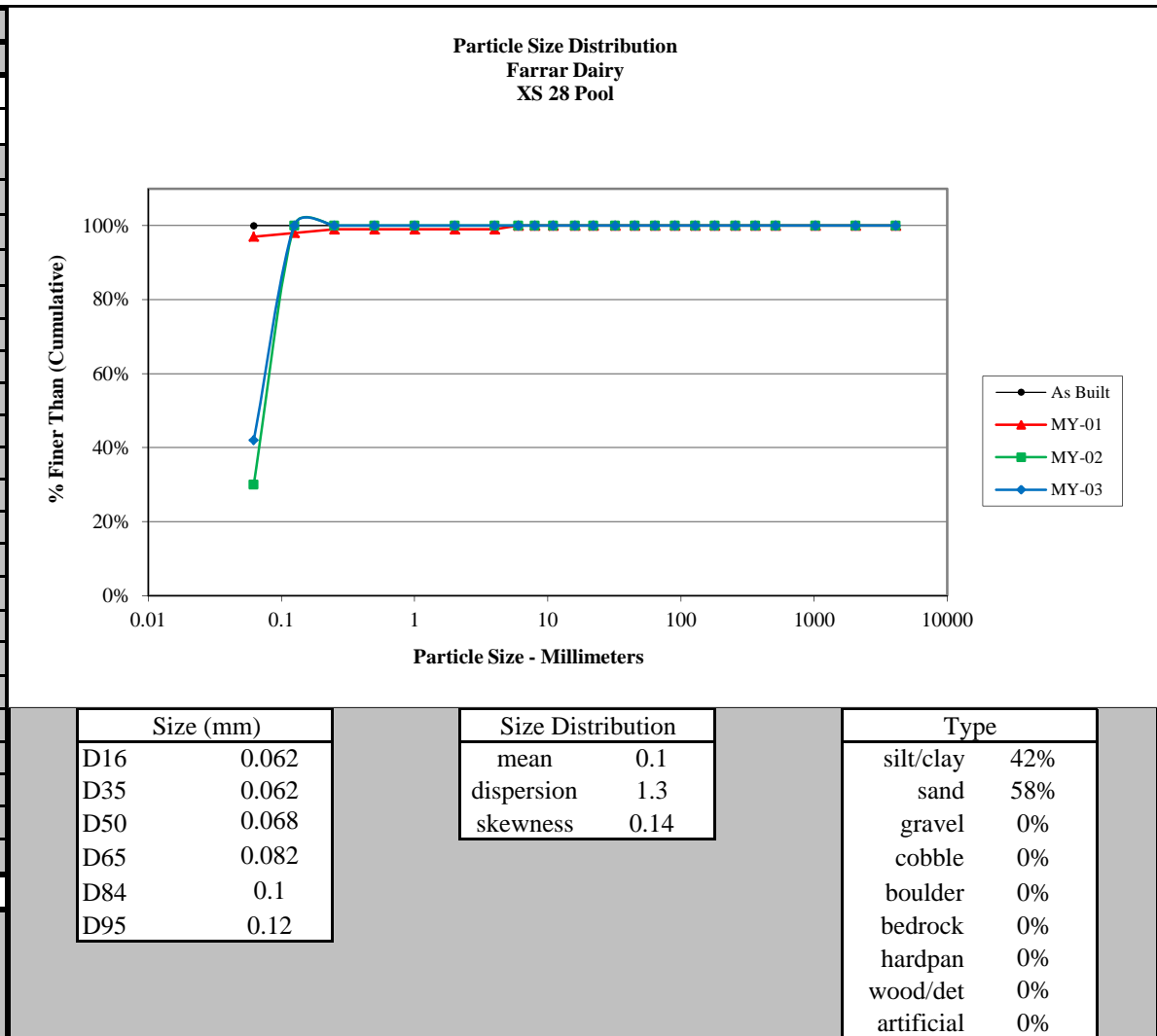


Size (mm)	
D16	0.062
D35	0.062
D50	0.062
D65	0.062
D84	0.087
D95	0.11

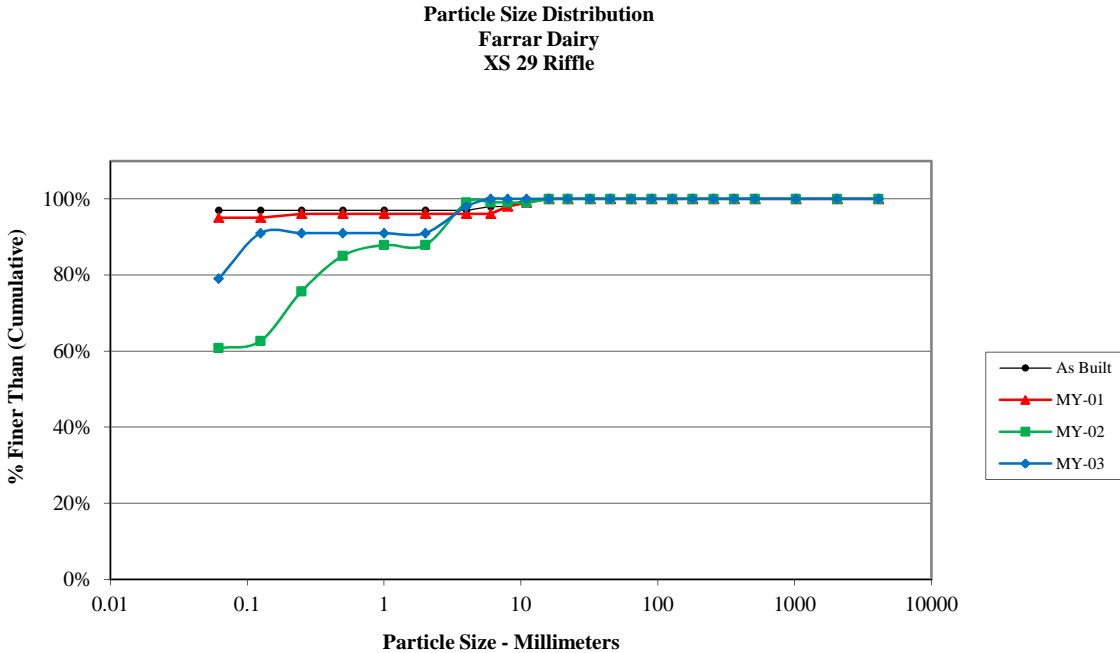
Size Distribution	
mean	0.1
dispersion	1.2
skewness	0.19

Type	
silt/clay	69%
sand	31%
gravel	0%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 28 Pool - MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	42
Very Fine	.062 - .125	S	58
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100
Note:			



Cross-Section 29 Riffle - MY-03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	79
Very Fine	.062 - .125	S	12
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	
Very Fine	2 - 4		7
Fine	4 - 5.7	G	2
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	100
Note:			

