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Engineers, Surveyors, Planners, Scientists

December 23, 2010

Mr. Guy Pearce
Full Delivery Supervisor
Ecosystem Enhancement Program
2728 Capital Blvd., Suite 1H 103
Raleigh, North Carolina 27604

Subject: Year 2 Monitoring Report for Stream Mitigation of Thompsons Fork
SCO# D06030-A

Dear Guy,

On behalf of Wetlands Resource Center, EMH&T Inc. is pleased to submit the Year 2 Monitoring Report for Thompsons Fork (SCO# D06030-A). This report contains data from the vegetation and stream monitoring, conducted in September and May, 2010 (respectively). Three hard copies and one electronic copy of the document are being provided. Questions regarding this monitoring report may be directed to Cal Miller of Wetlands Resource Center at (614) 864-7511 or me at (614) 775-4507. We appreciate your willingness to work with us on this report.

Sincerely,

EVANS, MECHWART, HAMBLETON & TILTON, INC.

Megan F. Wolf
Environmental Scientist

Enclosure

Copies: Cal Miller, WRC

Year 2 Monitoring Report for Stream Restoration of Thompsons Fork and Unnamed Tributary

McDowell County, NC
SCO # D06030-A

Prepared for:
NCDENR – EEP
2728 Capital Blvd, Suite 1H 103
Raleigh NC 27604

Ecosystem Enhancement PROGRAM

Submitted: December 2010

Prepared by:

Wetlands Resource Center
3970 Bowen Road
Canal Winchester, Ohio 43110
Project Manager: Cal Miller
P: (614) 864-7511
F: (614) 866-3691

And

EMH&T, Inc.
5500 New Albany Road
Columbus, Ohio 43054
Project Manager: Miles F. Hebert, PE
P: (614) 775-4205
F: (614) 775-4802
Main: (614) 775-4500

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I. EXECUTIVE SUMMARY

The Thompsons Fork stream restoration project is located near the City of Marion, in Nebo Township, McDowell County, North Carolina. Pre-restoration land use was primarily agricultural, resulting in impaired, channelized, eroding, incised and entrenched stream channels. The project reaches include the restoration of 2,727 linear feet of the Thompsons Fork mainstem and 1,948 linear feet of an unnamed tributary (UT); also included is 390 linear feet of enhancement and 356 linear feet of preservation along UT. Restoration of the project streams, completed during May 2008, provided the desired habitat and stability features required to improve and enhance the ecologic health of the streams for the long-term. The following report documents the Year 2 Annual Monitoring for this project.

Vegetative monitoring was completed in September 2010 following the Carolina Vegetation Survey methodology. Stem counts completed at ten (8) vegetation plots show an average density of 704 stems per acre for the site. This density exceeds the success criteria of 320 stems/acre after three years of monitoring. All individual plots had stem densities meeting the minimum requirement. Additionally, a large number of recruit stems were found in each plot. A few vegetative problem areas of low concern were noted in the project area, included scattered populations of problematic species and sparse vegetative cover. The problematic species have been proactively managed by herbicide treatment, with follow-up treatment planned for the spring of 2011; no maintenance is required for the areas of sparse vegetation at this time.

Year 2 monitoring of the streams identified some problem areas along the project reaches. Narrow bars of wetland vegetation forming along the stream banks of the mainstem were noted under the aggradation feature category for future monitoring. Aggradation is also occurring in a few pools associated with log sills along the unnamed tributary to Thompsons Fork. The degree of aggradation on the tributary warrants maintenance. Wetlands Resource Center will be clearing excess sediment and wetland vegetation within this channel before 2011 monitoring.

The visual stream stability assessment for Year 2 revealed that the majority of in-stream structures are functioning as designed and built on the Thompsons Fork mainstem and unnamed tributary. Bedform features are evolving along the restored reaches compared to as-built conditions, as shown on the long-term longitudinal profiles. Dimensional measurements of the monumented cross-sections remain stable when compared to Year 1 and as-built conditions. The comparison of the Year 1 and Year 2 long-term stream monitoring profile and cross-section data shows stability with no significant change from as-built conditions. For Thompsons Fork Main Stem, constructed riffles are stable and dimensionally consistent, with median particle distributions ranging from coarse to very coarse gravel. For UT-1, there appears to be a notable change in the width/depth relationship of the riffles and also a difference in substrate material. The differences noted at cross-sections 4 and 6 along UT-1 may be attributed to dense vegetative growth and some deposition within the channel, resulting in a smaller bankfull width and a resulting smaller width/depth relationship. As noted later in this report, there are observations of aggradation within portions of the UT-1 channel, affecting particle distribution calculations in both pools and riffles, and resulting in a change in the D_{50} value, with a corresponding change in stream classification, form C4b to C5b.

Based on the crest gage network installed on the project reaches, one bankfull event was recorded along each reach during both the Year 1 and Year 2 monitoring periods. This brings the total number of bankfull events for the the Main Stem and UT-1 to two, in consecutive years.

Thompsons Fork Mainstem

Parameter	Pre-Restoration	As-built	Year 1	Year 2
Length	**2,530 ft**	**2,727 ft**	**2,727 ft**	**2,727 ft**
Bankfull Width	**20.9 ft**	**37.7 ft**	**36.3 ft**	**34.1 ft**
Bankfull Max Depth	**5.1 ft**	**2.5 ft**	**2.4 ft**	**2.6 ft**
Width/Depth Ratio	**7.7**	**27.1**	**28.7**	**26.2**
Entrenchment Ratio	**1.5**	**3**	**3**	**3.0**
Bank Height Ratio	**2.4**	**1**	**1**	**1**
Sinuosity	**1.12**	**1.19**	**1.19**	**1.19**

Unnamed Tributary to Thompsons Fork

Parameter	Pre-Restoration	As-built	Year 1	Year 2
Length	**1,598 ft**	**1,948 ft**	**1,948 ft**	**1,948 ft**
Bankfull Width	**13.1 ft**	**14.0 ft**	**15.4 ft**	**10.9 ft**
Bankfull Max Depth	**1.1 ft**	**1.7 ft**	**1.6 ft**	**1.8 ft**
Width/Depth Ratio	**16**	**17.4**	**18.1**	**12.6**
Entrenchment Ratio	**3.4**	**6**	**5.6**	**7.0**
Bank Height Ratio	**1.6**	**1**	**1**	**1**
Sinuosity	**1.09**	**1.36**	**1.36**	**1.36**

II. PROJECT BACKGROUND

A. Location and Setting

The project is located near the intersection of Watson Road and South Creek Road on the north side of Interstate 40, approximately 7 miles east of the City of Marion, in Nebo Township, McDowell County, North Carolina as shown on **Figure 1**. The stream channels included in this project are the Thompsons Fork mainstem and one unnamed tributary stream designated UT.

The directions to the project site are as follows:

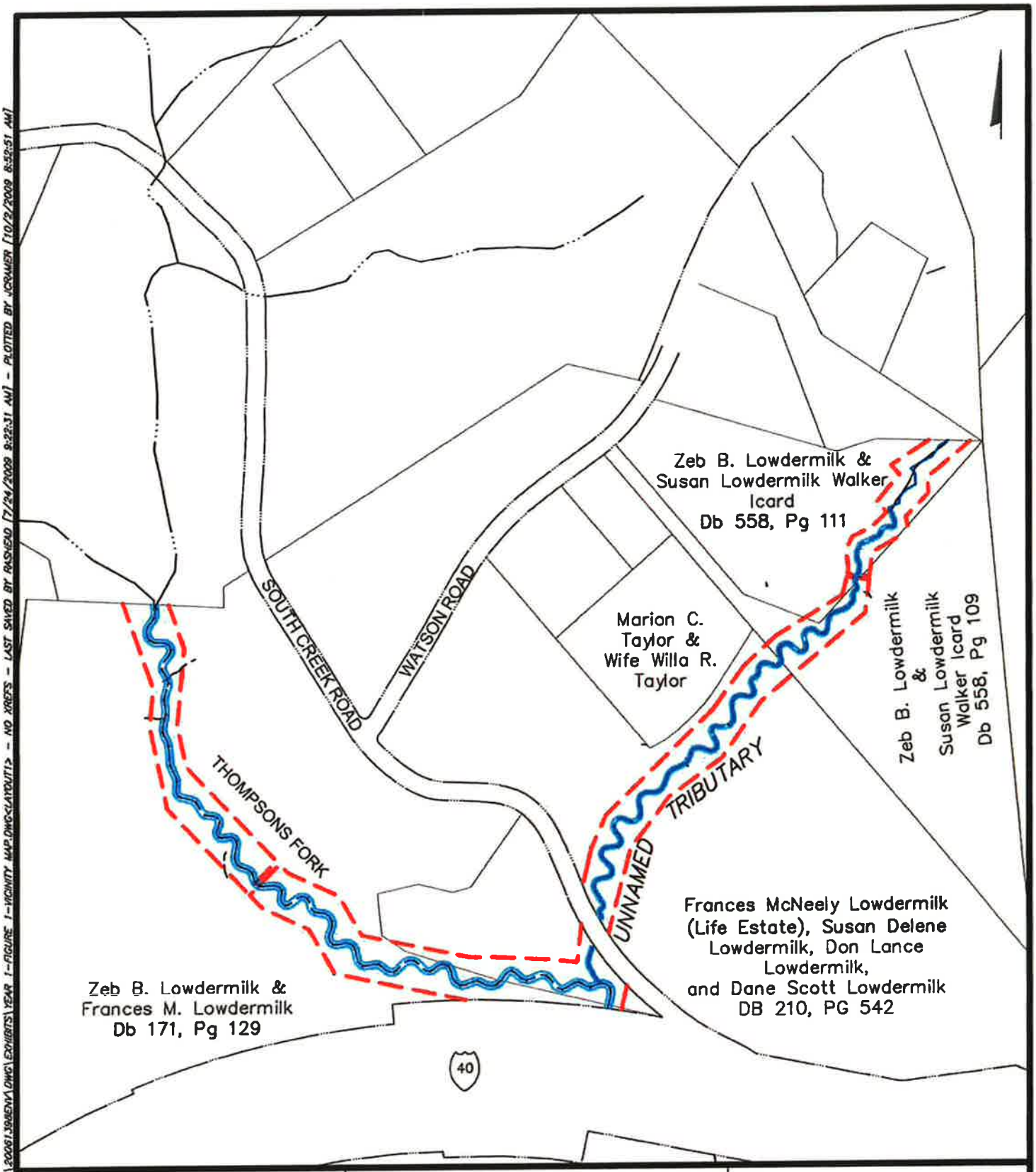
> Exit I-40 at Exit 94 and travel north on Dysartsville Road for 0.6 mile. Turn left and travel west onto US-70 for 3.2 miles, then turn left onto Watson Road. Travel 1.1 miles south on Watson Road to the intersection of South Creek Road. Zeb Lowdermilk's residence (1394 South Creek Road, Nebo, NC 28761) is located on the right (south) side of South Creek Road at the intersection of Watson Road. The project spans four tracts of land: (Tract 1) owned by Zeb B. Lowdermilk and wife Francis M. Lowdermilk (deceased); (Tract 2) owned by Francis McNeely Lowdermilk (Life Estate), Susan Delene Lowdermilk, Don Lance Lowdermilk, and Dane Scott Lowdermilk; and (Tracts 3 and 4) owned by Zeb B. Lowdermilk and daughter Susan Lowdermilk Walker Icard.

B. Project Structure, Mitigation Type, Approach and Objectives

Pre-restoration land use surrounding the project streams was predominantly agricultural, including pasture/hayland with wooded and cleared hillsides. Pre-restoration land use surrounding the Thompsons Fork restoration reach was active cattle pasture land. The pre-existing riparian corridor was absent to extremely narrow (5 to 10 feet wide) along the Thompsons Fork mainstem, widening for only a short distance near the downstream limits of the mainstem project reach. Streambanks were denuded and extremely unstable, with vertical to undercut banks up to 15 feet in height from the former farm stream crossing to the bottom of the mainstem reach.

A hayland meadow was present along the UT right bank. Along the UT left bank the riparian corridor consists of mature hardwood forested hill slope. Along the 356 linear feet of UT preservation reach, beginning at the granite outcrop spring from which the perennial UT emerges, the stream exists in a mature mixed hardwood and evergreen forest with diversified herbaceous, shrub, mid-story and canopy species present. Typical species observed along the streams and adjacent forested areas include *Alnus rugosa* (tag alder), *Platanus occidentalis* (Eastern sycamore), *Abies* species (fir), *Pinus taeda* (loblolly pine), *Pinus elliottii* (slash pine), *Ostrya virginiana* (Eastern hophornbeam), *Diospyros virginiana* (persimmon), *Kalmia latifolia* (mountain laurel), *Cornus amomum* (silky dogwood), *Ilex opaca* (American holly), and the invasive species *Ligustrum sinense* (Chinese privet) and *Lonicera japonica* (Japanese honeysuckle).

Prior to restoration, a combination of historical and recent anthropogenic factors and practices impacted the channel along the impaired mainstem reach, resulting in its unstable Rosgen G4 stream type. The deeply incised and entrenched condition of the channel prior to restoration was attributed to management of the riparian corridor for hay production, cattle intrusion resulting in



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MCDOWELL COUNTY, NORTH CAROLINA

THOMPSON FORK RESTORATION

FIGURE 1: SITE VICINITY MAP

N.C. ECOSYSTEM ENHANCEMENT PROGRAM

Date: July, 2009

Not To Scale

Ecosystem Enhancement PROGRAM

streambank hoof shear and vegetative denuding from grazing and browsing, combined with the erosive nature of the discharge of "sediment hungry" water from the 30-inch reinforced concrete pipe outfall from Muddy Creek Flood Control Dam Number 8. Additionally, a shift in stream base level occurred during the construction of Interstate 40 (I-40), when the invert of the culvert carrying Thompsons Fork under I-40 was set 12 to 15 feet below the pre-disturbance invert of the streambed, triggering channel incision, head cutting, floodplain abandonment, and lowering of the water table. The Thompsons Fork mainstem unstable bank height ratio, entrenchment ratio, channel slope (0.0039 ft/ft) greater than valley slope (0.0031 ft/ft) and poorly defined bedform features showed the instability of the deeply incised, unstable, degrading stream channel disconnected from its floodplain. Mid-channel, lateral, and transverse sand and gravel bars were present at locations throughout the mainstem reach, demonstrating the stream lacked stable pattern, profile, dimension, capacity and competency to entrain the high sediment load. The locations of these depositional features in the near-bank region deflected flows from the center of the channel toward the incised vertical to undercut, steep, denuded streambanks, resulting in accelerated erosion rates. Utilizing the near-bank stress method algorithm, it was estimated 2,076 cubic yards per year (or 2,700 tons per year) of sediment was being eroded from the streambanks along the mainstem.

The UT channel was a classic Rosgen Type I valley confined, A1-A2 stream type transitioning to a Type II colluvial valley, B3 stream type at the point where the stream emerges from its mixed deciduous hardwood and evergreen forested corridor into an open meadow at the top of the impaired reach. The forested reach segment has some bedrock control, in-stream boulders with negligible instream woody debris accumulation. The indigenous, well established, healthy riparian vegetative communities in the channel and in the overbank regions provide extremely stable channel conditions for the forested reach, and are preserved within the conservation easement recorded for the project. Agricultural land use adjacent to the stream corridor together with aggressive vegetative management resulted in steep to undercut streambanks, accelerated streambank erosion and channel incision along the Enhancement Level II and Priority Level I Restoration reaches. The unstable streambanks were contributing large volumes of suspended sediment and bedload material to the larger Thompsons Fork mainstem. It was estimated 291 cubic yards per year (or 378 tons per year) of sediment was being eroded from streambanks along the UT under existing conditions.

The mitigation goals and objectives for the project streams are related to restoring stable physical and biological function of the project streams beyond pre-restoration (impaired) conditions. Pre-restoration conditions consisted of impaired, channelized, eroding, incised and entrenched stream channels. The specific mitigation goals for the project are listed below.

- Provide stable stream channels with features inherent of ecologically diverse environments, including appropriate stream-bed features, such as pools and riffles, and a riparian corridor with diverse and native vegetation. Utilize reference reach information as the foundation of the restoration design.
- Provide stream channels with the appropriate geometry and slope to convey bankfull flows while entraining bedload and suspended sediment readily available to the streams.
- Provide a connection between the bankfull channel and the floodprone area, and stable channel geometry and protective cover to prevent erosion.
- Provide a minimization of future land use impacts to the streams and a perpetual stream corridor protection via livestock exclusion fencing and restrictive conservation easement conveyances to the State of North Carolina.

Restoration of the streams has met the objective of the project along both the mainstem of Thompsons Fork and the UT, providing the desired habitat and stability features required to improve and enhance the ecologic health of the streams for the long-term. Specifically, the completed restoration project has accomplished the items listed below.

Thompsons Fork Mainstem:

- Reversed the effects of channelization through a combination of Priority I and Priority II restoration techniques. The restoration has changed the average width/depth ratio from 7.7 to 28.7.
- Restored a natural and stable sinuosity to the stream channel, increasing the sinuosity of the channel from 1.1 to 1.2, and providing a more stable relationship between the valley and bankfull slopes (the bankfull slope was higher than the valley slope in the pre-restoration condition and is now less than the valley slope with the completed restoration).
- Stabilized eroding streambanks by providing an appropriately sized channel with stable channel bank slopes with a combination of embedded stone, natural fabrics and hearty vegetation as protective cover. The average Bank Height Ratio has been changed from 2.36 to 1.0.
- Provided a re-connection between the restored stream channel and the adjacent floodprone area by both raising the stream bed and excavating the adjacent floodplain. The completed restoration changed the average entrenchment ratio from 1.53 to 3.0.
- Created instream aquatic habitat features such as deep pools supported by riffles, including rock cross vanes with deep pools to transition the channel thalweg from the restored reach to the downstream existing channel.
- Re-vegetated the riparian corridor with indigenous trees and shrubs and preservation of existing riparian corridors where possible.

Unnamed Tributary (UT):

- Reversed the effects of channelization through a combination of Priority I and Priority II restoration techniques, as well as Enhancement Level I activities and Preservation of a short reach at the upstream end of the project. The average width/depth ratio of the restored stream channel is 18.1. In the restoration reach, stable pattern, profile and dimension were all restored to the stream channel. In the enhancement reach, a stable profile was provided and dimension of the stream channel was modified accordingly. The preservation reach is in a stable and heavily wooded corridor that will be protected by the conservation easement for the project.
- Restored a natural and stable sinuosity to the stream channel, increasing the sinuosity of the channel from 1.1 to more than 1.3, and providing a more stable relationship between the valley and bankfull slopes (the bankfull and valley slopes were nearly identical in the pre-restoration condition and is substantially less than the valley slope with the completed restoration).
- Stabilized eroding streambanks by providing an appropriately sized channel with stable channel bank slopes. The average Bank Height Ratio has been changed from 1.63 to 1.0.

- Provided a re-connection between the restored stream channel and the adjacent floodprone area by both raising the stream bed and excavating the adjacent floodplain. The completed restoration changed the average entrenchment ratio from 3.4 to 5.6.
- Created instream aquatic habitat features such as pools supported a combination of riffles and step-log structures.
- Re-vegetated the riparian corridor with indigenous trees and shrubs and preservation of existing riparian corridors where possible.

Information on the project structure and objectives is included in Tables I and II.

Table I. Project Structure Table Thompsons Fork Stream Restoration / EEP Project No. D06030-A	
Project Segment/Reach ID	**Linear Footage or Acreage**
Thompsons Fork Mainstem	2,727 ft
Unnamed Tributary (UT)	2,694 ft
TOTAL	**5,421 ft**

Table II. Project Mitigation Objectives Table Thompsons Fork Stream Restoration / EEP Project No. D06030-A					
Project Segment/ Reach ID	**Mitigation Type**	**Linear Footage or Acreage**	**Mitigation Ratio**	**Mitigation Units**	**Comment**
Thompsons Fork Mainstem	Priority Level 1 Restoration	2,727 ft	1.0	2,727 ft	Restore dimension, pattern, and profile
UT	Preservation	356 ft	5.0	71 ft	Preserved within the conservation easement
UT	Enhancement Level 1	390 ft	1.5	260 ft	Restore profile and dimension, step-pool bank stabilization
UT	Priority Level 2 Restoration	1,948 ft	1.0	1,948 ft	Restore dimension, pattern, and profile
TOTAL		**5,421 ft**		**5,006 ft**	

C. Project History and Background

Project activity and reporting history are provided in Table III. The project contact information is provided in Table IV. The project background history is provided in Table V.

Table III. Project Activity and Reporting History Thompsons Fork Stream Restoration / EEP Project No. D06030-A			
Activity or Report	**Scheduled Completion**	**Data Collection Complete**	**Actual Completion or Delivery**
Restoration plan	Apr 2007	Aug 2006	Jun 2007
Final Design - 90%[1]	--	--	--
Construction	Jan 2008	N/A	May 2008
Temporary S&E applied to entire project area[2]	Jan 2008	N/A	May 2008
Permanent plantings	Mar 2008	N/A	Apr 2008
Mitigation plan/As-built	May 2008	Jun 2008	Oct 2008
Year 1 monitoring	2009	Sep 2009 (vegetation) Jul 2009 (geomorphology)	Dec 2009
Year 2 monitoring	2010	May 2010 (geomorphology) Sep 2010 (vegetation)	Dec 2010
Year 3 monitoring	2011		
Year 4 monitoring	2012		
Year 5 monitoring	2013		

[1]Full-delivery project; 90% submittal not provided.
[2]Erosion and sediment control applied incrementally throughout the course of the project.
N/A: Data collection is not an applicable task for these project activities.

