

Meredell Farm Draft Monitoring Report Year 2 of 5 (2009)

Randolph County, North Carolina

USGS HUC: 03030003

Project ID No. 247



Prepared for:



NCDENR-Ecosystem Enhancement Program

1652 Mail Service Center
Raleigh, North Carolina 27699-1652

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Executive Summary

The Meredell Farm Stream Restoration project falls within USGS hydrologic unit **03030003**. The project lies within a rural setting that includes agricultural, forested, and low density residential areas. The project is located on Meredell Farm, a small farm operation that includes dairy and row crop production. Prior to restoration work, the project stream had been destabilized through channelization and hoof-shear.

Baker Engineering designed the restoration plans and restoration was completed in 2008. Kimley-Horn and Associates, Inc. (KHA) performed year 1 stream and riparian monitoring in 2008 and performed year 2 stream and riparian monitoring during June and October 2009 for this monitoring report. During the early growing season of 2009, KHA assessed twelve (12) vegetation quads. Combined stem count density for all the quads equaled approximately 387 stems per acre for planted stems. The Construction Drawings for Meredell Farm specified that the planted stem density was 457 stems per acre. Areas of isolated non-native/invasive species were located along UT3, UT4, and UT5.

The stream assessment that included a visual assessment and geomorphic survey indicated that the project reach was performing within established success criteria ranges. Between 97 and 100% of the footage across all reaches exhibited lateral and vertical stability and the measured geomorphic parameters are within the design ranges.

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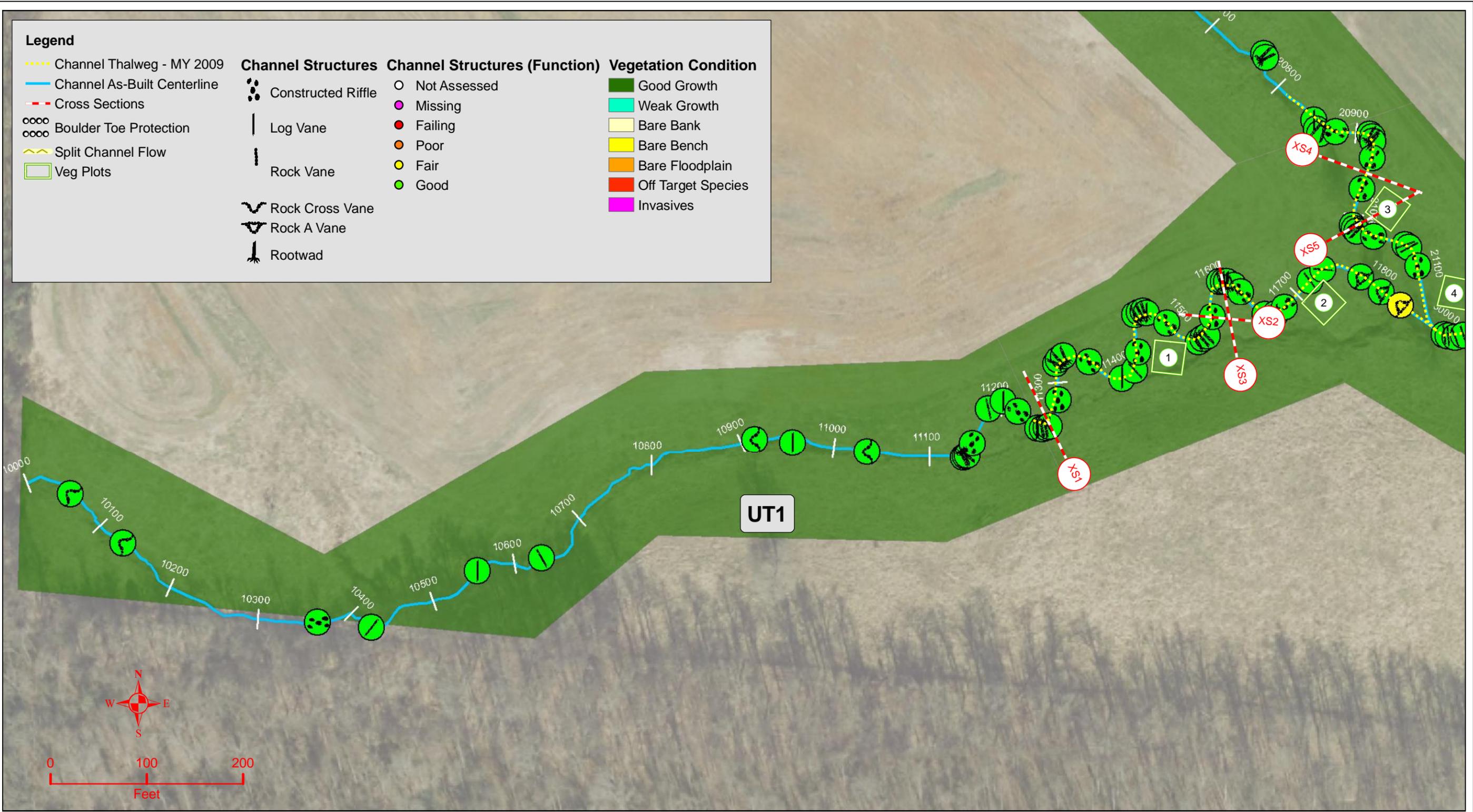
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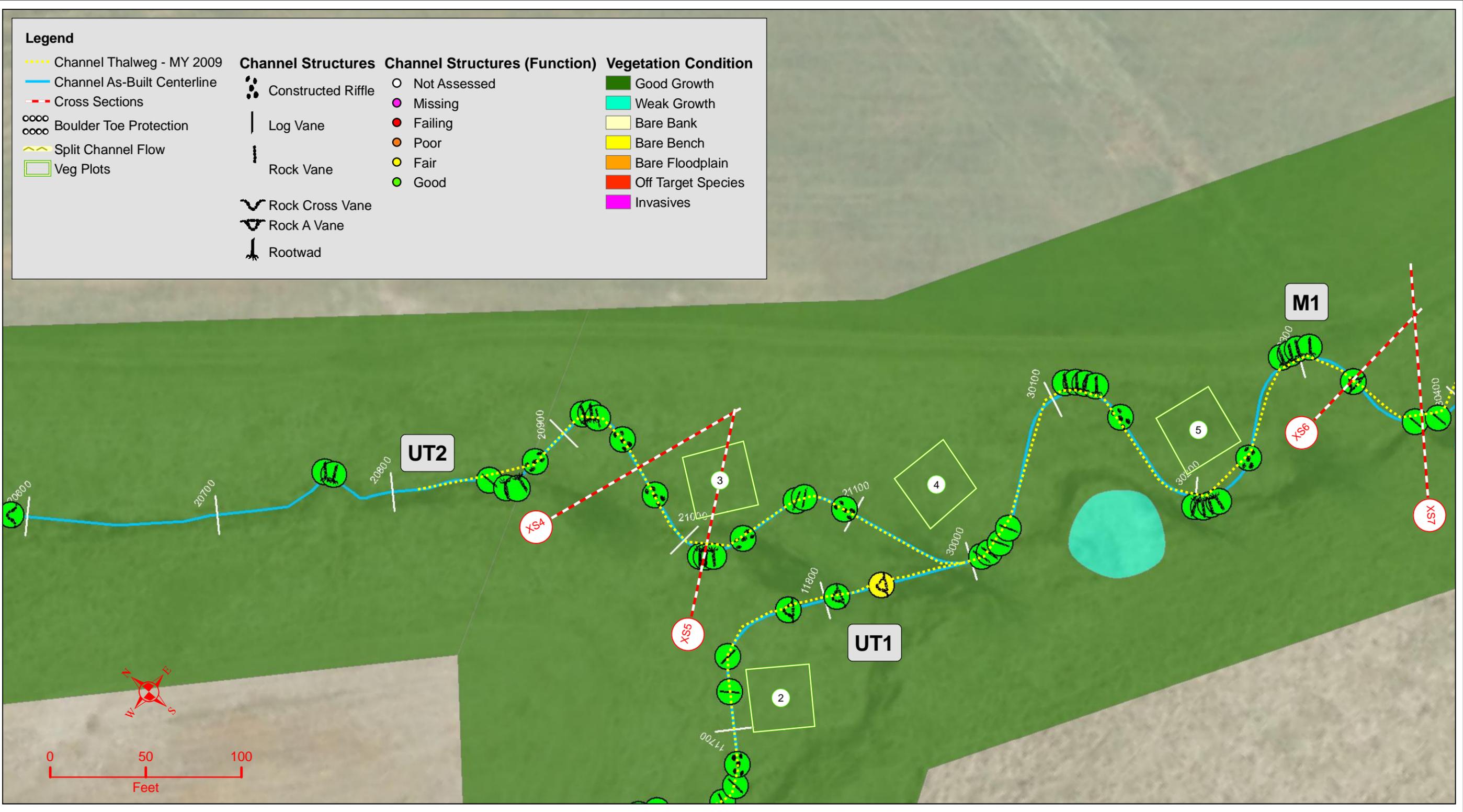
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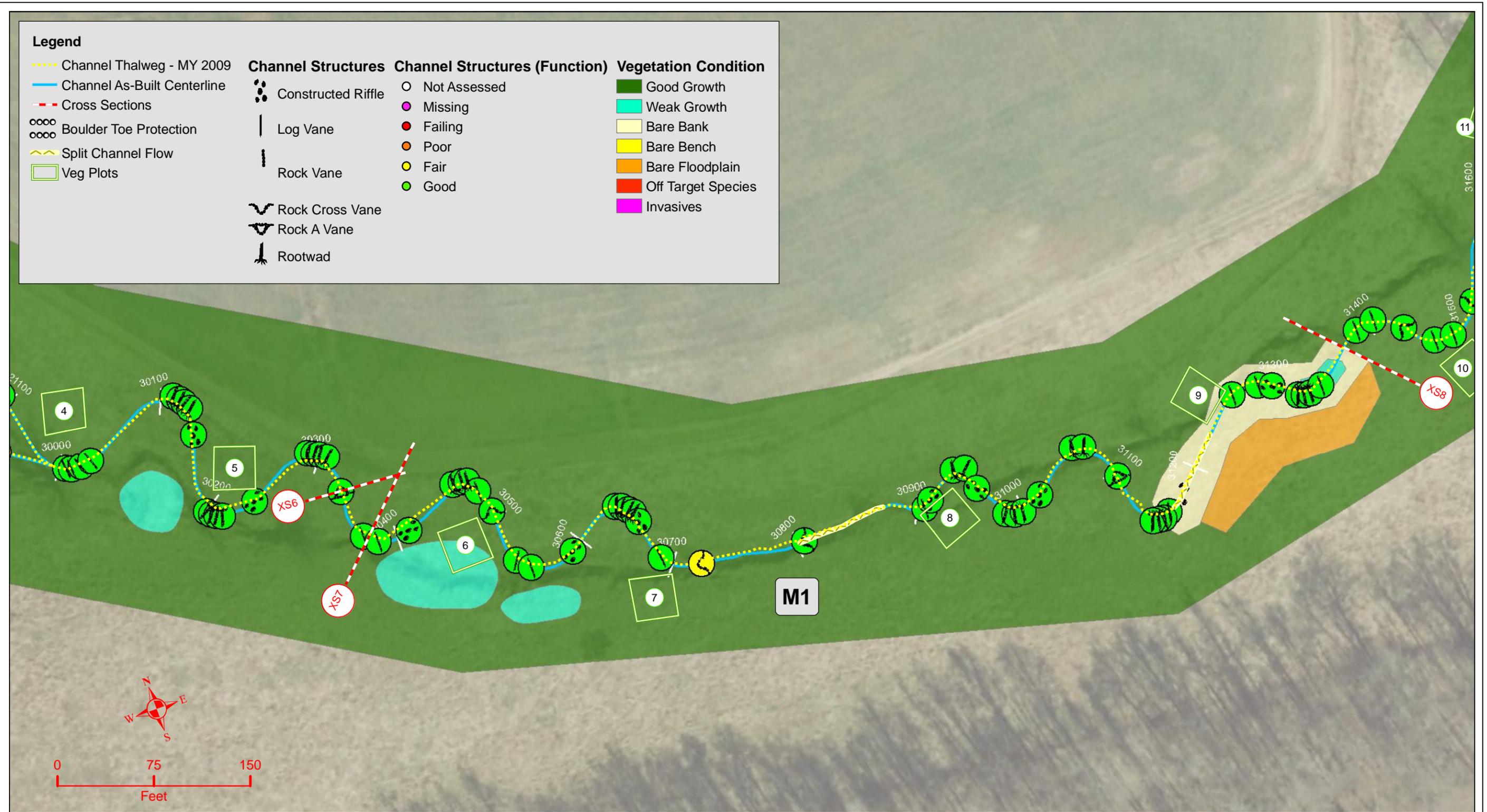
Title		Project Setting		
Prepared For: 	Project	Meredell Farm Stream Restoration Monitoring Year 2 – 2009 Randolph County, North Carolina		
	Date	Project Number	Figure	
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Title	Current Conditions Plan View UT1		
Prepared For: 	Project	Meredell Farm Stream Restoration Monitoring Year 2 – 2009 Randolph County, North Carolina	
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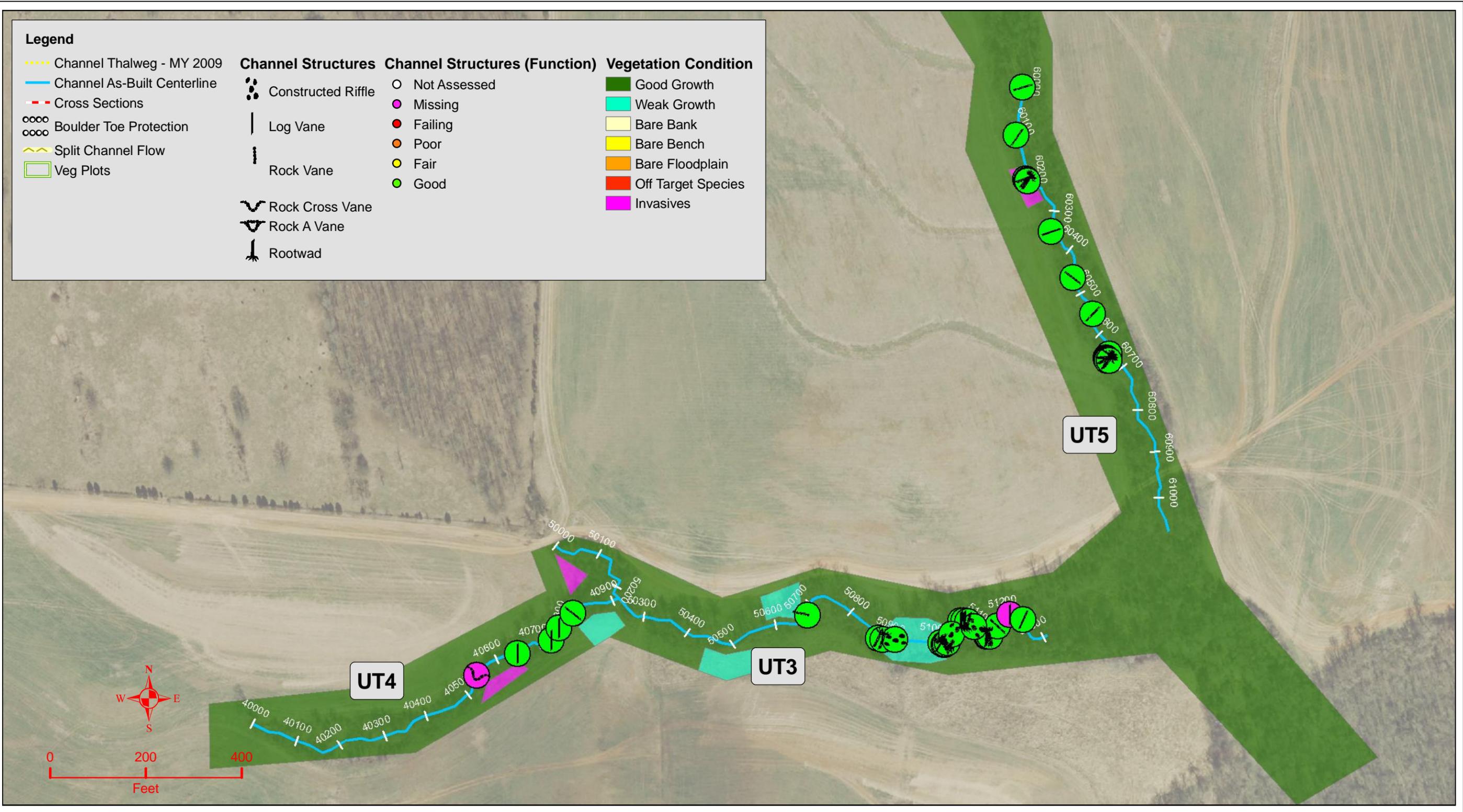
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Prepared For: 	Project	Meredell Farm Stream Restoration Monitoring Year 2 – 2009 Randolph County, North Carolina	
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PROJECT TABLES