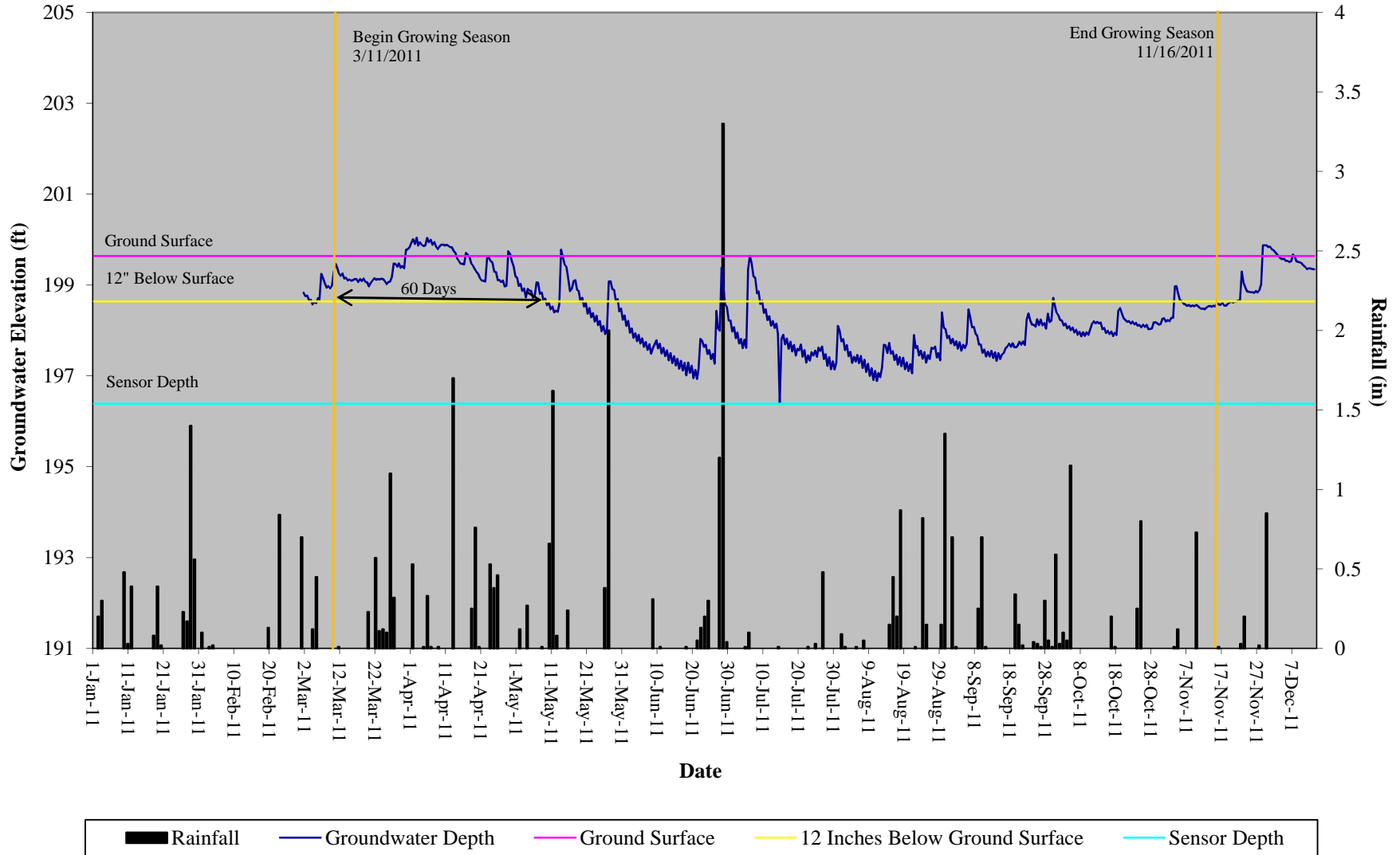


Size (mm)	
D16	0.062
D35	0.062
D50	0.062
D65	0.062
D84	0.083
D95	3

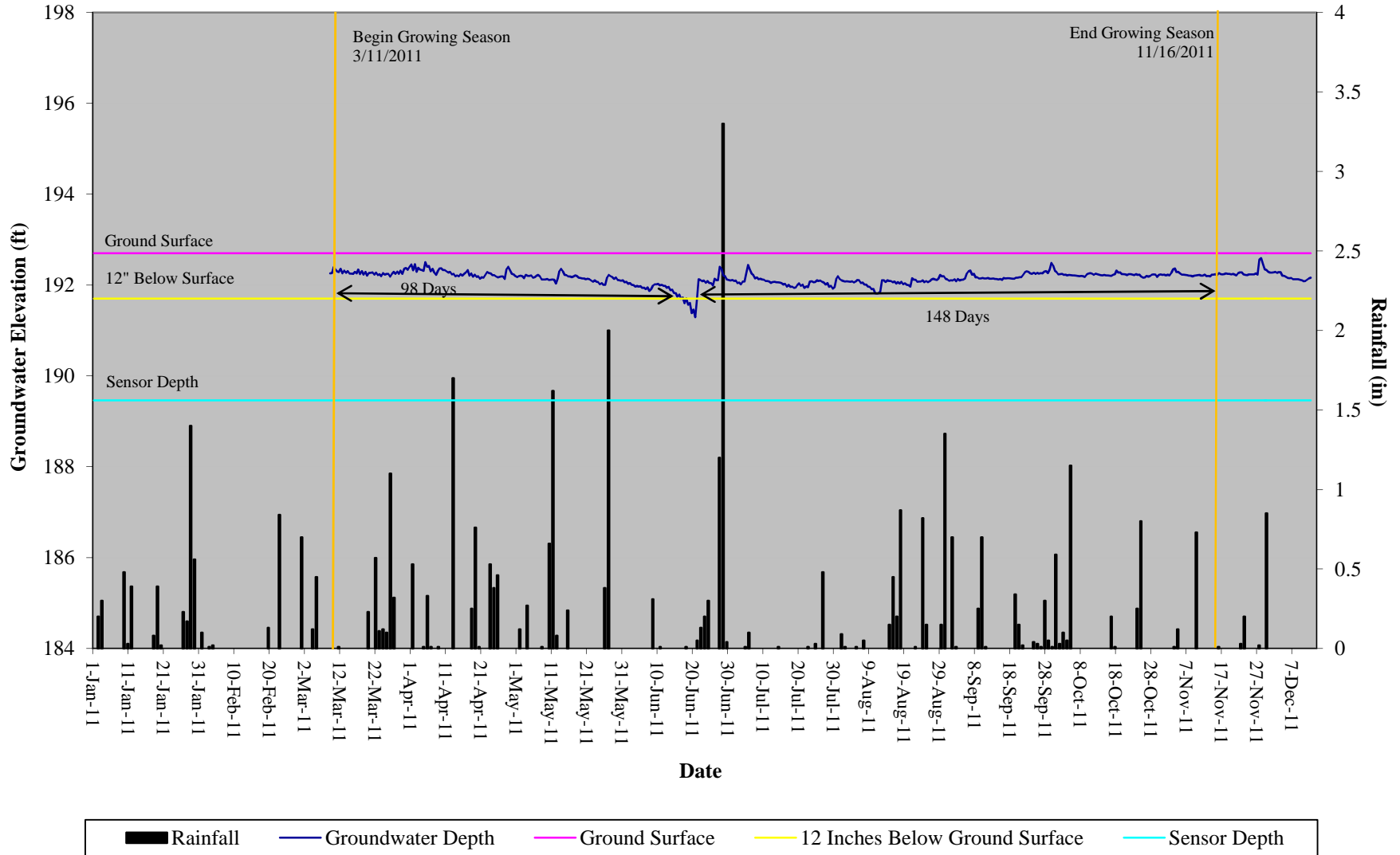
Size Distribution	
mean	0.1
dispersion	1.2
skewness	0.18

Type	
silt/clay	79%
sand	12%
gravel	9%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

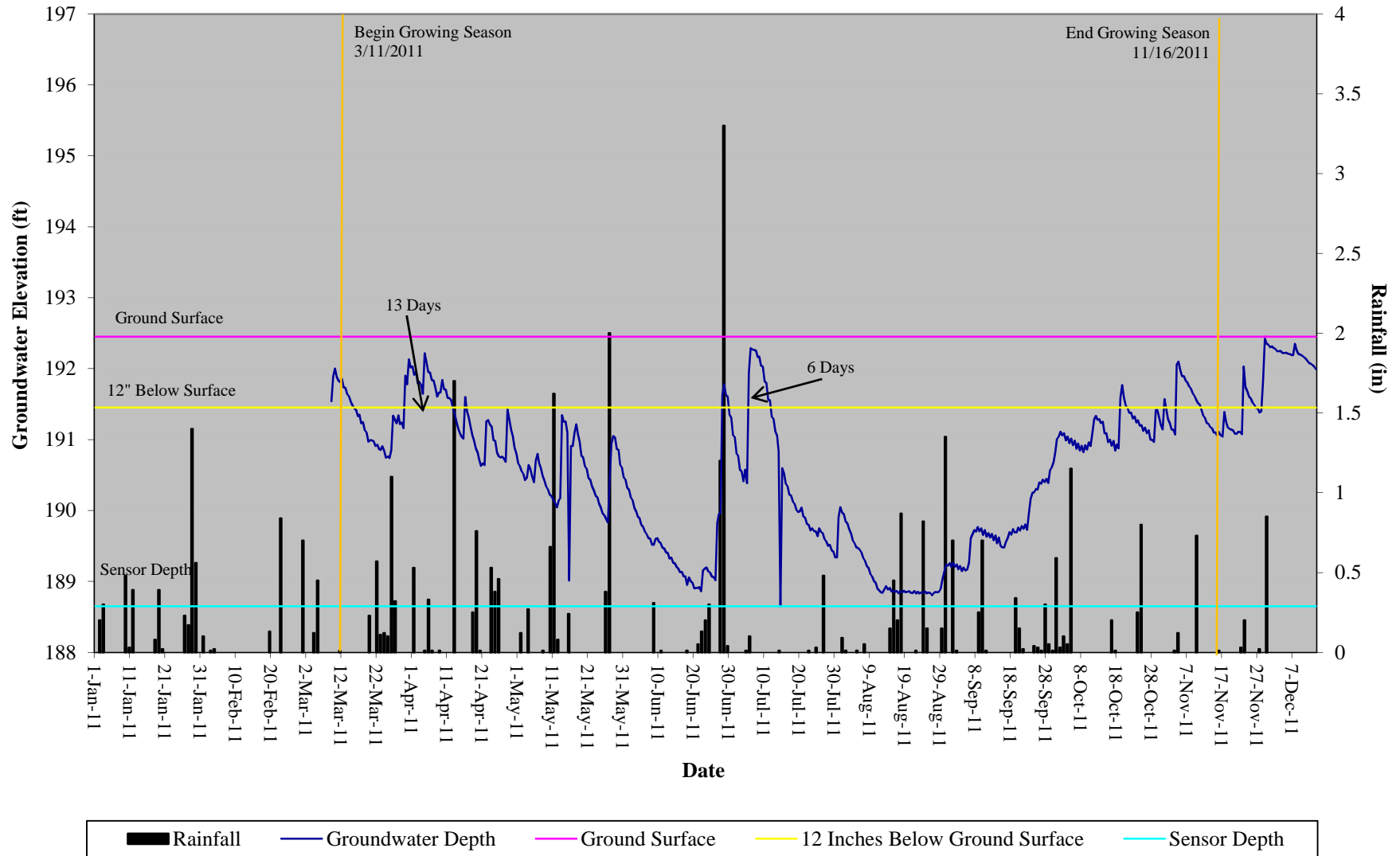
Farrar Dairy Restoration Site Hydrograph Wetland Gauge 1



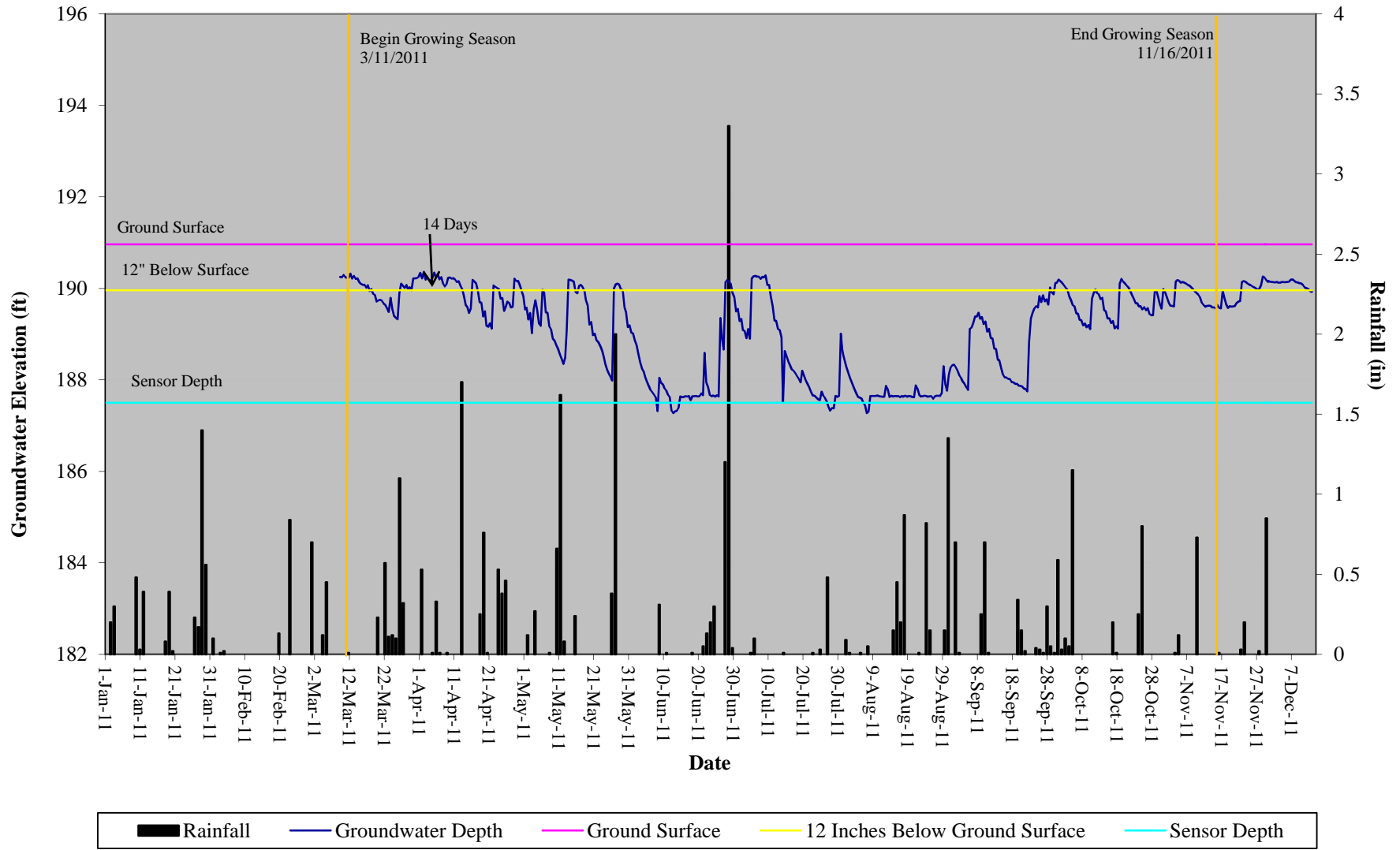
Farrar Dairy Restoration Site Hydrograph Wetland Gauge 2