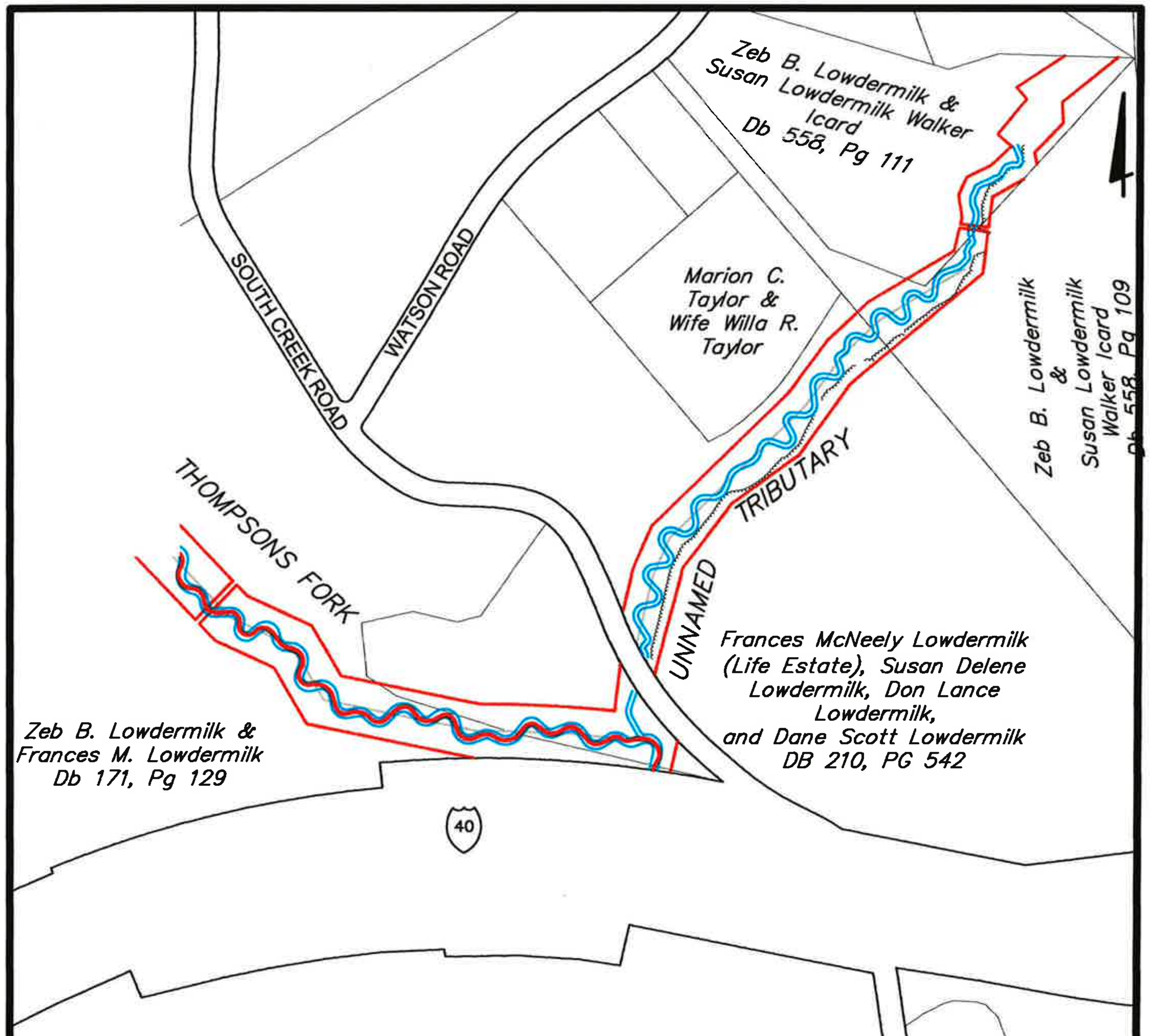
Table IV. Project Contact Table Thompsons Fork Stream Restoration / EEP Project No. D06030-A	
Designer	Evans, Mechwart, Hambleton & Tilton, Inc. 5500 New Albany Road, Columbus, OH 43054
Construction Contractor	South Mountain Forestry 6624 Roper Hollow, Morganton, NC 28655
Monitoring Performers	Evans, Mechwart, Hambleton & Tilton, Inc. 5500 New Albany Road, Columbus, OH 43054
Stream Monitoring POC	Jud M. Hines, EMH&T
Vegetation Monitoring POC	Megan F. Wolf, EMH&T

Table V. Project Background Table Thompsons Fork Stream Restoration / EEP Project No. D06030-A	
Project County	McDowell
Drainage Area	Mainstem-7.57 sq mi UT-0.163 sq mi
Drainage Impervious Cover Estimate	2.36%
Stream Order	Mainstem-3rd UT-1st
Physiographic Region	Blue Ridge Mountains/Southern Inner Piedmont
Ecoregion	Eastern Blue Ridge Foothills
Rosgen Classification of As-built	Mainstem-C4 UT- C3b
Dominant Soil Types	Colvard loam, Evard-Cowee complex, Iotla sandy loam
Reference Site ID	Thompsons Fork Mainstem, Brindle Creek
USGS HUC for Project and Reference	03050101
NCDWQ Sub-basin for Project and Reference	03050101040010
NCDWQ Classification for Project and Reference	C
Any portion of any project segment 303d listed?	No
Any portion of any project segment upstream of a 303d listed segment?	No
Reason for 303d listing or stressor	N/A
% of project easement fenced	50%

D. Monitoring Plan View

The monitoring plan view is included as Figure 2.

MCDOWELL COUNTY, NORTH CAROLINA
FIGURE 2 - MONITORING PLAN VIEW
FOR
THOMPSONS FORK AND UNNAMED TRIBUTARY
2008



LOCATION MAP
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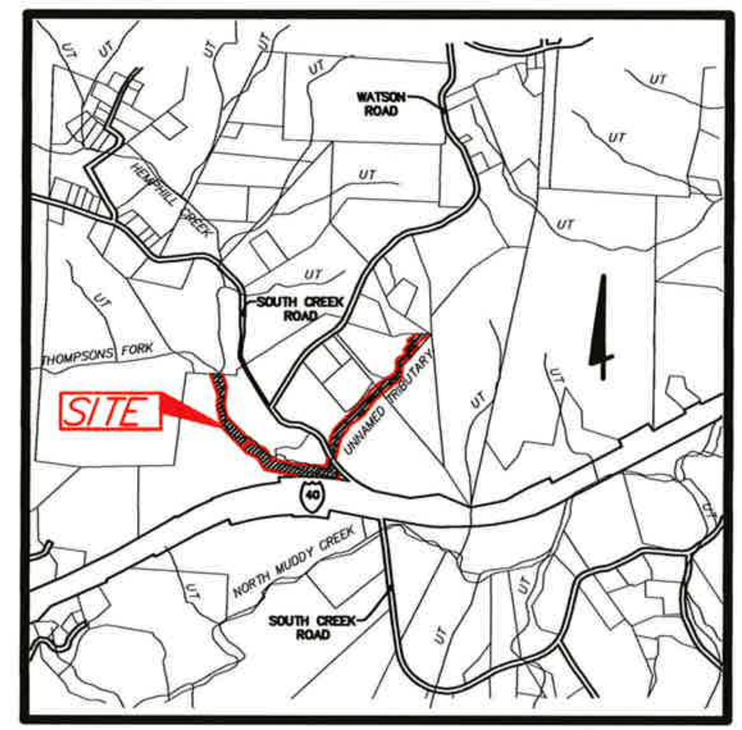

VICINITY MAP
Not To Scale

Job No. 2009-0328
Date October, 2009
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Sheet 1/8

MCDOWELL COUNTY, NORTH CAROLINA
FIGURE 2 - MONITORING PLAN VIEW
FOR
THOMPSONS FORK
AND UNNAMED TRIBUTARY

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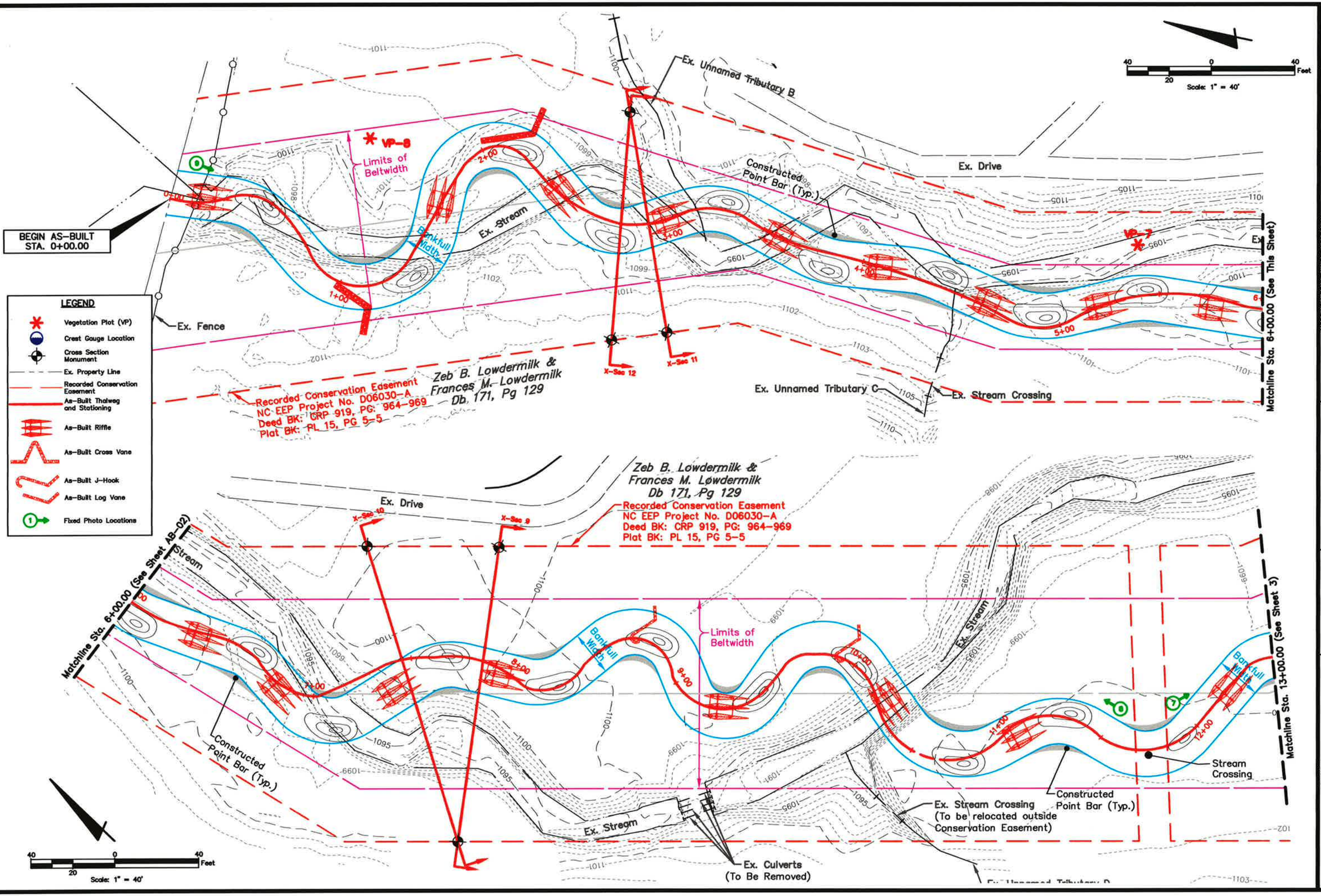
MARK	DATE	DESCRIPTION



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Sheet 2/8
Date October, 2009
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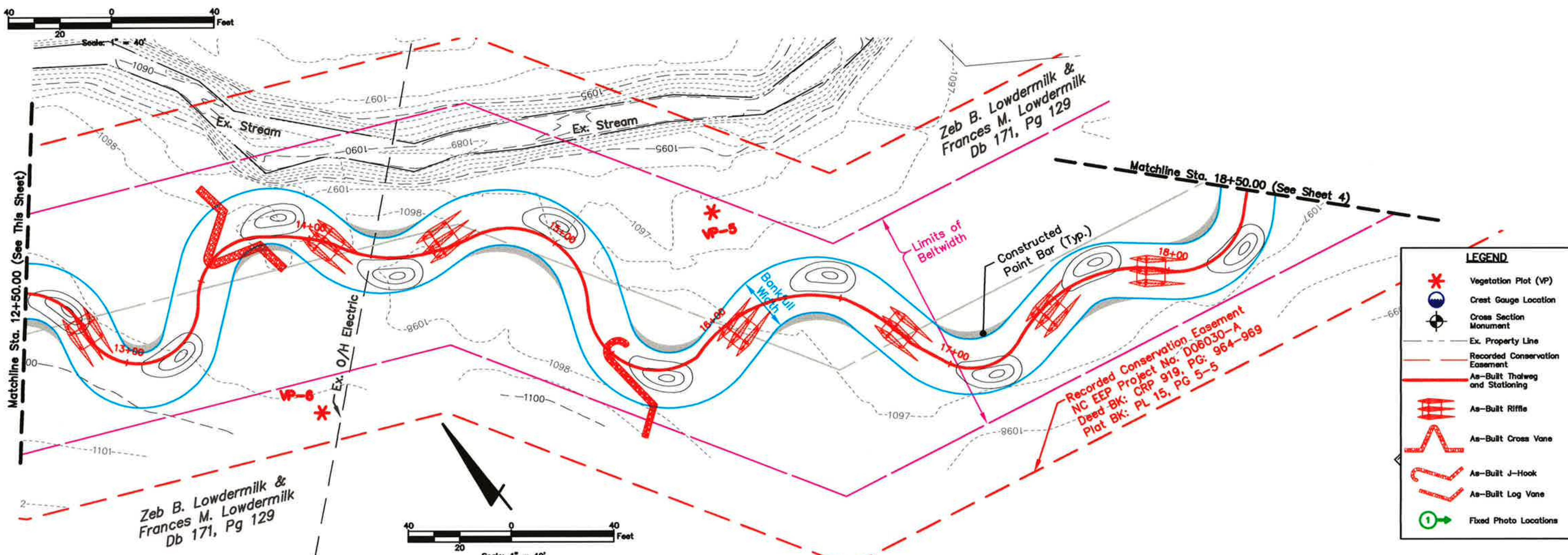
McDOWELL COUNTY, NORTH CAROLINA
FIGURE 2 - MONITORING PLAN VIEW
FOR
THOMPSONS FORK AND UNNAMED TRIBUTARY
THOMPSONS FORK

Ecosystem Enhancement Program

EMH&T
Environmental, Hydrologic & Transportation Engineers • Surveyors • Planners • Scientists
5500 New Albany Road, Columbus, OH 43054
Phone (614) 775-4500 Fax (614) 775-4800
www.emht.com

REVISIONS
MARK | DATE | DESCRIPTION



MCDOWELL COUNTY, NORTH CAROLINA
FIGURE 2 - MONITORING PLAN VIEW
FOR
THOMPSONS FORK
AND UNNAMED TRIBUTARY
THOMPSONS FORK

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5500 New Albany Road, Columbus, OH 43054
Phone: 614.775.4500 Fax: 614.775.4800

Date	October, 2009
Job No.	2009-0326
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Sheet	3/8

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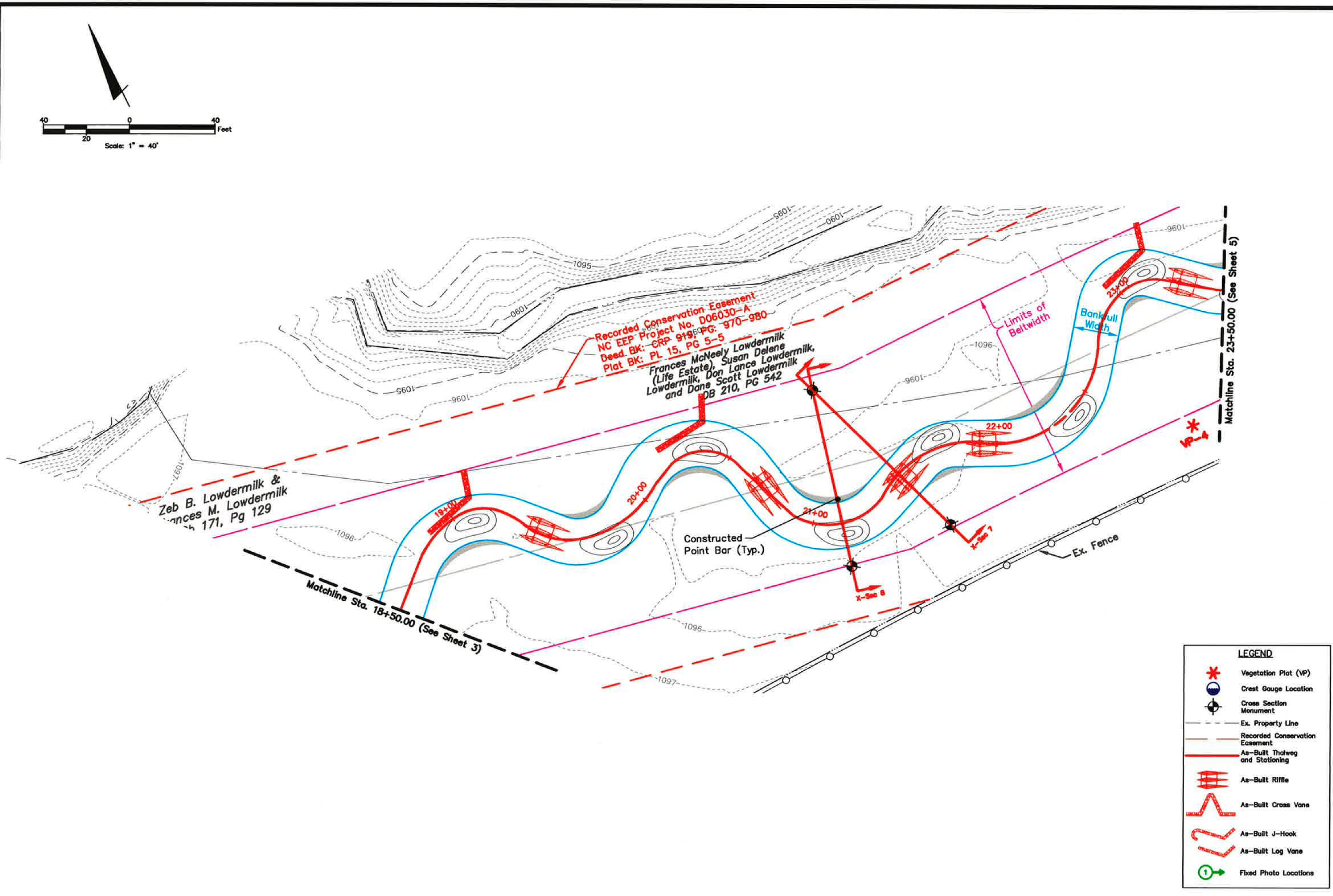
MARK DATE DESCRIPTION



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MCDOWELL COUNTY, NORTH CAROLINA
FIGURE 2 - MONITORING PLAN VIEW
FOR
THOMPSONS FORK
AND UNNAMED TRIBUTARY
THOMPSONS FORK

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Job No.: 2009-0328
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Sheet: 4/8

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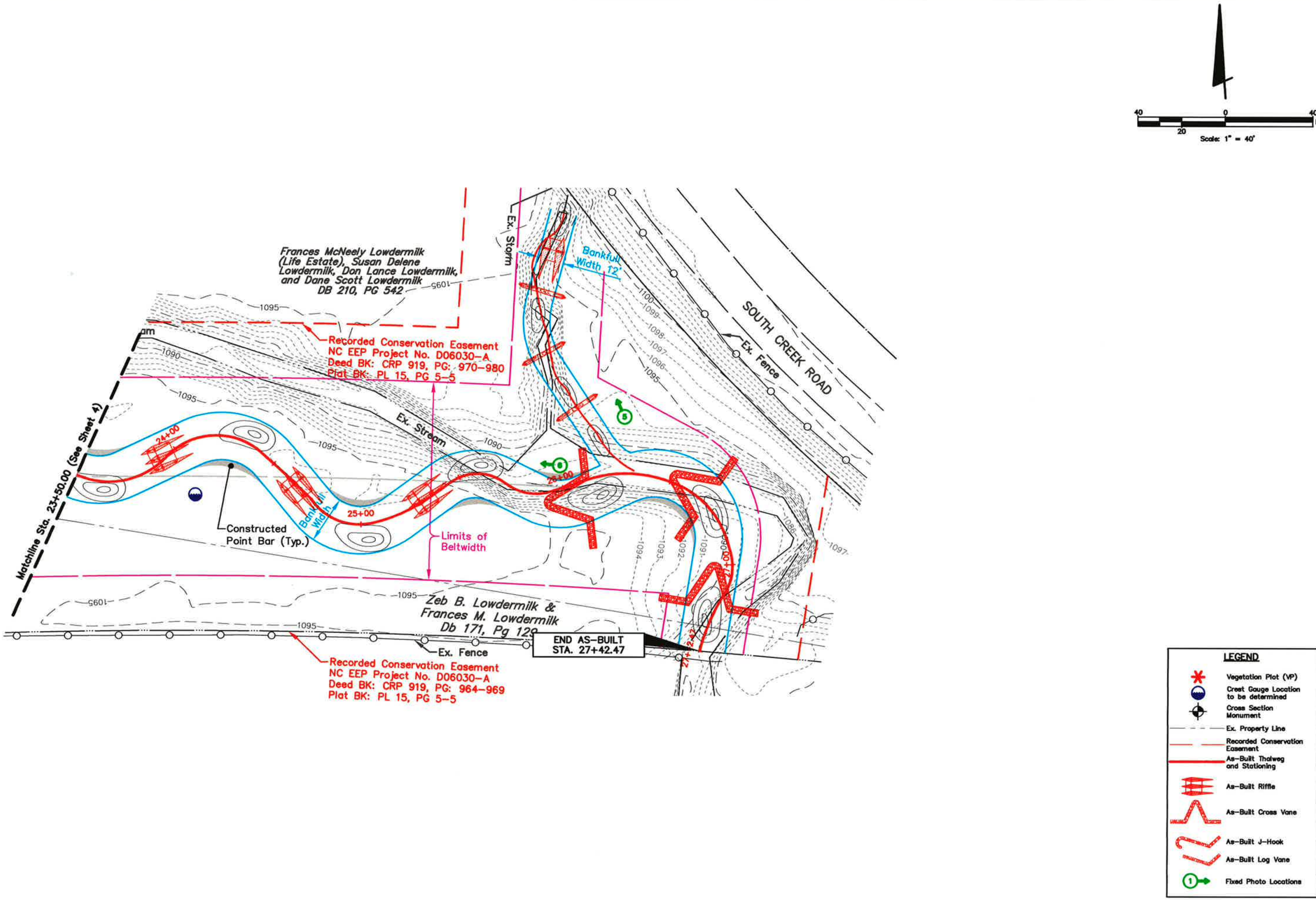

MCDOWELL COUNTY, NORTH CAROLINA
FIGURE 2 - MONITORING PLAN VIEW
FOR
THOMPSONS FORK AND UNNAMED TRIBUTARY
THOMPSONS FORK

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Job No.	2009-0328
Date	October, 2009
Scale	Hor: 1" = 40' Ver: 1" = 5'
Sheet	5/8

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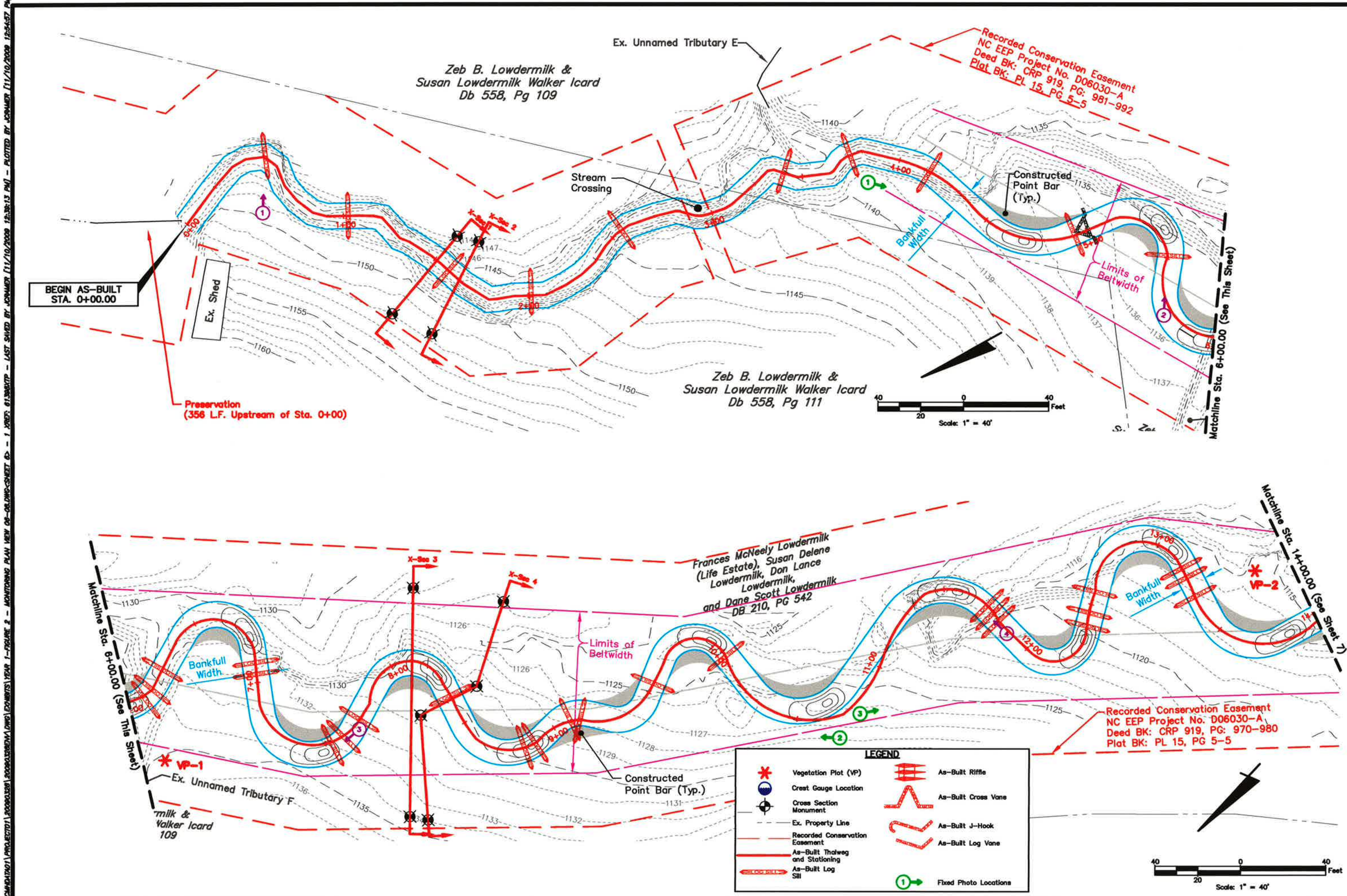
MARK	DATE	DESCRIPTION