Table I. Project Restoration Components Meredell Farm Stream Restoration Site (EEP Project #247)											
Project Segment or Reach ID	Existing Feet /	Type	Approach	Footage or Acreage		Mitigation Ratio	Mitigation Units	Stationing			Comment
UT1	1,621	R	P1	1,880	lf	1:1	1,880	10+00	-	28+79	
UT2	1,006	R	P1	1,095	lf	1:1	1,095	10+00	-	20+94	
M1	2,013	R	P1	2,254	lf	1:1	2,254	10+00	-	32+45	
UT3	1,236	R	P1	1,351	lf	1:1	1,351	10+00	-	20+79	
UT4	913	E1	N/A	913	lf	1.5:1	609	10+00	-	19+13	
UT5	1,075	E1	N/A	1,075	lf	1.5:1	717	10+00	-	20+74	
M2	1,398	P	N/A	1,398	lf	5:1	280	N/A	-	N/A	
Sandy Creek 1	1,033	P	N/A	1,033	lf	5:1	207	N/A	-	N/A	
Sandy Creek 2	801	P	N/A	801	lf	5:1	160	N/A	-	N/A	
Sandy Creek 3	1,902	P	N/A	1,902	lf	5:1	380	N/A	-	N/A	
Mitigation Unit Summaries											
Stream (lf)	Riparian Wetland	Non-Riparian Wetland (Ac.)		Total Wetland (Ac.)		Buffer (Ac.)			Comment		
	0.0	0.0		0.0							

R = Restoration P1 = Priority I
 EI = Enhancement P2 = Priority II
 EII = Enhancement P3 = Priority III
 S = Stabilization SS = Stream Bank stabilization
 P = Preservation

Table II. Project Activity and Reporting History				
Meredell Farm Stream Restoration Site (EEP Project #247)				
Activity or Report	Scheduled Completion	Data Collection Complete	Actual Completion or Delivery	Comments
Restoration Plan			September-04	
Final Design – 90% Construction	2008		March-06 March-08	
Temporary S&E mix applied to entire project area	2008		Prior to March 14th, 2008	
Permanent seed mix applied	2008		March-08	
Plantings	April-08		April-08	
Mitigation Plan / As-built (Year 0 Monitoring –	Not Scheduled	N/A	N/A	No As-Built data is known to exist for this project.
Year 1 Monitoring	February-09	May-09	June-09	Performed by KHA, Inc.
Year 2 Monitoring	November-09	October-09	November-09	Performed by KHA, Inc.
Year 3 Monitoring				
Year 4 Monitoring				
Year 5 Monitoring				

Table III. Project Contact Table		
Meredell Farm Stream Restoration Site (EEP Project #247)		
Designer		
Baker Engineering	8000 Regency Parkway, Suite 200, Cary, NC	
Primary Designer POC	Kevin Tweedy, P.E.	(919) 463-5488
Construction Contractor		
RiverWorks, Inc.	8000 Regency Parkway, Suite 200, Cary, NC	
Primary Contractor POC	Mike Rooney	(919) 459-9001
Planting Contractor		
Planting contractor POC		
Seeding Contractor		
Planting contractor POC		
Seed Mix Sources		
Nursery Stock Suppliers		
Monitoring Performers		
Kimley-Horn and Associates, Inc.	3001 Weston Parkway, Cary, NC	
Stream Monitoring POC	Daren Pait	(919) 677-2000
Vegetation Monitoring POC	Daren Pait	(919) 677-2000

Table IV. Project Background Table Meredell Farm Stream Restoration Site (EEP Project #247)	
Project County	Randolph
Drainage Area	M1 = 168 acres, UT1 = 64 acres, UT2 = 67 acres, UT3 = 148 acres, UT4 = 56 acres, UT5 = 59 acres, and M2 = 265 acres
Drainage impervious cover estimate (%)	<5%
Stream Order	M1 = 2nd order, UT1 = 1st order, UT2 = 1st order, UT3 = 1st and 2nd order, UT4 = 1st order, UT5 = 1st order, and M2 = 2nd order
Physiographic Region	Piedmont
Ecoregion	Carolina Slate Belt
Rosgen Classification of As-built	C
Cowardin Classification	N/A
Dominant soil types	Mecklenburg Loam (Ma) and Mecklenburg Clay Loam (Me)
Reference site ID	From the NCDOT database in Randolph County: West Branch to Tibbs Run, a tributary to Sandy Creek, and a tributary to Fork Creek.
USGS HUC for Project and Reference	3030003
NCDWQ Sub-basin for Project and Reference	03-06-09
NCDWQ classification for Project and Reference	WS-III; C
Any portion of any project segment 303d listed?	No
Any portion of any project segment upstream of a 303d listed segment?	No
Reasons for 303d listing or stressor	N/A
% of project easement fenced	100%

Table V. Verification of Bankfull Events Meredell Farm Stream Restoration Site (EEP Project #247)			
Date of Data Collection	Date of Occurrence	Method	Photo #
N/A	N/A	The only bankfull wrackline noted as of October 2008 was observed on Sandy Creek. No bankfull wracklines were observed on the restored reaches.	N/A
10/13/2009	N/A	Bankfull wracklines were not observed and the crest gauge did not indicate bkf event occurrence.	N/A

*Note: Crest gauge installed in M1 on September 1, 2009

**Table VI. Categorical Stream Feature Visual Stability Assessment
Meredell Farm Stream Restoration Site (EEP Project #247)**

Reach UT1						
Feature	Initial	MY-01	MY-02	MY-03	MY-04	MY-05
A. Riffles	--	100%	100%	--	--	--
B. Pools	--	100%	100%	--	--	--
C. Thalweg	--	100%	100%	--	--	--
D. Meanders	--	100%	100%	--	--	--
E. Bed General	--	100%	100%	--	--	--
F. Bank Condition	--	100%	100%	--	--	--
G. Vanes / J Hooks etc.	--	100%	98%	--	--	--
H. Wads and Boulders	--	100%	100%	--	--	--
Reach UT2						
Feature	Initial	MY-01	MY-02	MY-03	MY-04	MY-05
A. Riffles	--	100%	100%	--	--	--
B. Pools	--	100%	100%	--	--	--
C. Thalweg	--	100%	100%	--	--	--
D. Meanders	--	100%	100%	--	--	--
E. Bed General	--	100%	100%	--	--	--
F. Bank Condition	--	100%	100%	--	--	--
G. Vanes / J Hooks etc.	--	100%	100%	--	--	--
H. Wads and Boulders	--	100%	100%	--	--	--
Reach M1						
Feature	Initial	MY-01	MY-02	MY-03	MY-04	MY-05
A. Riffles	--	100%	100%	--	--	--
B. Pools	--	100%	100%	--	--	--
C. Thalweg	--	100%	100%	--	--	--
D. Meanders	--	100%	100%	--	--	--
E. Bed General	--	100%	97%	--	--	--
F. Bank Condition	--	100%	100%	--	--	--
G. Vanes / J Hooks etc.	--	100%	96%	--	--	--
H. Wads and Boulders	--	100%	100%	--	--	--
Reach UT3						
Feature	Initial	MY-01	MY-02	MY-03	MY-04	MY-05
A. Riffles	--	100%	100%	--	--	--
B. Pools	--	100%	100%	--	--	--
C. Thalweg	--	100%	100%	--	--	--
D. Meanders	--	100%	100%	--	--	--
E. Bed General	--	100%	100%	--	--	--
F. Bank Condition	--	100%	100%	--	--	--
G. Vanes / J Hooks etc.	--	100%	67%	--	--	--
H. Wads and Boulders	--	100%	100%	--	--	--
Reach UT4						
Feature	Initial	MY-01	MY-02	MY-03	MY-04	MY-05
A. Riffles	--	100%	100%	--	--	--
B. Pools	--	100%	100%	--	--	--
C. Thalweg	--	100%	100%	--	--	--
D. Meanders	--	100%	100%	--	--	--
E. Bed General	--	100%	100%	--	--	--
F. Bank Condition	--	100%	100%	--	--	--
G. Vanes / J Hooks etc.	--	100%	100%	--	--	--
H. Wads and Boulders	--	100%	100%	--	--	--
Reach UT5						
Feature	Initial	MY-01	MY-02	MY-03	MY-04	MY-05
A. Riffles	--	100%	100%	--	--	--
B. Pools	--	100%	100%	--	--	--
C. Thalweg	--	100%	100%	--	--	--
D. Meanders	--	100%	100%	--	--	--
E. Bed General	--	100%	100%	--	--	--
F. Bank Condition	--	100%	100%	--	--	--
G. Vanes / J Hooks etc.	--	100%	100%	--	--	--
H. Wads and Boulders	--	100%	100%	--	--	--

Table VII. Baseline Morphology and Hydraulic Summary
Meredell Farm Stream Restoration Site (EEP Project #247)

Reach UT1																			
Parameter	Units	USGS Gage Data			Regional Curve			Pre-Existing Condition			Project Reference Stream			Design			As-built		
		Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Dimension																			
BF Width	ft	*	*	*			*	4.1	14.7	*			*	7.3	7.3	*			
Floodprone Width	ft	*	*	*	*	*	*	6	59	*			*	*	*	*			
BF Cross Sectional Area	ft ²	*	*	*			*	2.6	8.3	*			*	4.5	4.5	*			
BF Mean Depth	ft	*	*	*			*	0.5	0.7	*			*	0.6	0.6	*			
BF Max Depth	ft	*	*	*	*	*	*	0.8	1.1	*			*	0.7	0.9	*			
Width/Depth Ratio		*	*	*	*	*	*	1.3	1.8	*			*	12	12	*			
Entrenchment Ratio		*	*	*	*	*	*	1.3	6.9	*			*	*	*	*			
Bank Height Ratio																			
Wetted Perimeter	ft	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hydraulic radius	ft	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Pattern																			
Channel Beltwidth	ft	*	*	*	*	*	*	10	140	*			*	26	59	*			
Radius of Curvature	ft	*	*	*	*	*	*	13	45	*			*	15	22	*			
Meander Wavelength	ft	*	*	*	*	*	*	80	400	*			*	51	81	*			
Meander Width ratio		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Profile																			
Rifle length	ft	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Rifle slope	ft/ft	*	*	*	*	*	*	*	*	*	*	*	*	0.0132	0.022	*	*	*	*
Pool length	ft	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Pool spacing	ft	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Substrate¹																			
d50	mm	*	*	*	*	*	*	*	*	11.2			*	*	*	11.2			*
d84	mm	*	*	*	*	*	*	*	*	38.4			*	*	*	38.4			*
Additional Reach Parameters																			
Valley Length	ft		*				*		*			*		*		*		*	
Channel Length	ft		*				*		*			*		*		*		*	
Sinuosity			*				*		1.2			*		1.4		*		*	
Water Surface Slope	ft/ft		*				*		0.0258			*		0.011		*		*	
BF slope	ft/ft		*				*		*			*		*		*		*	
Rosgen Classification			*				*		G4,F4b,E4b,C4b			*		C		*		*	
*Habitat Index			*				*		*			*		*		*		*	
*Macrobenthos			*				*		*			*		*		*		*	

Reach UT2																			
Parameter	Units	USGS Gage Data			Regional Curve			Pre-Existing Condition			Project Reference Stream			Design			As-built		
		Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Dimension																			
BF Width	ft	*	*	*			*	4.9	8.1	*			*	7.3	7.3	*			
Floodprone Width	ft	*	*	*	*	*	*	11	17	*			*	*	*	*			
BF Cross Sectional Area	ft ²	*	*	*			*	2.4	6.2	*			*	4.5	4.5	*			
BF Mean Depth	ft	*	*	*			*	0.4	0.8	*			*	0.6	0.6	*			
BF Max Depth	ft	*	*	*	*	*	*	0.8	1.2	*			*	0.7	0.9	*			
Width/Depth Ratio		*	*	*	*	*	*	9.8	18.4	*			*	12	12	*			
Entrenchment Ratio		*	*	*	*	*	*	1.6	2.3	*			*	*	*	*			
Bank Height Ratio																	*		
Wetted Perimeter	ft	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hydraulic radius	ft	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Pattern																			
Channel Beltwidth	ft	*	*	*	*	*	*	15	15	*			*	26	59	*			
Radius of Curvature	ft	*	*	*	*	*	*	3	13	*			*	15	22	*			
Meander Wavelength	ft	*	*	*	*	*	*	60	95	*			*	*	*	*			
Meander Width ratio		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Profile																			
Riffle length	ft	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Riffle slope	ft/ft	*	*	*	*	*	*	*	*	*			*	0.0161	0.0268	*			
Pool length	ft	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Pool spacing	ft	*	*	*	*	*	*	*	*	*			*	*	*	*	*	*	*
Substrate¹																			
d50	mm	*	*	*	*	*	*	*	*	0.7			*	*	*	*	*	*	*
d84	mm	*	*	*	*	*	*	*	*	9.8			*	*	*	*	*	*	*
Additional Reach Parameters																			
Valley Length	ft		*			*			*			*		*		*		*	
Channel Length	ft		*			*			*			*		*		*		*	
Sinuosity			*			*			1.12					1.2		*		*	
Water Surface Slope	ft/ft		*			*			0.0321					0.0134		*		*	
BF slope	ft/ft		*			*			*			*		*		*		*	
Rosgen Classification			*			*			B5,E5			*		*		*		*	
*Habitat Index			*			*			*			*		C		*		*	
*Macrobenthos			*			*			*			*		*		*		*	

Reach M1																			
Parameter	Units	USGS Gage Data			Regional Curve			Pre-Existing Condition			Project Reference Stream			Design			As-built		
		Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Dimension																			
BF Width	ft	*	*	*	*	*	*	4.6	7.6	*	*	*	*	10.2	10.2	*	*	*	*
Floodprone Width	ft	*	*	*	*	*	*	6	13	*	*	*	*	*	*	*	*	*	*
BF Cross Sectional Area	ft ²	*	*	*	*	*	*	3.7	8.4	*	*	*	*	8.6	8.6	*	*	*	*
BF Mean Depth	ft	*	*	*	*	*	*	0.8	1.1	*	*	*	*	0.8	0.8	*	*	*	*
BF Max Depth	ft	*	*	*	*	*	*	1.2	1.4	*	*	*	*	1	1.3	*	*	*	*
Width/Depth Ratio		*	*	*	*	*	*	5.8	7.9	*	*	*	*	12	12	*	*	*	*
Entrenchment Ratio		*	*	*	*	*	*	1.2	1.9	*	*	*	*	0	0	*	*	*	*
Bank Height Ratio																			
Wetted Perimeter	ft	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hydraulic radius	ft	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Pattern																			
Channel Beltwidth	ft	*	*	*	*	*	*	20	30	*	*	*	*	36	81	*	*	*	*
Radius of Curvature	ft	*	*	*	*	*	*	16	25	*	*	*	*	20	30	*	*	*	*
Meander Wavelength	ft	*	*	*	*	*	*	70	170	*	*	*	*	71	112	*	*	*	*
Meander Width ratio		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Profile																			
Rifle length	ft	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Rifle slope	ft/ft	*	*	*	*	*	*	*	*	*	*	*	*	0.0156	0.026	*	*	*	*
Pool length	ft	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Pool spacing	ft	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Substrate¹																			
d50	mm	*	*	*	*	*	*	*	*	16.5	*	*	*	*	*	16.5	*	*	*
d84	mm	*	*	*	*	*	*	*	*	60.4	*	*	*	*	*	60.4	*	*	*
Additional Reach Parameters																			
Valley Length	ft		*			*			*			*			*			*	
Channel Length	ft		*			*			*			*			*			*	
Sinuosity			*			*			1.08						1.38			*	
Water Surface Slope	ft/ft		*			*			0.014						0.13				
BF slope	ft/ft		*			*			*			*			*			*	
Rosgen Classification			*			*			G4c			*			C			*	
*Habitat Index			*			*			*			*			*			*	
*Macrobenthos			*			*			*			*			*			*	

¹Substrate collected at each cross section

Table VIII. Morphology and Hydraulic Monitoring Summary
Meredell Farm Stream Restoration Site (EEP Project #247)