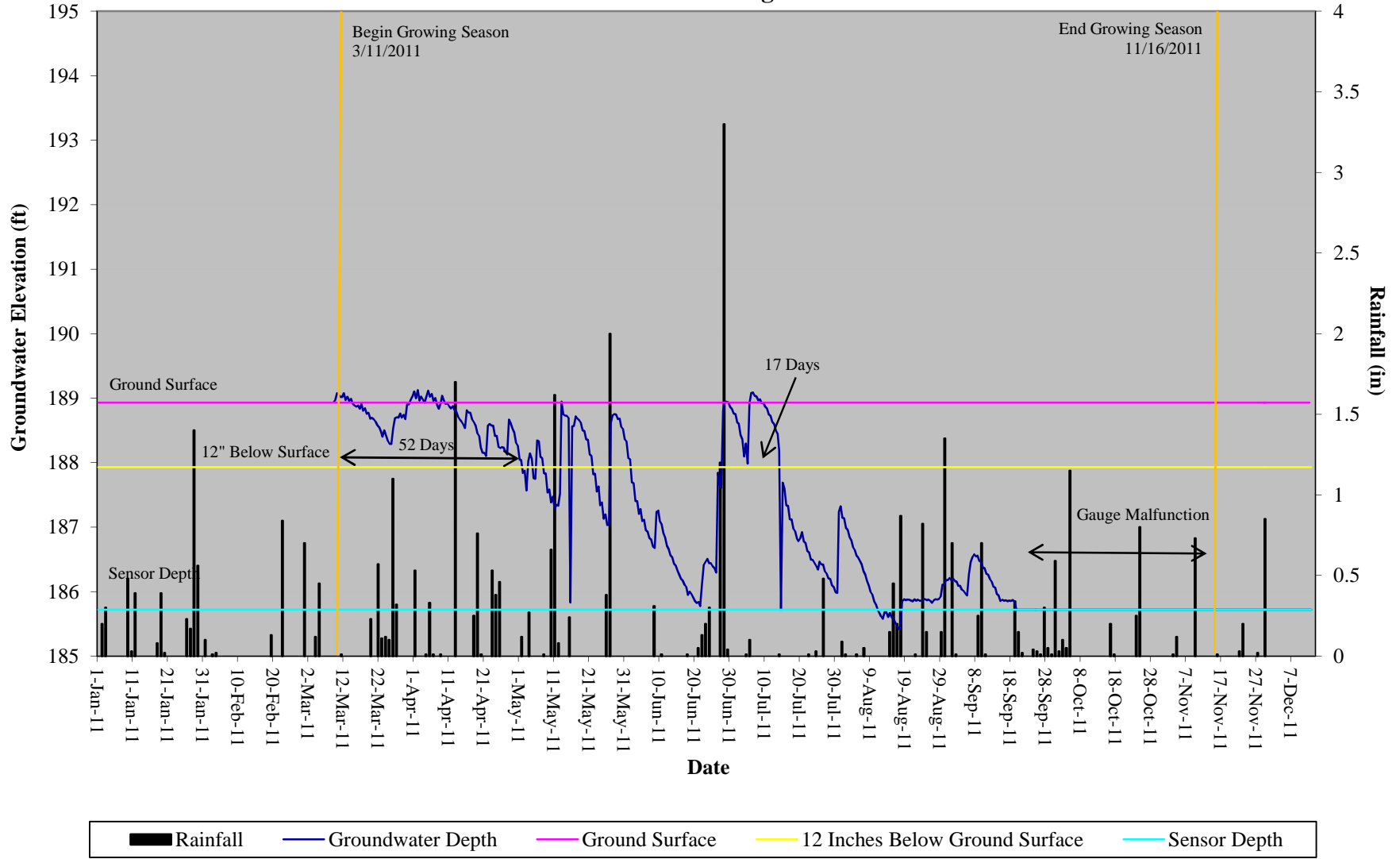
Farrar Dairy Restoration Site Hydrograph Wetland Gauge 3



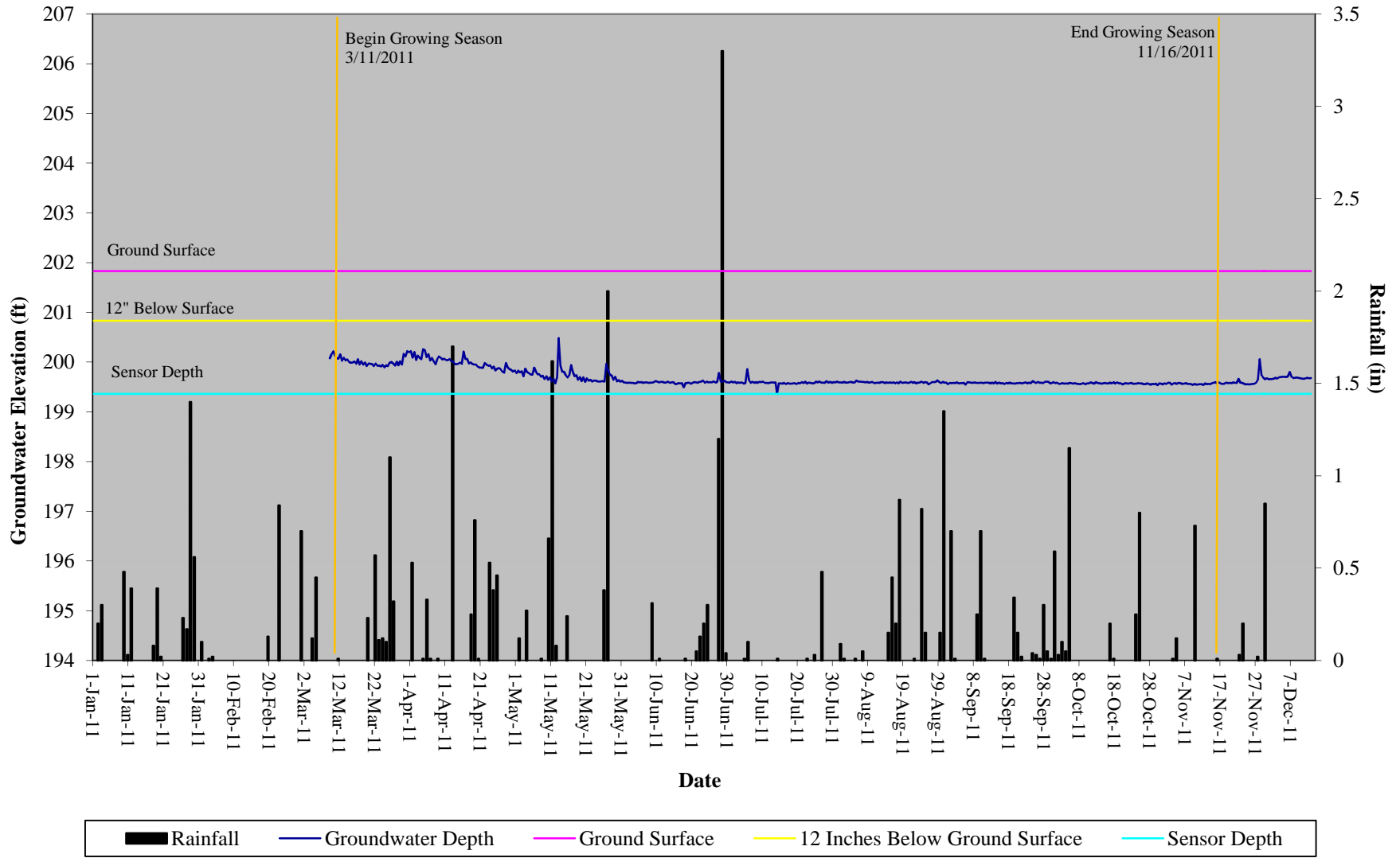
Farrar Dairy Restoration Site Hydrograph Wetland Gauge 4



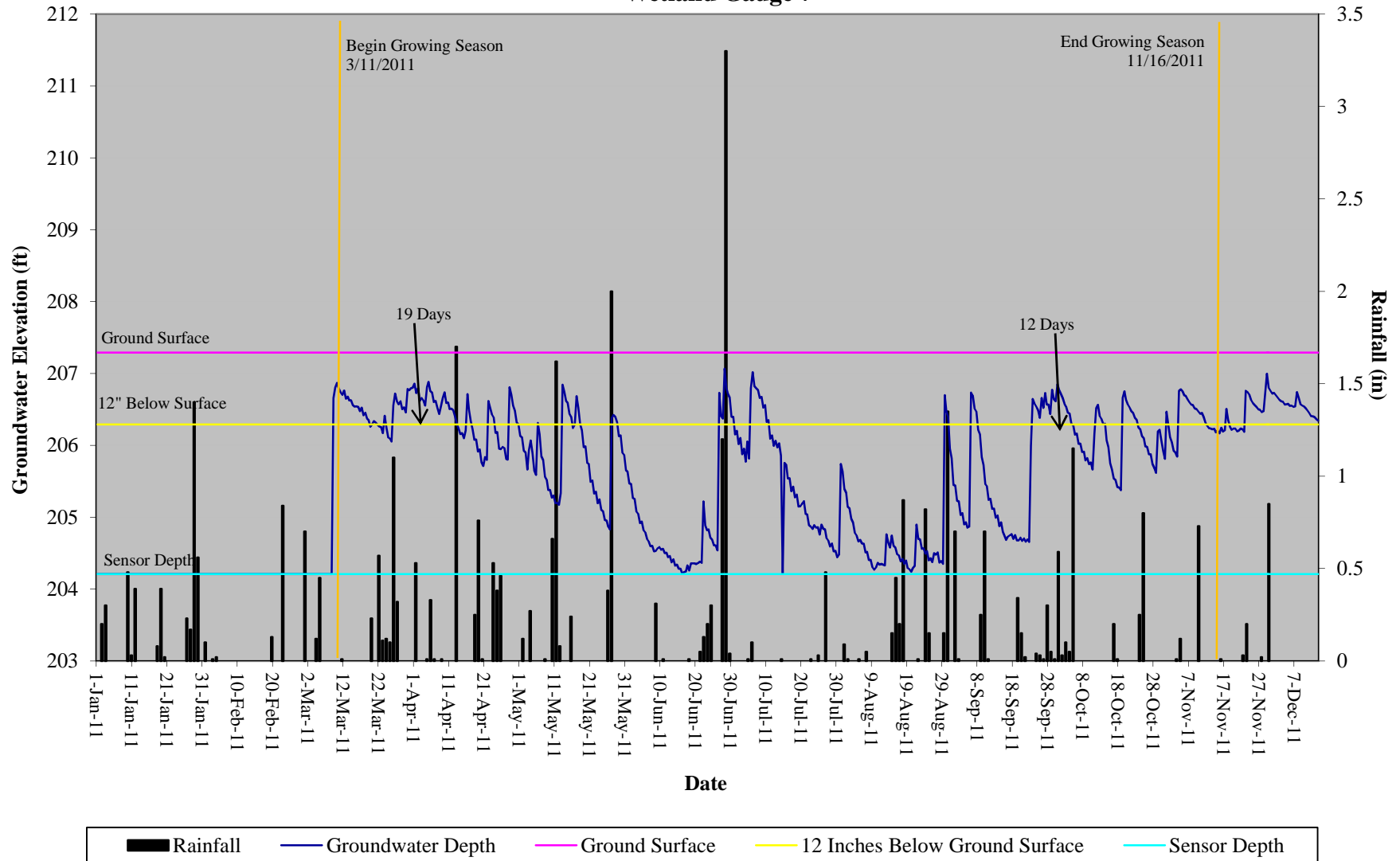
Farrar Dairy Restoration Site Hydrograph Wetland Gauge 5



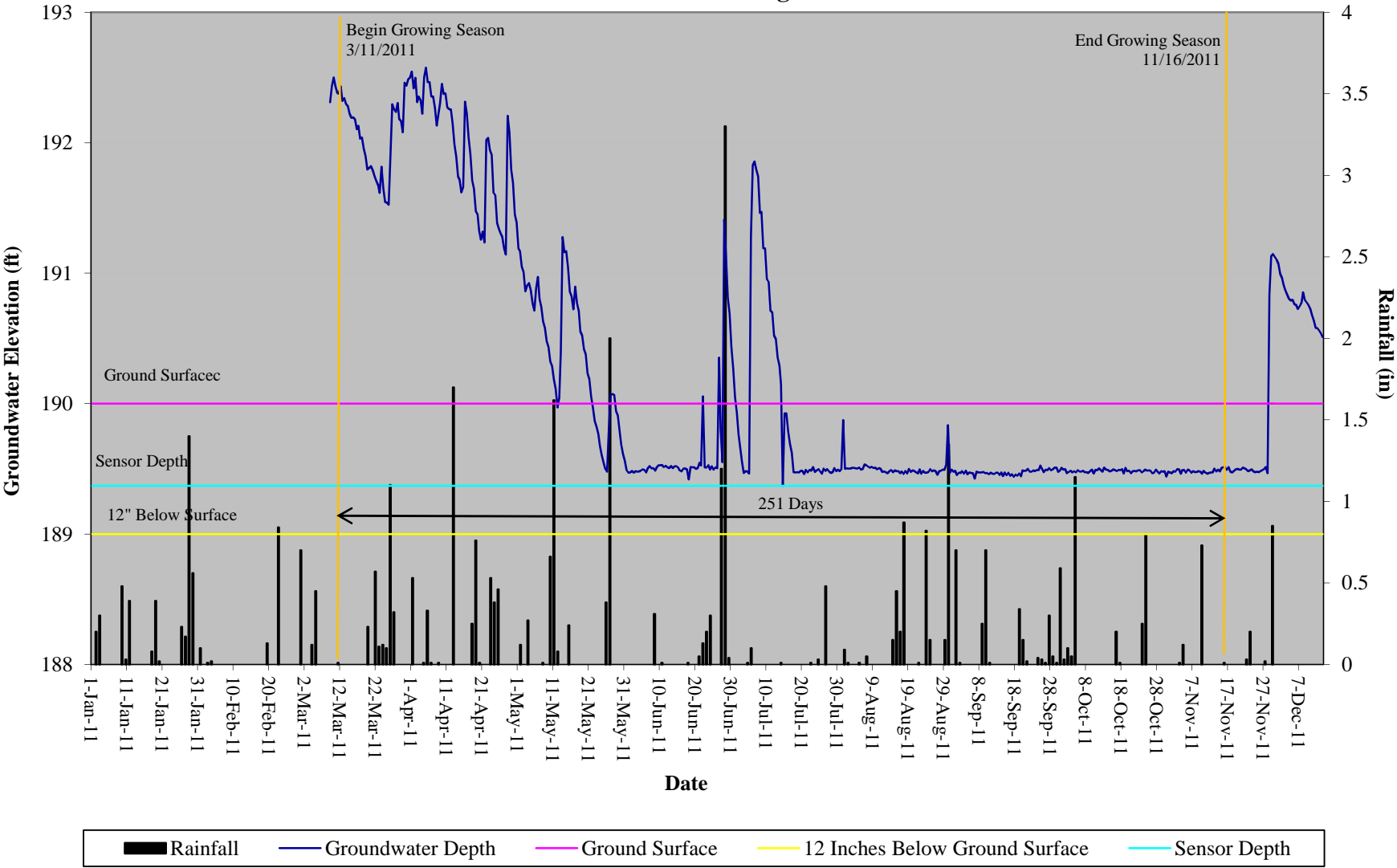
Farrar Dairy Restoration Site Hydrograph Wetland Gauge 6