Ex. Unnamed Tributary E
Zeb B. Lowdermilk &
Susan Lowdermilk Walker Icard
Db 558, Pg 109
Recorded Conservation Easement
NC EEP Project No. D06030-A
Deed BK: CRP 919, PG: 981-992
Plat BK: PL 15, PG 5-5
Stream Crossing
Constructed Point Bar (Typ.)
Bankfull Width
Limits of Beltwidth
BEGIN AS-BUILT STA. 0+00.00
Ex. Shed
X-Sec 1
X-Sec 2
Preservation
(356 L.F. Upstream of Sta. 0+00)
Zeb B. Lowdermilk &
Susan Lowdermilk Walker Icard
Db 558, Pg 111
Scale: 1" = 40'
Feet
Matchline Sta. 6+00.00 (See This Sheet)
Frances McNeely Lowdermilk
(Life Estate), Susan Delene
Lowdermilk, Don Lance
Lowdermilk,
and Dane Scott Lowdermilk
DB 210, PG 542
X-Sec 3
X-Sec 4
Bankfull Width.
Limits of Beltwidth
VP-1
VP-2
Ex. Unnamed Tributary F
Constructed Point Bar (Typ.)
Recorded Conservation Easement
NC EEP Project No. D06030-A
Deed BK: CRP 919, PG: 970-980
Plat BK: PL 15, PG 5-5
Matchline Sta. 14+00.00 (See Sheet 7)
LEGEND
Vegetation Plot (VP)
Crest Gauge Location
Cross Section Monument
Ex. Property Line
Recorded Conservation Easement
As-Built Thalweg and Stationing
As-Built Log Sill
As-Built Riffle
As-Built Cross Vane
As-Built J-Hook
As-Built Log Vane
Fixed Photo Locations
Scale: 1" = 40'

REVISIONS

MARK	DATE	DESCRIPTION

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Engineers • Surveyors • Planners • Scientists
5500 New Albany Road, Columbus, OH 43054

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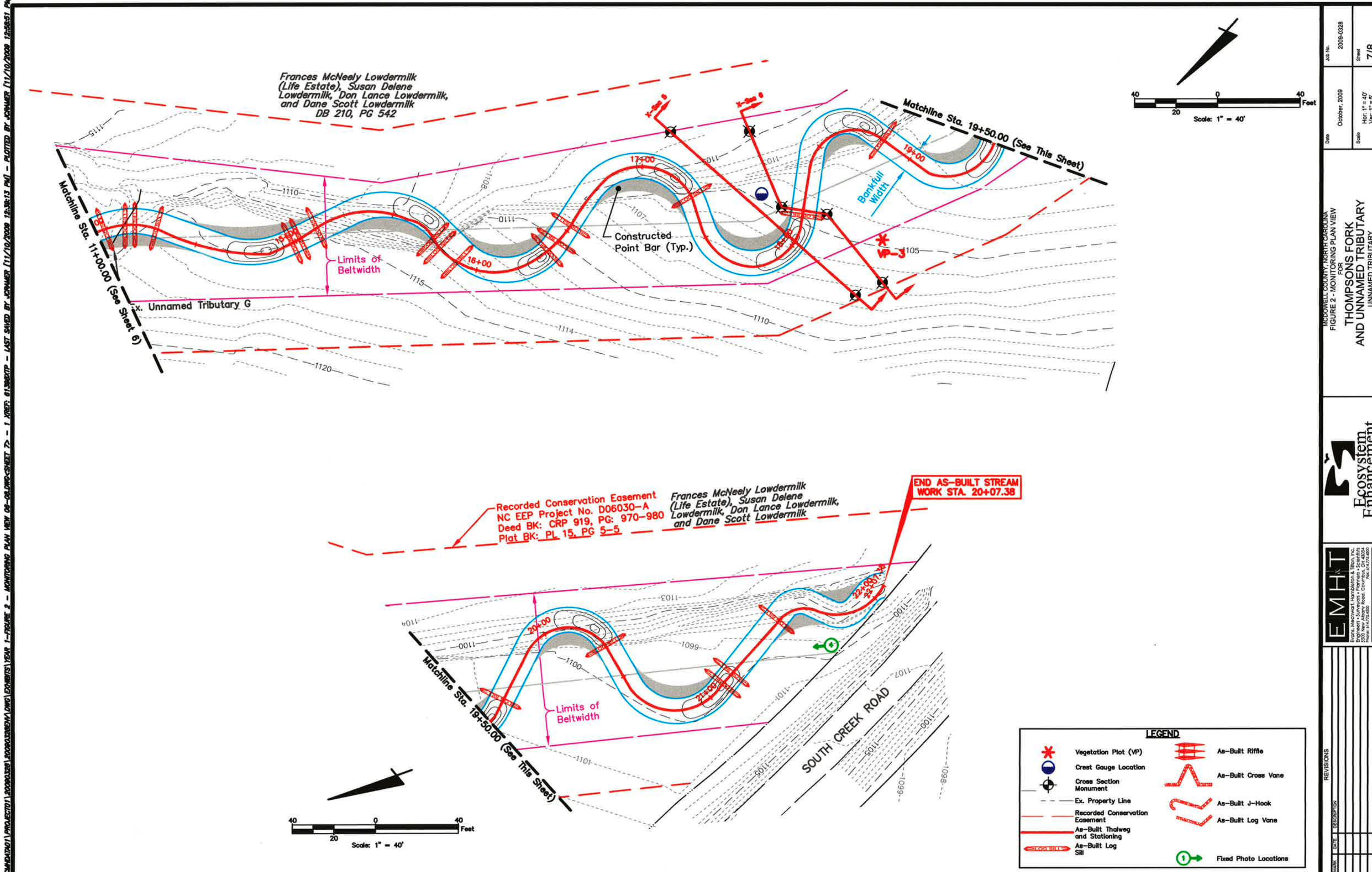
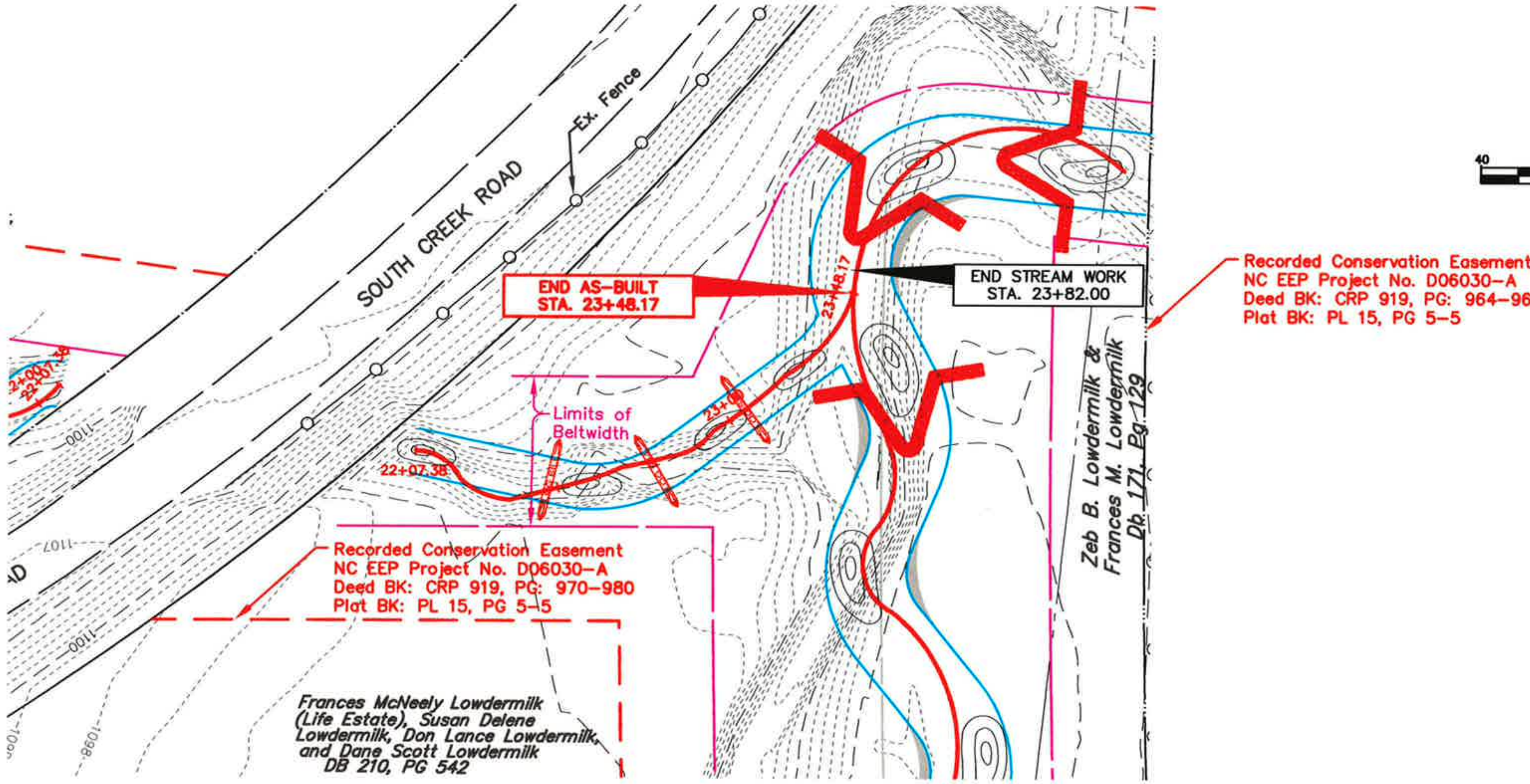
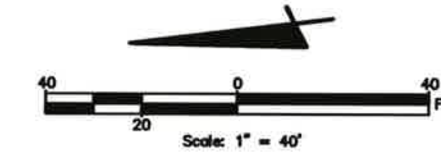
MCDOWELL COUNTY, NORTH CAROLINA
FIGURE 2 - MONITORING PLAN VIEW
FOR
THOMPSONS FORK
AND UNNAMED TRIBUTARY
UNNAMED TRIBUTARY

Date: October, 2009
Scale: Hor: 1" = 40', Ver: 1" = 5'
Job No. 2009-0328
Sheet 6/8



Frances McNeely Lowdermilk (Life Estate), Susan Delene Lowdermilk, Don Lance Lowdermilk, and Dane Scott Lowdermilk DB 210, PG 542
Matchline Sta. 11+00.00 (See Sheet 6)
Matchline Sta. 19+50.00 (See This Sheet)
Ex. Unnamed Tributary G
Limits of Beltwidth
Constructed Point Bar (Typ.)
Bankfull Width
VP-3
X-Sec 5
X-Sec 6
15+00
16+00
17+00
19+00
20+00
21+00
Recorded Conservation Easement NC EEP Project No. D06030-A Deed BK: CRP 919, PG: 970-980 Plat BK: PL 15, PG 5-5
END AS-BUILT STREAM WORK STA. 20+07.38
SOUTH CREEK ROAD
Scale: 1" = 40'
Feet
LEGEND
Vegetation Plot (VP)
Crest Gauge Location
Cross Section Monument
Ex. Property Line
Recorded Conservation Easement
As-Built Thalweg and Stationing
As-Built Log Sill
As-Built Riffle
As-Built Cross Vane
As-Built J-Hook
As-Built Log Vane
Fixed Photo Locations
McDOWELL COUNTY, NORTH CAROLINA
FIGURE 2 - MONITORING PLAN VIEW
FOR
THOMPSONS FORK AND UNNAMED TRIBUTARY
UNNAMED TRIBUTARY
Date October, 2009
Job No. 2009-0328
Scale Hor: 1" = 40' Ver: 1" = 5'
Sheet 7/8
Ecosystem Enhancement Program
EMHT
REVISIONS





LEGEND

- Vegetation Plot (VP)
- Crest Gauge Location
- Cross Section Monument
- Ex. Property Line
- Recorded Conservation Easement
- As-Built Thalweg and Stationing
- As-Built Log Sill
- As-Built Riffle
- As-Built Cross Vane
- As-Built J-Hook
- As-Built Log Vane
- As-Built Photo Locations of Typical Structures
- Fixed Photo Locations

McDOWELL COUNTY, NORTH CAROLINA
FIGURE 2 - MONITORING PLAN VIEW
FOR
THOMPSONS FORK
AND UNNAMED TRIBUTARY
UNNAMED TRIBUTARY

Date	Job No.
October, 2009	2009-0328

Scale	Sheet
Hor: 1" = 40' Ver: 1" = 5'	8/8

Ecosystem Enhancement PROGRAM

EMH&T

REVISIONS

MARK	DATE	DESCRIPTION

III. PROJECT CONDITION AND MONITORING RESULTS

A. Vegetation Assessment

1. Soil Data

Soil information was obtained from the NRCS Soil Survey of McDowell County, North Carolina (USDA NRCS, September, 1995). The soils along the mainstem of Thompsons Fork and its associated Unnamed Tributary include the Colvard Series consisting of loamy sediments ranging from 40 to 60 inches or more in thickness over deposits of sandy, loamy gravelly to cobbly sediments. Rock fragments range from 0 to 15 percent to a depth of 40 inches, and from 0 to 80 percent below 40 inches. Flakes of mica range from a few to common.

Data on the soils series found within and near the project site is summarized in Table VI.

Table VI. Preliminary Soil Data
Thompsons Fork Stream Restoration / EEP Project No. D06030-A

Series	Max. Depth (in.)	% Clay on Surface	K[1]	T[2]	% Organic Matter
Colvard loam (CoA)	60	8-18	0.15	4	1-2
Evard-Cowee complex (EwE)	30	7-25	0.28	2-5	1-5
Iotla sandy loam (IoA)	60	12-18	0.15	5	2-5

[1]Erosion Factor K indicates the susceptibility of a soil to sheet and rill erosion, ranging from 0.05 to 0.69.
[2]Erosion Factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity, measured in tons per acre per year.

2. Vegetative Problem Areas

Vegetative Problem Areas are defined as areas either lacking vegetation or containing populations of exotic vegetation. Each problem area identified during each year of monitoring is summarized in Table VII. Photographs of the vegetative problem areas are shown in Appendix A.

Table VII. Vegetative Problem Areas Thompsons Fork Stream Restoration / EEP Project No. D06030-A

Feature/Issue	Station # / Range	Probable Cause	Photo #
Invasive Population	UT: See Plan View	Native Vine: encroachment from adjacent woodland	VPA 1
Bare Floodplain	UT: See Plan View	Unknown: could be poor, rocky soil	VPA 2

In 2010, vegetation problem areas occurred on both the right and left banks of the unnamed tributary. In 2009, a species of pea vine had spread into the riparian corridor from the adjacent wooded hillside, with the most dense concentration located in the area of Vegetation Plot 2. The species is a member of the pea family, likely *Amphicarpaea bracteata* (hog peanut), which is native to North Carolina. In the Year 1 monitoring report it was noted that the vine was strangling the woody vegetation in and around monitoring plot 2, where approximately 80% of the planted

woody stems were suffering from vine strangulation. Without control of the vine, tree mortality could be high in this area, jeopardizing the minimum stem count criteria. Because of this, the presence of the vine within the project corridor was considered a problem area of high priority and management with herbicide treatments were conducted in the fall of 2009. Follow-up treatments were applied the spring of 2010, to try and control the spread of this vine within the project corridor. These treatments appear to be working to some degree. Woody plantings installed in late 2009 have thrived and added to overall density of planted stems along the tributary in 2010. Spraying will continue to be recommended, however, in order to keep the vine under control within the project corridor.

Again in Year 2, several areas along the unnamed tributary were noted to have low overall herbaceous cover along the riparian corridor on the right bank. These areas are patchy and scattered throughout the corridor, with none of the areas showing banks that are completely bare. However, due to the threat by invasive species in the same areas along the tributary, particularly the pea vine mentioned above, the sparse vegetation is noted as an area of concern. If the herbaceous cover does not increase, the open patches will provide an avenue for colonization and spread of invasive species. During 2010 vegetation monitoring however, colonization by invasives did not appear to be happening to any alarming degree.

The coverage of herbaceous vegetation and the spread of *Sericea lespedeza* along the right bank of the tributary are considered areas of low concern at this time, and will therefore be watched during future years of monitoring. In addition, proactive management in the form of herbicide treatments were conducted on the lespedeza throughout the fall of 2009 and spring of 2010, to limit the impact of this species on the vegetative success of the project.

3. Vegetation Problem Area Plan View

The location of each vegetation problem area is shown on the vegetative problem area plan view included in Appendix A. Each problem area is color coded with yellow for areas of low concern (areas to be watched) or red for high concern (areas where maintenance is warranted).

4. Stem Counts

A summary of the stem count data for each species arranged by plot is shown in Table VIII. Table VIIIa provides the survival information for planted species, while Table VIIIb provides the total stem count for the plots, including all planted and recruit stems. This data was compiled from the information collected on each plot using the *CVS-EEP Protocol for Recording Vegetation, Version 4.0*. Additional data tables generated using the CVS-EEP format are included in Appendix A. All vegetation plots are labeled as VP on Figure 2.

Table VIIIa. Stem counts for each species arranged by plot - planted stems. Thompsons Fork Stream Restoration / EEP Project No. D06030-A												
	Plots								Year 0 Totals	Year 1 Totals	Year 2 Totals	Survival %
Species	1	2	3	4	5	6	7	8				
Shrubs												
Alnus serrulata	3	3	3	2	8	6	9	5	42	42	39	93
Aronia arbutifolia	2			13	9	2	1	2	6	6	29	483
Cornus amomum							1		0	0	1	NA
Ilex verticillata						2			2	2	2	100
Salix exigua					5	3			7	7	8	114
Sambucus canadensis	2		1	2	1	1	6		1	1	13	1300
Trees												
Cercis canadensis				4					0	0	4	NA
Diospyros virginiana				1					1	1	1	100
Fraxinus pennsylvanica	9	20	15	9	4	2			59	59	59	100
Platanus occidentalis				2		5	1	4	12	12	12	100
Quercus palustris		1	1	1	1	1		1	6	6	6	100
Salix nigra					2	1		1	3	3	4	133
Year 2 Totals	16	24	20	34	30	23	18	13	139	139	178	128
Live Stem Density	648	972	810	1377	1215	932	729	527				
Average Live Stem Density	901											

Table VIIIb. Stem counts for each species arranged by plot - all stems. Thompsons Fork Stream Restoration / EEP Project No. D06030-A										
	Plots								Year 1	Year 2
Species	1	2	3	4	5	6	7	8	Totals	Totals
Shrubs										
Alnus serrulata	3	3	3	11	8	6	10	43	46	87
Aronia arbutifolia	2			13	9	2	1	2	6	29
Cornus amomum							1		0	1
Ilex verticallata						2			2	2
Salix exigua					5	5			7	10
Sambucus canadensis	2		2	5	3	1	7		11	20
Trees										
Cercis canadensis				4						4
Fraxinus pennsylvanica	10	24	17	9	5	2	6		59	73
Platanus occidentalis				2		6	1	4	12	13
Quercus palustris		1	1	1	1	1		1	6	6
Salix nigra					3	1		2	3	6
Year 2 Totals	17	28	23	45	34	26	26	52	152	251
Live Stem Density	689	1134	932	1823	1377	1053	1053	2106		
Average Live Stem Density	1271									

The average stem density of planted species for the site exceeds the minimum criteria of 320 stems per acre after three years. Each individual plot also has a stem density above the minimum. In addition, a number of recruit stems have been found in all plots. The recruit stems increase the total stem density across the site by 71%.

5. Vegetation Plot Photos

Vegetation plot photos are provided in Appendix A.

B. Stream Assessment

1. Hydrologic Criteria

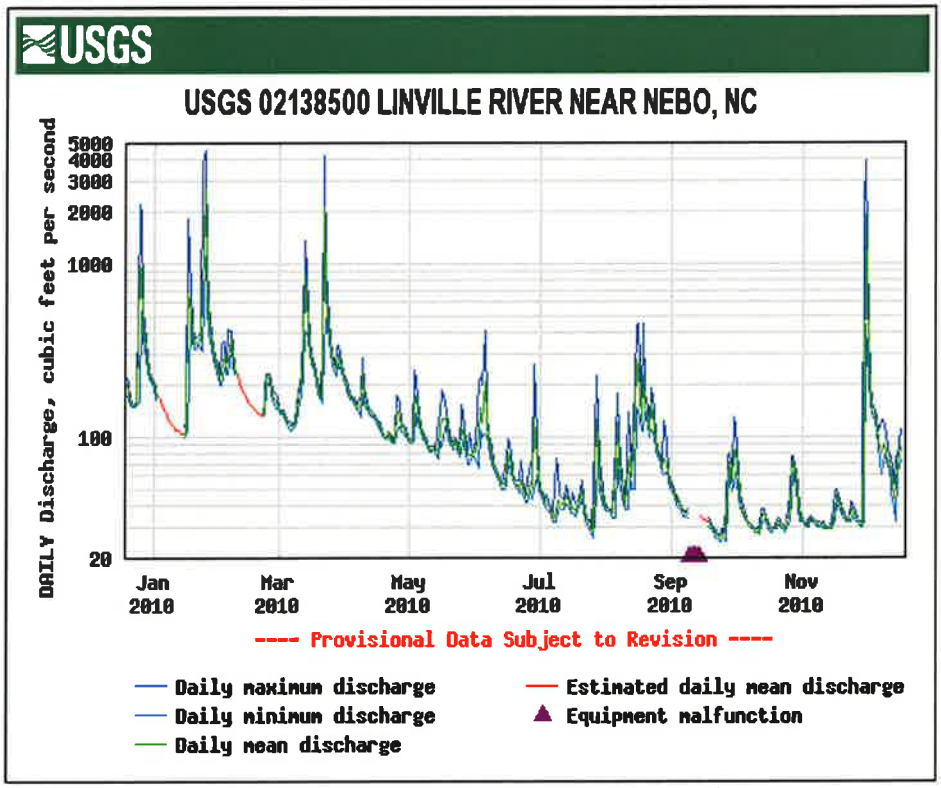
Two crest-stage stream gages were installed on the project reaches, each of which is located at the bankfull stage at a riffle cross-section, one along the unnamed tributary and one along the Thompsons Fork Mainstem. The locations of the crest-stage stream gages are shown on the monitoring plan view (Figure 2). Bankfull events were recorded during Year 2, as documented in Table IX.