Parameter	Units	Cross Section 1						Cross Section 2						Cross Section 3					
		Pool						Riffle						Pool					
Dimension		CD	MY1	MY2	MY3	MY4	MY5	CD	MY1	MY2	MY3	MY4	MY5	CD	MY1	MY2	MY3	MY4	MY5
BF Width	ft	12.0	24.0	25.0	*	*	*	7.3	8.9	8.7	*	*	*	12.0	12.4	12.9	*	*	*
Floodprone Width	ft	70.4	70.4	70.4	*	*	*	71.1	71.1	71.1	*	*	*	97.6	97.6	97.6	*	*	*
BF Cross Sectional Area	ft	11.5	11.4	12.3	*	*	*	4.5	3.8	3.8	*	*	*	11.5	10.1	10.3	*	*	*
BF Mean Depth	ft	1.0	0.5	0.5	*	*	*	0.6	0.4	0.4	*	*	*	1.0	0.8	0.8	*	*	*
BF Max Depth	ft	1.6	1.5	1.5	*	*	*	0.8	0.7	0.7	*	*	*	1.6	2.4	1.5	*	*	*
Width/Depth Ratio		12.5	50.7	50.4	*	*	*	12.0	21.3	19.9	*	*	*	12.5	15.2	16.1	*	*	*
Entrenchment Ratio		5.9	2.9	2.8	*	*	*	9.7	7.9	8.2	*	*	*	8.1	7.9	7.6	*	*	*
Bank Height Ratio		1.0	1.7	1.3	*	*	*	1.0	1.4	1.4	*	*	*	1.0	1.2	1.3	*	*	*
Wetted Perimeter	ft	10.1	25.7	25.0	*	*	*	7.8	10.6	8.8	*	*	*	10.1	15.8	13.5	*	*	*
Hydraulic radius	ft	1.1	0.4	0.5	*	*	*	0.6	0.4	0.4	*	*	*	1.1	0.6	0.8	*	*	*
Substrate																			
d50	mm	*	*	<0.062	*	*	*	*	*	8	*	*	*	*	*	0.5	*	*	*
d84	mm	*	*	0.25	*	*	*	*	*	22.6	*	*	*	*	*	1.0	*	*	*
Parameter	Units	Cross Section 4						Cross Section 5						Cross Section 6					
Dimension		Riffle						Pool						Riffle					
BF Width	ft	7.3	10.0	8.4	*	*	*	12.0	23.4	17.2	*	*	*	10.2	19.3	13.2	*	*	*
Floodprone Width	ft	110.8	110.8	110.8	*	*	*	110.7	110.7	110.7	*	*	*	80.8	80.8	80.8	*	*	*
BF Cross Sectional Area	ft	4.5	8.2	5.2	*	*	*	11.5	21.9	17.1	*	*	*	8.0	11.3	9.0	*	*	*
BF Mean Depth	ft	0.6	0.8	0.6	*	*	*	1.0	0.9	1.0	*	*	*	0.8	0.6	0.7	*	*	*
BF Max Depth	ft	0.8	1.5	1.2	*	*	*	1.6	2.6	2.2	*	*	*	1.1	1.5	1.2	*	*	*
Width/Depth Ratio		12.0	12.2	13.6	*	*	*	12.5	24.9	17.2	*	*	*	12.0	31.3	19.5	*	*	*
Entrenchment Ratio		15.2	11.1	13.1	*	*	*	9.2	4.7	6.4	*	*	*	7.9	4.2	6.1	*	*	*
Bank Height Ratio		1.0	1.3	1.4	*	*	*	1.0	1.0	1.0	*	*	*	1.0	1.0	1.2	*	*	*
Wetted Perimeter	ft	7.8	11.0	8.8	*	*	*	10.1	23.0	16.3	*	*	*	9.9	24.0	14.7	*	*	*
Hydraulic radius	ft	0.6	0.7	0.6	*	*	*	1.1	1.0	1.1	*	*	*	0.8	0.5	0.6	*	*	*
Substrate																			
d50	mm	*	*	<0.062	*	*	*	*	*	<0.062	*	*	*	*	*	<0.062	*	*	*
d84	mm	*	*	0.125	*	*	*	*	*	0.125	*	*	*	*	*	11.3	*	*	*
Parameter	Units	Cross Section 7						Cross Section 8						Cross Section 9					
Dimension		Pool						Riffle						Riffle					
BF Width	ft	15.0	15.9	13.3	*	*	*	10.2	12.0	11.7	*	*	*	10.2	12.9	13.3	*	*	*
Floodprone Width	ft	114.2	114.2	114.2	*	*	*	116.4	116.4	116.4	*	*	*	56.3	56.3	56.3	*	*	*
BF Cross Sectional Area	ft	18.5	13.8	14.6	*	*	*	8.0	8.4	8.5	*	*	*	8.0	7.9	8.9	*	*	*
BF Mean Depth	ft	1.2	0.9	0.8	*	*	*	0.8	0.7	0.7	*	*	*	0.8	0.6	0.7	*	*	*
BF Max Depth	ft	2.2	2.3	2.2	*	*	*	1.1	1.2	1.1	*	*	*	1.1	1.1	1.2	*	*	*
Width/Depth Ratio		12.2	18.2	22.9	*	*	*	12.0	17.0	16.2	*	*	*	12.0	21.0	19.7	*	*	*
Entrenchment Ratio		7.6	7.2	6.2	*	*	*	11.4	9.7	9.9	*	*	*	5.5	4.4	4.2	*	*	*
Bank Height Ratio		1.0	1.2	1.0	*	*	*	1.0	1.3	1.2	*	*	*	1.0	1.0	1.0	*	*	*
Wetted Perimeter	ft	13.1	19.2	19.6	*	*	*	9.9	11.9	11.1	*	*	*	9.9	13.2	13.8	*	*	*
Hydraulic radius	ft	1.4	0.7	0.8	*	*	*	0.8	0.7	0.8	*	*	*	0.8	0.6	0.7	*	*	*
Substrate																			
d50	mm	*	*	<0.062	*	*	*	*	*	16	*	*	*	*	*	8	*	*	*
d84	mm	*	*	0.5	*	*	*	*	*	90	*	*	*	*	*	64	*	*	*
Parameter	Units	Cross Section 10						Cross Section 11						Cross Section 12					
Dimension		Pool						Riffle						Riffle					
BF Width	ft	15.0	11.9	10.1	*	*	*	10.2	12.0	11.7	*	*	*	10.2	12.9	13.3	*	*	*
Floodprone Width	ft	43.4	43.4	43.4	*	*	*	116.4	116.4	116.4	*	*	*	56.3	56.3	56.3	*	*	*
BF Cross Sectional Area	ft	18.5	12.7	12.6	*	*	*	8.0	8.4	8.5	*	*	*	8.0	7.9	8.9	*	*	*
BF Mean Depth	ft	1.2	1.1	1.3	*	*	*	0.8	0.7	0.7	*	*	*	0.8	0.6	0.7	*	*	*
BF Max Depth	ft	2.2	2.8	2.7	*	*	*	1.1	1.2	1.1	*	*	*	1.1	1.1	1.2	*	*	*
Width/Depth Ratio		12.2	11.1	8.1	*	*	*	12.0	17.0	16.2	*	*	*	12.0	21.0	19.7	*	*	*
Entrenchment Ratio		2.9	3.7	4.3	*	*	*	11.4	9.7	9.9	*	*	*	5.5	4.4	4.2	*	*	*
Bank Height Ratio		1.0	1.1	1.1	*	*	*	1.0	1.3	1.2	*	*	*	1.0	1.0	1.0	*	*	*
Wetted Perimeter	ft	13.1	14.9	13.2	*	*	*	9.9	11.9	11.1	*	*	*	9.9	13.2	13.8	*	*	*
Hydraulic radius	ft	1.4	0.9	1.0	*	*	*	0.8	0.7	0.8	*	*	*	0.8	0.6	0.7	*	*	*
Substrate																			
d50	mm	*	*	<0.062	*	*	*	*	*	16	*	*	*	*	*	8	*	*	*
d84	mm	*	*	16	*	*	*	*	*	90	*	*	*	*	*	64	*	*	*
Parameter		CD			MY-01 (2008)			MY-02 (2009)			MY-03 (2010)			MY-04 (2011)			MY-05 (2012)		
Pattern		Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth	ft	30	83	57	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Radius of Curvature	ft	15	50	25	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Meander Wavelength	ft	75	134	108	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Meander Width ratio		4.1	5.5	5.1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Profile																			
Riffle length	ft	13.97	130.27	31.97	5.80	94.10	32.40	5.41	77.31	22.38	*	*	*	*	*	*	*	*	
Riffle slope	ft/ft	0.0114	0.0563	0.0240	0.0001	0.0519	0.0280	0.0047	0.1081	0.0255	*	*	*	*	*	*	*	*	
Pool length	ft	24.44	71.30	43.25	16.00	79.30	37.25	8.67	65.55	33.98	*	*	*	*	*	*	*	*	
Pool spacing	ft	47.25	302.62	68.18	8.25	138.67	51.80	7.45	76.88	37.86	*	*	*	*	*	*	*	*	
Additional Parameters																			
Valley Length	ft	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Channel Length	ft	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Simosity		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Water Surface Slope	ft/ft	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
BF slope	ft/ft	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Rosgen Classification		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Habitat Index*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Macrobenthos*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

APPENDIX A
VEGETATION MONITORING DATA

Table I. Vegetative Metadata	
Meredell Farm Stream Restoration Site (EEP Project #247)	
Report Prepared By	Steve Marks
Date Prepared	10/28/2009 15:13
database name	cvs-eeep-entrytool-v2.2.6.mdb
database location	K:\RAL_Environmental\011795 Meredell Farm Monitoring MDELL\MDELL VEGETATION
computer name	DD81987
file size	44048384
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT-----	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
PROJECT SUMMARY-----	
Project Code	247
project Name	Meredell Farm
Description	Riparian Buffer Restoration
River Basin	
length(ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	12

**Table II. Vegetation Vigor by Species
Meredell Farm Stream Restoration Site (EEP Project #247)**

	Species	4	3	2	1	0	Missing	Unknown
	Asimina triloba						1	
	Betula nigra	8	2			2		
	Cornus amomum	1		1				
	Corylus americana		3	7			1	
	Diospyros virginiana	2	3	3	4		4	
	Juglans nigra		3	2	1			
	Quercus alba		1					
	Quercus michauxii	2	3	2	1			
	Quercus pagoda		2	1			1	
	Quercus phellos	2		1	1			
	Salix sericea	24	18	5	2		2	
	Sambucus canadensis			2				
	Hamamelis virginiana	1	1	1				
	Carya		2					
	Lindera benzoin		3	1	1	1	3	
	Liriodendron tulipifera	1	4	3			2	
	Fraxinus						1	
	Platanus occidentalis	6	5	2	1			
	Populus deltoides	1						
	Acer rubrum	1	10					
	Ulmus		2	1			1	
TOT:	21	49	62	32	11	3	16	



**Table III. Vegetation Damage by Species
Meredell Farm Stream Restoration Site (EEP)**

<i>Species</i>	<i>All Damage Categories</i>	<i>(no damage)</i>	<i>Diseased</i>	<i>Insects</i>	<i>Vine Strangulation</i>
Acer rubrum	11	11			
Asimina triloba	1	1			
Betula nigra	12	12			
Carya	2	2			
Cornus amomum	2			2	
Corylus americana	11	11			
Diospyros virginiana	16	16			
Fraxinus	1	1			
Hamamelis virginiana	3	2		1	
Juglans nigra	6	5		1	
Lindera benzoin	9	9			
Liriodendron tulipifera	10	10			
Platanus occidentalis	14	12	1	1	
Populus deltoides	1	1			
Quercus alba	1	1			
Quercus michauxii	8	8			
Quercus pagoda	4	4			
Quercus phellos	4	4			
Salix sericea	51	47		3	1
Sambucus canadensis	2	1	1		
Ulmus	4	3		1	
TOT: 21	173	161	2	9	1



**Table IV. Vegetation Damage by Plot
Meredell Farm Stream Restoration Site (EEP Project #247)**

<i>Plot</i>	<i>All Damage Categories</i>	<i>(no damage)</i>	<i>Diseased</i>	<i>Insects</i>	<i>Vine Strangulation</i>
247-01-0001-year:2	32	31		1	
247-01-0002-year:2	8	8			
247-01-0003-year:2	21	21			
247-01-0004-year:2	13	13			
247-01-0005-year:2	12	12			
247-01-0006-year:2	7	7			
247-01-0007-year:2	9	9			
247-01-0008-year:2	17	15		1	1
247-01-0009-year:2	6	6			
247-01-0010-year:2	6	4	1	1	
247-01-0011-year:2	13	11		2	
247-01-0012-year:2	29	24	1	4	
TOT: 12	173	161	2	9	1



Table V. Planted Stem Count by Plot and Species
Meredell Farm Stream Restoration Site (EEP Project #247)

Species	Total Planted Stems			Plot												
	# plots	avg# stems		plot 247-01-0001-year:2	plot 247-01-0002-year:2	plot 247-01-0003-year:2	plot 247-01-0004-year:2	plot 247-01-0005-year:2	plot 247-01-0006-year:2	plot 247-01-0007-year:2	plot 247-01-0008-year:2	plot 247-01-0009-year:2	plot 247-01-0010-year:2	plot 247-01-0011-year:2	plot 247-01-0012-year:2	
Acer rubrum	11	2	5.5											4	7	
Betula nigra	10	5	2		3	1	1			3					2	
Carya	2	1	2					2								
Cornus amomum	2	1	2												2	
Corylus americana	10	2	5		3	7										
Diospyros virginiana	12	4	3	2			7	2						1		
Hamamelis virginiana	3	2	1.5	2										1		
Juglans nigra	6	3	2				1	2				3				
Lindera benzoin	5	4	1.25		1		2			1				1		
Liriodendron tulipifera	8	2	4										2	6		
Platanus occidentalis	14	7	2	3	2			1	2	2		1		3		
Populus deltoides	1	1	1								1					
Quercus alba	1	1	1						1							
Quercus michauxii	8	4	2		2		3	1					2			
Quercus pagoda	3	2	1.5	2			1									
Quercus phellos	4	2	2		3					1						
Salix sericea	49	5	9.8	20		13				8	4		4			
Sambucus canadensis	2	1	2										2			
Ulmus	3	1	3											3		
TOT:	19	154	19		29	7	20	12	11	4	7	15	5	6	13	25

Table VI. Vegetative Problem Areas Meredell Farm Stream Restoration Site (EEP Project #247)			
Feature/Issue	Station # / Range	Probable Cause	Photo #
2008			
Bare Bank	11 + 700 (UT1)	None planted/Wet conditions	
	31 + 200 (M1)	None planted/Wet conditions	
Bare Bench	30 + 400 (M1)	Weak growth	VP1 (VQ6)
	31 + 200 (M1)	Weak growth	VP2 (VQ9)
	50 + 900 (UT3)	Weak growth	
Bare Flood Plain			
Invasive/Exotic Populations			
2009			
Bare Bank	31 + 200 (M1)	None planted/Wet conditions	
Bare Bench	30 + 200 (M1)	Weak growth	
	30 + 400 (M1)	Weak growth	VP1 (VQ6)
	30 + 550 (M1)	Weak growth	
	31 + 200 (M1)	Weak growth	VP2 (VQ9)
	50 + 600 (UT3)	Weak growth	
	50 + 900 (UT3)	Weak growth	VP4
Bare Flood Plain	31 + 200 (M1)	Weak growth	
	40 + 850 (UT4)	Weak growth	VP1
	50 + 500 (UT3)	Weak growth	VP3
Invasive/Exotic Populations	40 + 600 (UT4)	Pokeberries	VP2
	50 + 100 (UT3)	Pokeberries	
	50 + 1100 (UT3)	Cattails	VP5
	60 + 200 (UT5)	Privet	VP6





VQ1: Vegetation Quad 1
Taken: 10-15-2009



VQ1: Vegetation Quad 1
Taken: 10-15-2009



VQ2: Vegetation Quad 2
Taken: 10-15-2009



VQ2: Vegetation Quad 2
Taken: 10-15-2009



VQ3: Vegetation Quad 3
Taken: 10-15-2009



VQ3: Vegetation Quad 3
Taken: 10-15-2009



VQ4: Vegetation Quad 4
Taken: 10-15-2009



VQ4: Vegetation Quad 4
Taken: 10-15-2009



VQ5: Vegetation Quad 5
Taken: 10-15-2009



VQ5: Vegetation Quad 5
Taken: 10-15-2009



VQ6: Vegetation Quad 6
Taken: 10-15-2009



VQ6: Vegetation Quad 6
Taken: 10-15-2009



VQ7: Vegetation Quad 7
Taken: 10-15-2009



VQ7: Vegetation Quad 7
Taken: 10-15-2009



VQ8: Vegetation Quad 8
Taken: 10-15-2009



VQ8: Vegetation Quad 8
Taken: 10-15-2009



VQ9: Vegetation Quad 9
Taken: 10-15-2009



VQ9: Vegetation Quad 9
Taken: 10-15-2009



VQ10: Vegetation Quad 10
Taken: 10-15-2009



VQ10: Vegetation Quad 10
Taken: 10-15-2009



VQ11: Vegetation Quad 11
Taken: 10-15-2009



VQ11: Vegetation Quad 11
Taken: 10-15-2009



VQ12: Vegetation Quad 12
Taken: 10-15-2009



VQ12: Vegetation Quad 12
Taken: 10-15-2009



VP1: UT4 Weak Growth
Taken: 11-09-2009



VP2: UT4 Invasives - Pokeweed
Taken: 11-09-2009



VP3: UT3 Weak Growth
Taken: 11-09-2009



VP4: UT3 Weak Growth
Taken: 11-09-2009



VP5: UT3 Invasives: Cattails
Taken: 11-09-2009



VP6: UT5 Invasives: Privet
Taken: 11-09-2009

APPENDIX B
STREAM MONITORING DATA

Table B1. Stream Problem Areas Meredell Farm Stream Restoration Site (EEP Project #247)					
Feature Issue	Reach	Stations	Description	Suspected Cause	Photo number
2009					
Aggradation/Bar Formation	M1	30,800-30,870	Split Channel Flow	Vegetation growing in Channel	
Aggradation/Bar Formation	M1	31,165-31,230	Split Channel Flow	Vegetation growing in Channel	
Bank scour	N/A				

Table B2. Visual Morphological Stability Assessment
Meredell Farm Stream Restoration Site (EEP Project #247)