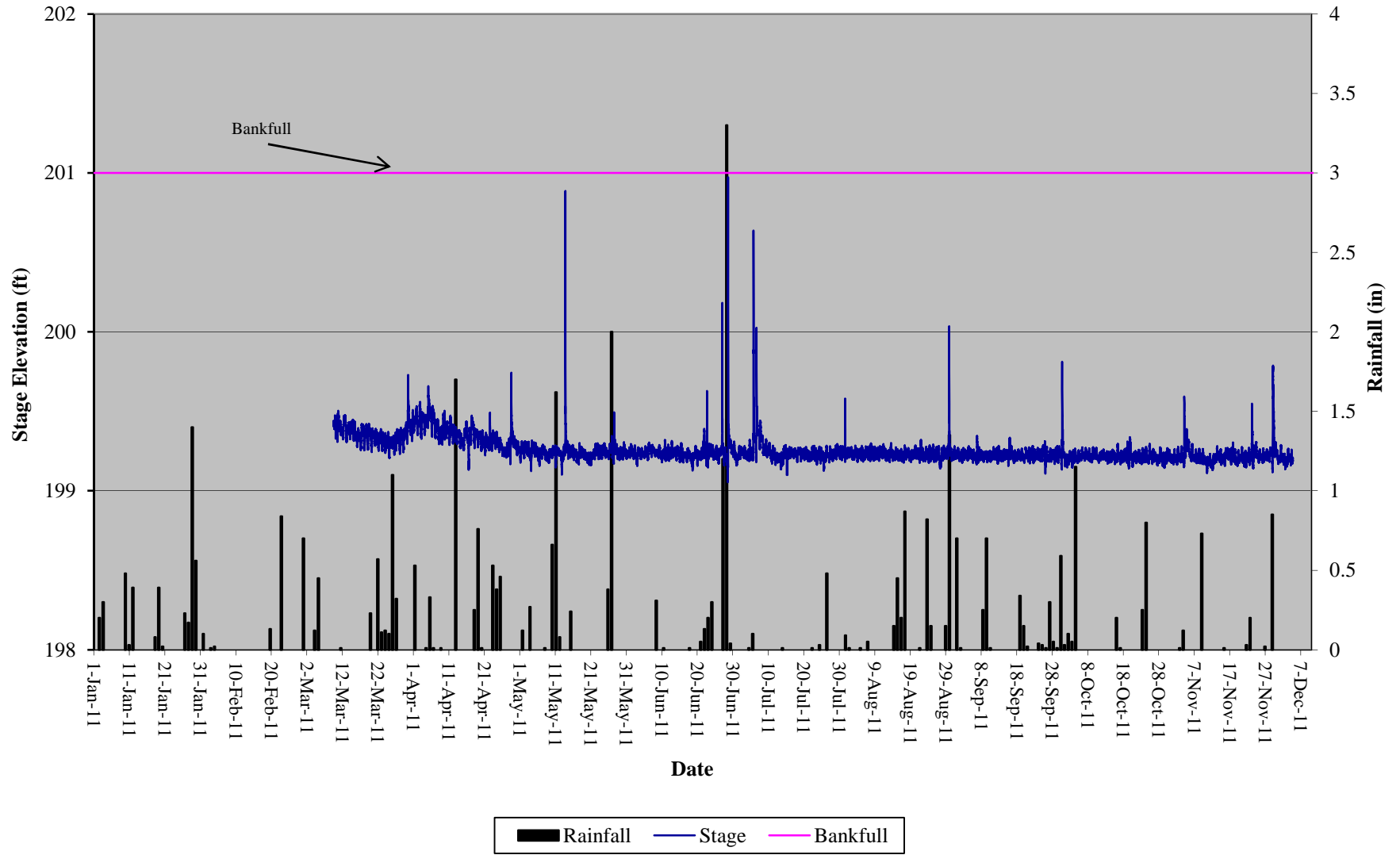
Farrar Dairy Restoration Site Hydrograph Wetland Gauge 7



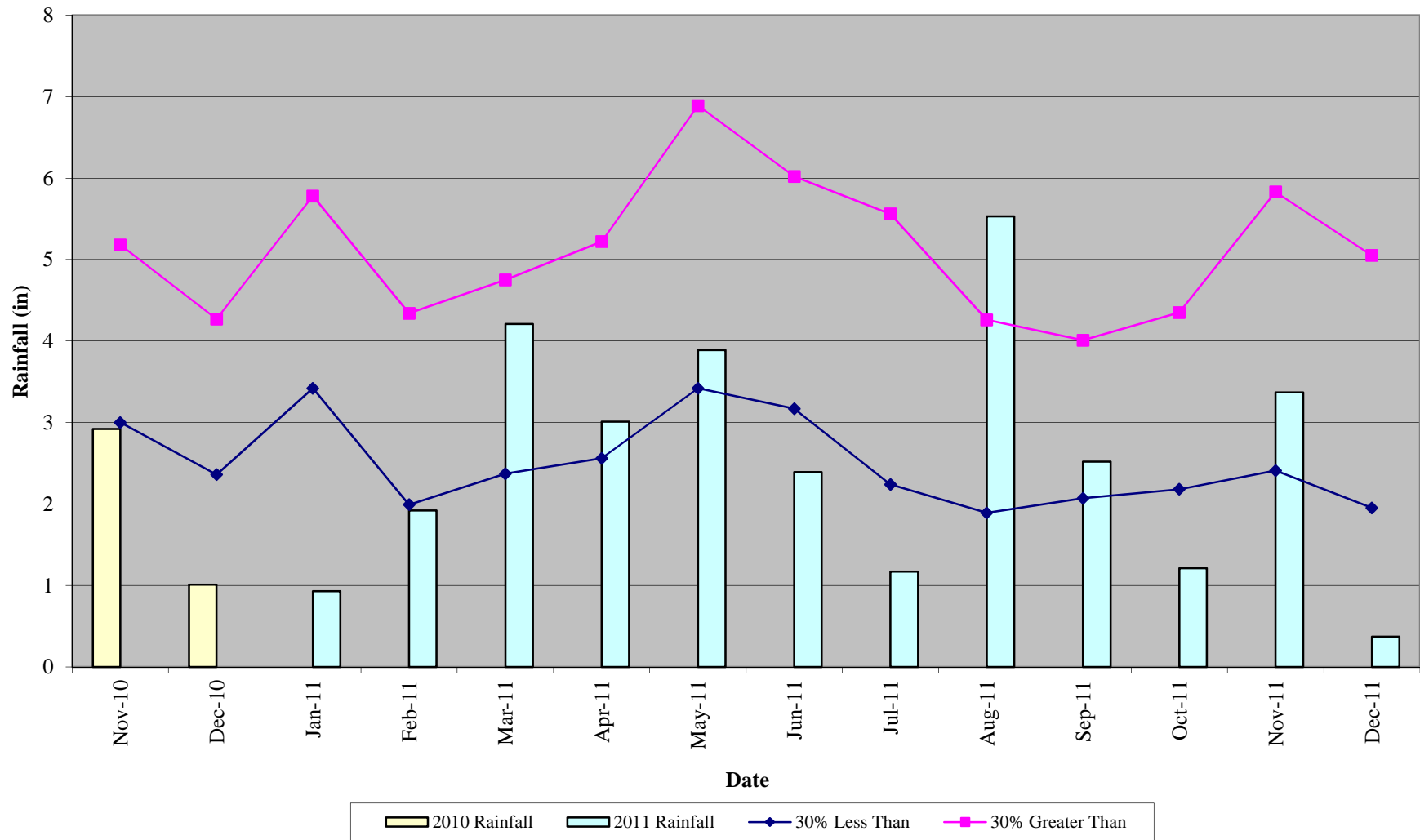
Farrar Dairy Restoration Site Hydrograph Reference Gauge