Table IX. Verification of Bankfull Events			
Date of Data Collection	**Date of Occurrence**	**Method**	**Photo #**
5/12/10	1/24/10-1/25/10 or 3/22/10*	Crest gage at XS-6 on UT	BF 1
5/12/10	1/24/10-1/25/10 or 3/22/10*	Crest gage at XS-7 on Mainstem	BF 2

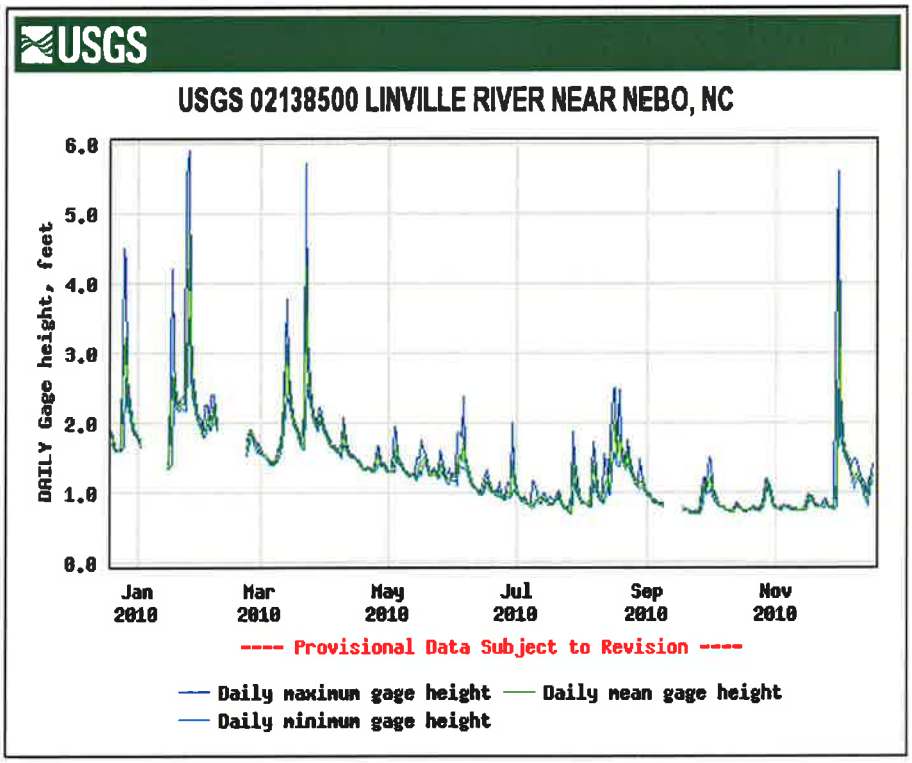
*Date is approximate; based on a review of recorded rainfall data

In May 2010, the crest gage on the unnamed tributary was examined and determined to have experienced a bankfull event at a height of 4-inches above the bottom of the crest gage. The crest gage on the mainstem of Thompsons Fork also documented a bankfull event, at a height of 1-inch above the bottom of the crest gage. These crest gages are set at or above the bankfull elevation of each stream channel. Photographs of the crest gages are shown in Appendix B.

The most likely date for the bankfull event was after the rain events that occurred on January 24 and January 25, 2010. These dates correspond to a high discharge events and gage heights, as recorded at USGS Gage 02138500 Linville River at Nebo, NC, which lies approximately 15 miles west of Morganton and 5 miles east of Marion, NC. Another large precipitation event occurred on March 22, 2010. The discharge and gage height recorded at the Nebo station are shown on the hydrographs below.



USGS Surface-Water Daily Data for North Carolina
http://waterdata.usgs.gov/nc/nwis/dv?



USGS Surface-Water Daily Data for North Carolina
http://waterdata.usgs.gov/nc/nwis/dv?

2. Stream Problem Areas

A summary of the areas of concern identified during the visual assessment of the stream for Year 2 is included in Table X.

Table X. Stream Problem Areas
Thompsons Fork Stream Restoration / EEP Project No. D06030-A

Feature Issue	Station Numbers	Suspected Cause	Photo Number
Aggradation	Scattered areas along UT(mostly) and Mainstem; See SPA Plan View	Low flows allow wetland vegetation to colonize the stream channel, which is contributing to sedimentation	SPA 1,2

As in 2009, in 2010 there was observed to be scattered areas throughout the project reaches that are developing wetland vegetation within the stream channel, particularly along the unnamed tributary. While the wetland vegetation is beneficial for water quality, there is the potential that the vegetation will decrease flows, particularly during times of low flow, thereby allowing sediment to drop into the channel. This type of problem tends to exacerbate itself, as continuing sedimentation allows for further colonization and growth of wetland plants.

This positive feedback loop is most evident on the tributary. Over the past year, sedimentation has continued along the mid-upper half of this reach. Cattails and other wetland vegetation are now established in the channel where sedimentation is most pronounced. The past year's sedimentation has caused the D50 of the tributary's particle distribution to fall into the medium sand category. Because of this, the tributary has changed shifted from a C4 channel classification to a C5 classification. Areas with sedimentation are marked on the stream problem are map as high concern areas. It has been recommended to the client that the channel be cleared of excessive sediment and wetland vegetation and restored back to a more functional channel morphology. The client has agreed to this management and will complete it in the winter of 2010. After channel maintenance has occurred, it will be watched in future years to ensure the channel remains viable as a stream, and does not begin to aggrade into a linear wetland type feature.

3. Stream Problem Areas Plan View

The locations of problem areas are shown on the stream problem area plan view included in Appendix B. Each problem area is color coded with yellow for areas of low concern (areas to be monitored) or red for high concern (areas where maintenance is warranted).

4. Stream Problem Areas Photos

Photographs of the stream problem areas are included in Appendix B.

5. Fixed Station Photos

Photographs were taken at each established photograph station on September 17 and September 18, 2010. These photographs are provided in Appendix B.

6. Stability Assessment Table

The visual stream assessment was performed to determine the percentage of stream features that remain in a state of stability after the first year of monitoring. The visual assessment for each reach is summarized in Table XIa and Table XIb. This summary was compiled from the more comprehensive Table B1, included in Appendix B. Only those structures included in the as-built survey were assessed during monitoring and reported in the tables.

Table XIa. Categorical Stream Feature Visual Stability Assessment
Thompsons Fork Stream Restoration / EEP Project No. D06030-A
Segment/Reach: Mainstem

Feature	Initial	MY-01	MY-02	MY-03	MY-04	MY-05
A. Riffles	100%	100%	100%			
B. Pools	100%	100%	100%			
C. Thalweg	100%	100%	100%			
D. Meanders	100%	99%	100%			
E. Bed General	100%	99%	99%			
F. Vanes / J Hooks etc.	100%	100%	100%			
G. Wads and Boulders	N/A	N/A	N/A			

Table XIa. Categorical Stream Feature Visual Stability Assessment
Thompsons Fork Stream Restoration / EEP Project No. D06030-A
Segment/Reach: UT

Feature	Initial	MY-01	MY-02	MY-03	MY-04	MY-05
A. Riffles	100%	100%	100%			
B. Pools	100%	96%	96%			
C. Thalweg	100%	100%	100%			
D. Meanders	100%	100%	100%			
E. Bed General	100%	100%	100%			
F. Vanes / J Hooks etc.	N/A	N/A	N/A			
G. Wads and Boulders	N/A	N/A	N/A			
H. Log Sills	100%	95%	92%			

[1]Riffles are assessed using the longitudinal profile. A riffle is determined to be stable based on a comparison of location and elevation with respect to the as-built profile.
[2]Pools are assessed using the longitudinal profile. A pool is determined to be stable based on a comparison of location and elevation with respect to the as-built profile and a consideration of appropriate depth.
[3]Physical structures such as vanes, J-hooks, and log sills are assessed using the as-built plan sheets to define the location of such features. A structure is considered stable if the feature remains functional in the same location as shown in the as-built plan.
[4]Those features not included in the stream restoration were labeled N/A. This includes structures such as rootwads and boulders.

The visual stream stability assessment revealed that the majority of in-stream structures are functioning as designed and built on the Thompsons Fork mainstem and unnamed tributary in Year 2. The only category on the mainstem reach that includes features performing in a state

unlike that of the as-built include minor areas of wetland formation. It appears that narrow bars forming along the stream banks are becoming vegetated with wetland species. Wetland plants are excellent for water quality, but these areas have been noted under the aggradation feature category for future monitoring.

Aggradation is also occurring along the unnamed tributary to Thompsons Fork. Sedimentation has occurred in some of the pools located near the log sills installed for grade control, thus decreasing the maximum pool depth. All pools and associated log sills are still present and functional throughout the stream channel, including those with noted sedimentation. Maintenance activities to be performed over the winter months to remove certain sediment deposits will further improve the performance of the unnamed tributary.

7. Quantitative Measures

Graphic interpretations of cross-sections, profiles and substrate particle distributions are presented in Appendix B. A summary of the baseline morphology for the site is included in Tables XII and XIII and is based on the more detailed monitoring data shown in the appendix. Table XIII contains a summary of the geomorphic analysis of all monitoring cross-sections, including pools and riffles. Table XII only includes a summary of riffle cross-sections, plus a summary of the geomorphic analysis of the stream profile, stream pattern, various reach parameters and provides the determined Rosgen classification. These tables offer a year-to-year comparison of the observed and calculated geomorphic data to assess the stability of the restored stream channel. We have considered the data compiled into these tables to offer the summary conclusions presented below.

The stream pattern data provided for Year 1 and Year 2 is the same as the data provided from the As-Built survey, as pattern has not changed based on the Year 2 stream surveys and visual field assessment.

Bedform features continue to evolve along the restored reaches as shown on the long-term longitudinal profiles. Dimensional measurements of the monumented cross-sections from year 2 remain generally stable when compared to as-built conditions. The comparison of the As-Built and Year 1 long-term stream monitoring profile data with Year 2 data shows stability with minimal change from as-built conditions. RiverMorph uses the shortest straight line distance between the consecutive survey points to create the stationing for the profile. The Year 2 survey represents a slightly smaller number of collected survey points along Thompsons Fork mainstem, which will lead to a lower cumulative length of stream profile, which also affects the locations of each pool and riffle with respect to Years 0 & 1 profiles. In fact, the pool and riffle features remain in the same locations shown on the as-built mitigation plan, with only slight adjustments. As such, we have evaluated stability from the standpoint of comparing features between Years 0,1 and 2 profiles with the understanding of the 'shift' in these features between the profiles.

For the unnamed tributary, riffle lengths and slopes are stable. The median pool to pool spacing for the Mainstem appeared to decrease from the as-built condition in Year 1, but has returned to values closer to the as-built condition in Year 2. For UT-1, the trend of reduced pool to pool spacing has continued from the as-built condition to Year 1, and then Year 1 to Year 2. None of these changes are significant and no signs of channel instability are evident in correlation to these changing values.

Due to sedimentation along the unnamed tributary, substrate of the constructed riffles exhibited a median particle size in the very fine sand category, as compared to a median particle distribution of coarse gravel in Year 1 and fine - very coarse gravel reported for the as-built condition. Remedial maintenance on the unnamed tributary is warranted at this time in order to promote natural channel flushing and a more stable median particle distribution. The maintenance listed above will clear the extra sediment load and wetland vegetation out of the tributary, thereby fostering further natural washing of sediment.

On the Thompsons Fork mainstem, there was a shift back to a more stable median distribution of coarse gravel for the substrate material in the riffles. In Year 1 the median particle distribution was in the very coarse gravel range. The as-built median particle distribution for the constructed riffles was in the fine to medium gravel range. The pool substrate for the project reaches remain stable, with median particle sizes consisting of very fine to coarse particles in the silt/clay category, based on the Year 2 substrate analysis.

XII: Baseline Geomorphologic and Hydraulic Summary

Thompsons Fork & Unnamed Tributary Mitigation Plan / EEP Project No. D06030-A

Station/Reach: Thompsons Fork Mainstem Priority I Restoration Reach - Station 0+00.00 to 18+06.42 (1,806.42 l.f.)

Parameter	Thompsons Fork Reference Reach			Pre-Existing Condition**			Design			As-Built Riffle XSs 7, 9, 10 & 11			Year 1 Riffle XSs 7, 9, 10 & 11			Year 2 Riffle XSs 7, 9, 10 & 11		
Dimension	Min	Max	Mean	Min	Max	Mean	Min	Max	Med.	Min	Max	Med.	Min	Max	Med.	Min	Max	Med.
Drainage Area (mi^2)			5.57			7.57			7.57			7.57			7.57			7.57
BF Width (ft)			15.38			20.90			21.50	34.52	39.81	37.74	35.30	38.95	36.32	28.65	38.81	34.11
Floodprone Width (ft)			18.89			32.00	39.0	100.0	90.0	89.89	143.71	113.53	86.87	146.66	109.57	87.45	146.55	94.61
BF Cross Sectional Area (ft^2)			23.80			56.50			52.00	48.51	59.39	52.85	39.38	54.16	47.43	36.12	53.80	43.68
BF Mean Depth (ft)			1.55			2.70			2.40	1.30	1.60	1.40	1.09	1.39	1.32	1.14	1.42	1.33
BF Max Depth (ft)			2.09			5.05			3.00	2.16	2.88	2.52	2.14	2.59	2.38	2.29	2.62	2.56
Width/Depth (ft)			9.92			7.74			8.96	23.21	30.16	27.07	25.40	33.00	28.68	22.74	29.40	26.18
Entrenchment Ratio			1.23			1.53	1.81	4.65	4.19	2.30	4.16	3.00	2.31	4.15	3.00	2.31	4.23	3.01
Bank Height Ratio			1.18			2.36			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Wetted Perimeter (ft)			18.50			24.77			26.30	34.91	40.28	38.84	35.70	39.27	36.73	29.28	39.17	34.62
Hydraulic Radius (ft)			12.50			2.28			1.98	1.28	1.57	1.38	1.08	1.38	1.31	1.12	1.40	1.30
BF Discharge (cfs)			64.8			285.0			285.0	149.5	149.5	149.5	149.5	149.5	149.5	149.5	149.5	149.5
BF Mean Velocity (ft/sec)			2.72			5.04			4.77	2.52	3.08	2.83	2.76	3.80	3.15	2.78	4.14	3.42
Pattern																		
*Channel Beltwidth (ft)	16.30	56.00	36.40				39.00	100.00	90.00	40.00	90.00	90.00	40.00	90.00	90.00	40.00	90.00	90.00
*Radius of Curvature (ft)	9.70	48.90	25.40				18.70	48.90	28.30	18.70	48.90	27.70	18.70	48.90	27.70	18.70	48.90	27.70
*Meander Wavelength (ft)	49.50	119.40	104.30				89.20	119.90	110.40	84.17	119.85	110.35	84.17	119.85	110.35	84.17	119.85	110.35
*Meander Width Ratio	1.06	3.64	2.37				4.15	5.58	5.13	1.04	2.34	2.34	1.13	2.48	2.31	1.03	3.14	2.64
Profile																		
Riffle Length (ft)	15.0	21.6	18.3				14.3	39.4	21.8	8.6	30.6	17.2	7.2	19.6	14.7	5.8	28.1	13.3
Riffle Slope (ft/ft)	0.0099	0.0127	0.0113				0.0099	0.0127	0.0113	0.0051	0.0571	0.0166	0.00599	0.03391	0.01832	0.00107	0.04770	0.01060
Pool Length (ft)	17.0	32.1	24.3				28.6	105.0	42.6	21.5	82.9	39.3	18.2	60.3	32.4	15.9	68.6	37.7
Pool Spacing (ft)	73.1	77.1	75.1				42.6	83.2	61.5	25.0	145.0	63.8	31.4	113.7	55.6	31.0	137.6	66.4
Substrate																		
D50 (mm)			29.4			13.7			13.7	5.7	10.6	9.1	23.8	32.7	29.1	28.3	67.6	33.8
D84 (mm)			50.1			26.2			26.2	35.9	66.3	43.4	60.8	87.1	73.9	77.5	130.5	104.7
Additional Reach Parameters																		
Valley Length (ft)			188.00			2261			2295			2295			2295			2295
Channel Length (ft)			140.00			2530			2799			2742			2742			2742
Sinuosity			1.34			1.12			1.22			1.19			1.19			1.19
Valley Slope (ft/ft)			0.0031			0.0044			0.0031			0.0036			0.0036			0.0036
Bankfull Slope (ft/ft)			0.0024			0.0039			0.0024			0.0030			0.0030			0.0030
Rosgen Classification			E4			G4			E4			C4			C4			C4
*Habitat Index																		
*Macrobenthos																		

Notes: * Inclusion will be project specific and determined primarily by As-built monitoring plan success criteria

**Insufficient field indicators to estimate pattern and bedform features under impaired G4 channel conditions.

Blank fields = Historic project documentation necessary to provide these data were unavailable at the time of this report submission.

Where no min/max values are provided, only one value was measured or computed and is presented as the mean value.

Year 1 and 2 Monitoring data were quantitatively and qualitatively evaluated using RiverMorph v 4.3.0.

Table XII: Baseline Geomorphologic and Hydraulic Summary

Thompsons Fork & Unnamed Tributary Mitigation Plan / EEP Project No. D06030-A

Station/Reach: UT Priority Level I Restoration Reach - Station 4+00.00 to 16+37.32 (1,237.32 l.f.)

Parameter	Brindle Creek Reference Reach			Pre-Existing Condition			Design			As-Built XS-4 & XS-6			Year 1 XS-4 & XS-6			Year 2 XS-4 & XS-6		
Dimension	Min	Max	Mean	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Drainage Area (mi^2)			1.16			0.16			0.16			0.16			0.16			0.16
BF Width (ft)			24.02			13.10			12.00	13.94	14.08	14.01	14.03	16.67	15.35	10.94	12.21	11.58
Floodprone Width (ft)			232.00			44.80	45.00	85.00	71.50	78.48	88.08	83.28	74.03	97.32	85.68	76.72	94.68	85.70
BF Cross Sectional Area (ft^2)			30.77			10.70			11.50	11.17	11.37	11.27	11.15	14.89	13.02	9.50	11.52	10.51
BF Mean Depth (ft)			1.28			0.82			0.96	0.80	0.81	0.81	0.80	0.89	0.85	0.87	0.94	0.91
BF Max Depth (ft)			1.72			1.12			1.20	1.64	1.76	1.70	1.56	1.62	1.59	1.75	1.81	1.78
Width/Depth (ft)			18.77			15.98			12.50	17.38	17.42	17.40	17.54	18.73	18.14	12.57	12.99	12.78
Entrenchment Ratio			9.66			3.42	3.75	7.08	5.96	5.63	6.26	5.95	5.28	5.84	5.56	7.01	7.76	7.39
Bank Height Ratio			1.00			1.63			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Wetted Perimeter (ft)			26.58			14.74			13.92	14.41	14.56	14.49	14.39	17.02	15.71	11.59	12.84	12.22
Hydraulic Radius (ft)			1.16			0.73			0.83	0.77	0.78	0.78	0.78	0.87	0.83	0.82	0.90	0.86
BF Discharge (cfs)			98.2			54.9			54.9	54.9	54.9	54.9	54.9	54.9	54.9	54.9	54.9	54.9
BF Mean Velocity (ft/sec)			3.19			5.13			4.77	4.83	4.91	4.87	3.69	4.92	4.22	4.77	5.78	5.22
Pattern																		
*Channel Beltwidth (ft)	44.17	46.50	45.22				45.00	85.00	71.50	44.00	75.41	73.33	44.00	75.41	73.33	44.00	75.41	73.33
*Radius of Curvature (ft)	12.97	24.44	17.67				14.40	40.90	22.60	10.39	40.91	22.57	10.39	40.91	22.57	10.39	40.91	22.57
*Meander Wavelength (ft)	88.23	115.70	104.80				64.20	124.00	100.00	64.19	124.91	99.37	64.19	124.91	99.37	64.19	124.91	99.37
*Meander Width Ratio	1.84	1.94	1.88				3.75	7.08	5.96	3.14	5.38	5.23	3.14	4.78	4.52	3.60	6.89	6.34
Profile																		
Riffle Length (ft)	19.0	31.0	25.7				22.60	46.60	36.40	6.08	55.10	23.40	7.57	43.62	25.79	6.39	44.28	23.15
Riffle Slope (ft/ft)	0.0125	0.0362	0.0211				0.0603	0.1215	0.0578	0.0350	0.0940	0.0595	0.0400	0.0957	0.0633	0.0103	0.1198	0.0510
Pool Length (ft)	11.0	31.6	17.4				18.40	43.00	27.60	8.19	48.20	24.71	6.28	52.80	21.02	4.99	52.71	20.89
Pool Spacing (ft)	67.6	77.5	71.4				63.40	112.00	78.40	20.94	159.00	65.21	14.18	99.67	59.44	13.50	93.87	45.43
Substrate																		
D50 (mm)			38.5			37.5			37.5	7.7	37.5	16.0	18.9	20.0	19.4	10.1	10.6	10.3
D84 (mm)			60.2			73.4			73.4	68.2	73.7	71.8	53.9	71.5	62.7	42.7	49.5	46.1
Additional Reach Parameters																		
Valley Length (ft)			294.00			1485			1437			1437			1437			1437
Channel Length (ft)			353.00			1617			1966			1948			1948			1948
Sinuosity			1.2			1.09			1.37			1.36			1.36			1.36
Valley Slope (ft/ft)			0.0106			0.0353			0.0353			0.0353			0.0350			0.0350
Bankfull Slope (ft/ft)			0.0115			0.0324			0.0258			0.0243			0.0244			0.0258
Rosgen Classification			C4			C3b			C3b			C3b			C4b			C5b
*Habitat Index																		
*Macrobenthos																		

Notes: * Inclusion will be project specific and determined primarily by As-built monitoring plan/success criteria

Blank fields = Historic project documentation necessary to provide these data were unavailable at the time of this report submission.

Where no min/max values provided, only one value was measured or computed and is presented as the median value.

Year 1 and 2 Monitoring data were quantitatively and qualitatively evaluated using RiverMorph v 4.3.0.