Reach UT1									
Feature Category	Metric (per As-built and reference baselines)		(# Stable) Number Performing as Intended	Total number per As-built*	Total Number / feet in unstable state		% Perform in Stable Condition	Feature Perform. Mean or Total	
A. Riffles	1	Present?	5	5	NA		100%	100%	
	2	Armor stable (e.g. no displacement)?	5	5	NA		100%		
	3	Facet grade appears stable?	5	5	NA		100%		
	4	Minimal evidence of embedding/fining?	5	5	NA		100%		
	5	Length appropriate?	5	5	NA		100%		
B. Pools	1	Present? (e.g not subject to severe aggrad. or migrat.?)	5	5	NA		100%	100%	
	2	Sufficiently deep (Max Pool D-Mean Bkf >1.6?)	5	5	NA		100%		
	3	Length appropriate?	5	5	NA		100%		
C. Thalweg	1	Upstream of meander bend (run/inflection) centering?	5	5	NA		100%	100%	
	2	Downstream of meander (glide/inflection) centering?	5	5	NA		100%		
D. Meanders	1	Outer bend in state of limited/controlled erosion?	5	5	NA		100%	100%	
	2	Of those eroding, # w/concomitant point bar formation?	5	5	NA		100%		
	3	Apparent Rc within spec?	5	5	NA		100%		
	4	Sufficient floodplain access and relief?	5	5	NA		100%		
E. Bed General	1	General channel bed aggradation areas (bar formation)	--	--	0	/	0	100%	100%
	2	Channel bed degradation - areas of increasing down-cutting or head cutting?	--	--	0	/	0	100%	
F. Bank	2	Actively eroding, wasting, or slumping bank	--	--	0	/	0	100%	100%
G. Vanes	1	Free of back or arm scour?	10	10	NA		100%	98%	
	2	Height appropriate?	10	10	NA		100%		
	3	Angle and geometry appear appropriate?	10	10	NA		100%		
	4	Free of piping or other structural failures?	9	10	NA		90%		
H. Wads/ Boulders	1	Free of scour?	15	15	NA		100%	100%	
	2	Footing stable?	15	15	NA		100%		
Reach UT2									
Feature Category	Metric (per As-built and reference baselines)		(# Stable) Number Performing as Intended	Total number per As-built*	Total Number / feet in unstable state		% Perform in Stable Condition	Feature Perform. Mean or Total	
A. Riffles	1	Present?	5	5	NA		100%	100%	
	2	Armor stable (e.g. no displacement)?	5	5	NA		100%		
	3	Facet grade appears stable?	5	5	NA		100%		
	4	Minimal evidence of embedding/fining?	5	5	NA		100%		
	5	Length appropriate?	5	5	NA		100%		
B. Pools	1	Present? (e.g not subject to severe aggrad. or migrat.?)	4	4	NA		100%	100%	
	2	Sufficiently deep (Max Pool D-Mean Bkf >1.6?)	4	4	NA		100%		
	3	Length appropriate?	4	4	NA		100%		
C. Thalweg	1	Upstream of meander bend (run/inflection) centering?	3	3	NA		100%	100%	
	2	Downstream of meander (glide/inflection) centering?	3	3	NA		100%		
D. Meanders	1	Outer bend in state of limited/controlled erosion?	3	3	NA		100%	100%	
	2	Of those eroding, # w/concomitant point bar formation?	3	3	NA		100%		
	3	Apparent Rc within spec?	3	3	NA		100%		
	4	Sufficient floodplain access and relief?	3	3	NA		100%		
E. Bed General	1	General channel bed aggradation areas (bar formation)	--	--	0	/	0	100%	100%
	2	Channel bed degradation - areas of increasing down-cutting or head cutting?	--	--	0	/	0	100%	
F. Bank	2	Actively eroding, wasting, or slumping bank	--	--	0	/	0	100%	100%
G. Vanes	1	Free of back or arm scour?	5	5	NA		100%	100%	
	2	Height appropriate?	5	5	NA		100%		
	3	Angle and geometry appear appropriate?	5	5	NA		100%		
	4	Free of piping or other structural failures?	5	5	NA		100%		
H. Wads/ Boulders	1	Free of scour?	10	10	NA		100%	100%	
	2	Footing stable?	10	10	NA		100%		
Reach M1									
Feature Category	Metric (per As-built and reference baselines)		(# Stable) Number Performing as Intended	Total number per As-built*	Total Number / feet in unstable state		% Perform in Stable Condition	Feature Perform. Mean or Total	
A. Riffles	1	Present?	25	25	NA		100%	100%	
	2	Armor stable (e.g. no displacement)?	25	25	NA		100%		
	3	Facet grade appears stable?	25	25	NA		100%		
	4	Minimal evidence of embedding/fining?	25	25	NA		100%		
	5	Length appropriate?	25	25	NA		100%		
B. Pools	1	Present? (e.g not subject to severe aggrad. or migrat.?)	23	23	NA		100%	100%	
	2	Sufficiently deep (Max Pool D-Mean Bkf >1.6?)	23	23	NA		100%		
	3	Length appropriate?	23	23	NA		100%		
C. Thalweg	1	Upstream of meander bend (run/inflection) centering?	26	26	NA		100%	100%	
	2	Downstream of meander (glide/inflection) centering?	26	26	NA		100%		
D. Meanders	1	Outer bend in state of limited/controlled erosion?	26	26	NA		100%	100%	
	2	Of those eroding, # w/concomitant point bar formation?	26	26	NA		100%		
	3	Apparent Rc within spec?	26	26	NA		100%		
	4	Sufficient floodplain access and relief?	26	26	NA		100%		
E. Bed General	1	General channel bed aggradation areas (bar formation)	--	--	2	/	140	94%	97%
	2	Channel bed degradation - areas of increasing down-cutting or head cutting?	--	--	0	/	0	100%	
F. Bank	2	Actively eroding, wasting, or slumping bank	--	--	0	/	0	100%	100%
G. Vanes	1	Free of back or arm scour?	6	6	NA		100%	96%	
	2	Height appropriate?	6	6	NA		100%		
	3	Angle and geometry appear appropriate?	6	6	NA		100%		
	4	Free of piping or other structural failures?	5	6	NA		83%		
H. Wads/ Boulders	1	Free of scour?	42	42	NA		100%	100%	
	2	Footing stable?	42	42	NA		100%		

Table B2. Visual Morphological Stability Assessment
Meredell Farm Stream Restoration Site (EEP Project #247)

Reach UT3							
Feature Category	Metric (per As-built and reference baselines)		# Stable Number Performing as Intended	Total number per As-built*	Total Number / feet in unstable state	% Perform in Stable Condition	Feature Perform. Mean or Total
A. Riffles	1	Present?	8	8	NA	100%	100%
	2	Armor stable (e.g. no displacement)?	8	8	NA	100%	
	3	Facet grade appears stable?	8	8	NA	100%	
	4	Minimal evidence of embedding/fining?	8	8	NA	100%	
	5	Length appropriate?	8	8	NA	100%	
B. Pools	1	Present? (e.g. not subject to severe aggrad. or migrat.?)	8	8	NA	100%	100%
	2	Sufficiently deep (Max Pool D-Mean Bkf >1.6?)	8	8	NA	100%	
	3	Length appropriate?	8	8	NA	100%	
C. Thalweg	1	Upstream of meander bend (run/inflection) centering?	8	8	NA	100%	100%
	2	Downstream of meander (glide/inflection) centering?	8	8	NA	100%	
D. Meanders	1	Outer bend in state of limited/controlled erosion?	8	8	NA	100%	100%
	2	Of those eroding, # w/concomitant point bar formation?	8	8	NA	100%	
	3	Apparent Rc within spec?	8	8	NA	100%	
	4	Sufficient floodplain access and relief?	8	8	NA	100%	
E. Bed General	1	General channel bed aggradation areas (bar formation)	--	--	0 / 0	100%	100%
	2	Channel bed degradation - areas of increasing down-cutting or head cutting?	--	--	0 / 0	100%	
F. Bank	2	Actively eroding, wasting, or slumping bank	--	--	0 / 0	100%	100%
G. Vanes	1	Free of back or arm scour?	2	3	NA	67%	67%
	2	Height appropriate?	2	3	NA	67%	
	3	Angle and geometry appear appropriate?	2	3	NA	67%	
	4	Free of piping or other structural failures?	2	3	NA	67%	
H. Wads/ Boulders	1	Free of scour?	4	4	NA	100%	100%
	2	Footing stable?	4	4	NA	100%	
Reach UT4							
Feature Category	Metric (per As-built and reference baselines)		# Stable Number Performing as Intended	Total number per As-built*	Total Number / feet in unstable state	% Perform in Stable Condition	Feature Perform. Mean or Total
A. Riffles	1	Present?	N/A	N/A	NA	100%	100%
	2	Armor stable (e.g. no displacement)?	N/A	N/A	NA	100%	
	3	Facet grade appears stable?	N/A	N/A	NA	100%	
	4	Minimal evidence of embedding/fining?	N/A	N/A	NA	100%	
	5	Length appropriate?	N/A	N/A	NA	100%	
B. Pools	1	Present? (e.g. not subject to severe aggrad. or migrat.?)	N/A	N/A	NA	100%	100%
	2	Sufficiently deep (Max Pool D-Mean Bkf >1.6?)	N/A	N/A	NA	100%	
	3	Length appropriate?	N/A	N/A	NA	100%	
C. Thalweg	1	Upstream of meander bend (run/inflection) centering?	N/A	N/A	NA	100%	100%
	2	Downstream of meander (glide/inflection) centering?	N/A	N/A	NA	100%	
D. Meanders	1	Outer bend in state of limited/controlled erosion?	N/A	N/A	NA	100%	100%
	2	Of those eroding, # w/concomitant point bar formation?	N/A	N/A	NA	100%	
	3	Apparent Rc within spec?	N/A	N/A	NA	100%	
	4	Sufficient floodplain access and relief?	N/A	N/A	NA	100%	
E. Bed General	1	General channel bed aggradation areas (bar formation)	--	--	0 / 0	100%	100%
	2	Channel bed degradation - areas of increasing down-cutting or head cutting?	--	--	0 / 0	100%	
F. Bank	2	Actively eroding, wasting, or slumping bank	--	--	0 / 0	100%	100%
G. Vanes	1	Free of back or arm scour?	4	4	NA	100%	100%
	2	Height appropriate?	4	4	NA	100%	
	3	Angle and geometry appear appropriate?	4	4	NA	100%	
	4	Free of piping or other structural failures?	4	4	NA	100%	
H. Wads/ Boulders	1	Free of scour?	N/A	N/A	NA	100%	100%
	2	Footing stable?	N/A	N/A	NA	100%	
Reach UT5							
Feature Category	Metric (per As-built and reference baselines)		# Stable Number Performing as Intended	Total number per As-built*	Total Number / feet in unstable state	% Perform in Stable Condition	Feature Perform. Mean or Total
A. Riffles	1	Present?	N/A	N/A	NA	100%	100%
	2	Armor stable (e.g. no displacement)?	N/A	N/A	NA	100%	
	3	Facet grade appears stable?	N/A	N/A	NA	100%	
	4	Minimal evidence of embedding/fining?	N/A	N/A	NA	100%	
	5	Length appropriate?	N/A	N/A	NA	100%	
B. Pools	1	Present? (e.g. not subject to severe aggrad. or migrat.?)	N/A	N/A	NA	100%	100%
	2	Sufficiently deep (Max Pool D-Mean Bkf >1.6?)	N/A	N/A	NA	100%	
	3	Length appropriate?	N/A	N/A	NA	100%	
C. Thalweg	1	Upstream of meander bend (run/inflection) centering?	N/A	N/A	NA	100%	100%
	2	Downstream of meander (glide/inflection) centering?	N/A	N/A	NA	100%	
D. Meanders	1	Outer bend in state of limited/controlled erosion?	N/A	N/A	NA	100%	100%
	2	Of those eroding, # w/concomitant point bar formation?	N/A	N/A	NA	100%	
	3	Apparent Rc within spec?	N/A	N/A	NA	100%	
	4	Sufficient floodplain access and relief?	N/A	N/A	NA	100%	
E. Bed General	1	General channel bed aggradation areas (bar formation)	--	--	0 / 0	100%	100%
	2	Channel bed degradation - areas of increasing down-cutting or head cutting?	--	--	0 / 0	100%	
F. Bank	2	Actively eroding, wasting, or slumping bank	--	--	0 / 0	100%	100%
G. Vanes	1	Free of back or arm scour?	7	7	NA	100%	100%
	2	Height appropriate?	7	7	NA	100%	
	3	Angle and geometry appear appropriate?	7	7	NA	100%	
	4	Free of piping or other structural failures?	7	7	NA	100%	
H. Wads/ Boulders	1	Free of scour?	N/A	N/A	NA	100%	100%
	2	Footing stable?	N/A	N/A	NA	100%	

* This number may not be accurate. No design issues, were noticed in the stream, therefore the features in the visual assessment were determined to be at 100%.



M1 – Vegetation Growing in Channel
Taken: 06-25-2009



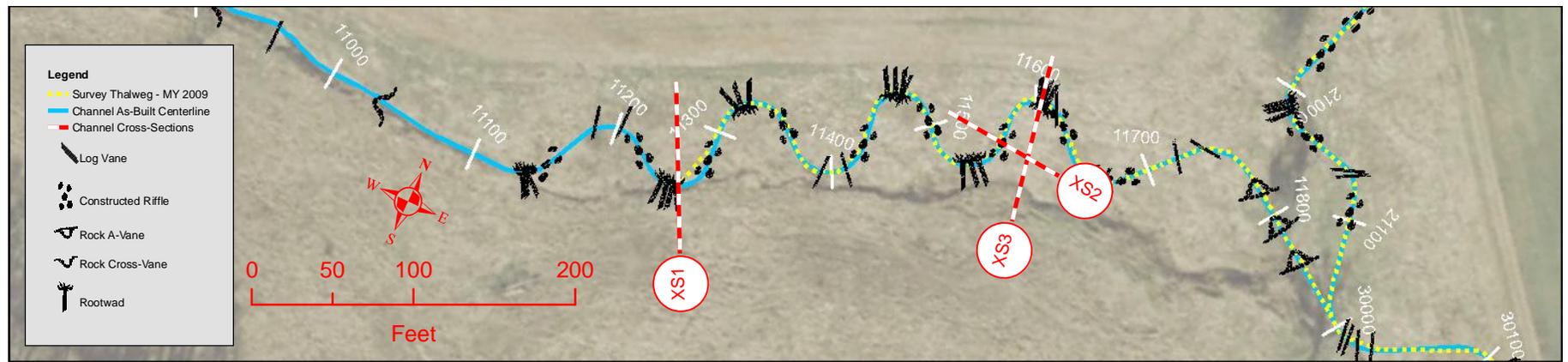
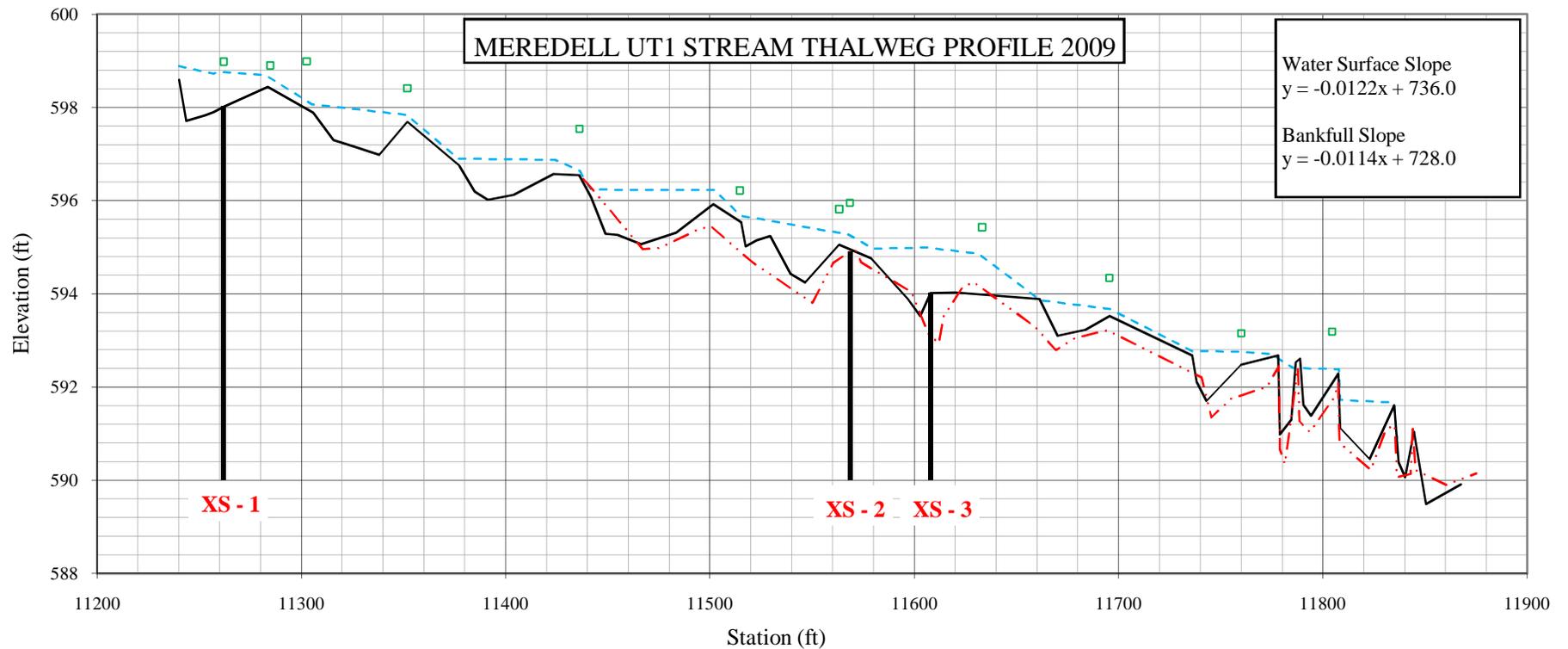
UT3 – Saturated Floodplain
Taken: 06-25-2009