Farrar Dairy Restoration Site Stage Hydrograph Stream Gauge 1

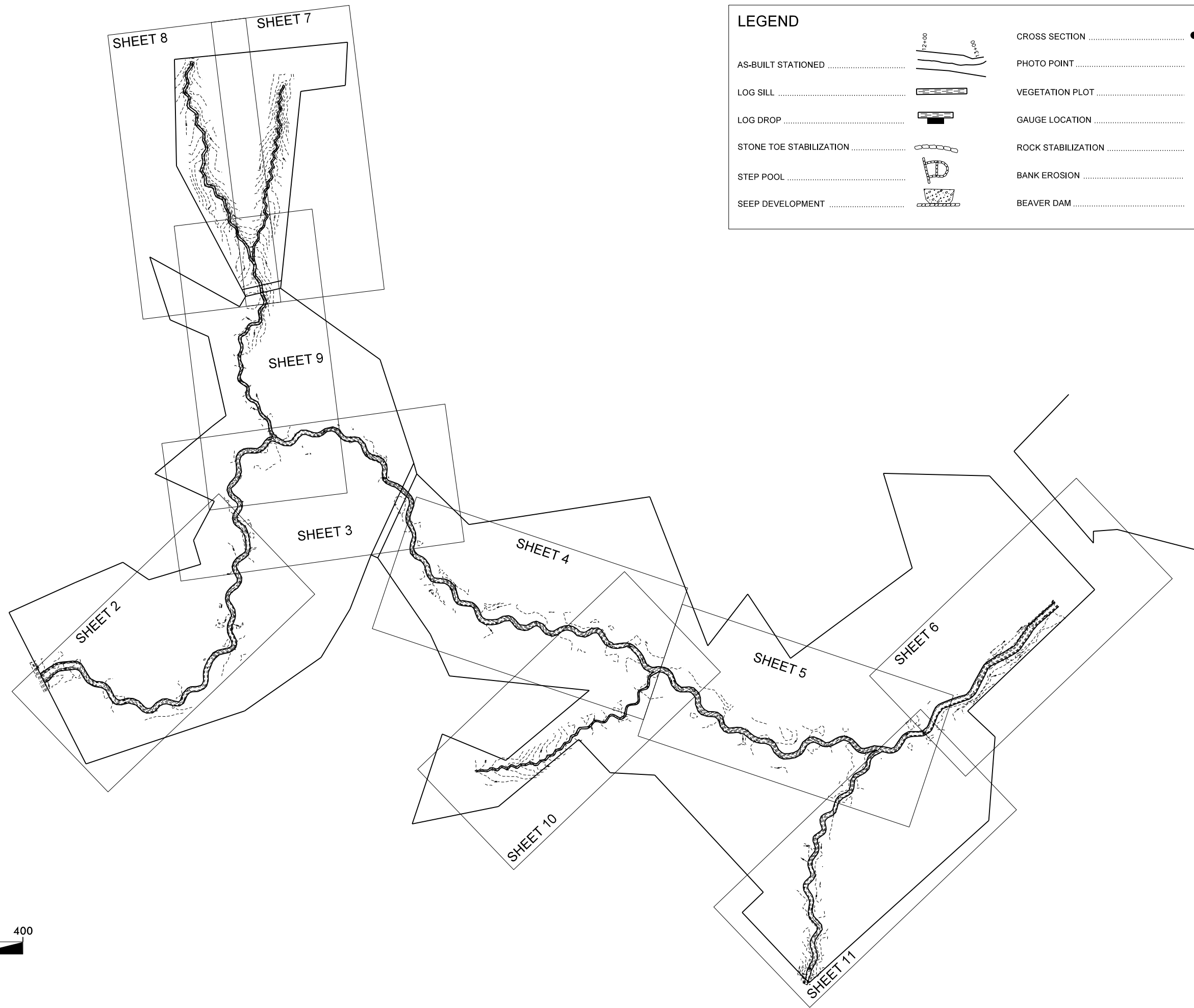


Farrar 30-70 Percentile Graph 2010-2011
Lillington, NC Monthly Rainfall

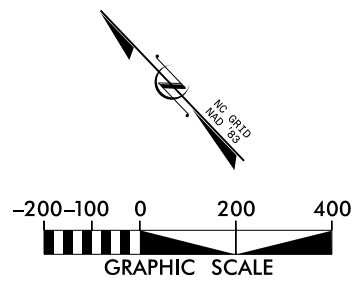


Appendix D

Current Condition Plan View



LEGEND			
AS-BUILT STATIONED		CROSS SECTION	
LOG SILL		PHOTO POINT	
LOG DROP		VEGETATION PLOT	
STONE TOE STABILIZATION		GAUGE LOCATION	
STEP POOL		ROCK STABILIZATION	
SEEP DEVELOPMENT		BANK EROSION	
		BEAVER DAM	



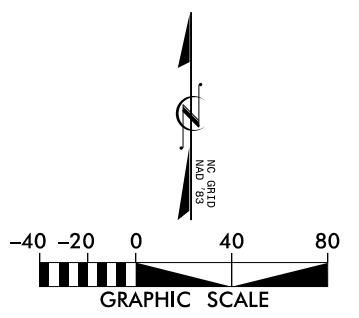
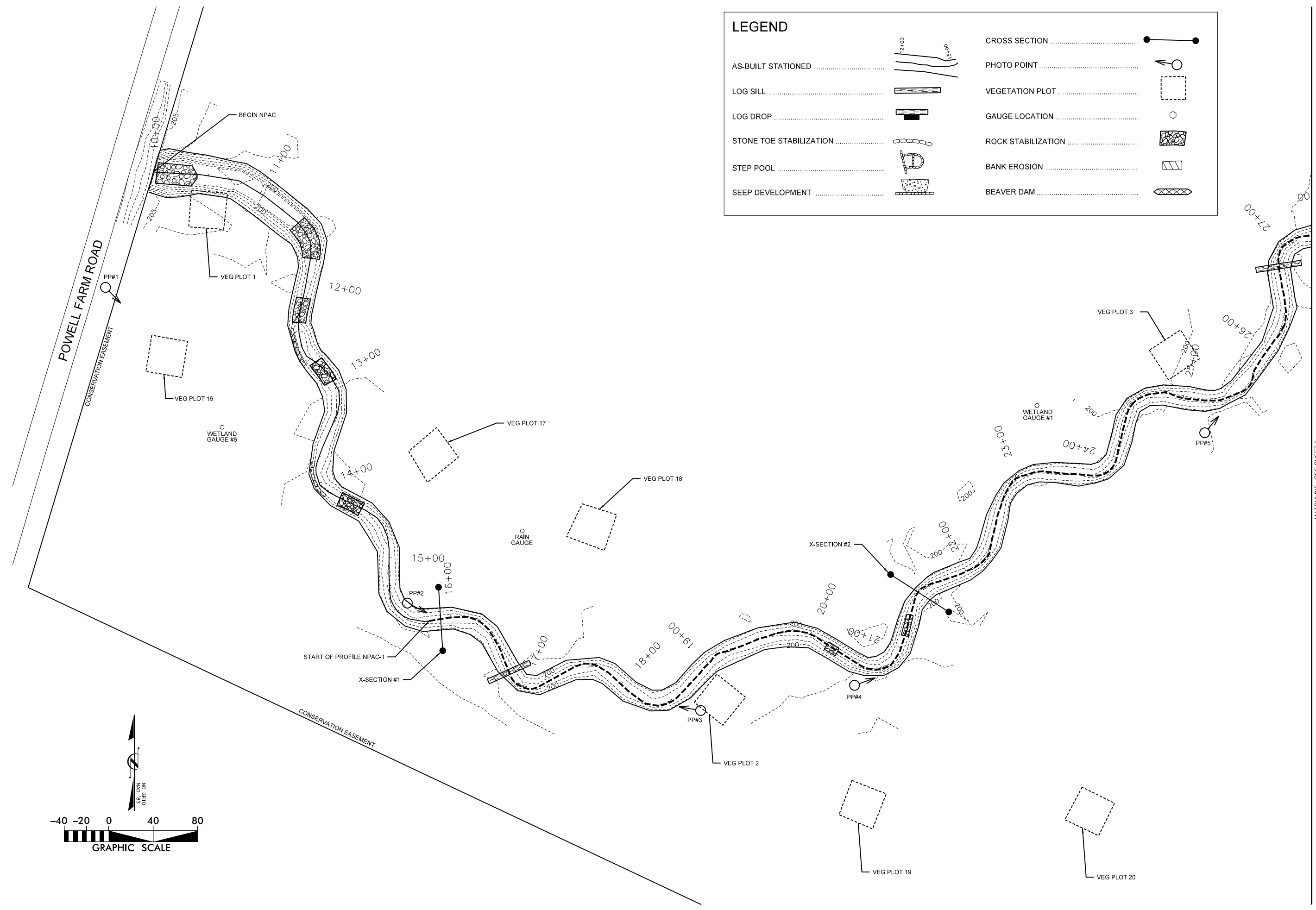
REVISIONS	
SYL	DATE



KCI
 TECHNOLOGIES
 ENGINEERS • PLANNERS • SCIENTISTS
 4601 SIX FORKS ROAD
 RALEIGH, NORTH CAROLINA 27609

**FARRAR DAIRY
 STREAM AND WETLAND RESTORATION**
 LILLINGTON, HARNETT COUNTY, NORTH CAROLINA

DATE: DEC 2011
SCALE: 1"=400'
CURRENT CONDITION PLAN VIEW
SHEET 1 OF 11



MATCHLINE - SEE SHEET 3

REVISIONS	
SYL	DATE

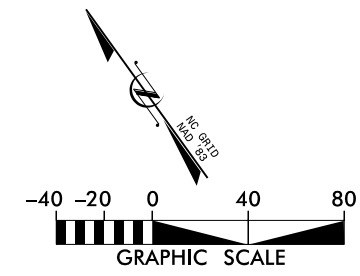
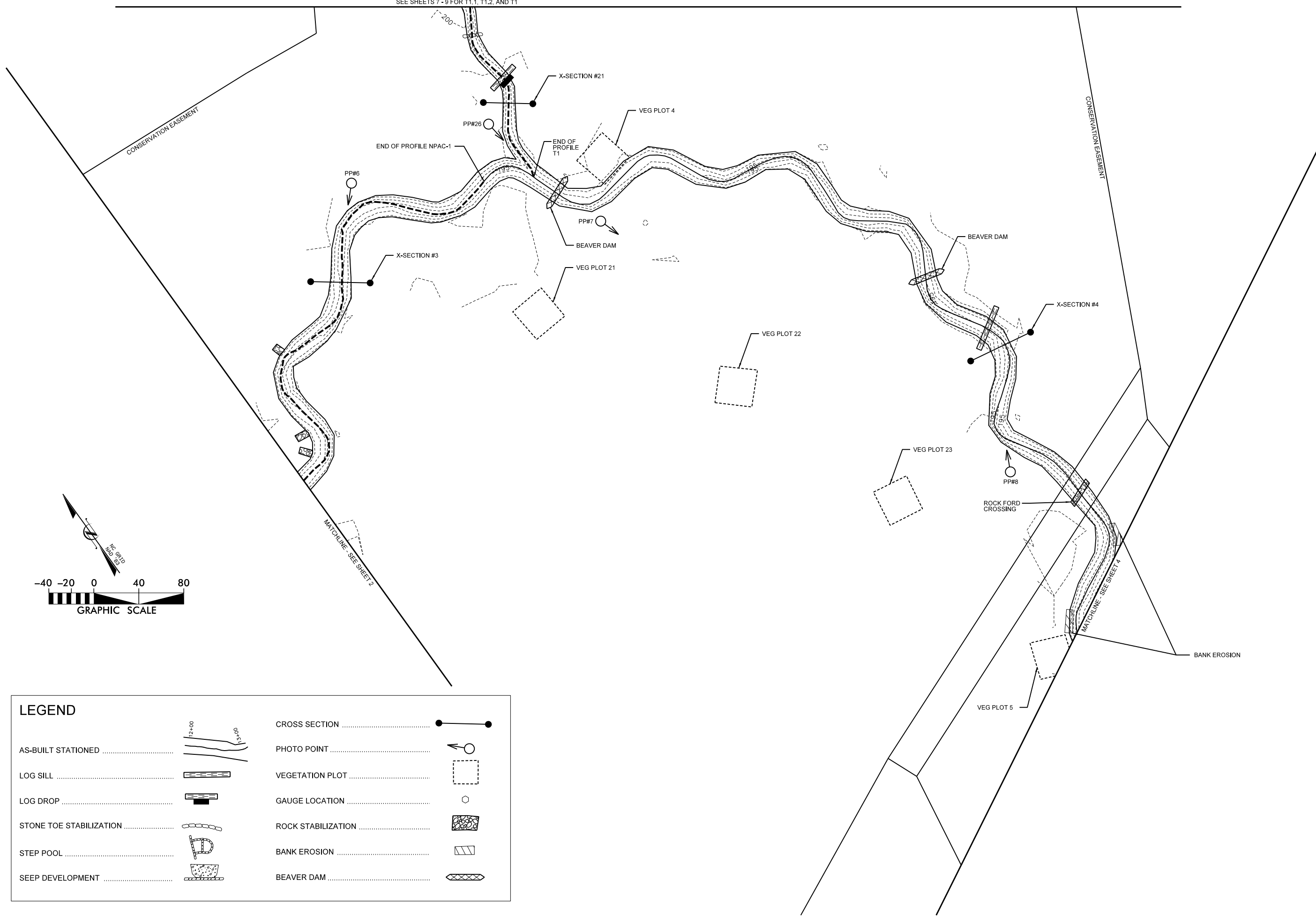


KCI TECHNOLOGIES
 ENGINEERS • PLANNERS • SCIENTISTS
 4601 SIX FORKS ROAD
 RALEIGH, NORTH CAROLINA 27609

**FARRAR DAIRY
 STREAM AND WETLAND RESTORATION**
 LILLINGTON, HARNETT COUNTY, NORTH CAROLINA
 NPAC - STATION 10+00 TO STATION 27+17

DATE: DEC 2011
 SCALE: 1"=80'
 CURRENT
 CONDITION
 PLAN VIEW
 SHEET 2 OF 11

SEE SHEETS 7 - 9 FOR T1.1, T1.2, AND T1



LEGEND	
AS-BUILT STATIONED	
LOG SILL	
LOG DROP	
STONE TOE STABILIZATION	
STEP POOL	
SEEP DEVELOPMENT	
CROSS SECTION	
PHOTO POINT	
VEGETATION PLOT	
GAUGE LOCATION	
ROCK STABILIZATION	
BANK EROSION	
BEAVER DAM	