Table XIII: Morphology and Hydraulic Monitoring Summary

Thompsons Fork & Unnamed Tributary Stream Restoration/ EEP Project No. D06030-A

Reach: Mainstem

Parameter	Cross Section (Riffle 7)			Cross Section (Pool 8)			Cross Section (Riffle 9)			Cross Section (Riffle 10)			Cross Section (Riffle 11)			Cross Section (Pool 12)		
Dimension	**MY 0**	**MY 1**	**MY 2**	**MY 0**	**MY 1**	**MY 2**	**MY 0**	**MY 1**	**MY 2**	**MY 0**	**MY 1**	**MY 2**	**MY 0**	**MY 1**	**MY 2**	**MY 0**	**MY 1**	**MY 2**
BF Width (ft)	38.51	38.95	38.81	39.25	39.37	20.98	38.74	36.66	33.52	34.52	35.30	34.69	39.81	35.97	28.65	43.16	45.96	45.95
Floodprone Width (ft	89.89	89.89	89.82	83.90	129.13	83.91	113.53	114.87	99.40	143.71	146.66	146.55	91.41	86.87	87.45	103.78	105.70	107.84
BF Cross Sectional Area (ft²	53.71	54.16	53.80	69.91	69.72	65.41	50.20	45.81	38.27	48.51	49.04	49.09	52.43	39.38	36.12	72.70	73.87	75.05
BF Mean Depth (ft)	1.39	1.39	1.39	1.78	1.77	3.12	1.30	1.25	1.14	1.41	1.39	1.42	1.32	1.09	1.26	1.68	1.61	1.63
BF Max Depth (ft)	2.16	2.14	2.29	3.60	4.84	5.60	2.49	2.34	2.58	2.52	2.59	2.62	2.88	2.42	2.54	3.69	3.80	3.89
Width/Depth Ratio	27.71	28.02	27.92	22.05	22.24	6.72	29.80	29.33	29.40	24.48	25.40	24.43	30.16	33.00	22.74	25.69	28.55	28.19
Entrenchment Ratio	2.33	2.31	2.31	2.14	3.28	4.00	2.93	3.13	2.97	4.16	4.15	4.23	2.30	2.41	3.05	2.40	2.30	2.35
Bank Height Ratio	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Wetted Perimeter (ft)	38.84	39.27	39.17	40.02	41.03	24.10	39.10	37.00	34.06	34.91	35.70	35.18	40.28	36.46	29.28	43.94	46.84	47.73
Hydraulic Radius (ft)	1.38	1.38	1.37	1.75	1.70	2.71	1.28	1.24	1.12	1.39	1.37	1.40	1.30	1.08	1.23	1.65	1.58	1.57
Substrate																		
D50 (mm)	9.10	32.72	67.55	*	**	0.05	10.64	23.78	37.50	*	26.67	30.12	5.70	32.00	28.29	*	6.69	0.71
D84 (mm)	66.30	76.04	130.48	*	**	0.11	35.94	87.08	120.35	*	60.76	88.95	43.37	75.74	77.53	*	26.74	4.26

Table XIII: Morphology and Hydraulic Monitoring Summary

Thompsons Fork & Unnamed Tributary Stream Restoration/ EEP Project No. D06030-A

Reach: UT-1

Parameter	Cross Section (Pool 1)			Cross Section (Riffle 2)			Cross Section (Pool 3)			Cross Section (Riffle 4)			Cross Section (Pool 5)			Cross Section (Riffle 6)		
Dimension	**MY 0**	**MY 1**	**MY 2**	**MY 0**	**MY 1**	**MY 2**	**MY 0**	**MY 1**	**MY 2**	**MY 0**	**MY 1**	**MY 2**	**MY 0**	**MY 1**	**MY 2**	**MY 0**	**MY 1**	**MY 2**
BF Width (ft)	13.31	13.20	13.24	8.35	8.67	7.30	20.72	20.53	18.13	20.74	16.67	12.21	17.47	16.88	18.49	14.38	14.03	10.94
Floodprone Width (ft)	26.08	22.94	18.94	23.46	23.67	19.41	90.10	88.25	88.09	98.92	97.32	94.68	72.80	59.96	73.19	76.11	74.03	76.72
BF Cross Sectional Area (ft²	23.51	21.66	16.02	11.78	12.71	10.11	24.85	21.02	19.95	16.37	14.89	11.52	19.00	16.74	19.66	10.63	11.15	9.50
BF Mean Depth (ft)	1.77	1.64	1.21	1.41	1.47	1.39	1.20	1.02	1.10	0.79	0.89	0.94	1.09	0.99	1.06	0.74	0.80	0.87
BF Max Depth (ft)	2.78	2.41	1.80	2.40	2.43	2.15	2.29	2.09	2.10	1.61	1.62	1.75	2.14	1.80	2.10	1.55	1.56	1.81
Width/Depth Ratio	7.52	8.05	10.94	5.92	5.90	5.25	17.27	20.13	16.48	26.25	5.84	12.99	16.03	17.05	17.44	19.43	17.54	12.57
Entrenchment Ratio	1.96	1.74	1.43	2.81	2.73	2.66	4.35	4.30	4.86	4.77	3.13	7.76	4.17	3.55	3.96	5.29	5.28	7.01
Bank Height Ratio	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Wetted Perimeter (ft)	14.76	14.51	13.94	9.93	10.33	8.92	21.25	21.02	18.66	21.07	17.02	12.84	17.99	17.28	19.11	14.73	14.39	11.59
Hydraulic Radius (ft)	1.59	1.49	1.15	1.19	1.23	1.13	1.17	1.00	1.07	0.78	0.87	0.90	1.06	0.97	1.03	0.72	0.78	0.82
Substrate																		
D50 (mm)	*	0.03	0.71	*	4.96	0.43	*	0.03	0.04	16.00	19.96	10.55	*	0.03	0.05	7.67	18.89	10.14
D84 (mm)	*	0.05	4.26	*	36.99	13.09	*	0.05	0.10	68.15	71.49	42.65	*	0.05	0.22	73.73	53.91	49.45

* Pebble counts were not collected for the As-Built (Year 0) stream substrate documentation

** Pebble counts were not collected for Year 1 stream substrate documentation

IV. METHODOLOGY

Vegetation monitoring was conducted in September 2010 using the *CVS-EEP Protocol for Recording Vegetation, Version 4.0* (Lee, M.T., Peet, RK., Roberts, S.R., Wentworth, T.R. 2006). Year 2 stream monitoring was conducted in May 2010 to provide adequate time between the Year 1 monitoring survey. Subsequent stream monitoring will occur in the summer-fall of Years 3 through 5 to provide at least a full year between surveys. Vegetation monitoring will continue to be conducted in the fall of each subsequent year of monitoring, providing a full year between vegetative surveys.

APPENDIX A

Vegetation Raw Data

1. Vegetation Monitoring Plot Photos
2. Vegetation Data Tables
3. Vegetation Problem Area Photos
4. Vegetation Problem Area Plan View

Vegetation Plot 1
Monitoring Year 2

(EMH&T, Inc. 9/18/10)

Vegetation Plot 2
Monitoring Year 2
(EMH&T, Inc. 9/18/10)

Vegetation Plot 3
Monitoring Year 2
(EMH&T, Inc. 9/18/10)

Vegetation Plot 4
Monitoring Year 2
(EMH&T, Inc. 9/18/10)

Vegetation Plot 5
Monitoring Year 2
(EMH&T, Inc. 9/18/10)

Vegetation Plot 6
Monitoring Year 2
(EMH&T, Inc. 9/18/10)

Vegetation Plot 7
Monitoring Year 2
(EMH&T, Inc. 9/18/10)

Vegetation Plot 8
Monitoring Year 2
(EMH&T, Inc. 9/18/10)

Table 1. Vegetation Metadata	
Report Prepared By	Megan Wolf
Date Prepared	12/19/2010 18:22
database name	cvs-eep-entrytool-v2.2.6.mdb
database location	Q:\ENVIRONMENTAL\Monitoring\EEP Vegetation Database
computer name	HX1N941
file size	51789824
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.
ALL Stems by Plot and spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
PROJECT SUMMARY----------	
Project Code	D06030A
project Name	Thompsons Fork
Description	Stream restoration of Thompsons Fork mainstem and tributary.
River Basin	
length(ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	8

Table 2. Vegetation Vigor by Species								
	Species	**4**	**3**	**2**	**1**	**0**	**Missing**	**Unknown**
	Alnus serrulata	29	5	4	1			
	Aronia arbutifolia	9	18	1	1			
	Cornus amomum		1					
	Fraxinus pennsylvanica	30	30	8	1			
	Ilex verticillata	2						
	Quercus palustris	3	3					
	Salix nigra	4						
	Sambucus canadensis	4	6	1	2			
	Cercis canadensis	1		1	2			
	Platanus occidentalis	8	4					
	Salix exigua	7	1					
TOT:	**11**	**97**	**68**	**15**	**7**			

Table 3. Vegetation Damage by Species						
	Species	All Damage Categories	(no damage)	Deer	Insects	Vine Strangulation
	Alnus serrulata	42	40			2
	Aronia arbutifolia	30	30			
	Cercis canadensis	4	4			
	Cornus amomum	1	1			
	Fraxinus pennsylvanica	70	55	9	1	5
	Ilex verticillata	2	2			
	Platanus occidentalis	12	12			
	Quercus palustris	6	6			
	Salix exigua	8	8			
	Salix nigra	5	5			
	Sambucus canadensis	14	14			
TOT:	**11**	**194**	**177**	**9**	**1**	**7**

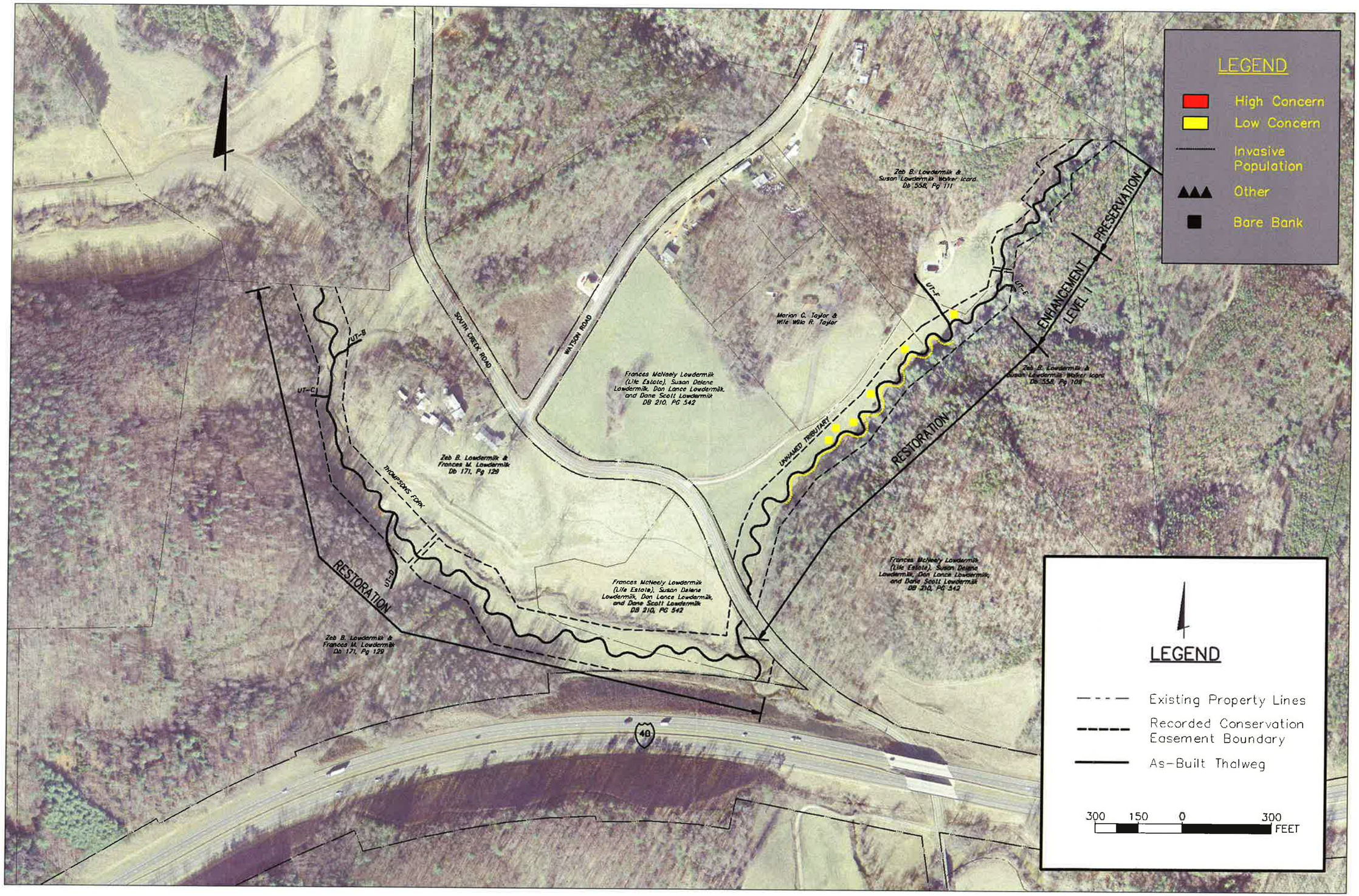
Table 4: Vegetation Damage by Plot						
	plot	All Damage Categories	(no damage)	Deer	Insects	Vine Strangulation
	D06030A-01-0001-year:2	17	11	6		
	D06030A-01-0002-year:2	26	21			5
	D06030A-01-0003-year:2	20	19	1		
	D06030A-01-0004-year:2	36	35	1		
	D06030A-01-0005-year:2	33	32	1		
	D06030A-01-0006-year:2	24	23		1	
	D06030A-01-0007-year:2	24	22			2
	D06030A-01-0008-year:2	14	14			
TOT:	**8**	**194**	**177**	**9**	**1**	**7**

Table 5. Stem Count by Plot and Species - Planted Stems												
	Species	Total Planted Stems	# plots	avg# stems	plot D06030A-01-0001-year:2	plot D06030A-01-0002-year:2	plot D06030A-01-0003-year:2	plot D06030A-01-0004-year:2	plot D06030A-01-0005-year:2	plot D06030A-01-0006-year:2	plot D06030A-01-0007-year:2	plot D06030A-01-0008-year:2
	Alnus serrulata	39	8	4.88	3	3	3	2	8	6	9	5
	Aronia arbutifolia	29	6	4.83	2			13	9	2	1	2
	Cercis canadensis	4	1	4				4				
	Cornus amomum	1	1	1							1	
	Fraxinus pennsylvanica	69	7	9.86	10	22	15	9	5	2	6	
	Ilex verticillata	2	1	2						2		
	Platanus occidentalis	12	4	3				2		5	1	4
	Quercus palustris	6	6	1		1	1	1	1	1		1
	Salix exigua	8	2	4					5	3		
	Salix nigra	4	3	1.33					2	1		1
	Sambucus canadensis	13	6	2.17	2		1	2	1	1	6	
TOT:	**11**	**187**	**11**		**17**	**26**	**20**	**33**	**31**	**23**	**24**	**13**

Table 6. Stem Count by Plot and Species - All Stems												
	Species	Total Stems	# plots	avg# stems	D06030A-01-0001-year:2	D06030A-01-0002-year:2	D06030A-01-0003-year:2	D06030A-01-0004-year:2	D06030A-01-0005-year:2	D06030A-01-0006-year:2	D06030A-01-0007-year:2	D06030A-01-0008-year:2
	Alnus serrulata	87	8	10.88	3	3	3	11	8	6	10	43
	Aronia arbutifolia	29	6	4.83	2			13	9	2	1	2
	Cornus amomum	1	1	1							1	
	Fraxinus pennsylvanica	73	7	10.43	10	24	17	9	5	2	6	
	Ilex verticillata	2	1	2						2		
	Quercus palustris	6	6	1		1	1	1	1	1		1
	Salix nigra	6	3	2					3	1		2
	Sambucus canadensis	20	6	3.33	2		2	5	3	1	7	
	Cercis canadensis	4	1	4				4				
	Platanus occidentalis	13	4	3.25				2		6	1	4
	Salix exigua	10	2	5					5	5		
TOT:	**11**	**251**	**11**		**17**	**28**	**23**	**45**	**34**	**26**	**26**	**52**

VPA 1
View of Vegetation Plot 2 showing the decline in the coverage of unknown vine. This vine is considered a problem area of low concern.
(EMH&T, Inc. 9/18/10)

VPA 2
of the patchy vegetation along the right bank of UT1. This is only considered a problem due to the threat of spread by invasives in the same area of the project.
(EMH&T, Inc. 9/18/10)



MCDOWELL COUNTY, NORTH CAROLINA
THOMPSONS FORK
AND UNNAMED TRIBUTARY
APPENDIX A
VEGETATION PROBLEM AREA PLAN VIEW

Job No.	Sheet
2009-0328	1/1
Date: December, 2010	Scale: 1" = 300'

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Environmental, Hydrology & Transportation
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www.emht.com

\\CMHDATA01\Project01\20090328\20090328env\Dwg\Exhibits\Appendix A(12-1-10).dwg<Layout 1> - 1 Xref: /\\CMHARC1\archive0\2006\20061398\20061398env\dwg\X-Refs\61398xbs.dwg/ - 4 Images: /\\CMHGIS01\gis\NC\County\McDowell\Imagery\2005_xx_NCFloodplainMappingProgram\10173102.tif, 10174203.tif, 10173204.tif, 10174101.tif/ - SavedBy: JCRAMER [12/2/2010 10:00:34 AM] - PlottedBy: JCRAMER [12/2/2010 10:07:47 AM]

APPENDIX B

Geomorphologic Raw Data

1. Fixed Station Photos
2. Table B1. Qualitative Visual Stability Assessment
3. Cross Section Plots
4. Longitudinal Plots
5. Pebble Count Plots
6. Bankfull Event Photos
7. Stream Problem Areas Photos
8. Stream Problem Area Plan View

Fixed Station 1
Overview of valley along UT1 near the upstream terminus of the project, approximately Station 4+00, facing downstream.
(EMH&T, Inc. 9/18/10)

Fixed Station 2
Overview of valley along UT1 near the midpoint of the project, approximately Station 10+75, facing upstream.
(EMH&T, Inc. 9/18/10)

Fixed Station 3
Overview of valley along UT1 near the midpoint of the project, approximately Station 10+75, facing downstream.
(EMH&T, Inc. 9/18/10)

Fixed Station 4
Overview of valley along UT1 near the downstream terminus of the project, just north of South Creek Road, facing upstream.
(EMH&T, Inc. 9/18/10)

Fixed Station 5
Overview of valley along UT1 at the downstream terminus of the project, facing upstream.
(EMH&T, Inc. 9/18/10)

Fixed Station 6
Overview of valley along the mainstem near the downstream terminus of the project, facing upstream.
(EMH&T, Inc. 9/18/10)

Fixed Station 7
Overview of valley along the mainstem near the midpoint of the project, approximately Station 12+00, facing downstream.
(EMH&T, Inc. 9/18/10)

Fixed Station 8
Overview of valley along the mainstem near the midpoint of the project, approximately Station 11+50, facing upstream.
(EMH&T, Inc. 9/18/10)

Fixed Station 9
Overview of valley along the mainstem near the upstream terminus of the project, facing downstream.
(EMH&T, Inc. 9/18/10)

Table B1. Visual Morphological Stability Assessment
Thompsons Fork Stream Restoration / EEP Project No. D06030-A
Segment/Reach: Mainstem

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?	42	42	0	100	
	2. Armor stable (e.g. no displacement)?	42	42	0	100	
	3. Facet grade appears stable?	42	42	0	100	
	4. Minimal evidence of embedding/fining?	42	42	0	100	
	5. Length appropriate?	42	42	0	100	**100%**
B. Pools	1. Present? (e.g. not subject to severe aggrad. or migrat.?)	42	42	0	100	
	2. Sufficiently deep (Max Pool D:Mean Bkf>1.6?)	42	42	0	100	
	3. Length appropriate?	42	42	0	100	**100%**
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	42	42	0	100	
	2. Downstream of meander (glide/inflection) centering?	42	42	0	100	**100%**
D. Meanders	1. Outer bend in state of limited/controlled erosion?	42	42		100	
	2. Of those eroding, # w/concomitant point bar formation?	42	42	0	100	
	3. Apparent Rc within spec?	42	42	0	100	
	4. Sufficient floodplain access and relief?	42	42	0	100	**100%**
E. Bed General	1. Geveral channel bed aggradation areas (bar formation)	N/A	N/A	3/25 feet	99	
	2. Channel bed degradation - areas of increasing downcutting or headcutting?	N/A	N/A	0/0 feet	100	**99%**
F. Vanes	1. Free of back or arm scour?	10	10	0	100	
	2. Height appropriate?	10	10	0	100	
	3. Angle and geometry appear appropriate?	10	10	0	100	
	4. Free of piping or other structural failures?	10	10	0	100	**100%**
G. Wads/ Boulders	1. Free of scour?	N/A	0	N/A	N/A	
	2. Footing stable?	N/A	0	N/A	N/A	**N/A**

Table B1. Visual Morphological Stability Assessment
Thompsons Fork Stream Restoration / EEP Project No. D06030-A
Segment/Reach: UT

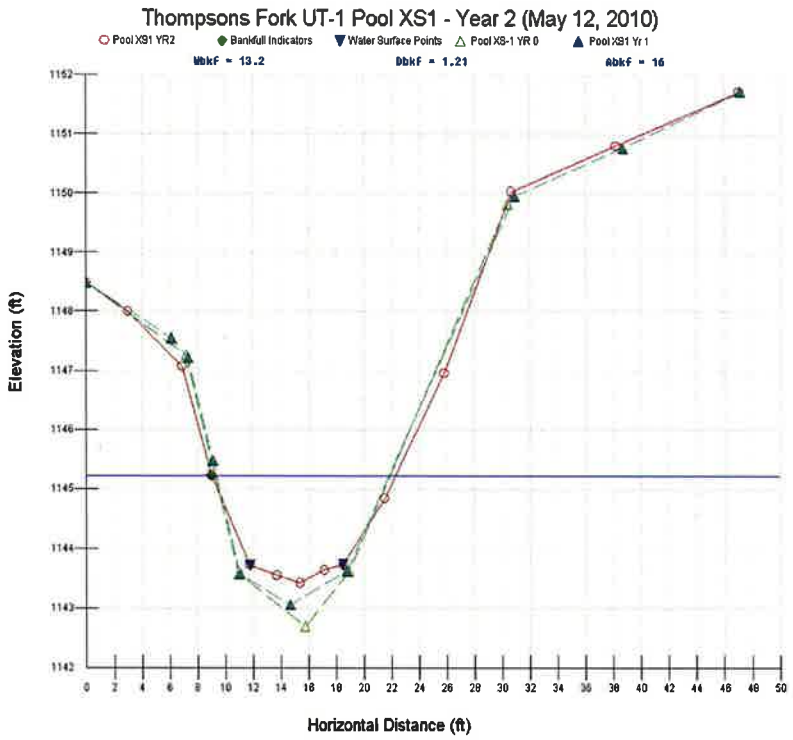
Feature Category	Metric (per As-built and reference baselines	(# Stable) Number Performing as Intended	Total number per As-built	Total Number / feet in unstable state	% Perform in Stable Condition	Feature Perform. Mean or Total
A. Riffles	1. Present?	35	35	0	100	
	2. Armor stable (e.g. no displacement)?	35	35	0	100	
	3. Facet grade appears stable?	35	35	0	100	
	4. Minimal evidence of embedding/fining?	35	35	0	100	
	5. Length appropriate?	35	35	0	100	**100%**
B. Pools	1. Present? (e.g. not subject to severe aggrad. or migrat.?)	35	35	0	100	
	2. Sufficiently deep (Max Pool D:Mean Bkf>1.6?)	31	35	4	89	
	3. Length appropriate?	35	35	0	100	**96%**
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	38	38	0	100	
	2. Downstream of meander (glide/inflection) centering?	38	38	0	100	**100%**
D. Meanders	1. Outer bend in state of limited/controlled erosion?	38	38	0	100	
	2. Of those eroding, # w/concomitant point bar formation?	38	38	0	100	
	3. Apparent Rc within spec?	38	38	0	100	
	4. Sufficient floodplain access and relief?	38	38	0	100	**100%**
E. Bed General	1. General channel bed aggradation areas (bar formation)	N/A	N/A	0/0 feet	100	
	2. Channel bed degradation - areas of increasing downcutting or headcutting?	N/A	N/A	0/0 feet	100	**100%**
F. Vanes	1. Free of back or arm scour?	N/A	0	N/A	N/A	
	2. Height appropriate?	N/A	0	N/A	N/A	
	3. Angle and geometry appear appropriate?	N/A	0	N/A	N/A	
	4. Free of piping or other structural failures?	N/A	0	N/A	N/A	**N/A**
G. Wads/ Boulders	1. Free of scour?	N/A	0	N/A	N/A	
	2. Footing stable?	N/A	0	N/A	N/A	**N/A**
H. Log Sills	1. Maintaining grade control?	58	58	0	100	
	2. Minimal evidence of sedimentation in adjacent pool?	48	58	10	83	**92%**

Summary Data
All dimensions in feet.