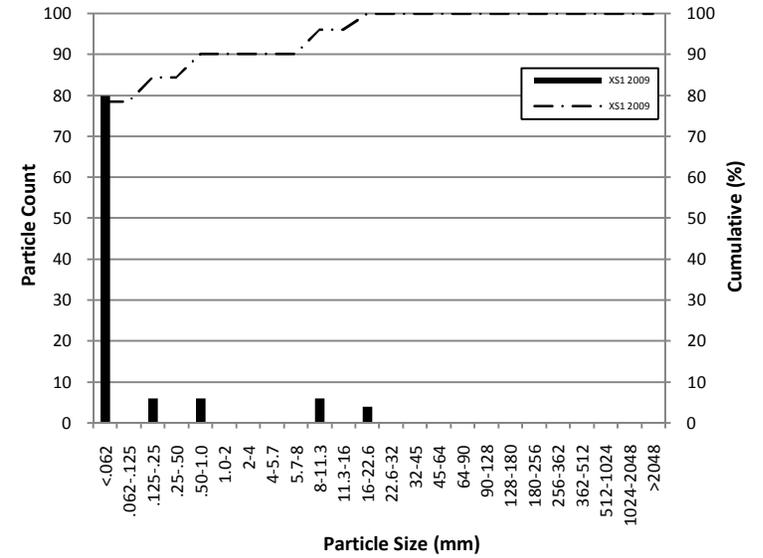
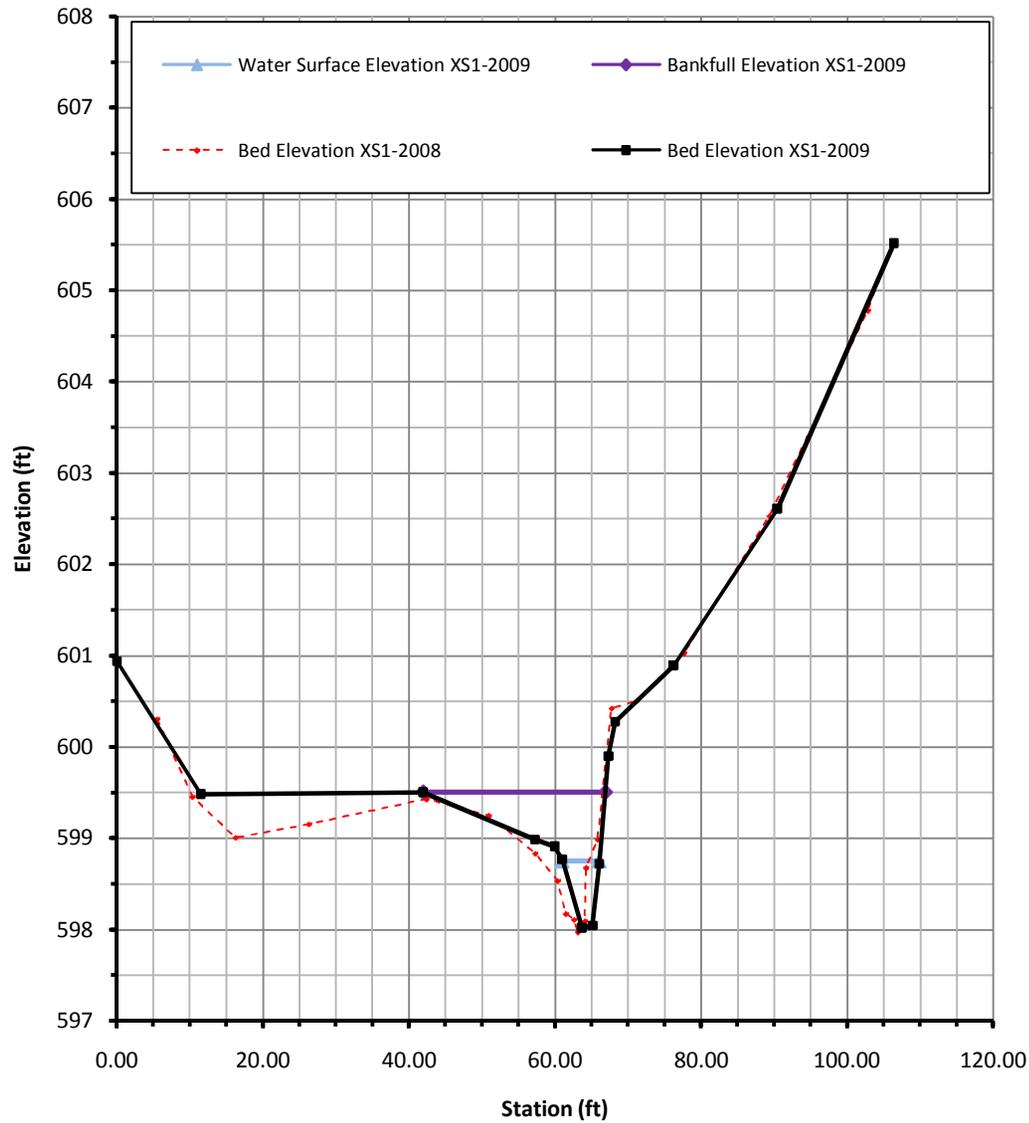


M1 – Typical view of riparian area
Taken: 06-25-2009



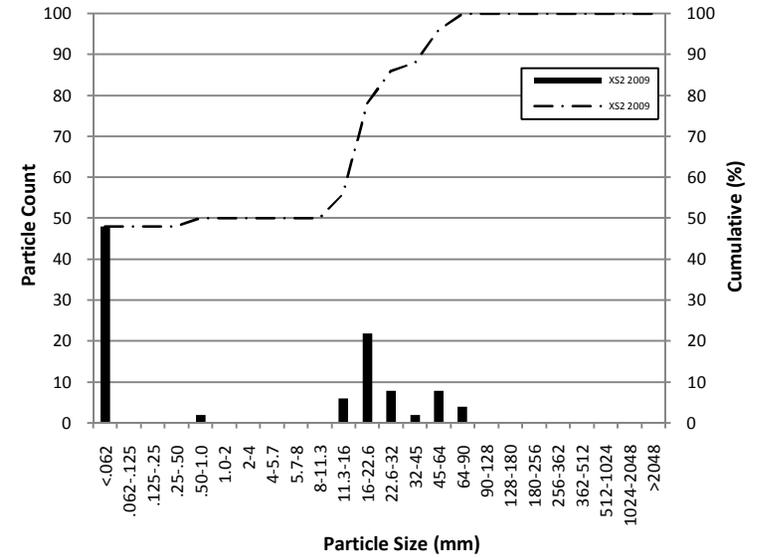
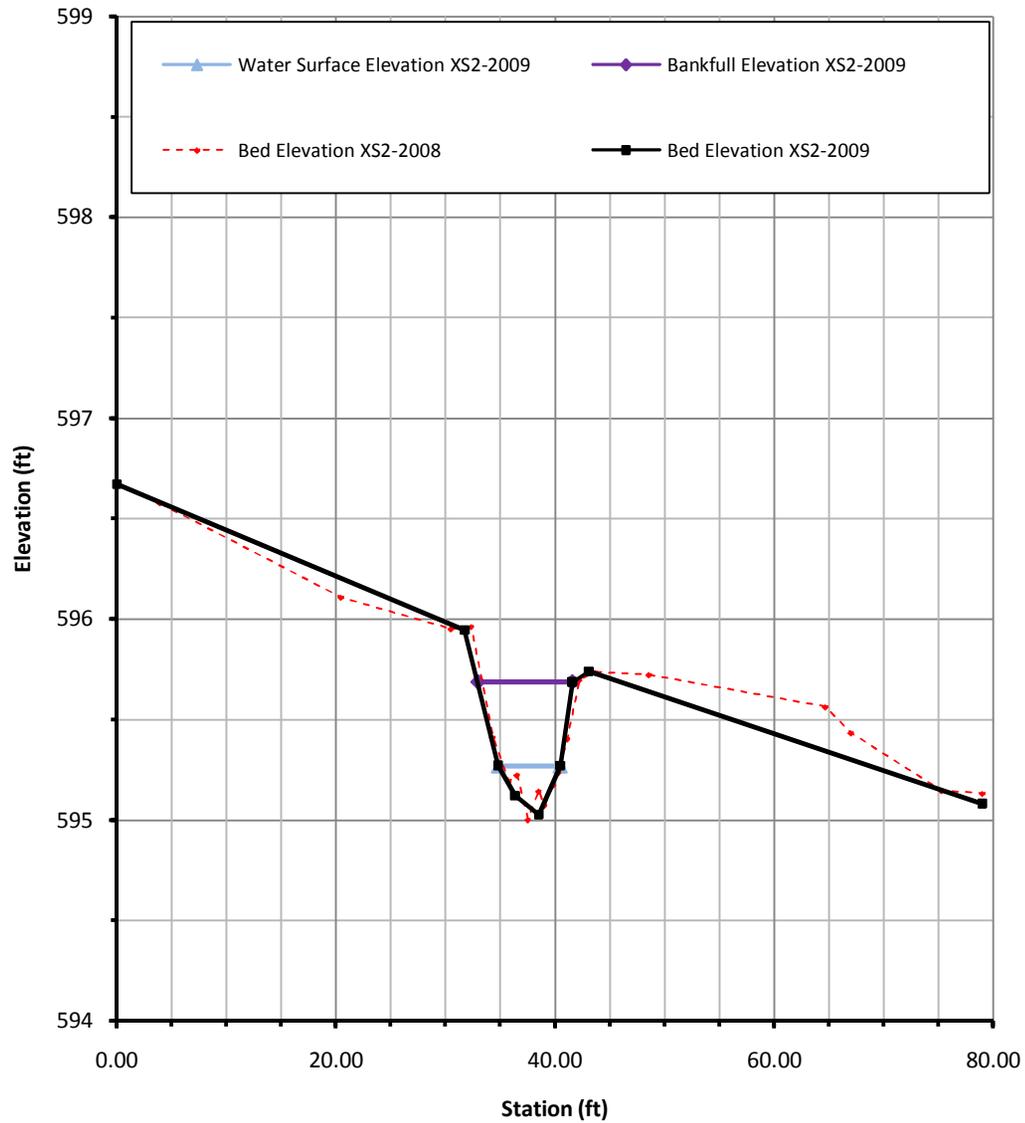
UT1 – Typical view of riparian area
Taken: 06-25-2009





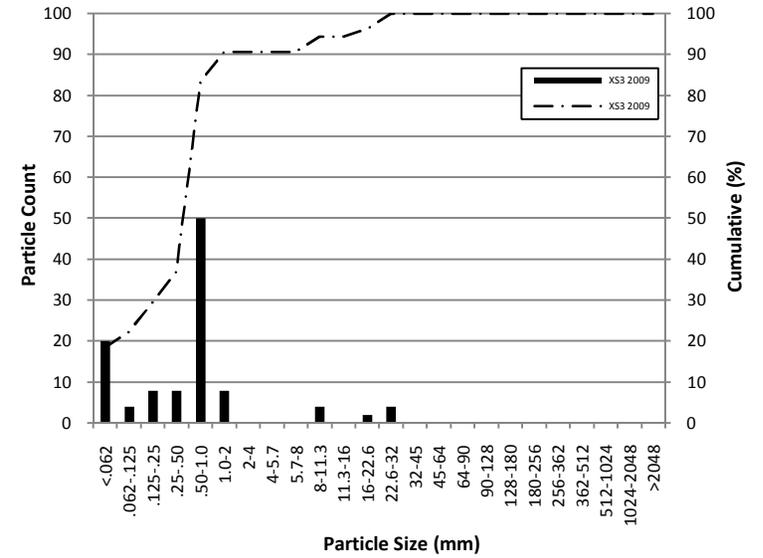
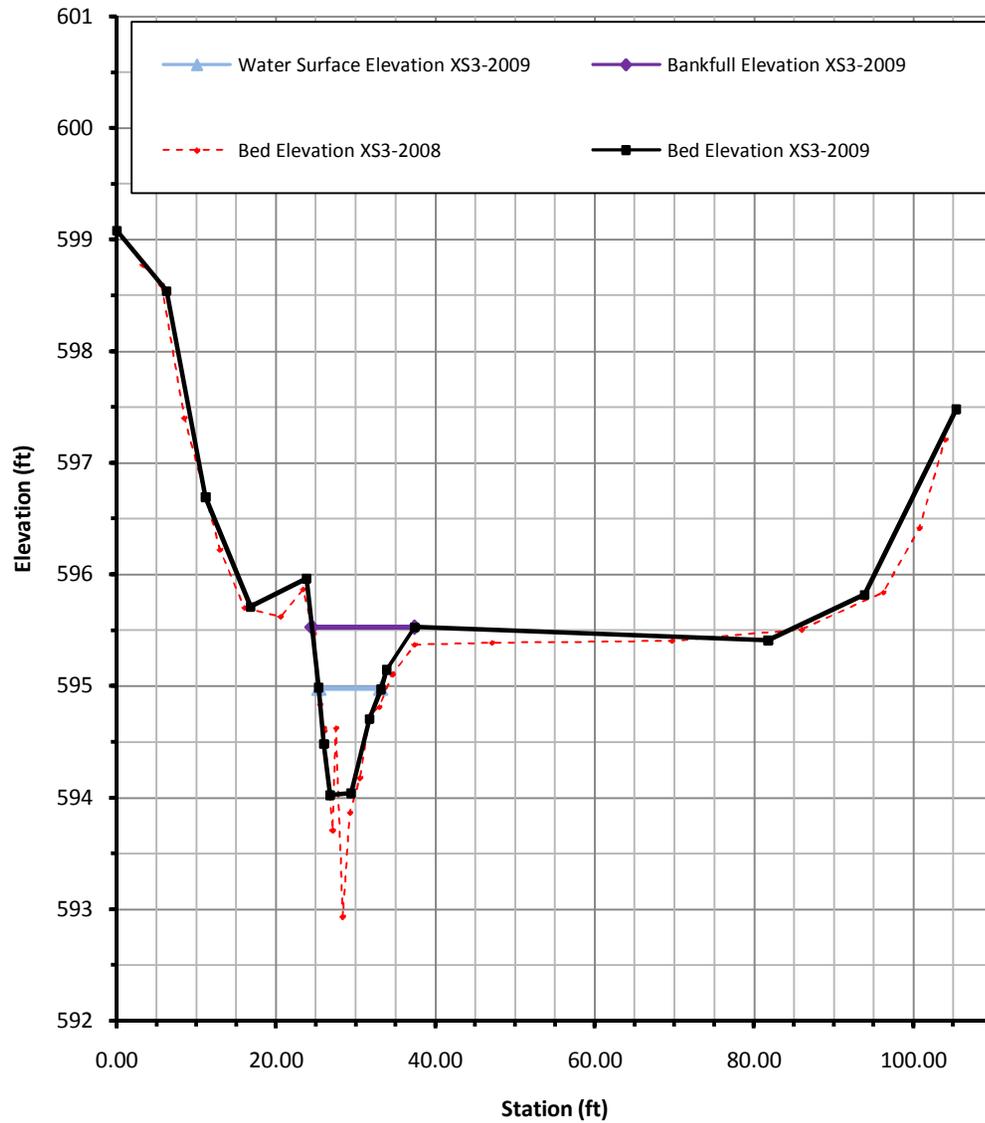
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XS1	2008	CD	POOL	12.0	11.5	1.0
XS1	2008	MY1	POOL	10.9	4.5	0.4
XS1	2009	MY2	POOL	25.0	12.3	0.5

ID	YEAR	PHASE	d50 (mm)	d84 (mm)
XS1	2009	MY2	<0.062	0.25



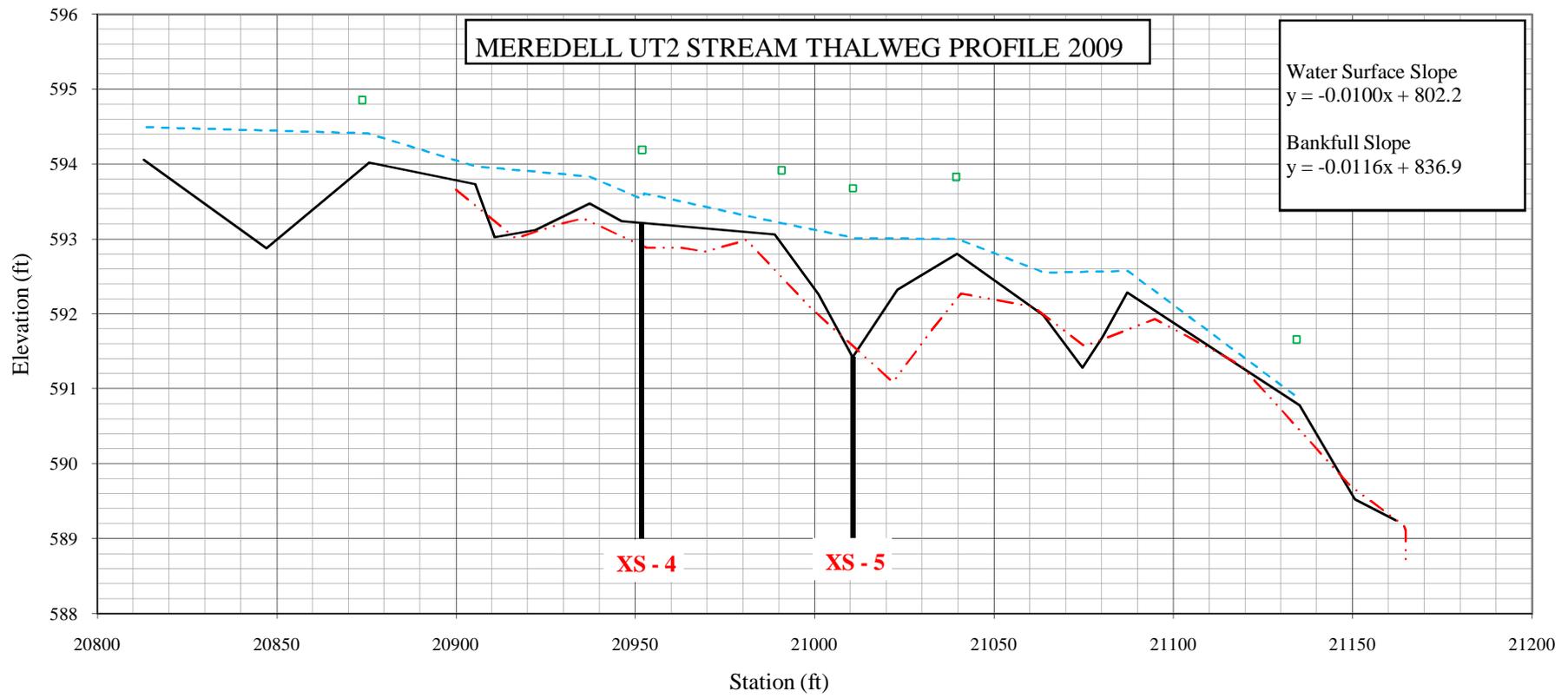
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XS2	2008	CD	RIFFLE	7.3	4.5	0.6
XS2	2008	MY1	RIFFLE	8.9	3.8	0.4
XS2	2009	MY2	RIFFLE	8.7	3.8	0.4