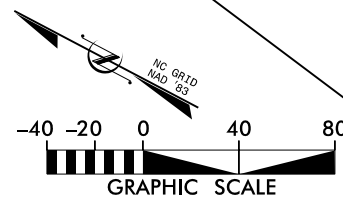
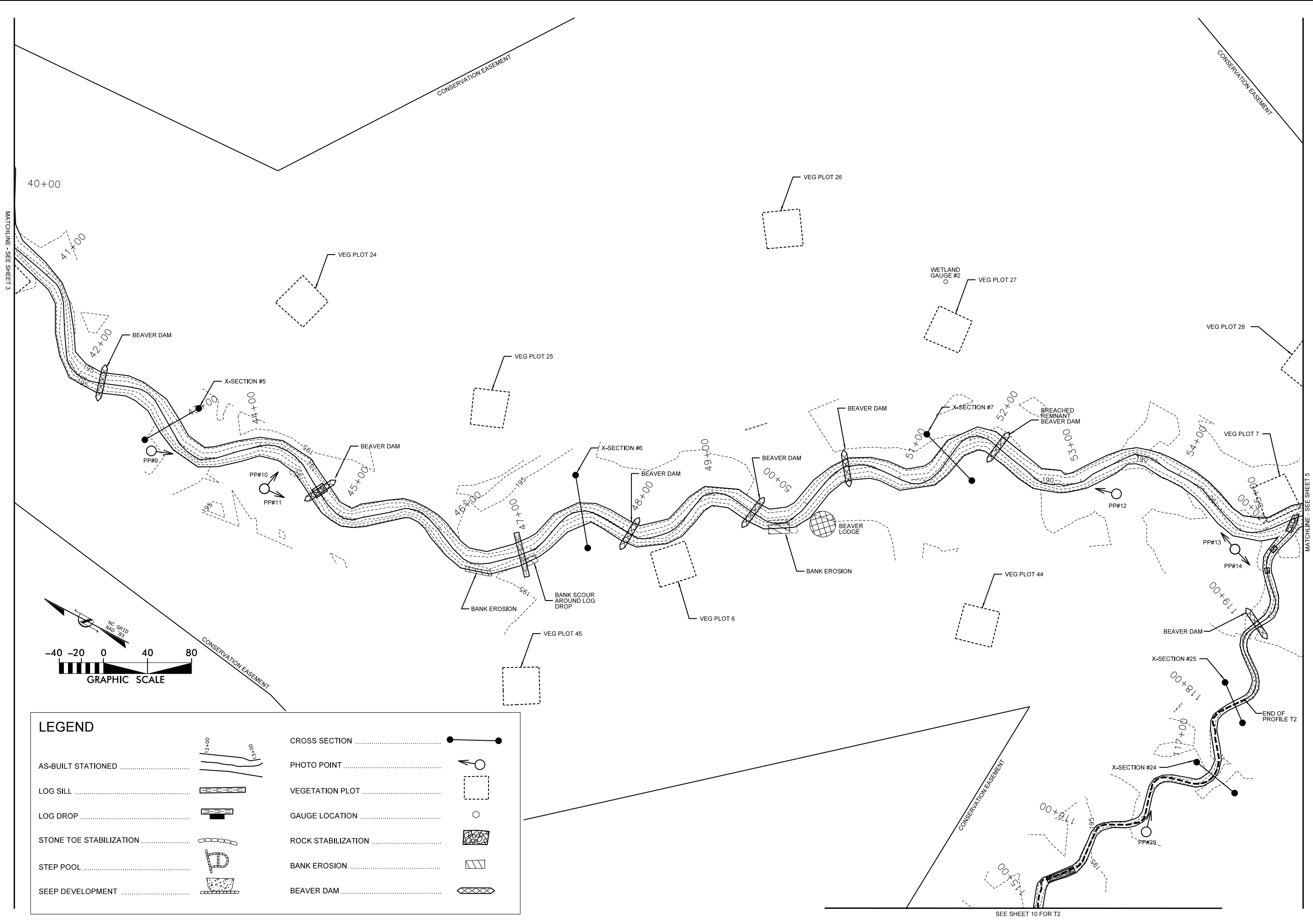
REVISIONS		
SYL	DESCRIPTION	DATE



KCI TECHNOLOGIES
 ENGINEERS • PLANNERS • SCIENTISTS
 4601 SIX FORKS ROAD
 RALEIGH, NORTH CAROLINA 27609

**FARRAR DAIRY
 STREAM AND WETLAND RESTORATION**
 LILLINGTON, HARNETT COUNTY, NORTH CAROLINA
 NPAC - STATION 27+17 TO STATION 40+51

DATE: DEC 2011
SCALE: 1"=80'
CURRENT CONDITION PLAN VIEW
SHEET 3 OF 11



LEGEND	
AS-BUILT STATIONED	
LOG SILL	
LOG DROP	
STONE TOE STABILIZATION	
STEP POOL	
SEEP DEVELOPMENT	
CROSS SECTION	
PHOTO POINT	
VEGETATION PLOT	
GAUGE LOCATION	
ROCK STABILIZATION	
BANK EROSION	
BEAVER DAM	

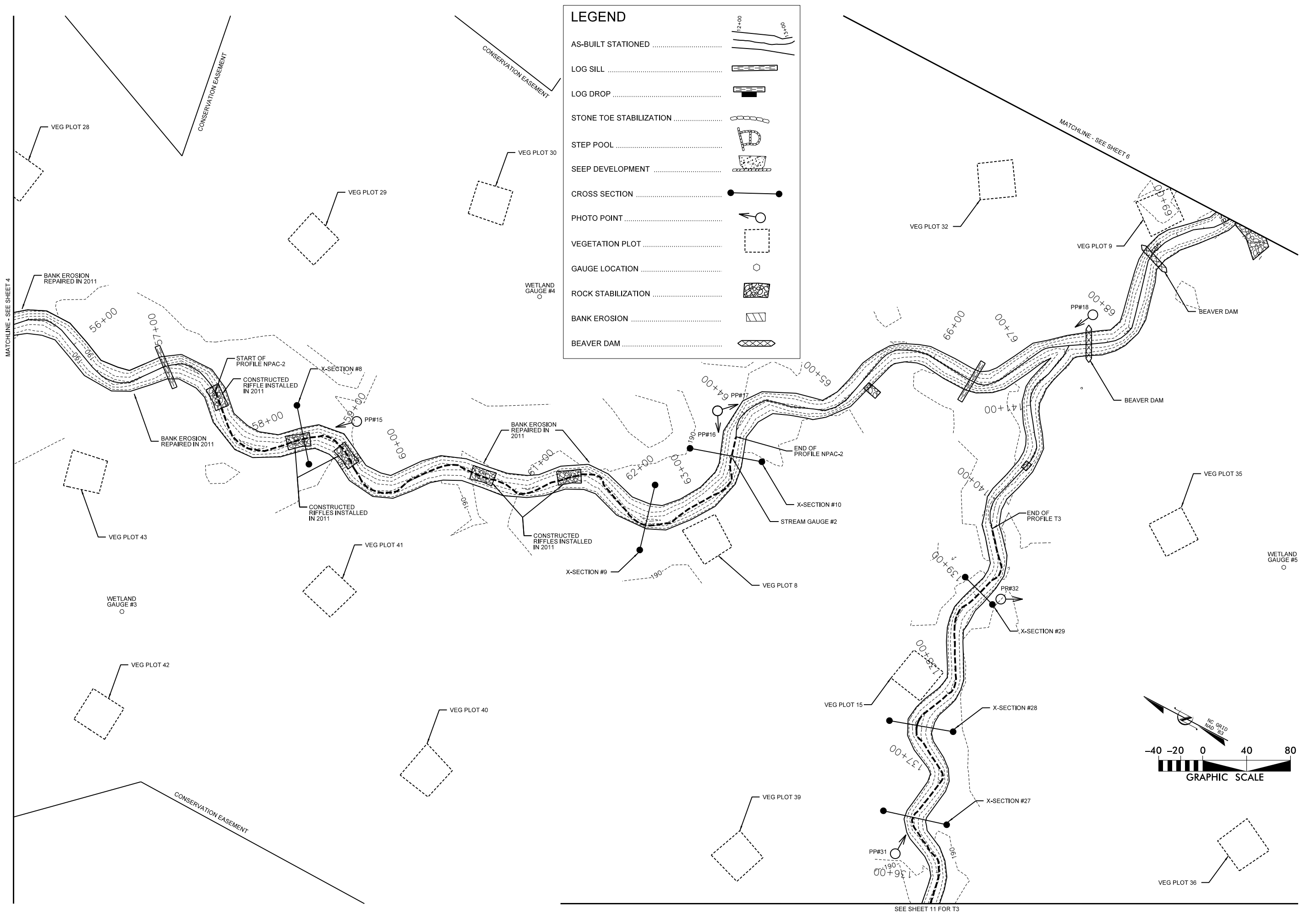
SYL	DESCRIPTION	DATE	APPROVED



KCI
 TECHNOLOGIES
 ENGINEERS • PLANNERS • SCIENTISTS
 4601 SIX FORKS ROAD
 RALEIGH, NORTH CAROLINA 27609

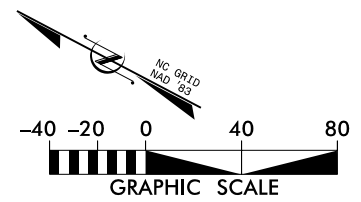
**FARRAR DAIRY
 STREAM AND WETLAND RESTORATION**
 LILLINGTON, HARNETT COUNTY, NORTH CAROLINA
 NPAC - STATION 40+51 TO STATION 55+39

DATE: DEC 2011
 SCALE: 1"=80'
**CURRENT
 CONDITION
 PLAN VIEW**
 SHEET 4 OF 11



LEGEND

- AS-BUILT STATIONED
- LOG SILL
- LOG DROP
- STONE TOE STABILIZATION
- STEP POOL
- SEEP DEVELOPMENT
- CROSS SECTION
- PHOTO POINT
- VEGETATION PLOT
- GAUGE LOCATION
- ROCK STABILIZATION
- BANK EROSION
- BEAVER DAM