Bankfull Area	16.02 ft^2
Bankfull Width	13.24 ft
Mean Depth	1.21 ft
Maximum Depth	1.8 ft
Width/Depth Ratio	10.94
Entrenchment Ratio	1.43

PROJECT	Thompsons Fork
	D06030-A
	2-YEAR
TASK	Cross-Section
REACH	UT-1
DATE	5/12/10
CROSS SECTION:	1
FEATURE:	Pool

Cross-section photo – looking upstream

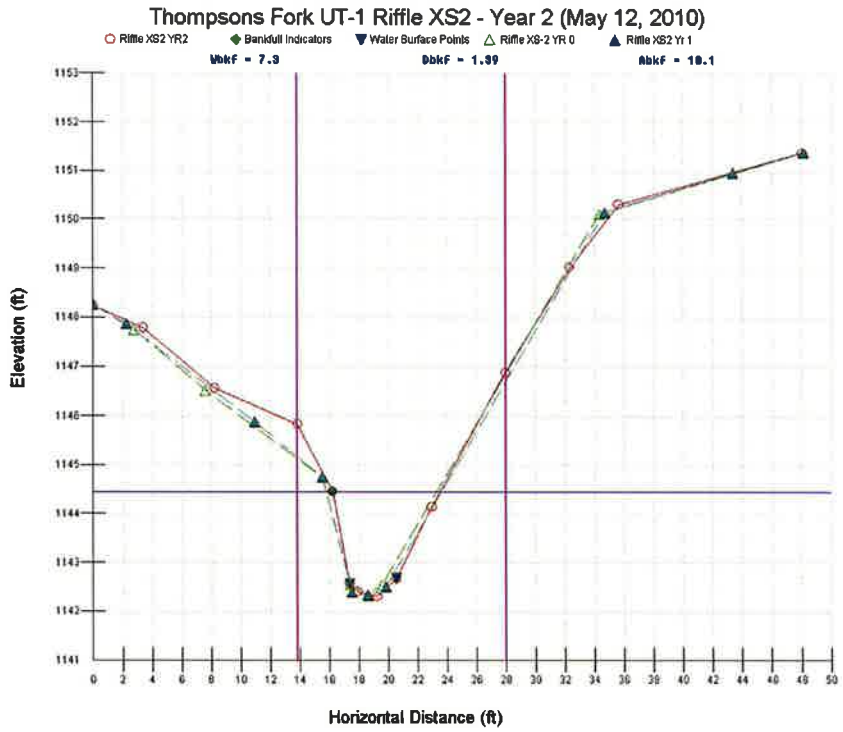


Summary Data
All dimensions in feet.

Bankfull Area	10.11 ft^2
Bankfull Width	7.3 ft
Mean Depth	1.39 ft
Maximum Depth	2.15 ft
Width/Depth Ratio	5.25
Entrenchment Ratio	2.66
Classification	E

PROJECT	Thompsons Fork D06030-A 2-YEAR
TASK	Cross-Section
REACH	UT-1
DATE	5/12/10
CROSS SECTION:	2
FEATURE:	Riffle

Cross-section photo – looking upstream

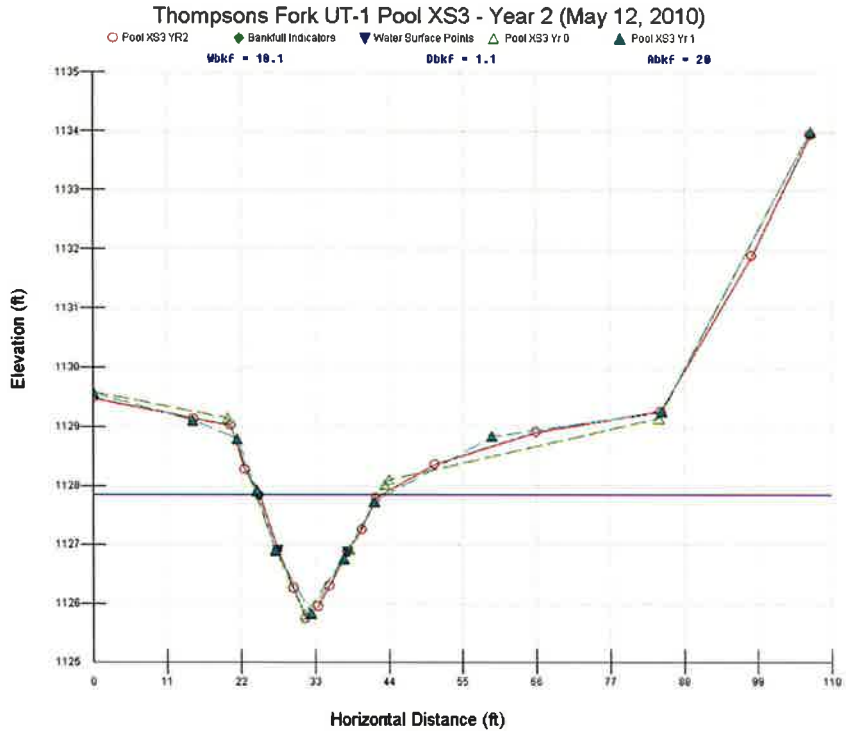


Summary Data
All dimensions in feet.

Bankfull Area	19.95 ft^2
Bankfull Width	18.13 ft
Mean Depth	1.1 ft
Maximum Depth	2.1 ft
Width/Depth Ratio	16.48
Entrenchment Ratio	4.86

PROJECT	Thompsons Fork
	D06030-A
	2-YEAR
TASK	Cross-Section
REACH	UT-1
DATE	5/12/10
CROSS SECTION:	3
FEATURE:	Pool

Cross-section photo – looking downstream

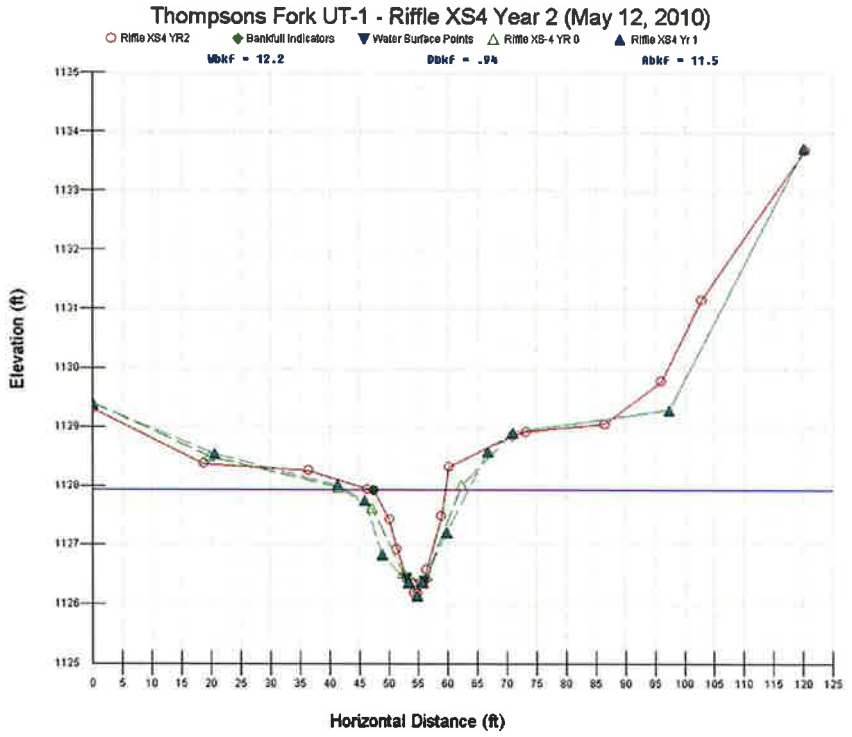


Summary Data
All dimensions in feet.

Bankfull Area	11.52 ft^2
Bankfull Width	12.21 ft
Mean Depth	0.94 ft
Maximum Depth	1.75 ft
Width/Depth Ratio	12.99
Entrenchment Ratio	7.76
Classification	C

PROJECT	Thompsons Fork
	D06030-A
	2-YEAR
TASK	Cross-Section
REACH	UT-1
DATE	5/12/10
CROSS SECTION:	4
FEATURE:	Riffle

Cross-section photo – looking upstream

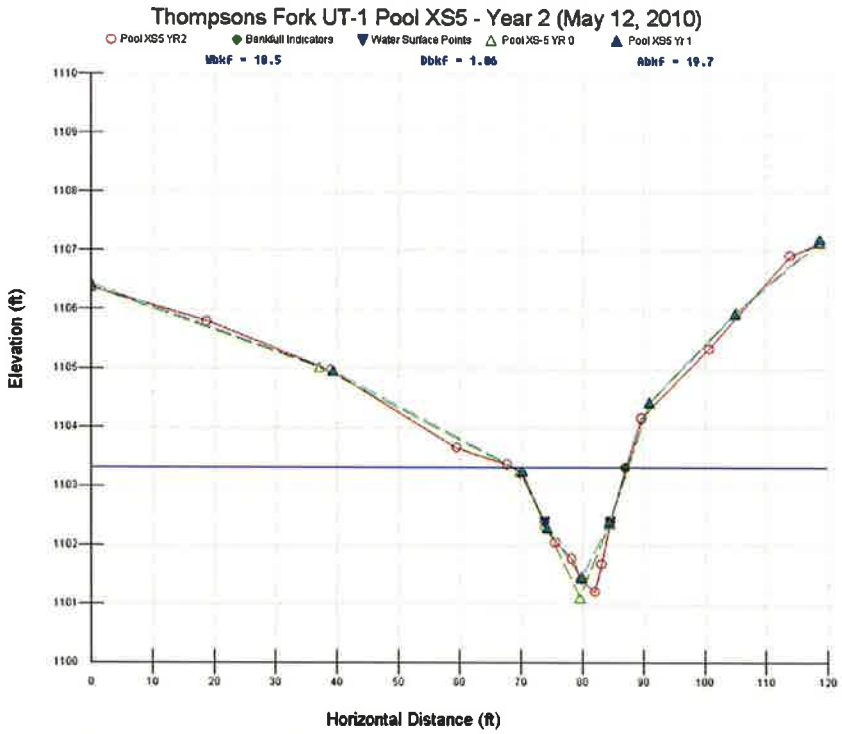


Summary Data
All dimensions in feet.

Bankfull Area	19.66 ft^2
Bankfull Width	18.49 ft
Mean Depth	1.06 ft
Maximum Depth	2.1 ft
Width/Depth Ratio	17.44
Entrenchment Ratio	3.96

PROJECT	Thompsons Fork
	D06030-A
	2-YEAR
TASK	Cross-Section
REACH	UT-1
DATE	5/12/10
CROSS SECTION:	5
FEATURE:	Pool

Cross-section photo – looking upstream



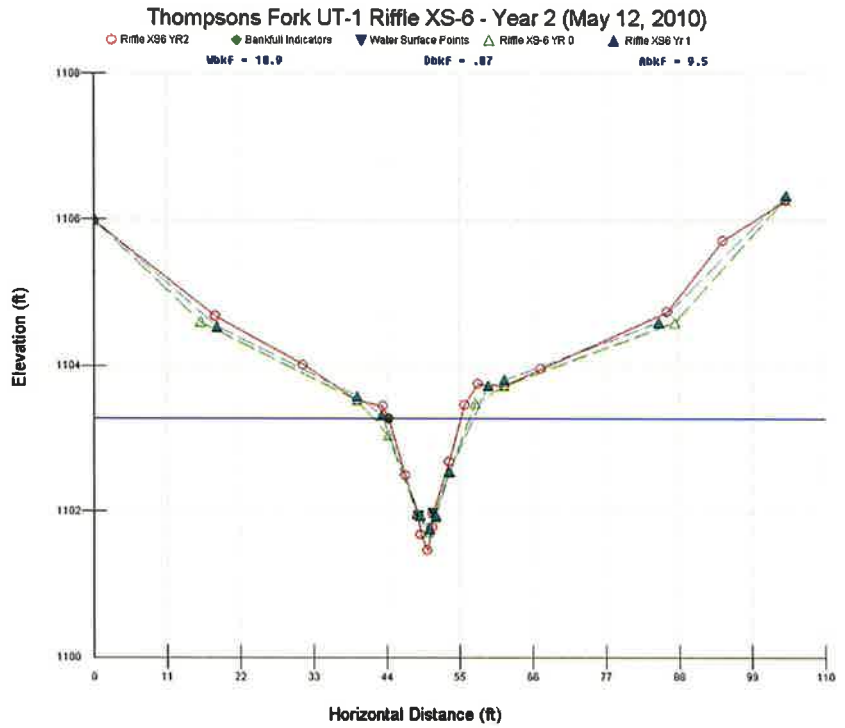
Summary Data
All dimensions in feet.

Bankfull Area	9.5 ft^2
Bankfull Width	10.94 ft
Mean Depth	0.87 ft
Maximum Depth	1.81 ft
Width/Depth Ratio	12.57
Entrenchment Ratio	7.01
Classification	C

PROJECT	Thompsons Fork
	D06030-A
	2-YEAR
TASK	Cross-Section
REACH	UT-1
DATE	5/12/10
CROSS SECTION:	6
FEATURE:	Riffle

Ecosystem Enhancement

Cross-section photo – looking downstream



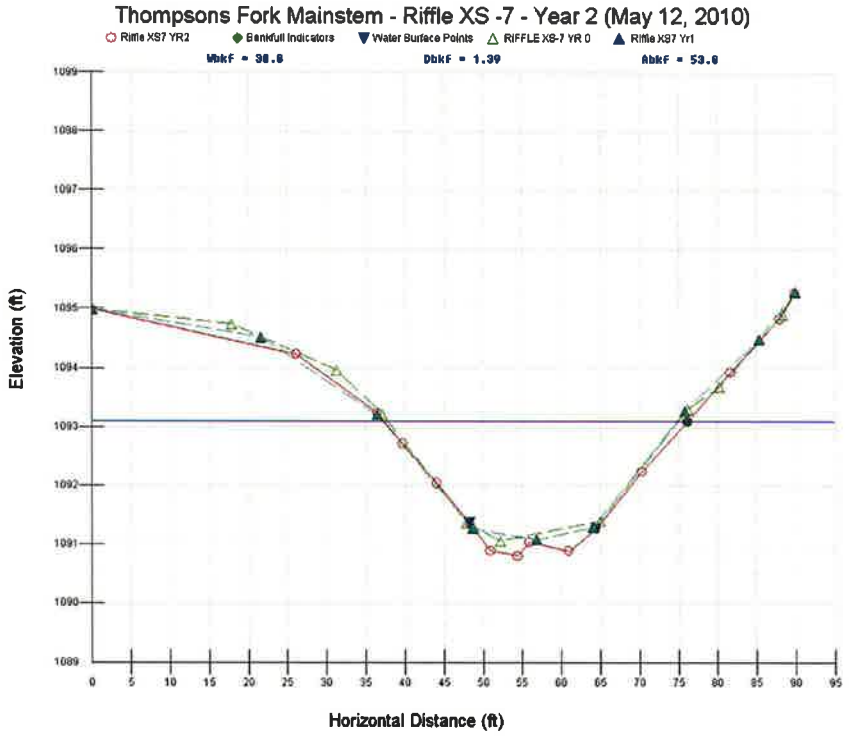
EMH&T

Summary Data
All dimensions in feet.

Bankfull Area	53.8 ft^2
Bankfull Width	38.81 ft
Mean Depth	1.39 ft
Maximum Depth	2.29 ft
Width/Depth Ratio	27.92
Entrenchment Ratio	2.31
Classification	C

PROJECT	Thompsons Fork
	D06030-A
	2-YEAR
TASK	Cross-Section
REACH	Mainstem
DATE	5/12/10
CROSS SECTION:	7
FEATURE:	Riffle

Cross-section photo – looking from right to left bank

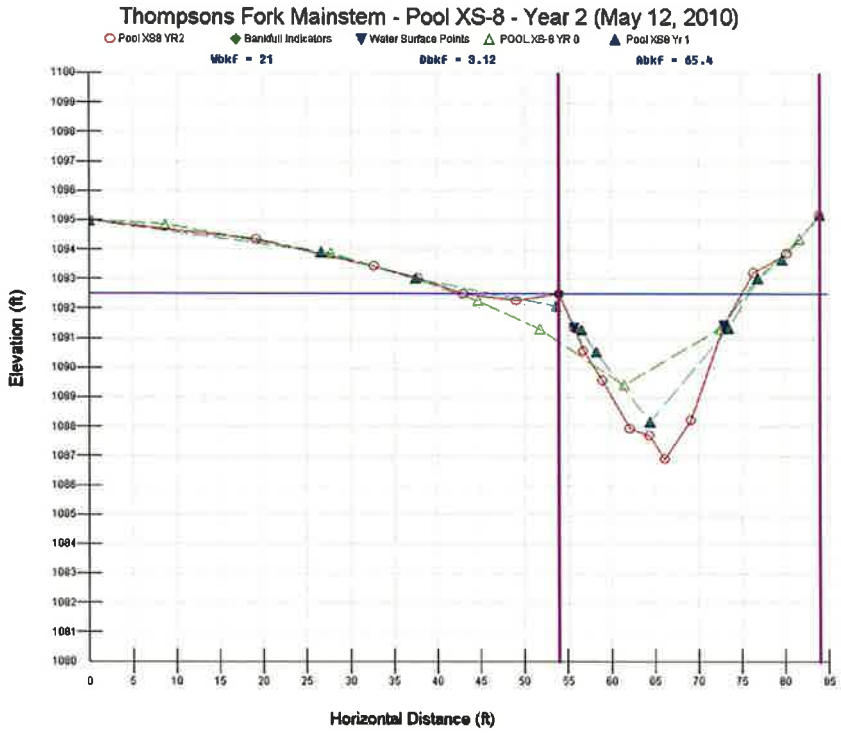


Summary Data
All dimensions in feet.

Bankfull Area	65.41 ft^2
Bankfull Width	20.98 ft
Mean Depth	3.12 ft
Maximum Depth	5.6 ft
Width/Depth Ratio	6.72
Entrenchment Ratio	4.0

PROJECT	Thompsons Fork
	D06030-A
	2-YEAR
TASK	Cross-Section
REACH	Mainstem
DATE	5/12/10
CROSS SECTION:	8
FEATURE:	Pool

Cross-section photo – looking upstream

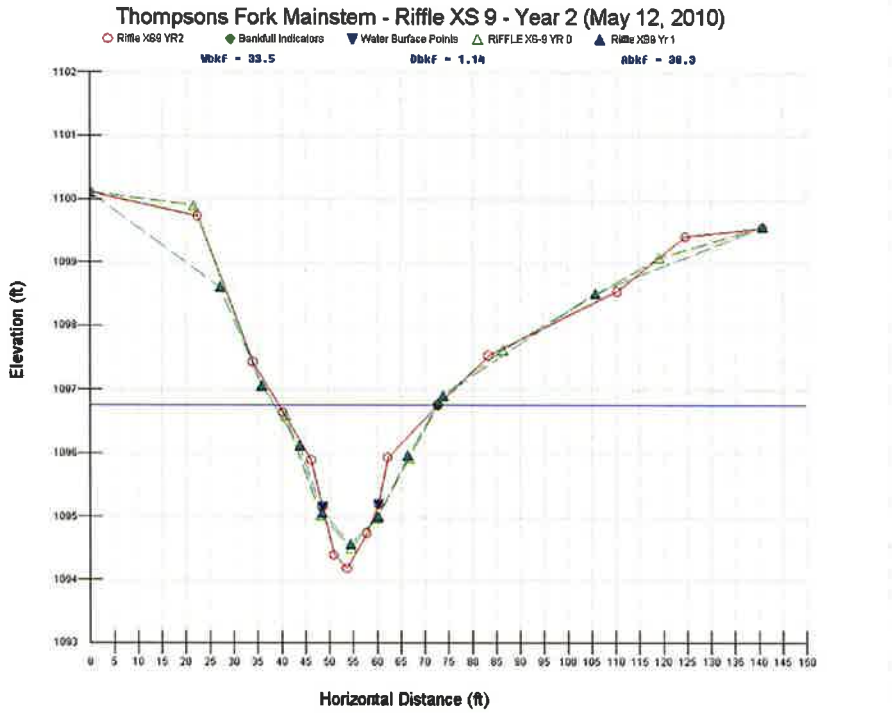


Summary Data
All dimensions in feet.

Bankfull Area	38.27 ft^2
Bankfull Width	33.52 ft
Mean Depth	1.14 ft
Maximum Depth	2.58 ft
Width/Depth Ratio	29.4
Entrenchment Ratio	2.97
Classification	C

PROJECT	Thompsons Fork
	D06030-A
	2-YEAR
TASK	Cross-Section
REACH	Mainstem
DATE	5/12/10
CROSS SECTION:	9
FEATURE:	Riffle

Cross-section photo – looking upstream

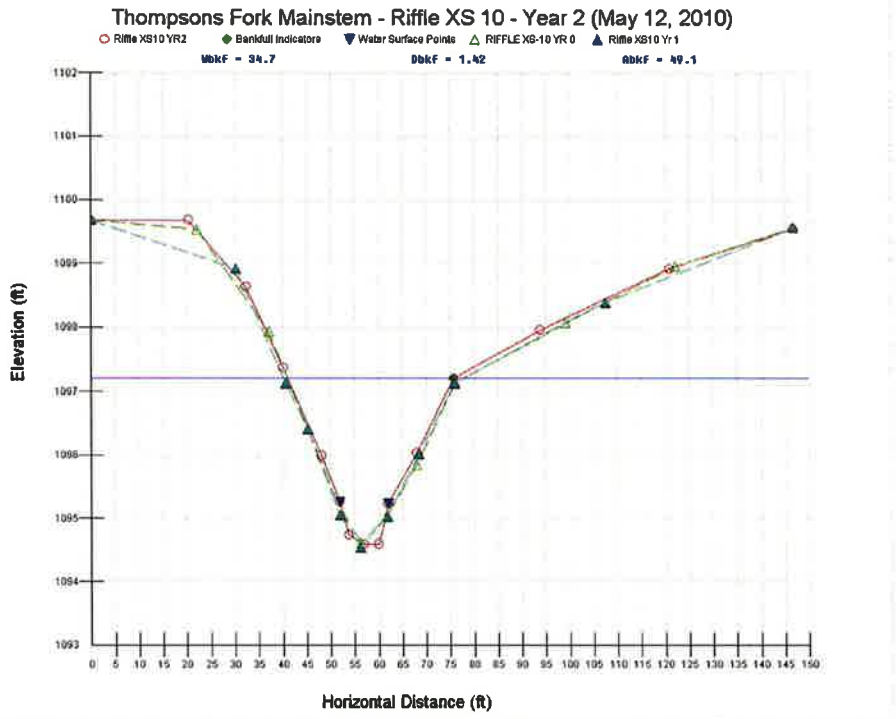


Summary Data
All dimensions in feet.