ID	YEAR	PHASE	d50 (mm)	d84 (mm)
XS2	2009	MY2	8	22.6

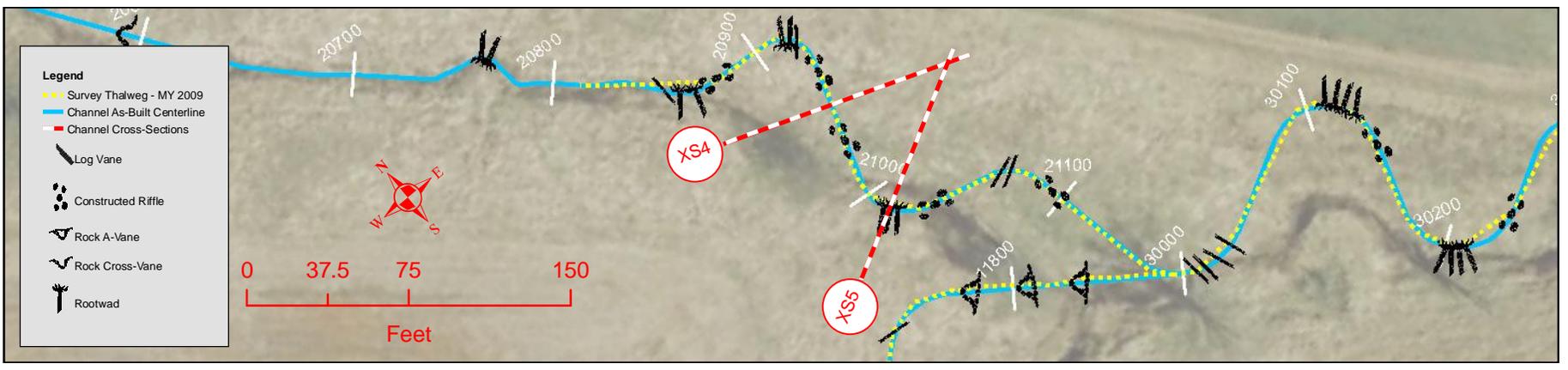


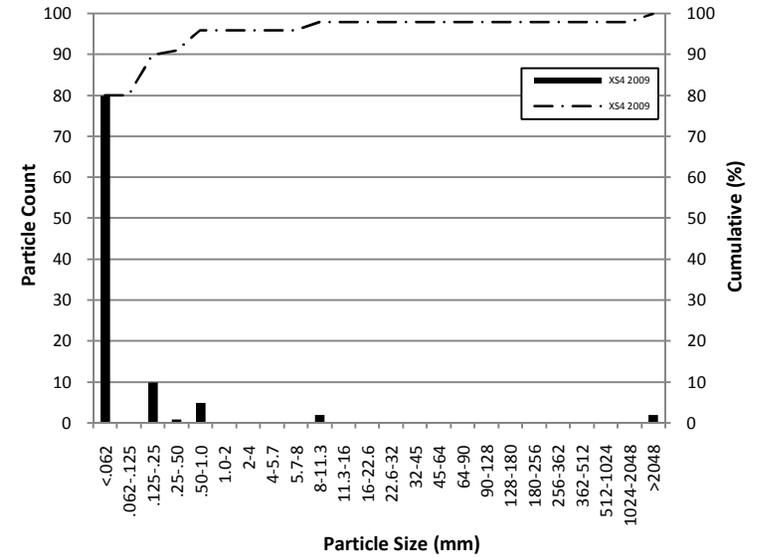
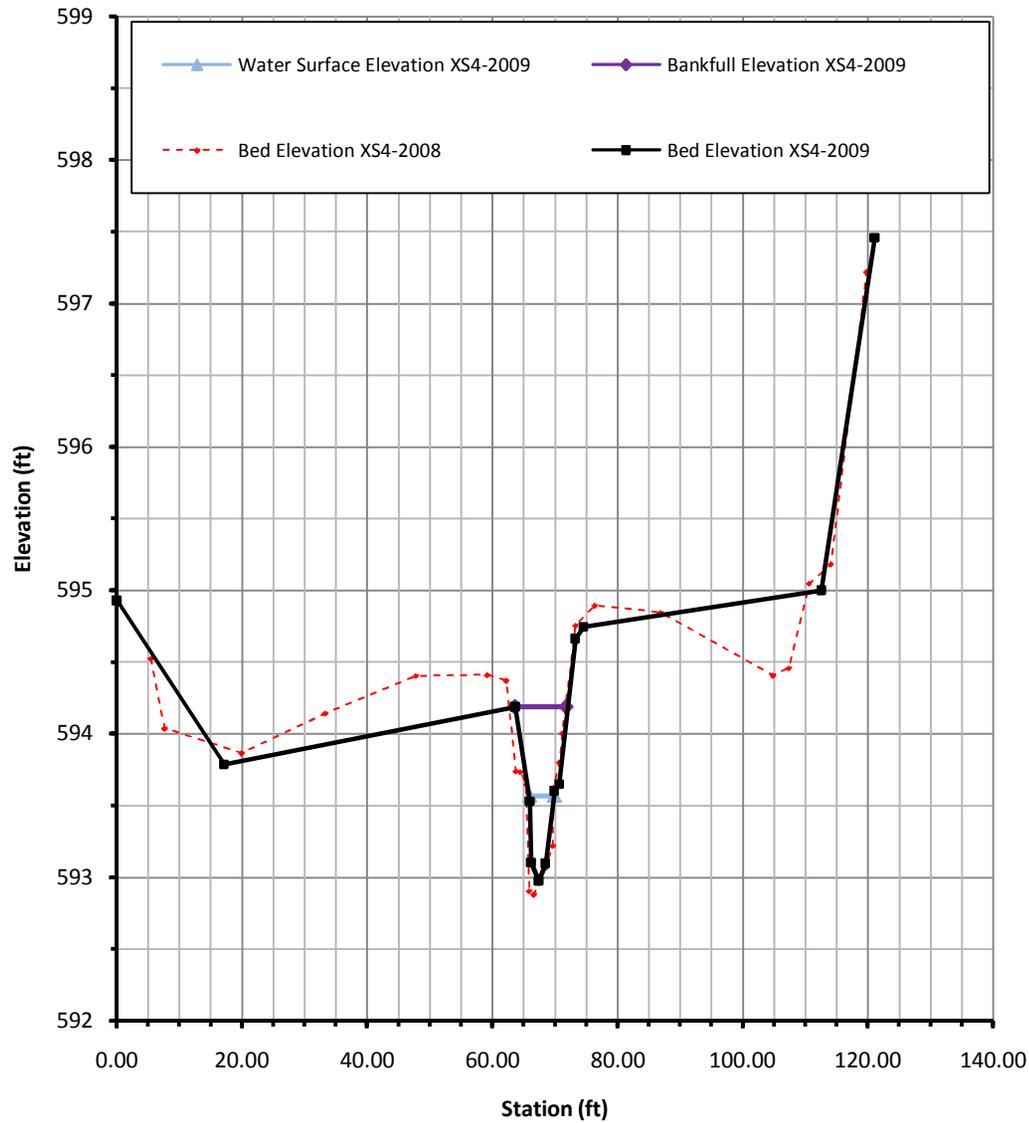
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XS3	2008	CD	POOL	12.0	11.5	1.0
XS3	2008	MY1	POOL	12.4	10.1	0.8
XS3	2009	MY2	POOL	12.9	10.3	0.8

ID	YEAR	PHASE	d50 (mm)	d84 (mm)
XS3	2009	MY2	0.5	1.0



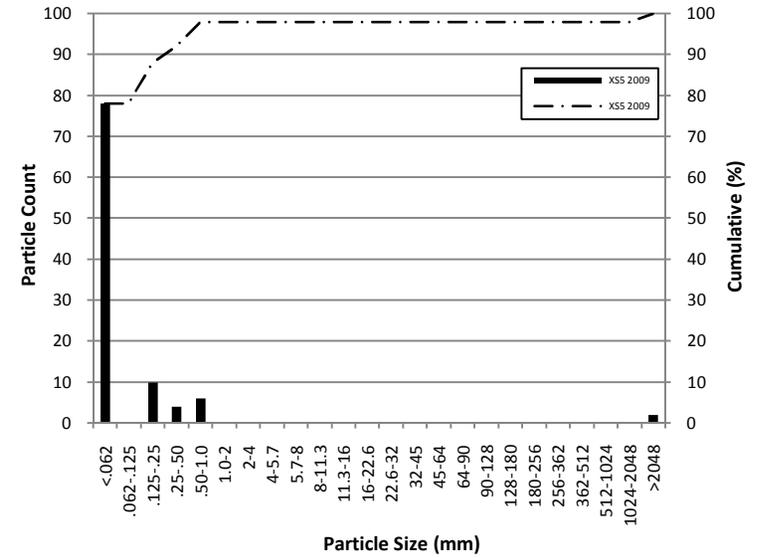
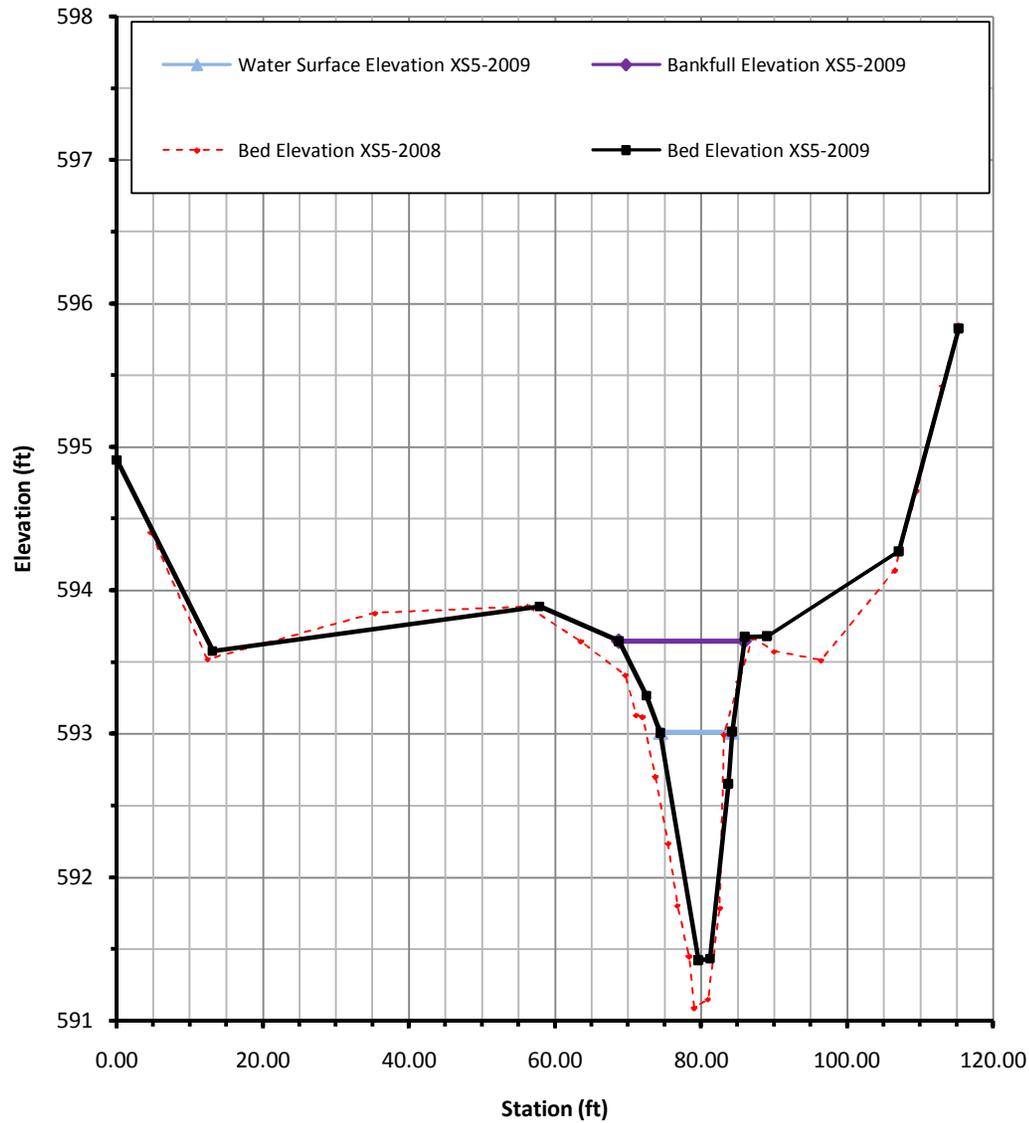
□ BANKFULL
 - - - 2009 WATER SURFACE
 — 2009 BED ELEVATION
 - · - · 2008 BED ELEVATION





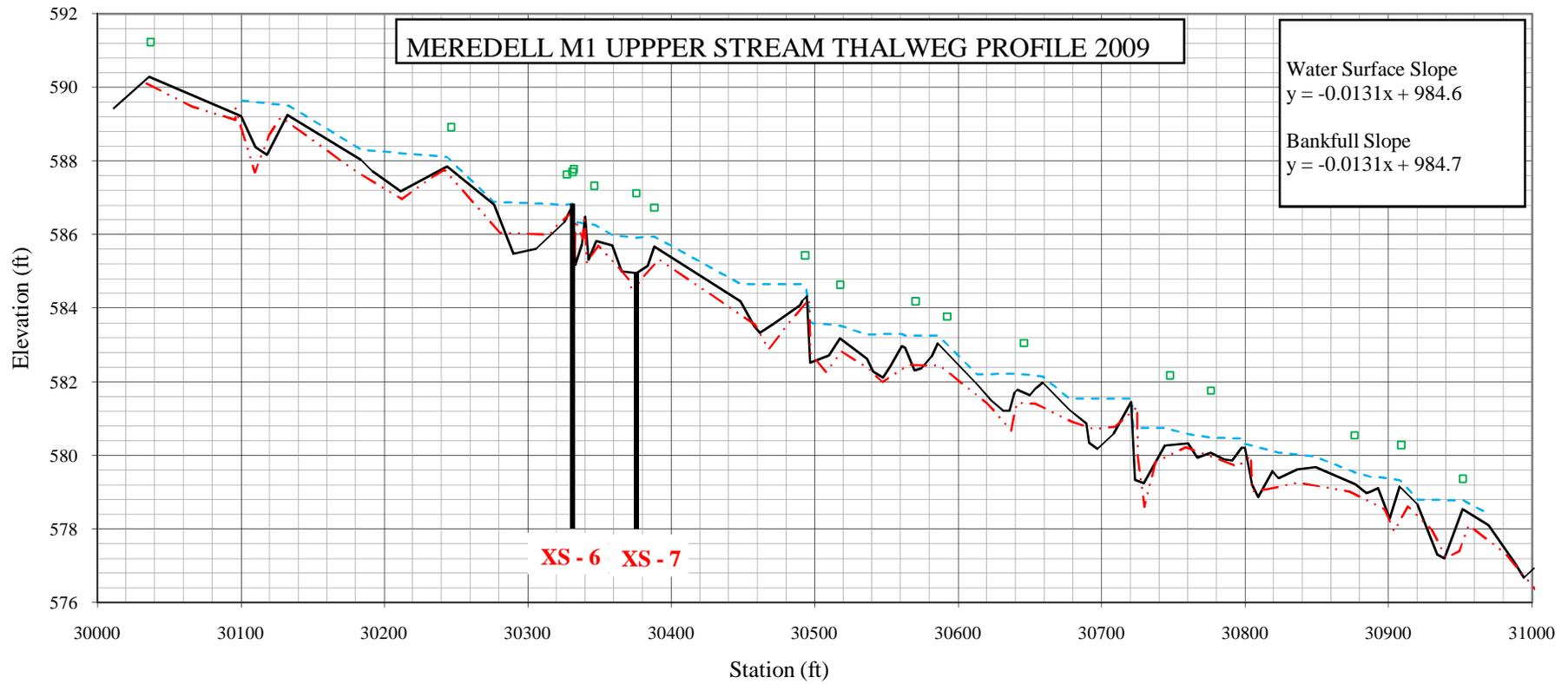
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XS4	2008	CD	RIFFLE	7.3	4.5	0.6
XS4	2008	MY1	RIFFLE	10.0	8.2	0.8
XS4	2009	MY2	RIFFLE	8.4	5.2	0.6