SYMBOL	DESCRIPTION	DATE	APPROVED

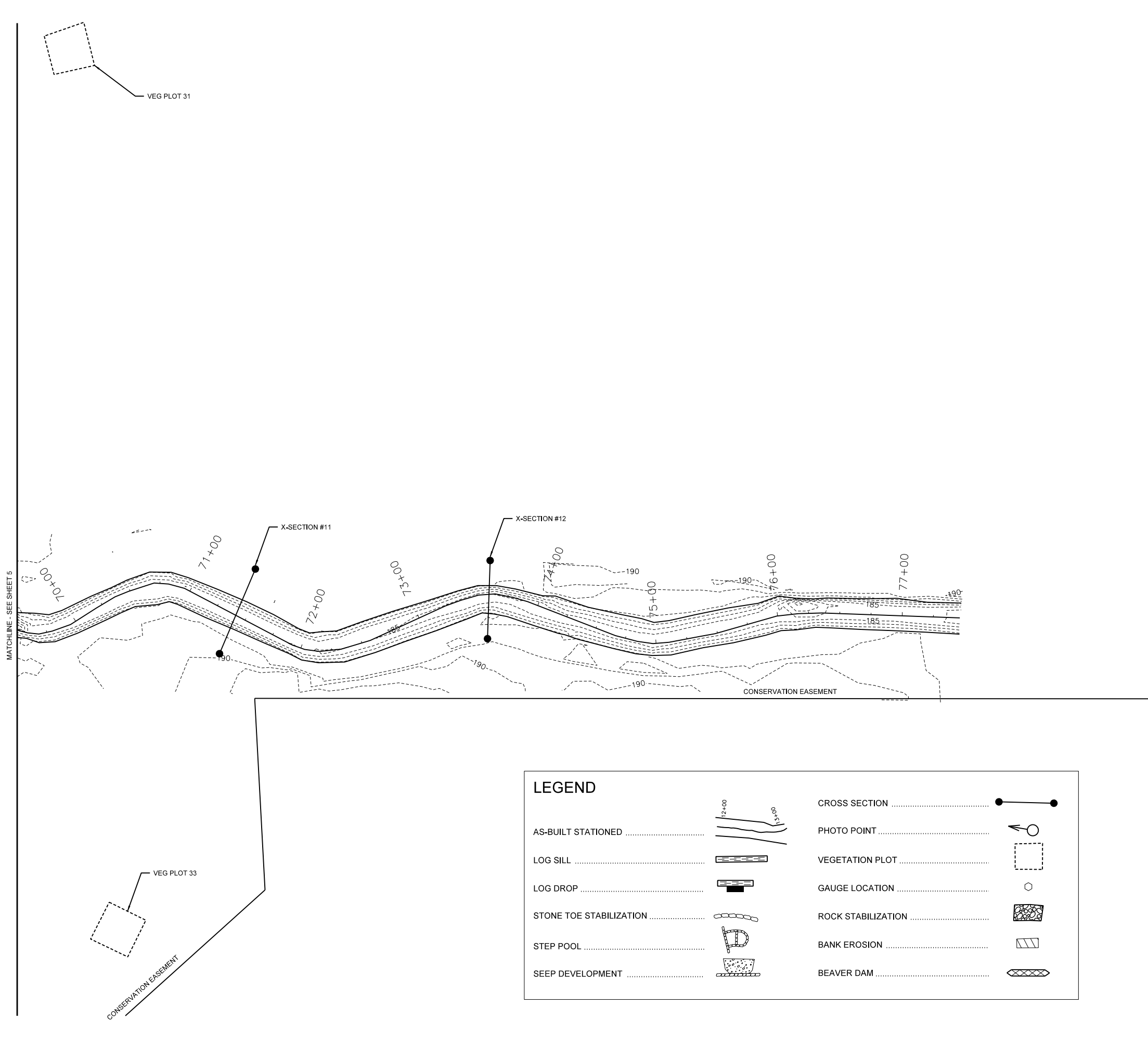


KCI
 TECHNOLOGIES
 ENGINEERS • PLANNERS • SCIENTISTS
 4601 SIX FORKS ROAD
 RALEIGH, NORTH CAROLINA 27609

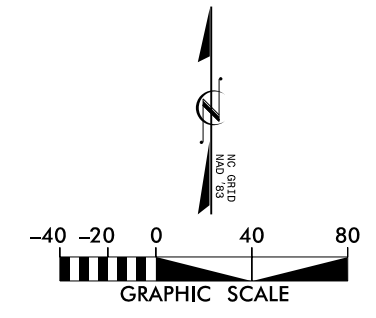
**FARRAR DAIRY
 STREAM AND WETLAND RESTORATION**
 LILLINGTON, HARNETT COUNTY, NORTH CAROLINA
 NPAC - STATION 55+39 TO STATION 69+51



DATE: DEC 2011
 SCALE: 1"=80'
**CURRENT
 CONDITION
 PLAN VIEW**
 SHEET 5 OF 11

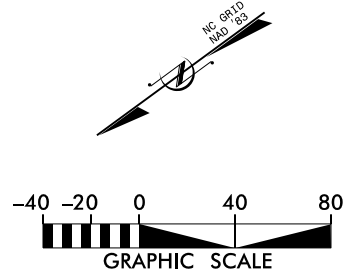
SEE SHEET 11 FOR T3



LEGEND			
AS-BUILT STATIONED		CROSS SECTION	
LOG SILL		PHOTO POINT	
LOG DROP		VEGETATION PLOT	
STONE TOE STABILIZATION		GAUGE LOCATION	
STEP POOL		ROCK STABILIZATION	
SEEP DEVELOPMENT		BANK EROSION	
		BEAVER DAM	

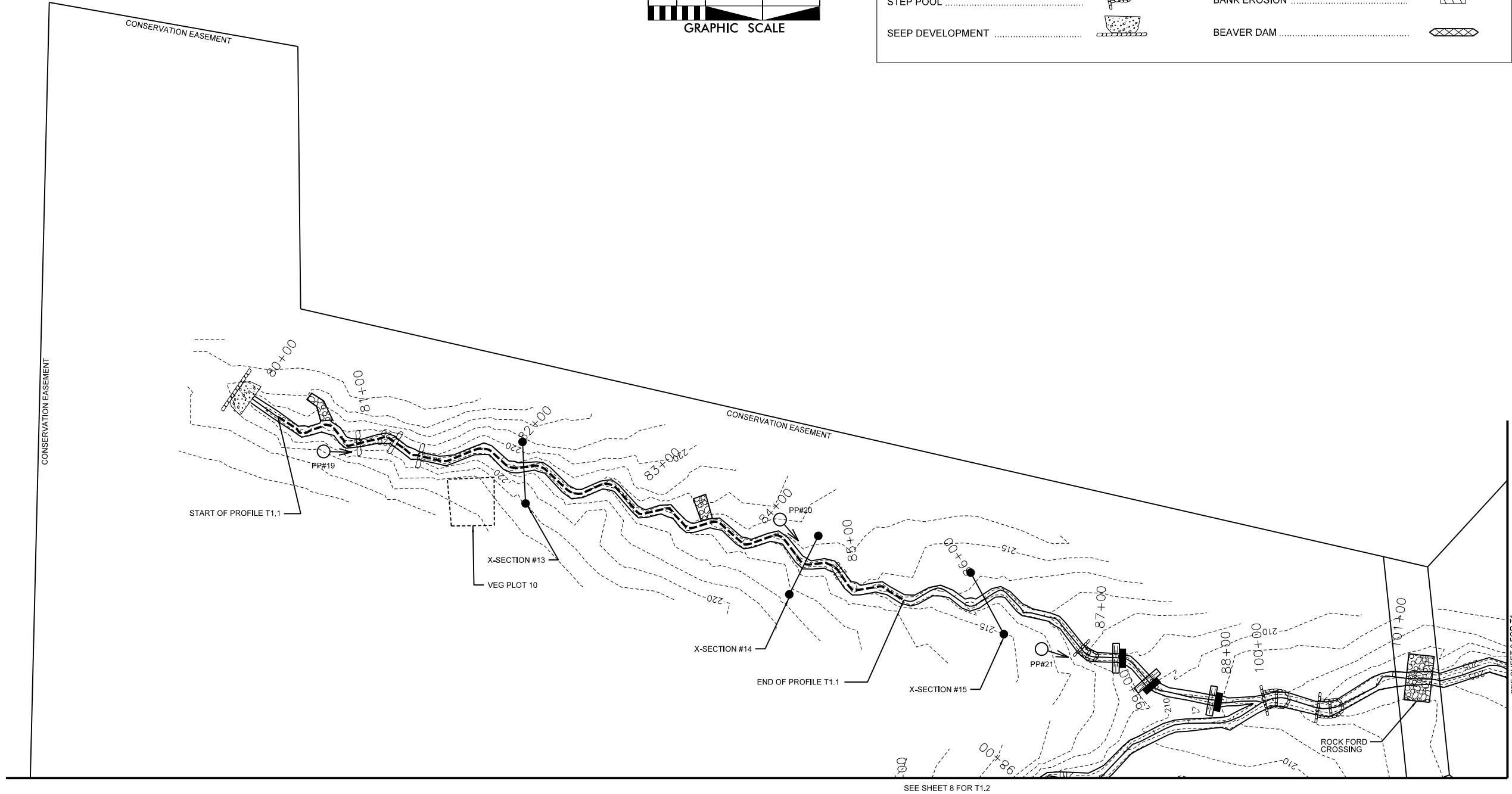


 KCI TECHNOLOGIES ENGINEERS • PLANNERS • SCIENTISTS 4601 SIX FORKS ROAD RALEIGH, NORTH CAROLINA 27609	 Ecosystem Enhancement PROGRAM																								
FARRAR DAIRY STREAM AND WETLAND RESTORATION LILLINGTON, HARNETT COUNTY, NORTH CAROLINA NPAC - STATION 69+51 TO STATION 77+46	REVISIONS <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>SYMBOL</th> <th>DESCRIPTION</th> <th>DATE</th> <th>APPROVED</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">B</td> <td>REVISED MAIN CHANNEL/BOUNDING PROFILE</td> <td></td> <td></td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	SYMBOL	DESCRIPTION	DATE	APPROVED	B	REVISED MAIN CHANNEL/BOUNDING PROFILE																		
SYMBOL	DESCRIPTION	DATE	APPROVED																						
B	REVISED MAIN CHANNEL/BOUNDING PROFILE																								
DATE: DEC 2011 SCALE: 1"=80' CURRENT CONDITION PLAN VIEW																									
SHEET 6 OF 11																									



LEGEND

AS-BUILT STATIONED		CROSS SECTION	
LOG SILL		PHOTO POINT	
LOG DROP		VEGETATION PLOT	
STONE TOE STABILIZATION		GAUGE LOCATION	
STEP POOL		ROCK STABILIZATION	
SEEP DEVELOPMENT		BANK EROSION	
		BEAVER DAM	



SYL	DESCRIPTION	DATE	APPROVED



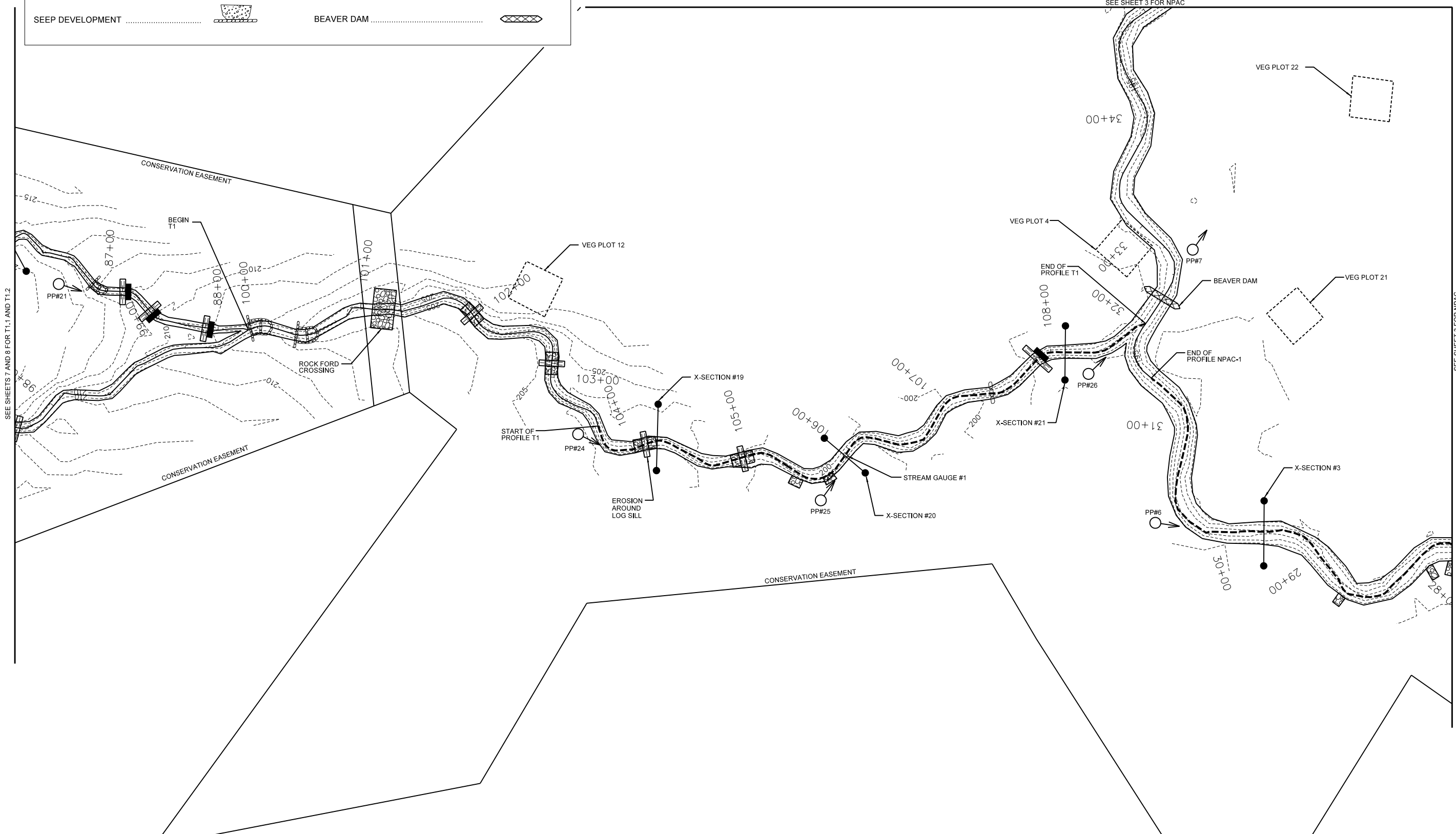
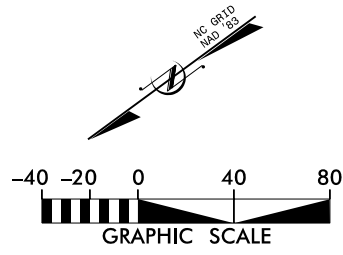
KCI
 TECHNOLOGIES
 ENGINEERS • PLANNERS • SCIENTISTS
 4601 SIX FORKS ROAD
 RALEIGH, NORTH CAROLINA 27609