Bankfull Area	49.09 ft^2
Bankfull Width	34.69 ft
Mean Depth	1.42 ft
Maximum Depth	2.62 ft
Width/Depth Ratio	24.43
Entrenchment Ratio	4.23
Classification	C

PROJECT	Thompsons Fork
	D06030-A
	2-YEAR
TASK	Cross-Section
REACH	Mainstem
DATE	5/12/10
CROSS SECTION:	10
FEATURE:	Riffle

Cross-section photo – looking downstream

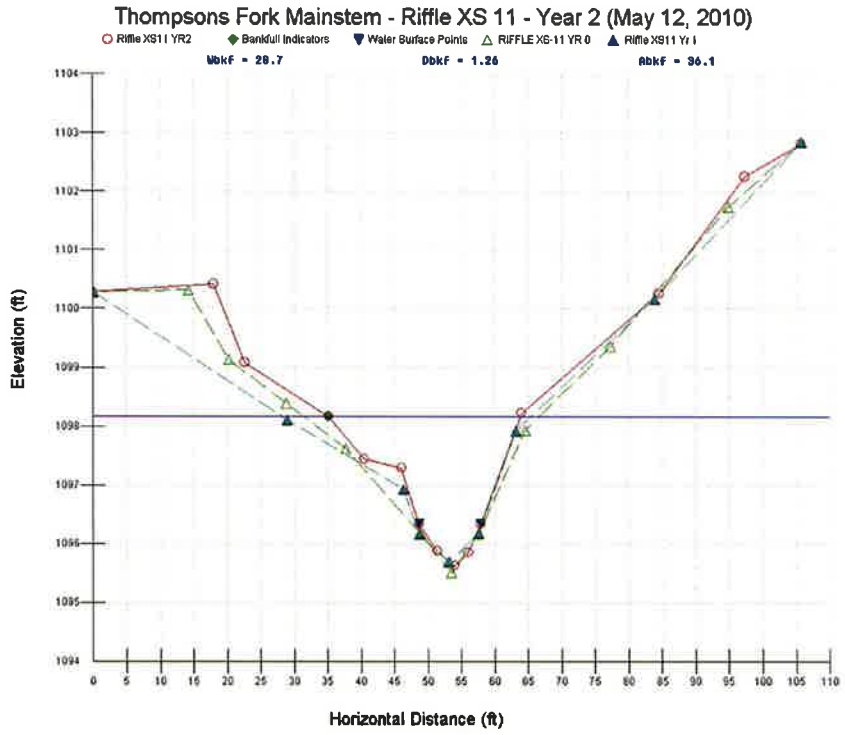


Summary Data
All dimensions in feet.

Bankfull Area	36.12 ft^2
Bankfull Width	28.65 ft
Mean Depth	1.26 ft
Maximum Depth	2.54 ft
Width/Depth Ratio	22.74
Entrenchment Ratio	3.05
Classification	C

PROJECT	Thompsons Fork
	D06030-A
	2-YEAR
TASK	Cross-Section
REACH	Mainstem
DATE	5/12/10
CROSS SECTION:	11
FEATURE:	Riffle

Cross-section photo – looking upstream

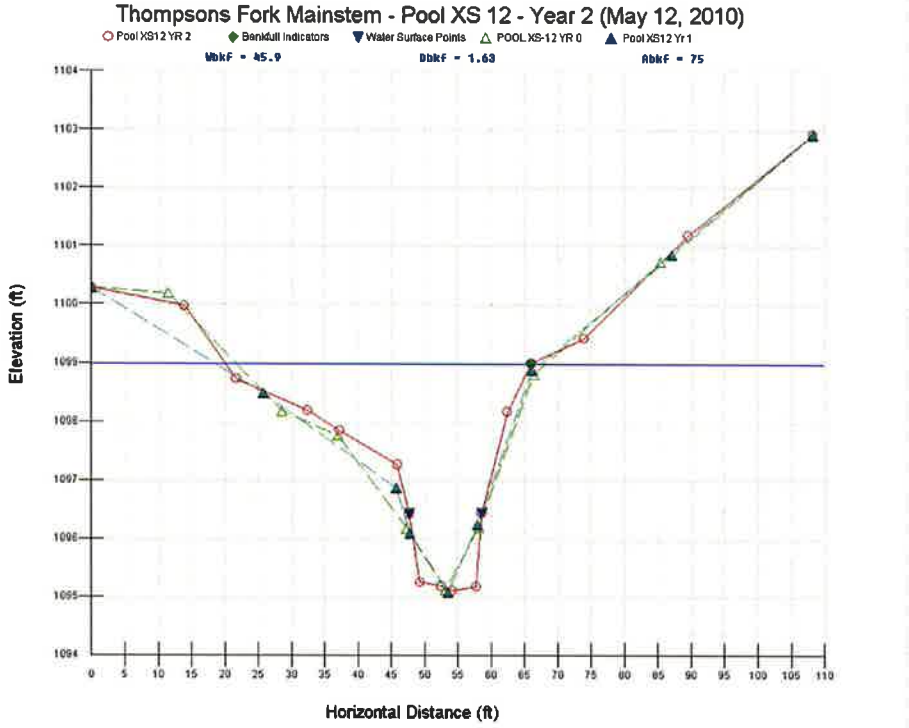


Summary Data
All dimensions in feet.

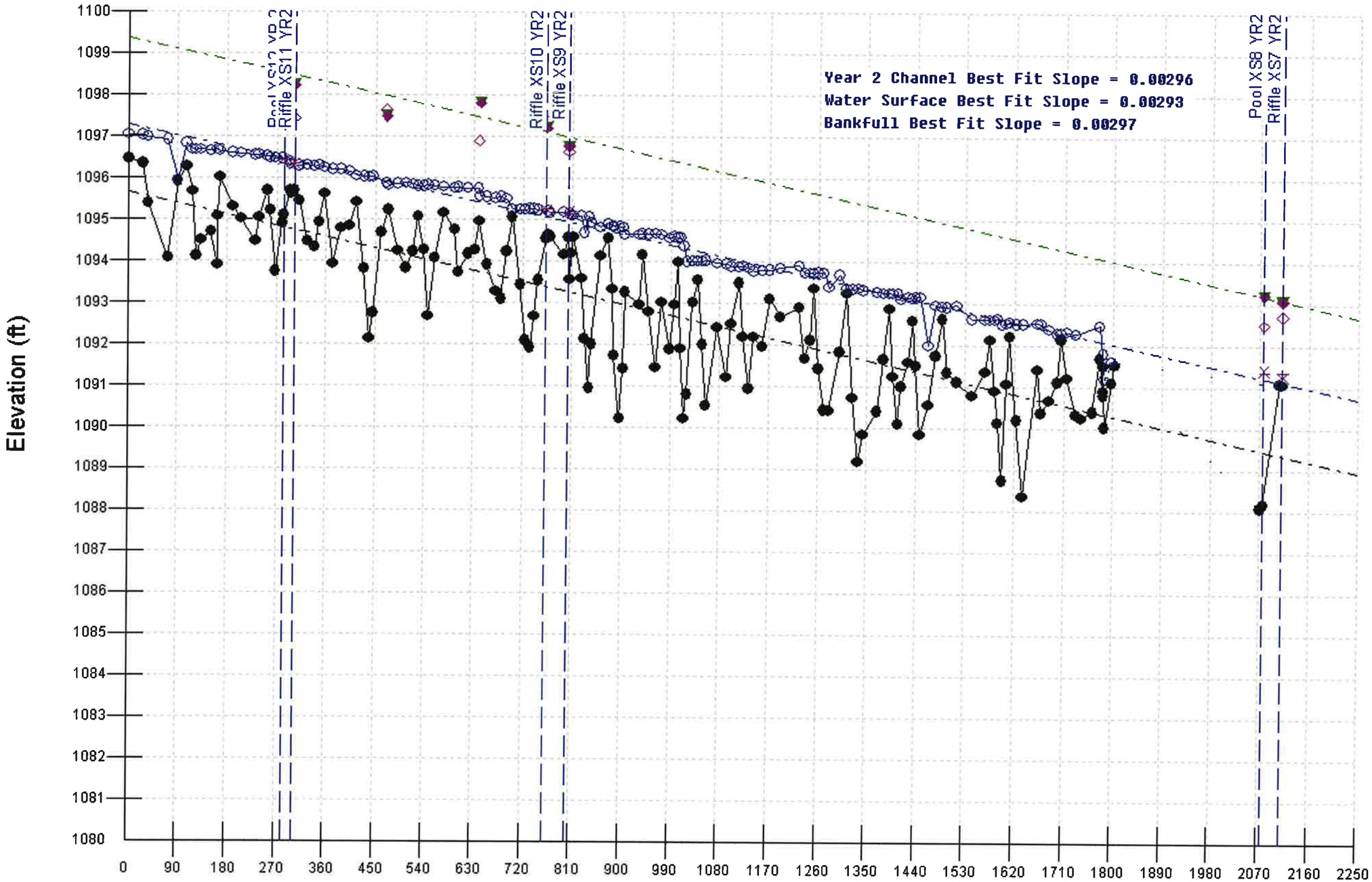
Bankfull Area	75.05 ft^2
Bankfull Width	45.95 ft
Mean Depth	1.63 ft
Maximum Depth	3.89 ft
Width/Depth Ratio	28.19
Entrenchment Ratio	2.35

PROJECT	Thompsons Fork
	D06030-A
	2-YEAR
TASK	Cross-Section
REACH	Mainstem
DATE	5/12/10
CROSS SECTION:	12
FEATURE:	Pool

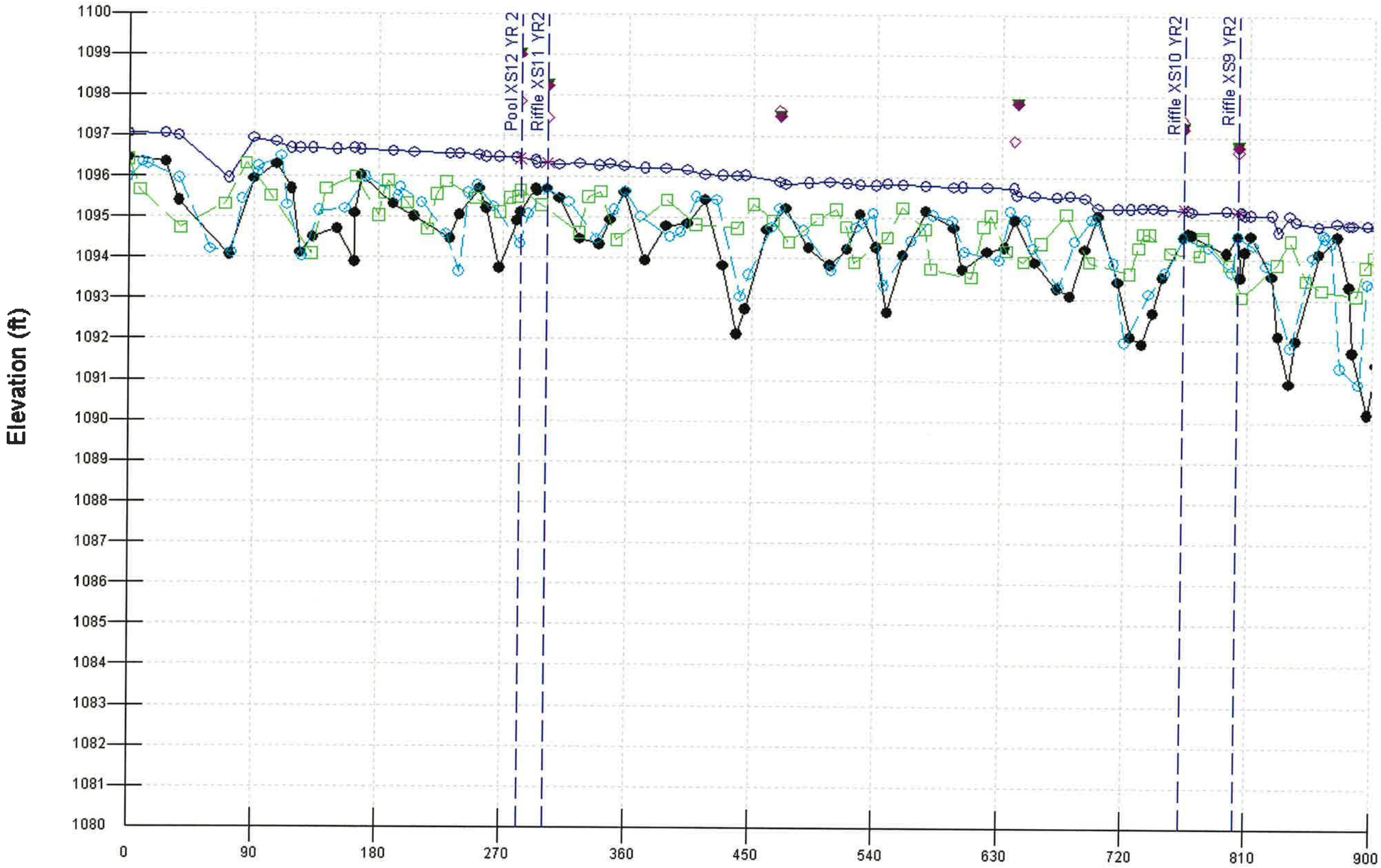
Cross-section photo – looking downstream



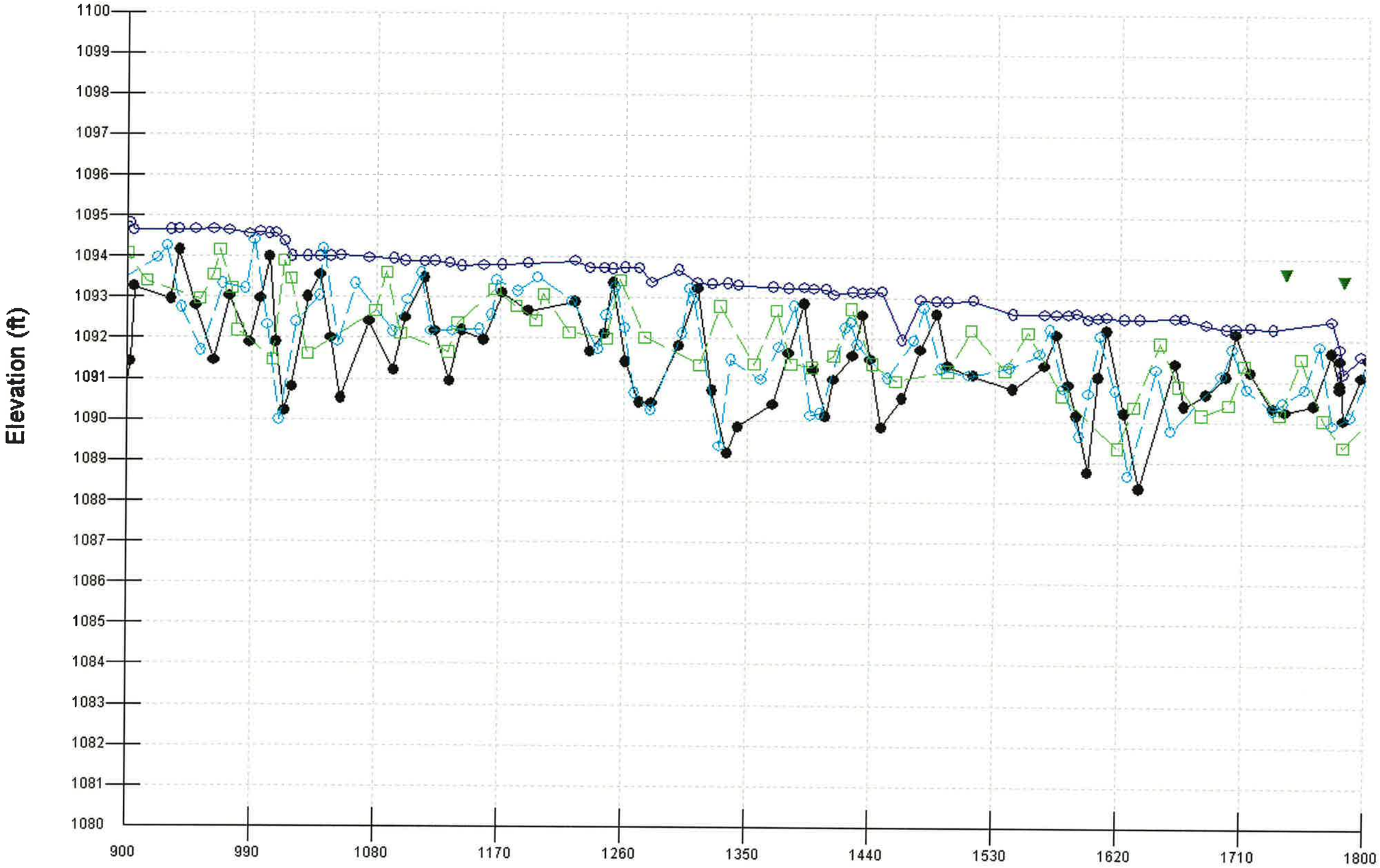
Thompsons Fork Mainstem Longitudinal Profile - Year 2 (May 12, 2010)



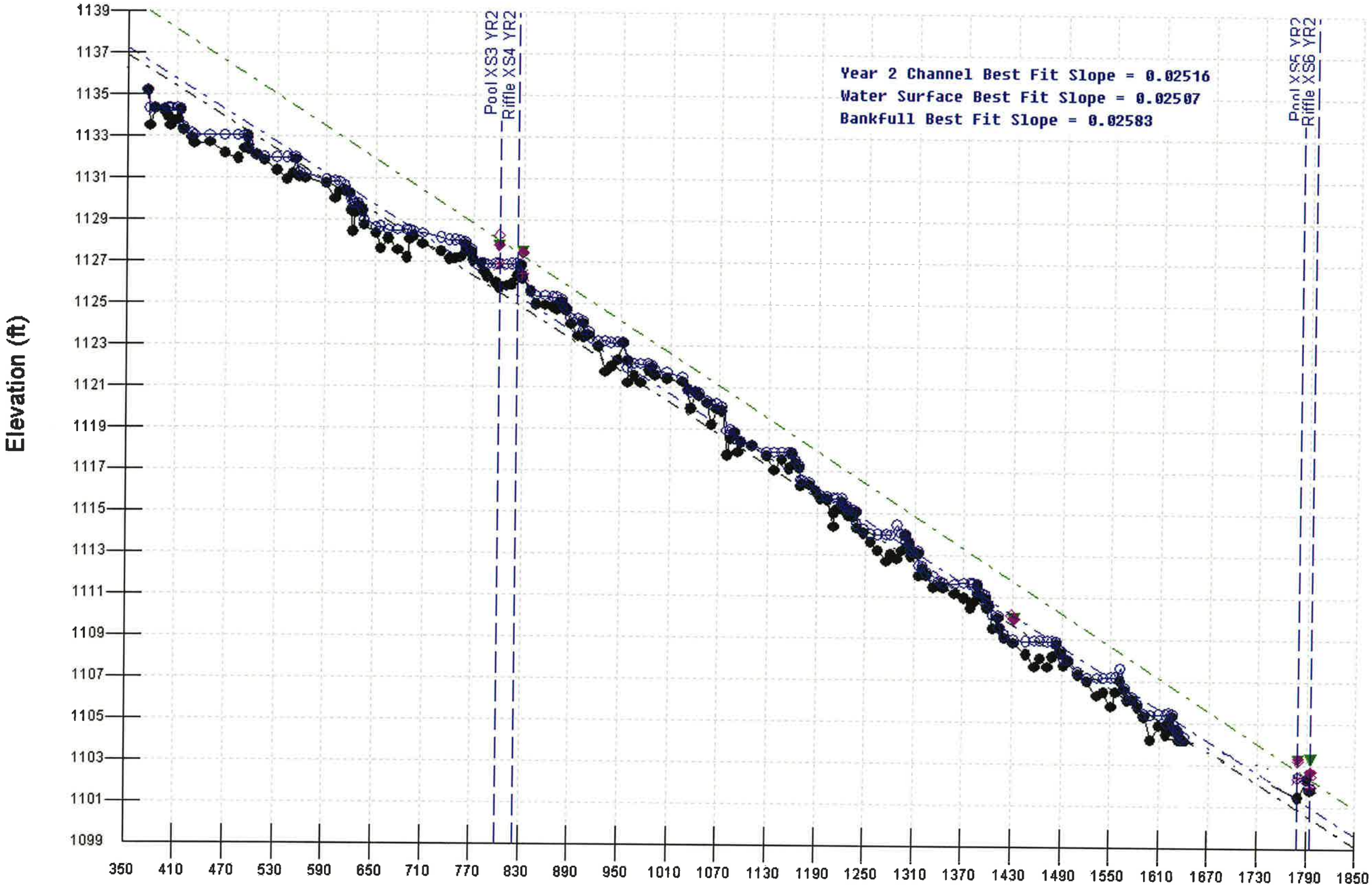
Thompsons Fork Mainstem Longitudinal Profile - Year 2 (May 12, 2010)



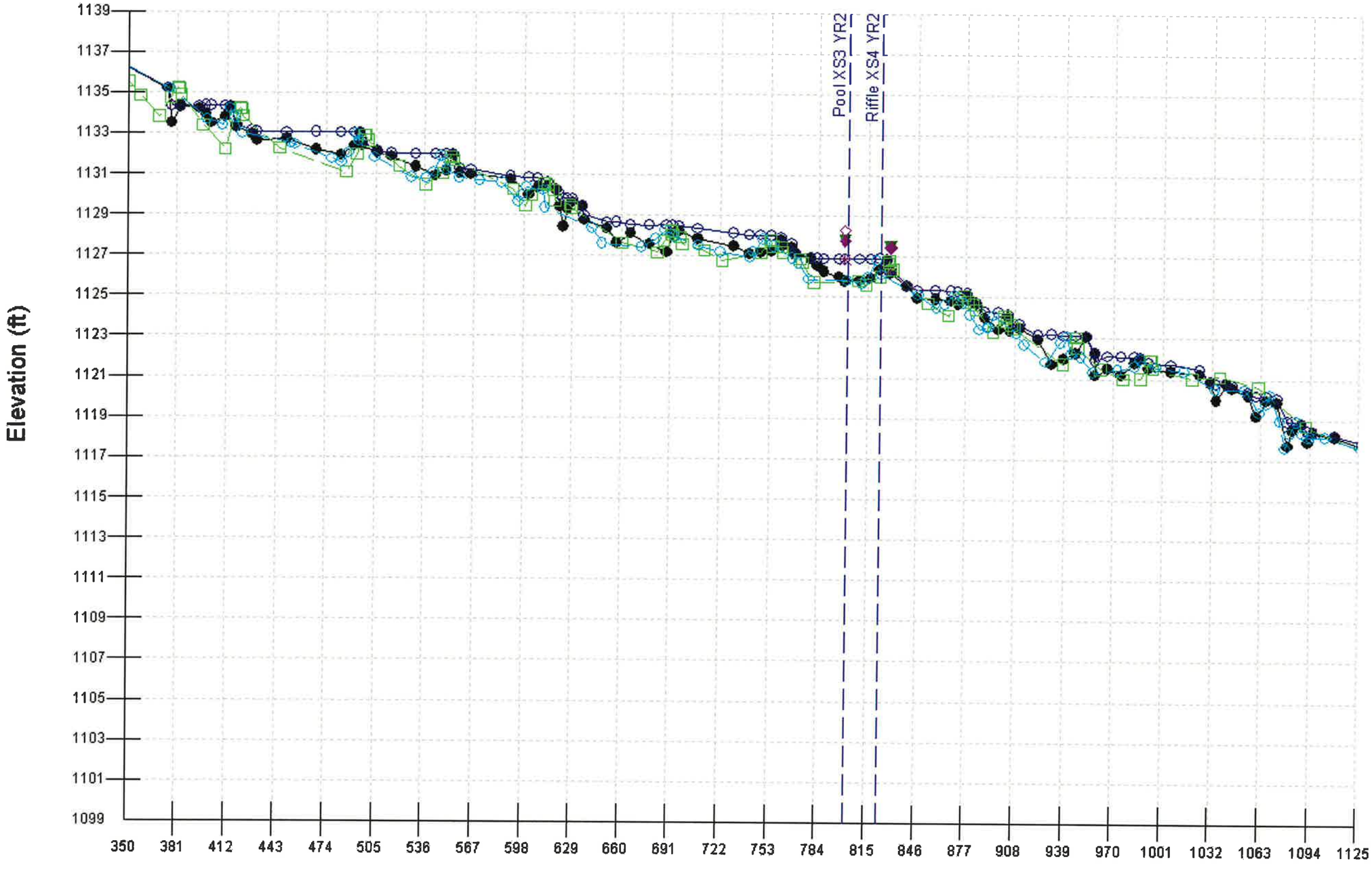
Thompsons Fork Mainstem Longitudinal Profile - Year 2 (May 12, 2010)