ID	YEAR	PHASE	d50 (mm)	d84 (mm)
XS4	2009	MY2	<0.062	0.125

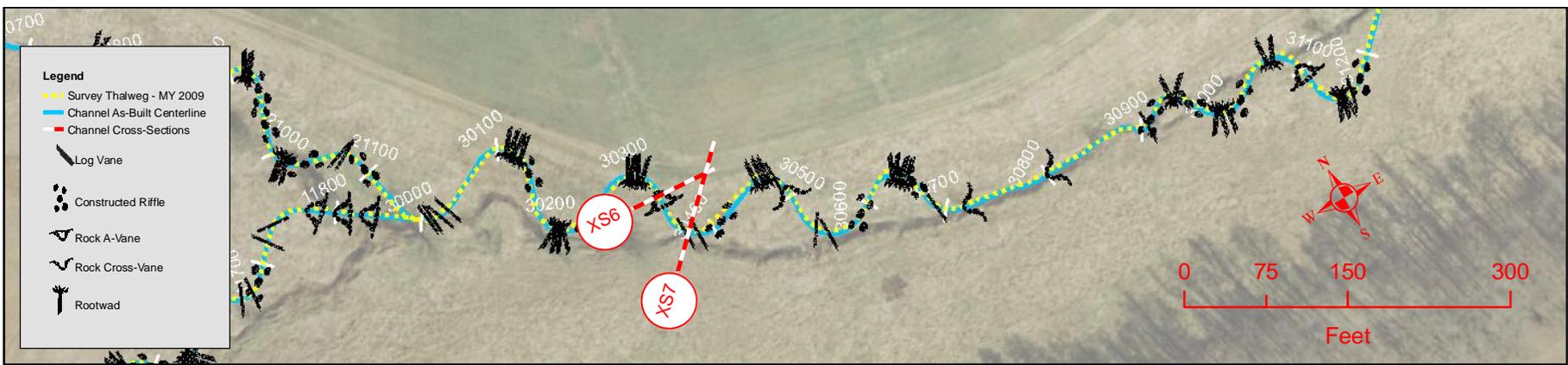


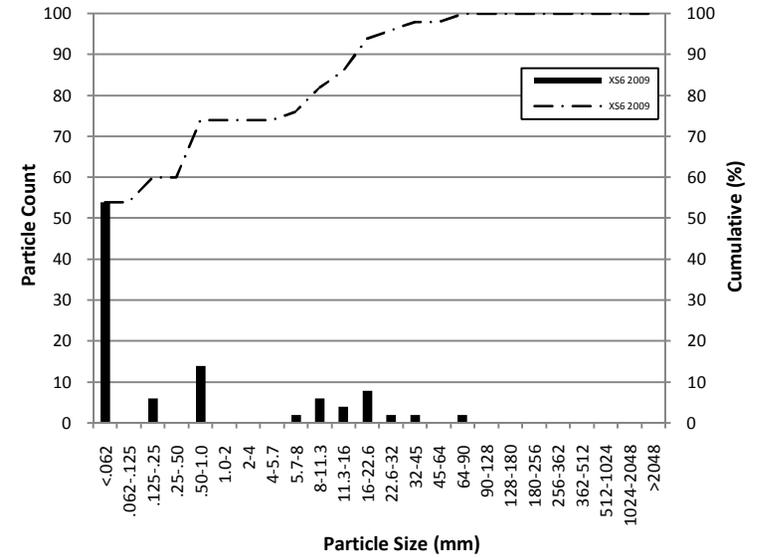
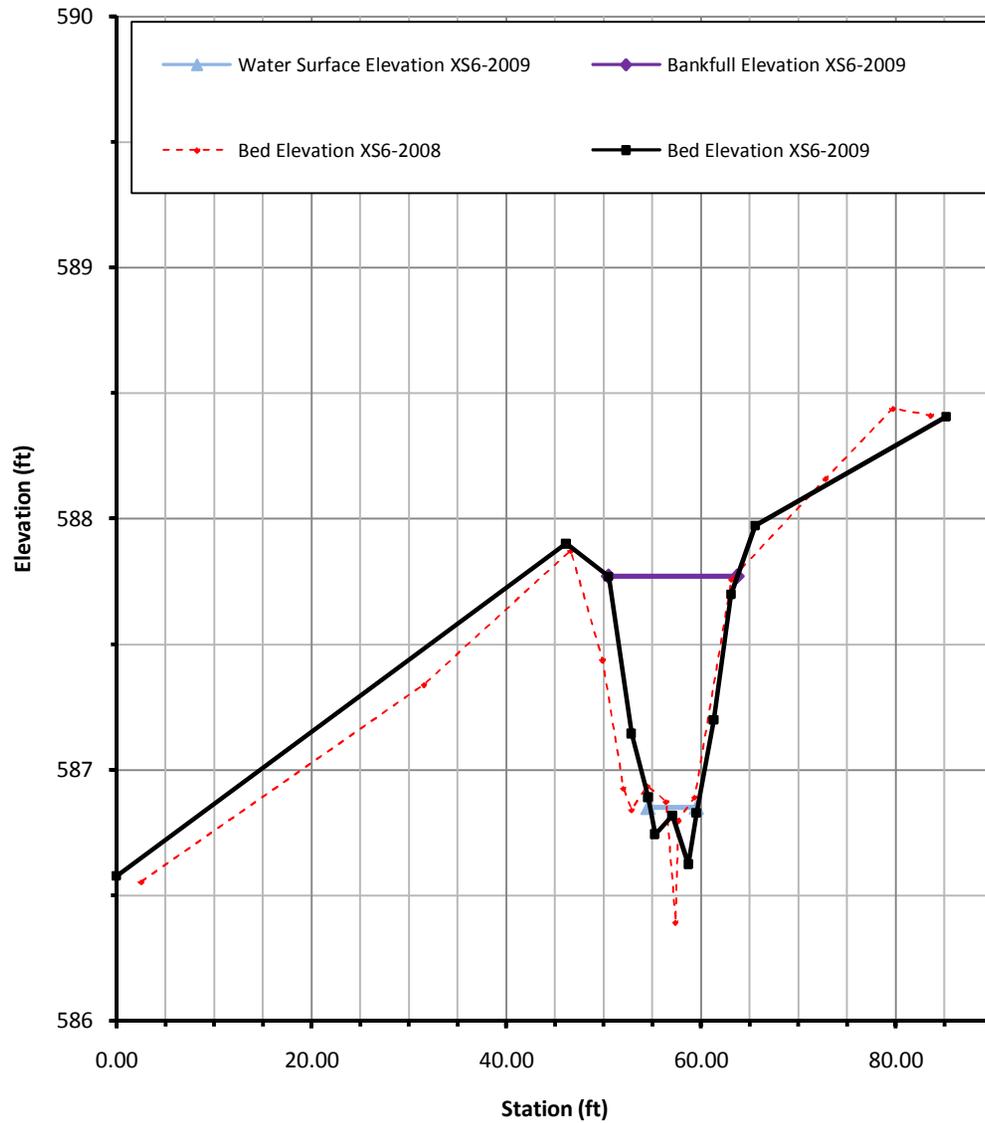
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XS5	2008	CD	POOL	12.0	11.5	1.0
XS5	2008	MY1	POOL	23.4	21.9	0.9
XS5	2009	MY2	POOL	17.2	17.1	1.0

ID	YEAR	PHASE	d50 (mm)	d84 (mm)
XS5	2009	MY2	<0.062	0.125



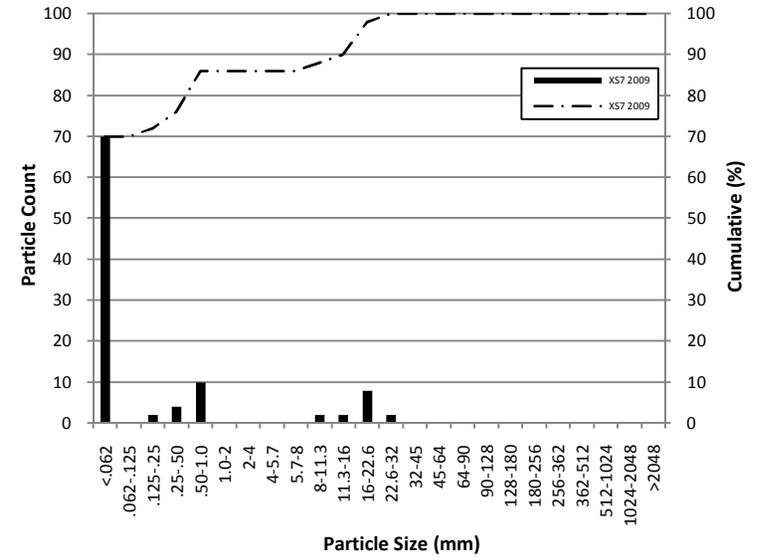
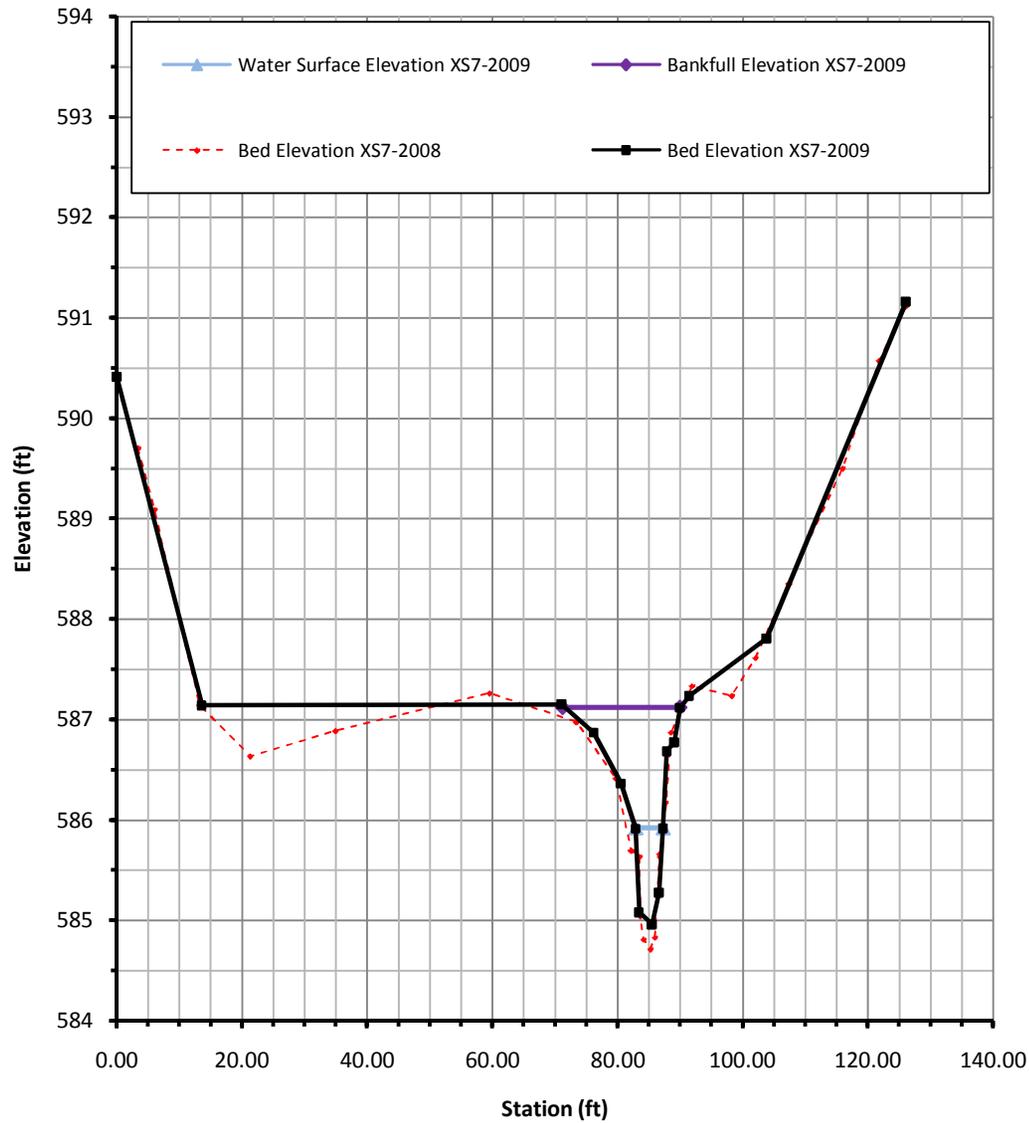
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 - - - 2009 WATER SURFACE
 — 2009 BED ELEVATION
 - · - · - 2008 BED ELEVATION





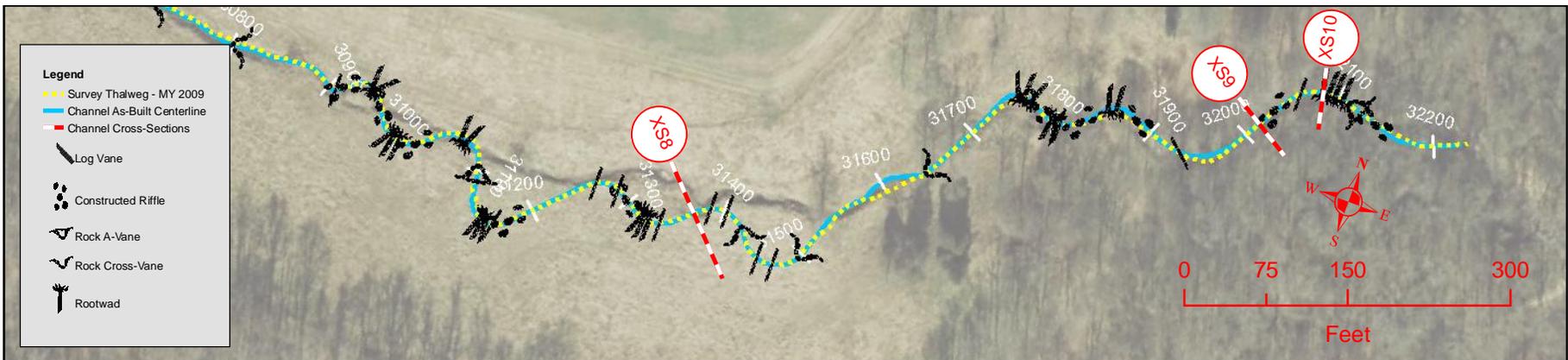
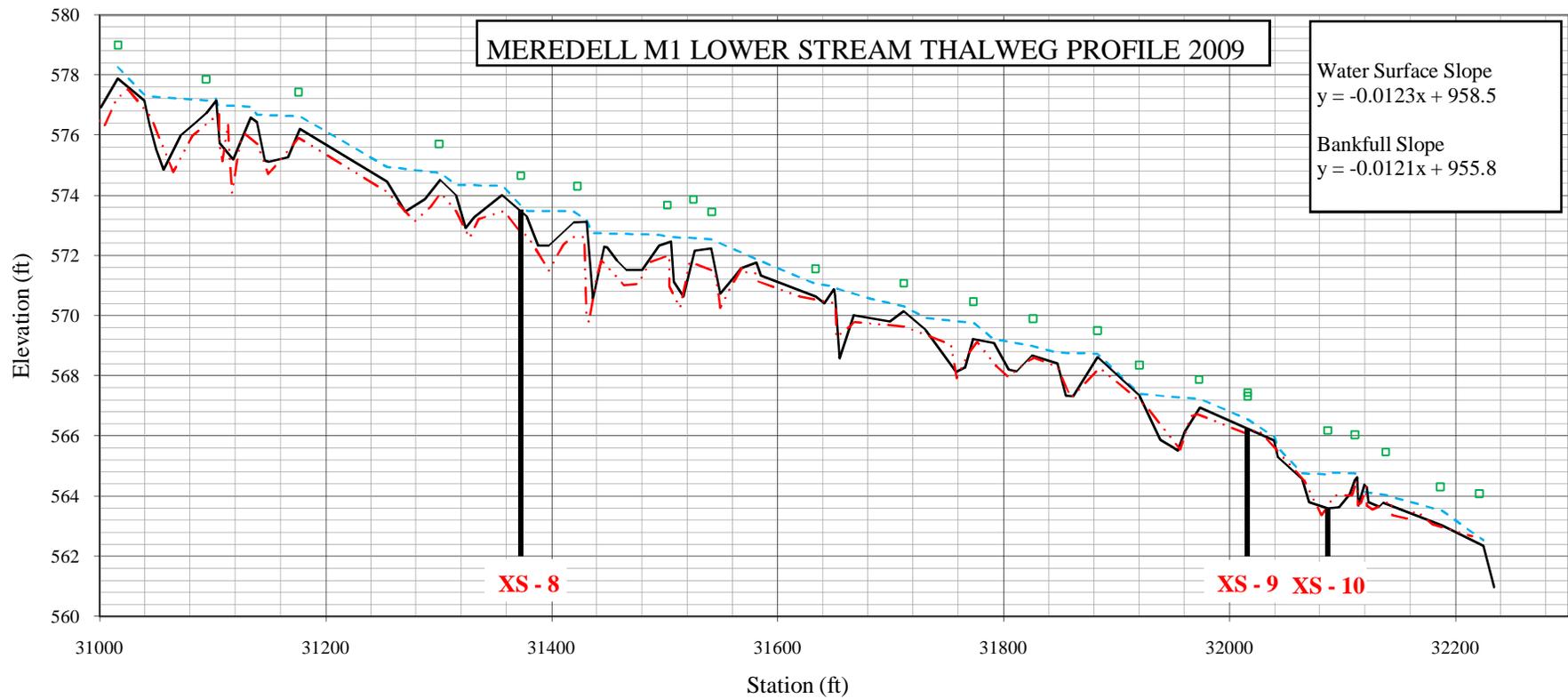
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XS6	2008	CD	RIFFLE	10.2	8.0	0.8
XS6	2008	MY1	RIFFLE	19.3	11.3	0.6
XS6	2009	MY2	RIFFLE	13.2	9.0	0.7