**FARRAR DAIRY
 STREAM AND WETLAND RESTORATION**
 LILLINGTON, HARNETT COUNTY, NORTH CAROLINA
 T1.1 - STATION 80+00 TO STATION 88+25

DATE: DEC 2011
 SCALE: 1"=80'
 CURRENT
 CONDITION
 PLAN VIEW
 SHEET 7 OF 11

LEGEND

AS-BUILT STATIONED		CROSS SECTION	
LOG SILL		PHOTO POINT	
LOG DROP		VEGETATION PLOT	
STONE TOE STABILIZATION		GAUGE LOCATION	
STEP POOL		ROCK STABILIZATION	
SEEP DEVELOPMENT		BANK EROSION	
		BEAVER DAM	



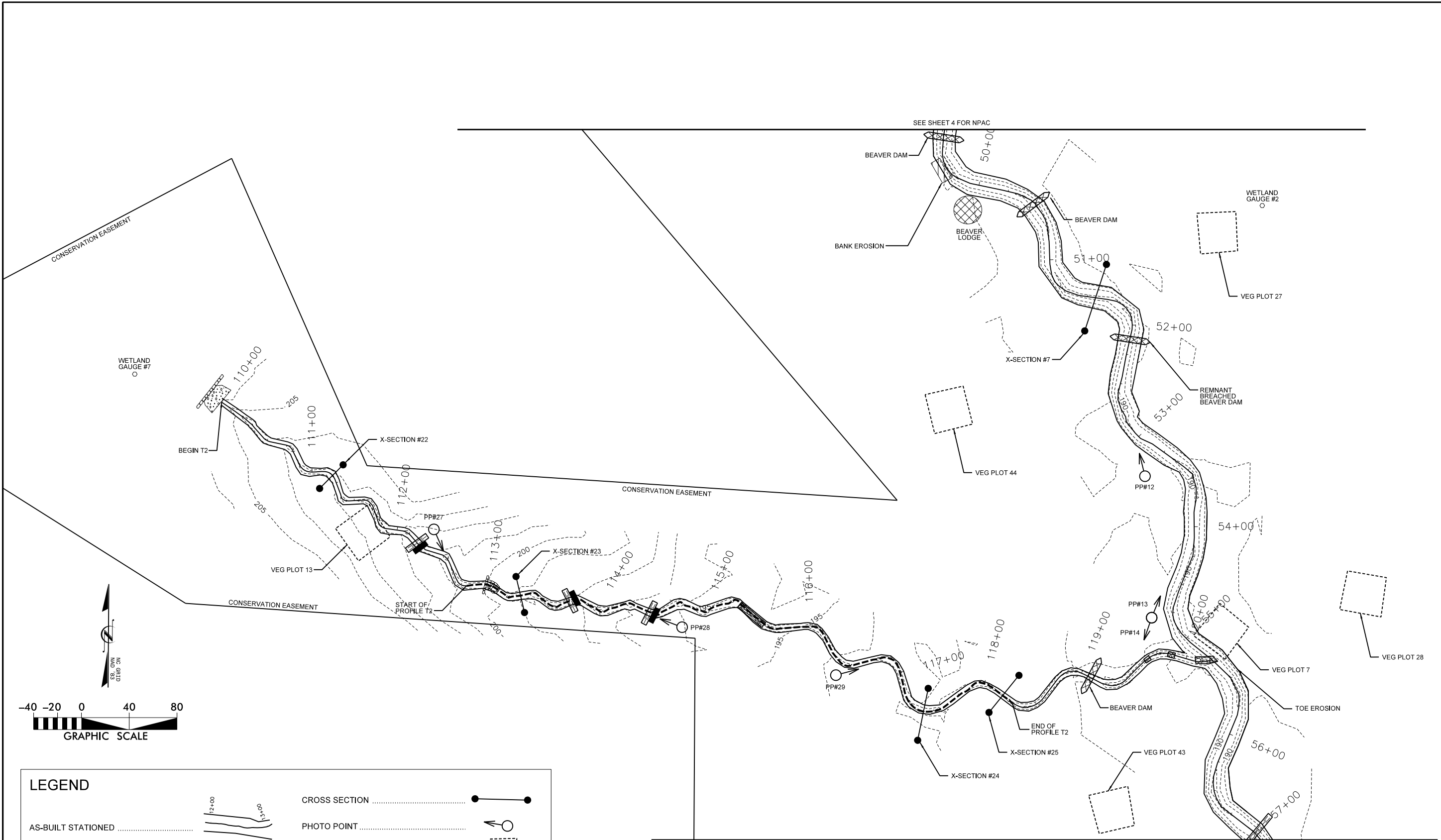
SYMBOL	DESCRIPTION	DATE	APPROVED



KCI
 TECHNOLOGIES
 ENGINEERS • PLANNERS • SCIENTISTS
 4601 SIX FORKS ROAD
 RALEIGH, NORTH CAROLINA 27609

**FARRAR DAIRY
 STREAM AND WETLAND RESTORATION**
 LILLINGTON, HARNETT COUNTY, NORTH CAROLINA
 T1 - STATION 100+00 TO STATION 108+84

DATE: DEC 2011
 SCALE: 1"=80'
 CURRENT
 CONDITION
 PLAN VIEW
 SHEET 9 OF 11



LEGEND

AS-BUILT STATIONED		CROSS SECTION	
LOG SILL		PHOTO POINT	
LOG DROP		VEGETATION PLOT	
STONE TOE STABILIZATION		GAUGE LOCATION	
STEP POOL		ROCK STABILIZATION	
SEEP DEVELOPMENT		BANK EROSION	
		BEAVER DAM	

SYL	DESCRIPTION	DATE	APPROVED



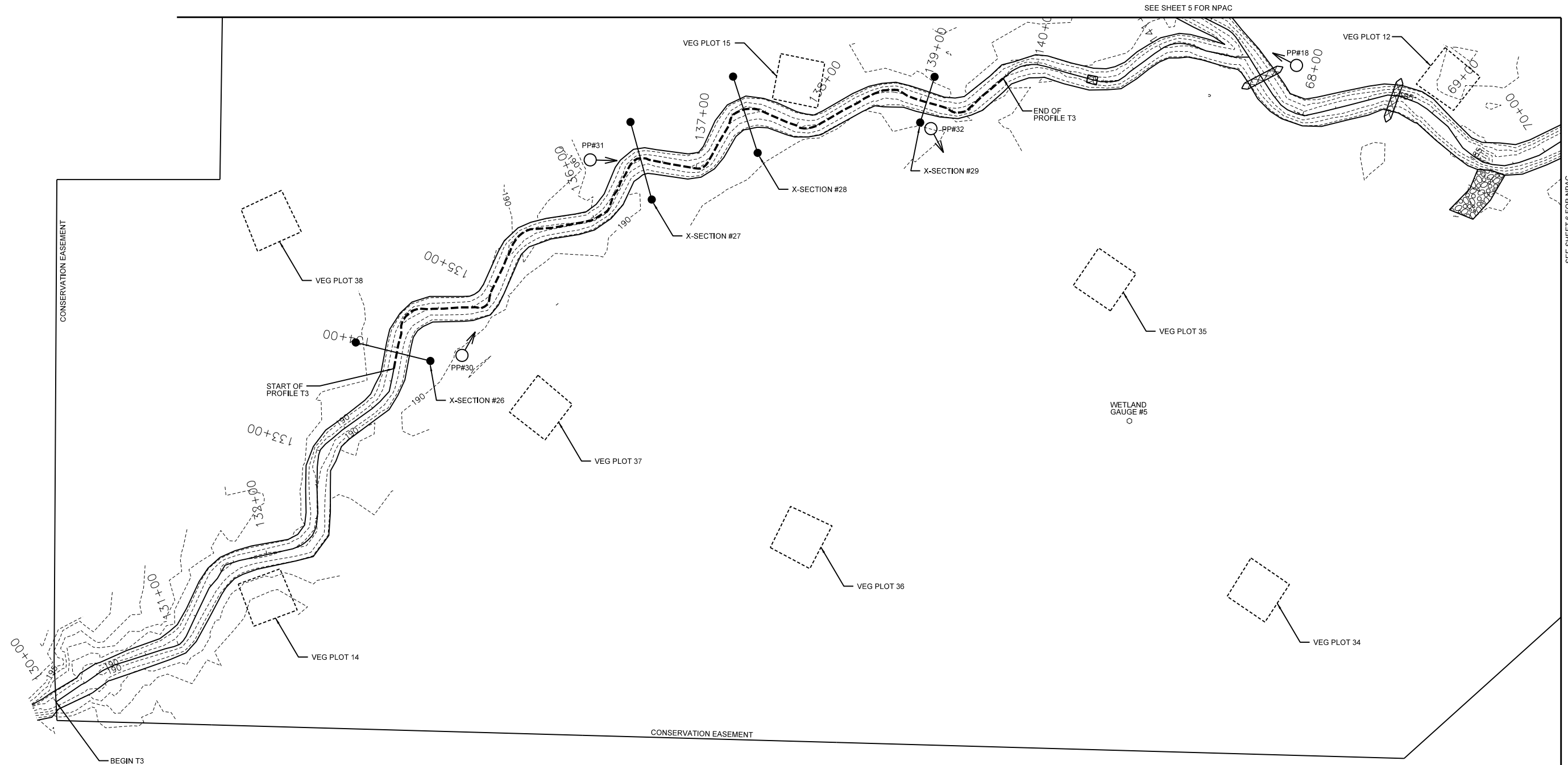
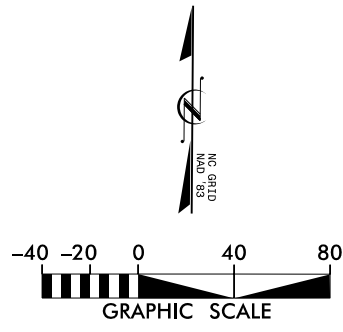
KCI
 TECHNOLOGIES
 ENGINEERS • PLANNERS • SCIENTISTS
 4601 SIX FORKS ROAD
 RALEIGH, NORTH CAROLINA 27609

**FARRAR DAIRY
 STREAM AND WETLAND RESTORATION**
 LILLINGTON, HARNETT COUNTY, NORTH CAROLINA
 T2 - STATION 110+00 TO STATION 120+22

DATE: DEC 2011
 SCALE: 1"=80'
 CURRENT
 CONDITION
 PLAN VIEW
 SHEET 10 OF 11

LEGEND

AS-BUILT STATIONED		CROSS SECTION	
LOG SILL		PHOTO POINT	
LOG DROP		VEGETATION PLOT	
STONE TOE STABILIZATION		GAUGE LOCATION	
STEP POOL		ROCK STABILIZATION	
SEEP DEVELOPMENT		BANK EROSION	
		BEAVER DAM	



SYL	DESCRIPTION	DATE	APPROVED



KCI
 TECHNOLOGIES
 ENGINEERS • PLANNERS • SCIENTISTS
 4601 SIX FORKS ROAD
 RALEIGH, NORTH CAROLINA 27609

**FARRAR DAIRY
 STREAM AND WETLAND RESTORATION**
 LILLINGTON, HARNETT COUNTY, NORTH CAROLINA
 T3 - STATION 130+00 TO STATION 141+67

DATE: DEC 2011
SCALE: 1"=80'
CURRENT CONDITION PLAN VIEW
SHEET 11 OF 11