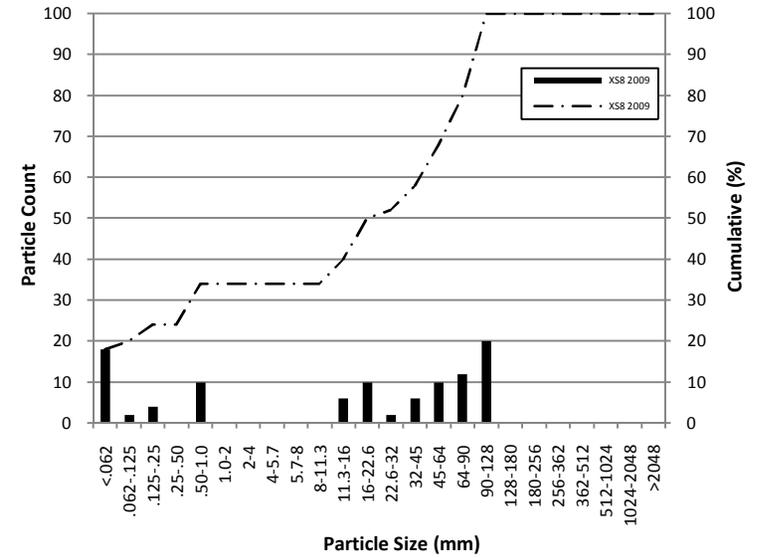
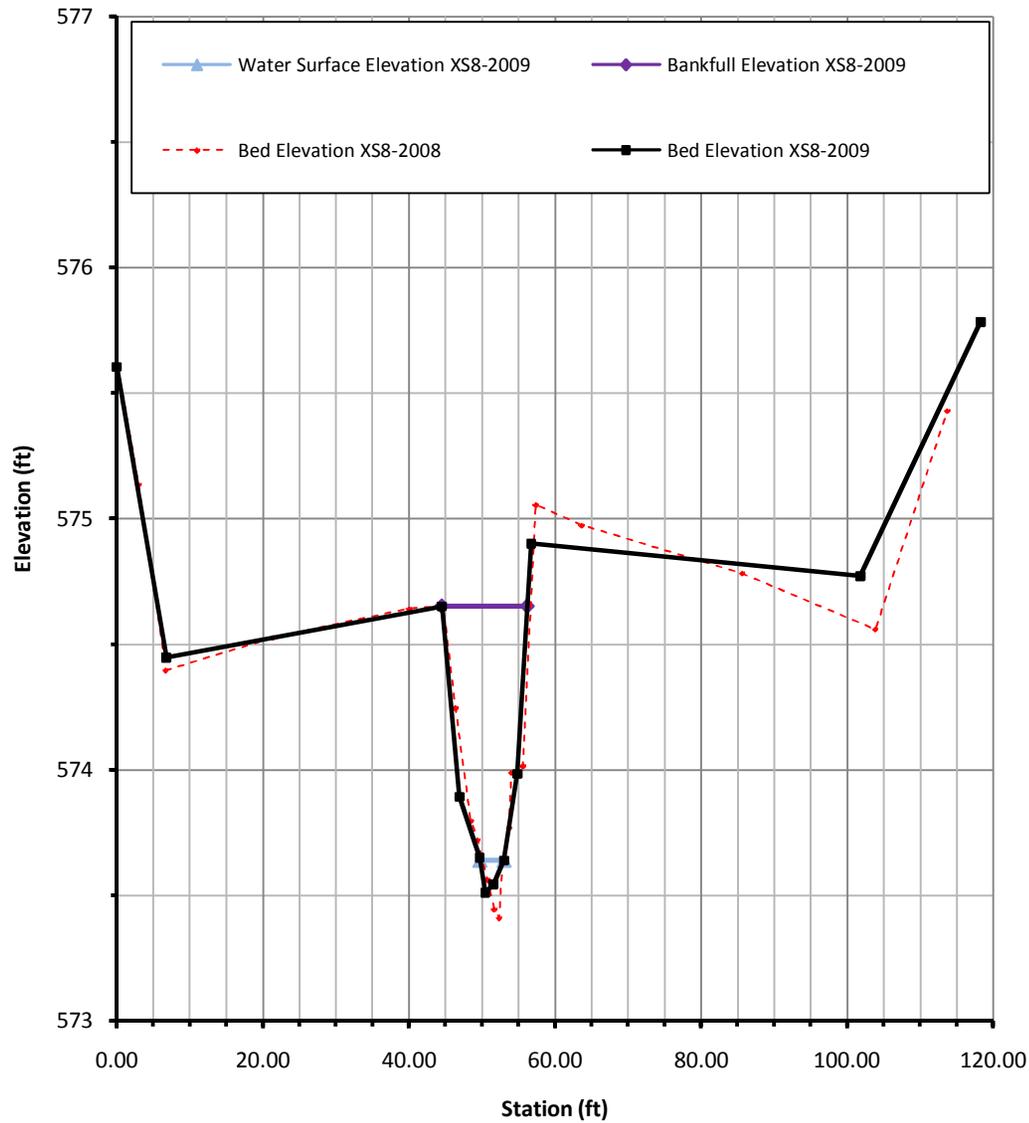
ID	YEAR	PHASE	d50 (mm)	d84 (mm)
XS6	2009	MY2	<0.062	11.3



ID	YEAR	PHASE	FACET TYPE	Wbkf	Abkf	Dbkf
XS7	2008	CD	POOL	15.0	18.5	1.2
XS7	2008	MY1	POOL	15.9	13.8	0.9
XS7	2009	MY2	POOL	18.3	14.6	0.8

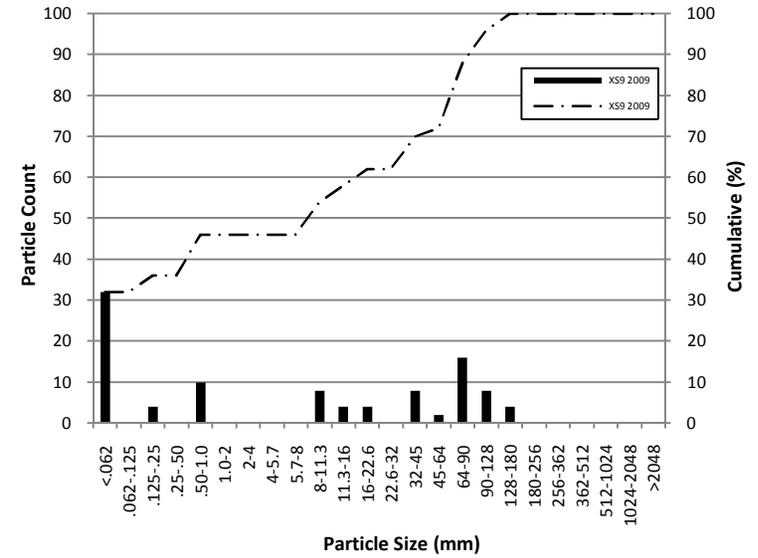
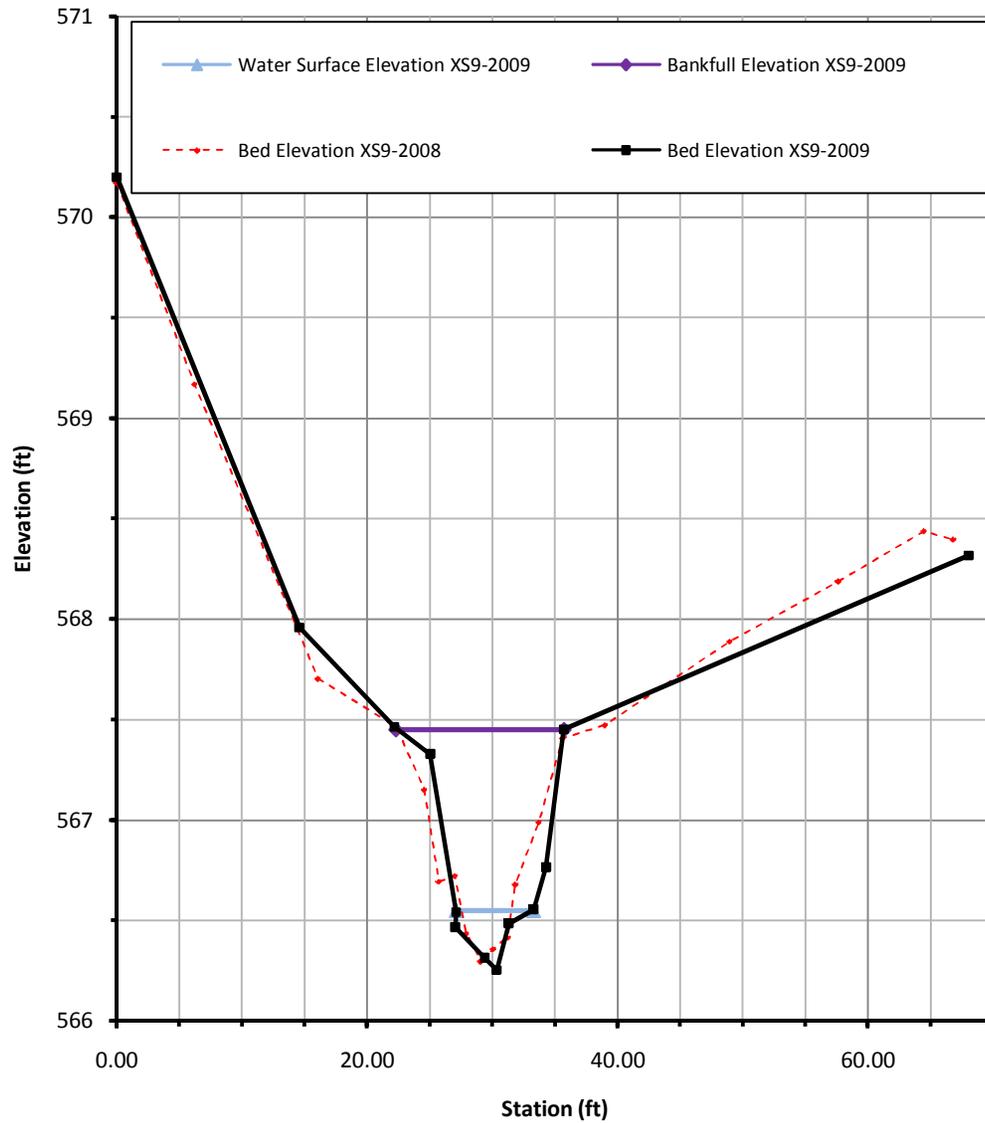
ID	YEAR	PHASE	d50 (mm)	d84 (mm)
XS7	2009	MY2	<0.062	0.5





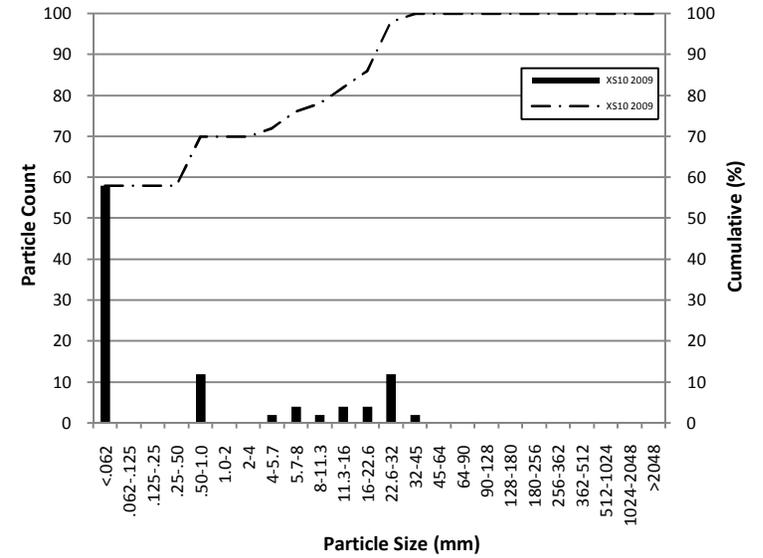
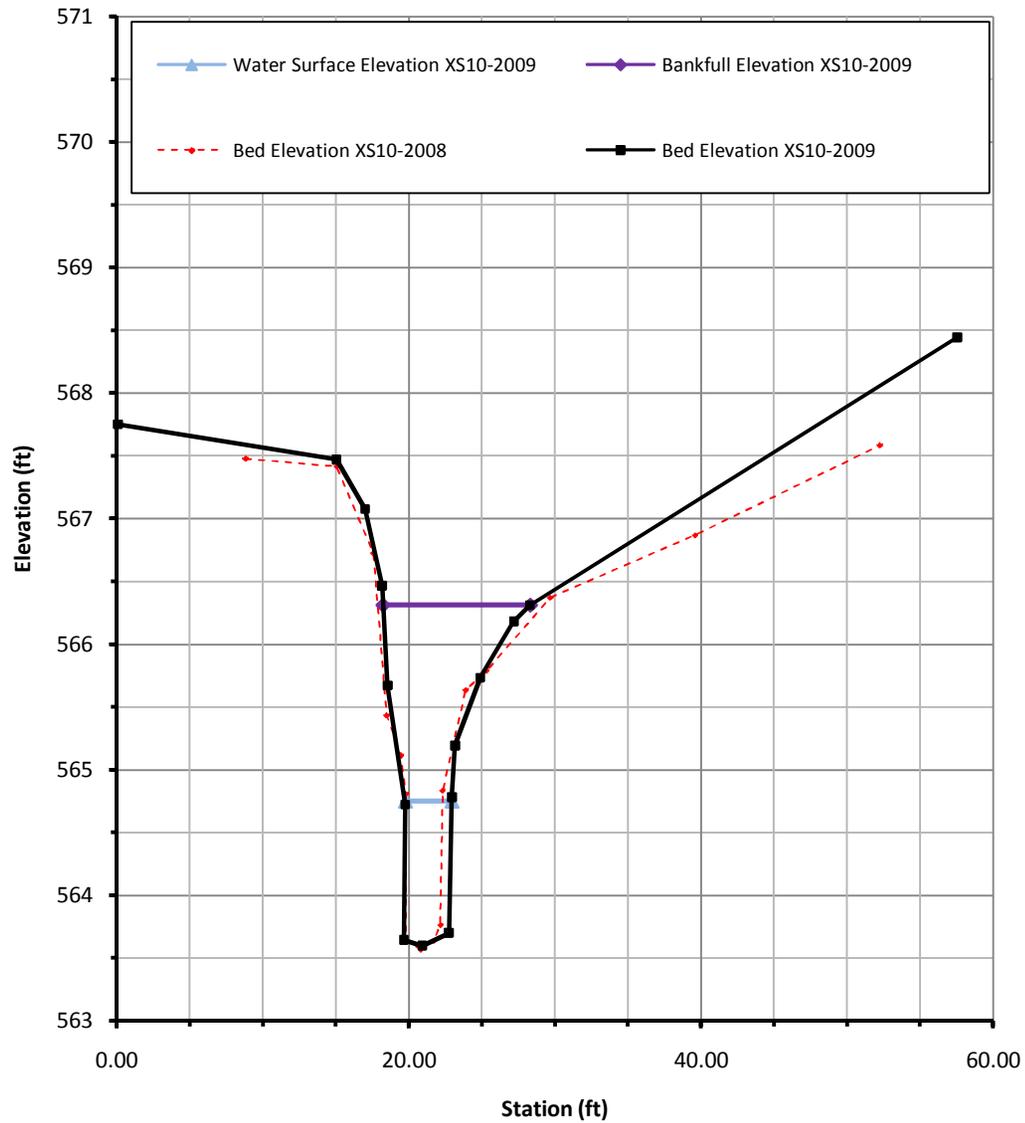
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XS8	2008	CD	RIFFLE	10.2	8.0	0.8
XS8	2008	MY1	RIFFLE	12.0	8.4	0.7
XS8	2009	MY2	RIFFLE	11.7	8.5	0.7

ID	YEAR	PHASE	d50 (mm)	d84 (mm)
XS8	2009	MY2	16	90



ID	YEAR	PHASE	FACET TYPE	Wbkf	Abkf	Dbkf
XS9	2008	CD	RIFFLE	10.2	8.0	8.0
XS9	2008	MY1	RIFFLE	12.9	7.9	7.9
XS9	2009	MY2	RIFFLE	13.3	8.9	8.9

ID	YEAR	PHASE	d50 (mm)	d84 (mm)
XS9	2009	MY2	8	64



ID	YEAR	PHASE	FACET TYPE	Wbkf	Abkf	Dbkf
XS10	2008	CD	POOL	15.0	18.5	1.2
XS10	2008	MY1	POOL	11.9	12.7	1.1
XS10	2009	MY2	POOL	10.1	12.6	1.3

ID	YEAR	PHASE	d50 (mm)	d84 (mm)
XS10	2009	MY2	<0.062	16