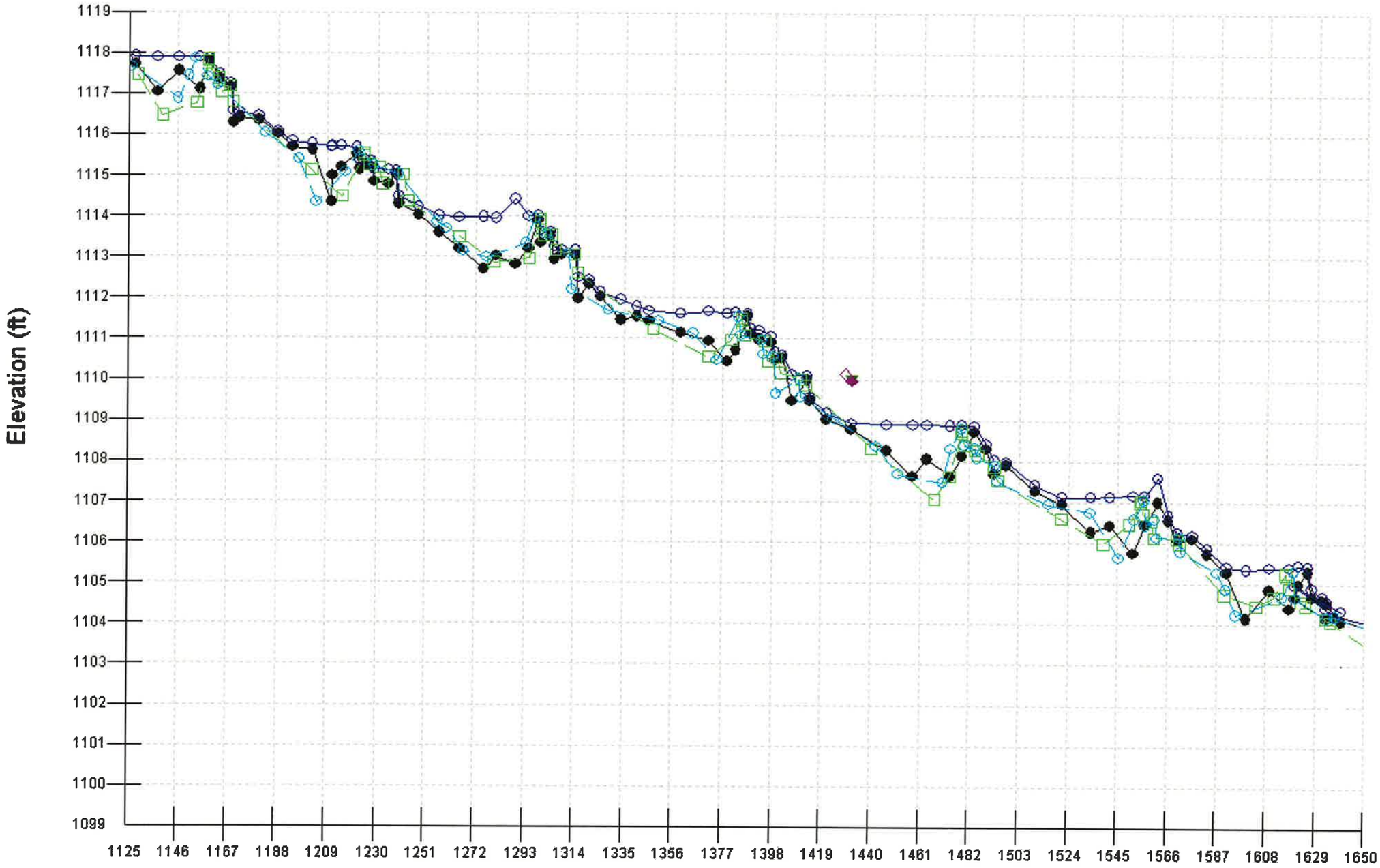
Thompsons Fork - UT1 - Longitudinal Profile - Year 2 (May 12, 2010)



Thompsons Fork - UT1 - Longitudinal Profile - Year 2 (May 12, 2010)

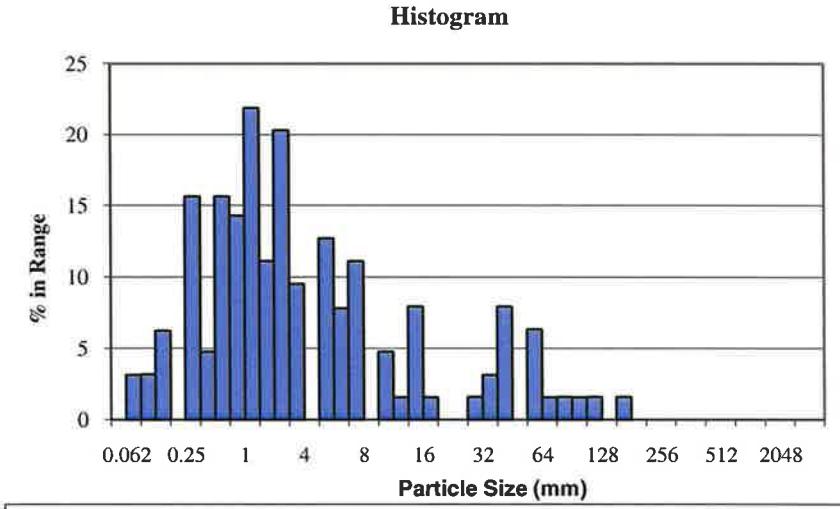


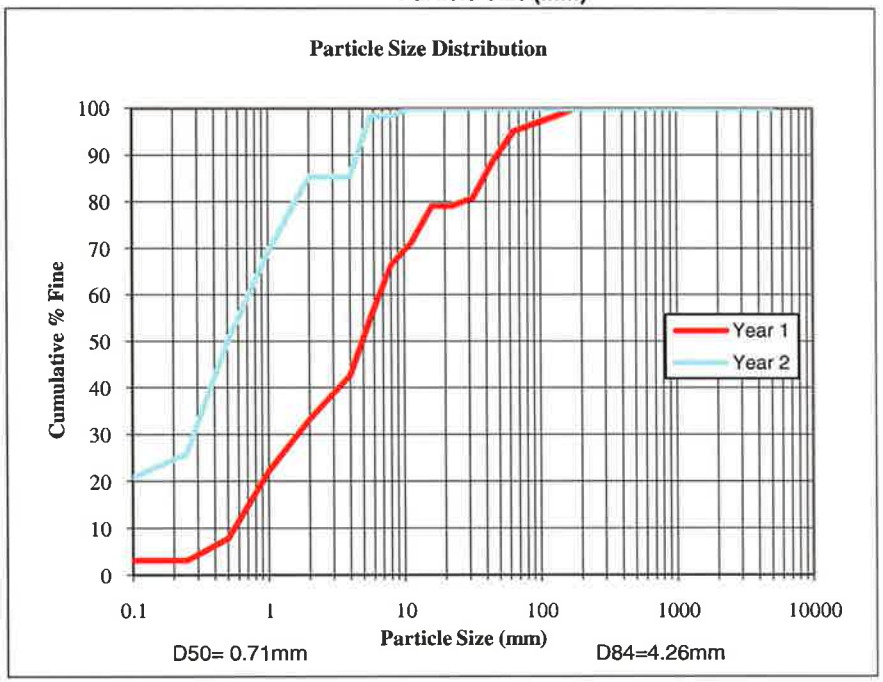
Thompsons Fork - UT1 - Longitudinal Profile - Year 2 (May 12, 2010)



Pebble Count - Pool				
Material	**Particle Size (mm)**	**Count**	**% in Range**	**% Cumulative**
Silt/Clay	<0.062	2	3	3
Very Fine Sand	0.062-0.125	4	6	9
Fine Sand	0.125-0.25	10	16	25
Medium Sand	0.25-0.5	10	16	41
Coarse Sand	0.5-1.0	14	22	63
Very Coarse Sand	1.0-2.0	13	20	83
Very Fine Gravel	2.0-4.0	0	0	83
Fine Gravel	4.0-5.7	5	8	91
Fine Gravel	5.7-8.0	0	0	91
Medium Gravel	8.0-11.3	1	2	92
Medium Gravel	11.3-16.0	1	2	94
Coarse Gravel	16.0-22.6	0	0	94
Coarse Gravel	22.6-32	2	3	97
Very Coarse Gravel	32-45	0	0	97
Very Coarse Gravel	45-64	1	2	98
Small Cobble	64-90	1	2	100
Small Cobble	90-128	0	0	100
Large Cobble	128-180	0	0	100
Large Cobble	180-256	0	0	100
Small Boulder	256-362	0	0	100
Small Boulder	362-512	0	0	100
Medium Boulder	512-1024	0	0	100
Large Boulder	1024-2048	0	0	100
Bedrock	<2048	0	0	100
Totals		64	100	

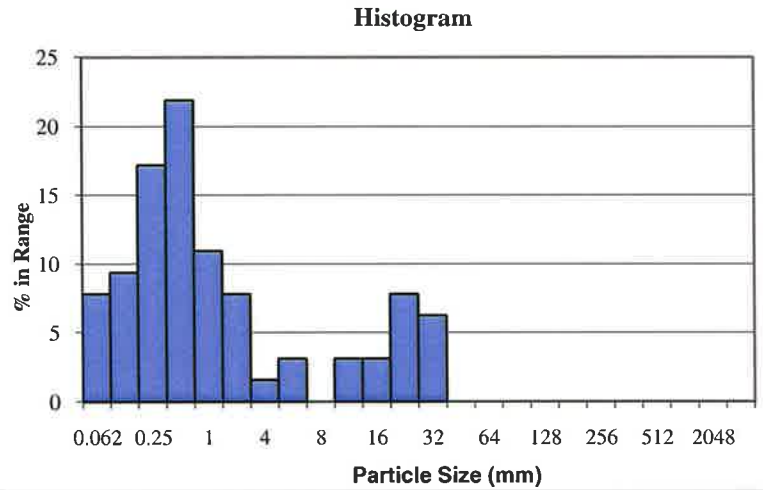
Thompsons Fork Stream Restoration EEP Project No. D06030-A			
Reach	UT	**X Sec**	1
Date	09/18/10	**Sta No.**	1+60

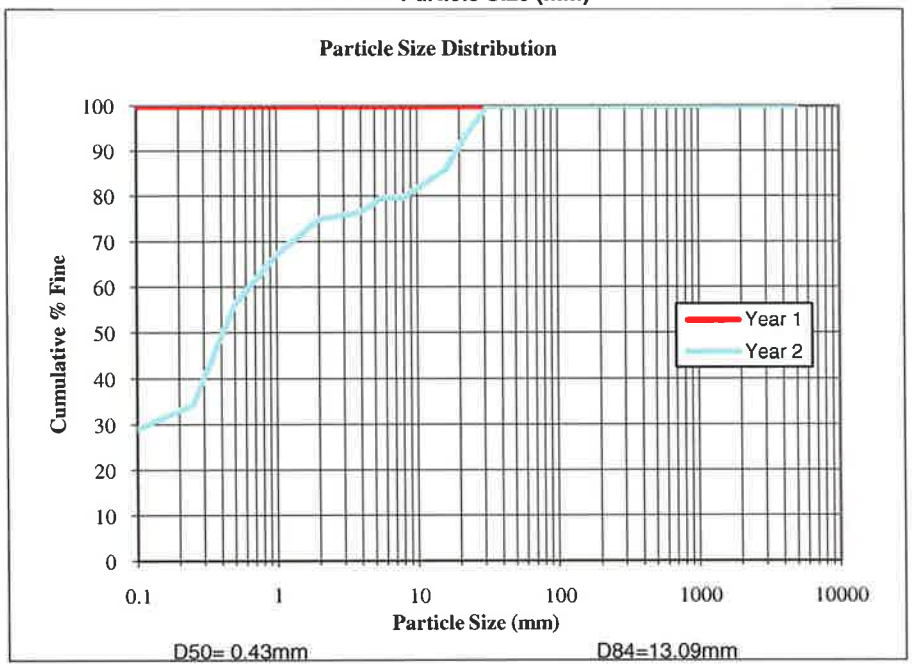




Pebble Count - Pool				
Material	**Particle Size (mm)**	**Count**	**% in Range**	**% Cumulative**
Silt/Clay	<0.062	5	8	8
Very Fine Sand	0.062-0.125	6	9	17
Fine Sand	0.125-0.25	11	17	34
Medium Sand	0.25-0.5	14	22	56
Coarse Sand	0.5-1.0	7	11	67
Very Coarse Sand	1.0-2.0	5	8	75
Very Fine Gravel	2.0-4.0	1	2	77
Fine Gravel	4.0-5.7	2	3	80
Fine Gravel	5.7-8.0	0	0	80
Medium Gravel	8.0-11.3	2	3	83
Medium Gravel	11.3-16.0	2	3	86
Coarse Gravel	16.0-22.6	5	8	94
Coarse Gravel	22.6-32	4	6	100
Very Coarse Gravel	32-45	0	0	100
Very Coarse Gravel	45-64	0	0	100
Small Cobble	64-90	0	0	100
Small Cobble	90-128	0	0	100
Large Cobble	128-180	0	0	100
Large Cobble	180-256	0	0	100
Small Boulder	256-362	0	0	100
Small Boulder	362-512	0	0	100
Medium Boulder	512-1024	0	0	100
Large Boulder	1024-2048	0	0	100
Bedrock	<2048	0	0	100
Totals		64	100	

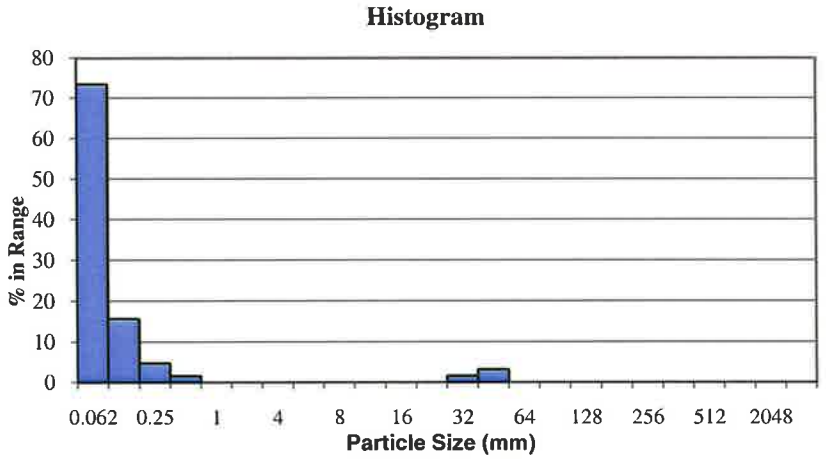
Thompsons Fork Stream Restoration EEP Project No. D06030-A			
Reach	UT	**X Sec**	2
Date	09/18/10	**Sta No.**	1+74

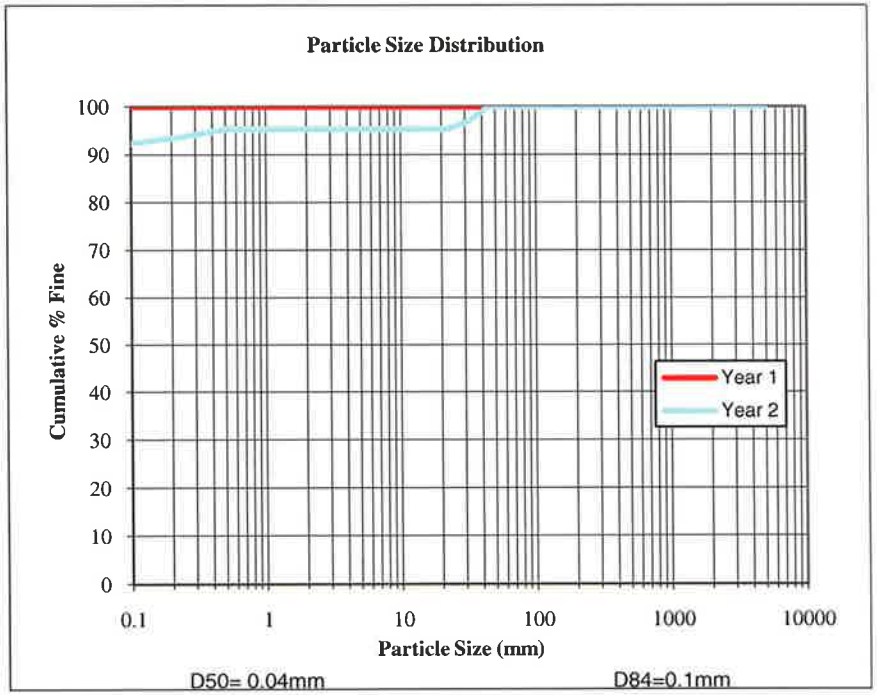




Pebble Count - Pool				
Material	Particle Size (mm)	Count	% in Range	% Cumulative
Silt/Clay	<0.062	47	73	73
Very Fine Sand	0.062-0.125	10	16	89
Fine Sand	0.125-0.25	3	5	94
Medium Sand	0.25-0.5	1	2	95
Coarse Sand	0.5-1.0	0	0	95
Very Coarse Sand	1.0-2.0	0	0	95
Very Fine Gravel	2.0-4.0	0	0	95
Fine Gravel	4.0-5.7	0	0	95
Fine Gravel	5.7-8.0	0	0	95
Medium Gravel	8.0-11.3	0	0	95
Medium Gravel	11.3-16.0	0	0	95
Coarse Gravel	16.0-22.6	0	0	95
Coarse Gravel	22.6-32	1	2	97
Very Coarse Gravel	32-45	2	3	100
Very Coarse Gravel	45-64	0	0	100
Small Cobble	64-90	0	0	100
Small Cobble	90-128	0	0	100
Large Cobble	128-180	0	0	100
Large Cobble	180-256	0	0	100
Small Boulder	256-362	0	0	100
Small Boulder	362-512	0	0	100
Medium Boulder	512-1024	0	0	100
Large Boulder	1024-2048	0	0	100
Bedrock	<2048	0	0	100
Totals		64	100	

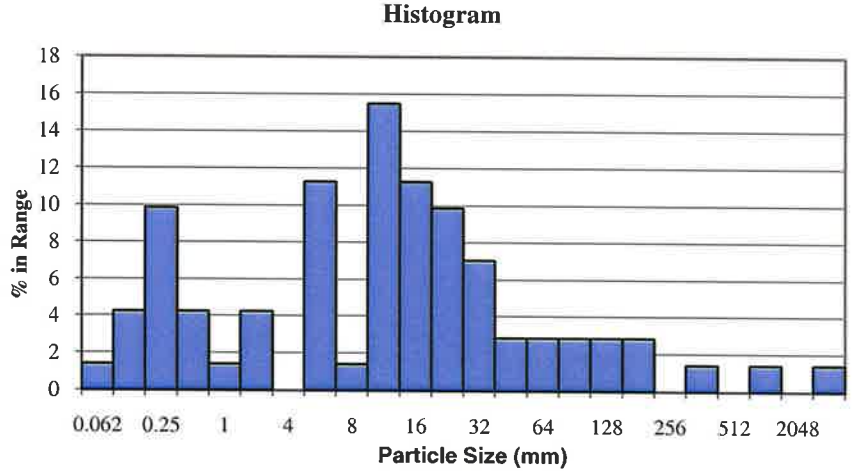
Thompsons Fork Stream Restoration EEP Project No. D06030-A			
Reach	UT	X Sec	3
Date	09/18/10	Sta No.	8+09

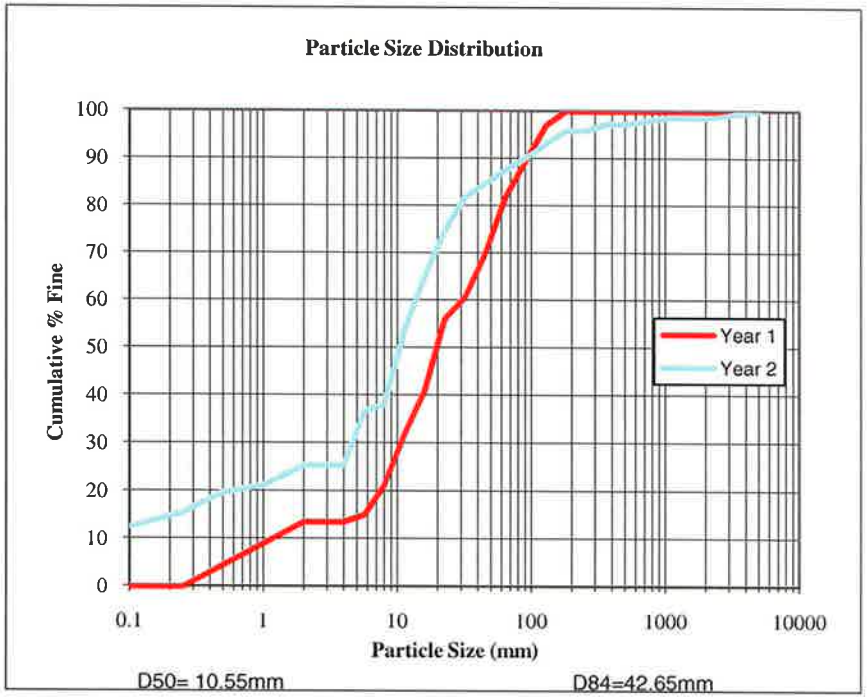




Pebble Count - Riffle				
Material	Particle Size (mm)	Count	% in Range	% Cumulative
Silt/Clay	<0.062	1	1	1
Very Fine Sand	0.062-0.125	3	4	6
Fine Sand	0.125-0.25	7	10	15
Medium Sand	0.25-0.5	3	4	20
Coarse Sand	0.5-1.0	1	1	21
Very Coarse Sand	1.0-2.0	3	4	25
Very Fine Gravel	2.0-4.0	0	0	25
Fine Gravel	4.0-5.7	8	11	37
Fine Gravel	5.7-8.0	1	1	38
Medium Gravel	8.0-11.3	11	15	54
Medium Gravel	11.3-16.0	8	11	65
Coarse Gravel	16.0-22.6	7	10	75
Coarse Gravel	22.6-32	5	7	82
Very Coarse Gravel	32-45	2	3	85
Very Coarse Gravel	45-64	2	3	87
Small Cobble	64-90	2	3	90
Small Cobble	90-128	2	3	93
Large Cobble	128-180	2	3	96
Large Cobble	180-256	0	0	96
Small Boulder	256-362	1	1	97
Small Boulder	362-512	0	0	97
Medium Boulder	512-1024	1	1	99
Large Boulder	1024-2048	0	0	99
Bedrock	<2048	1	1	100
Totals		71	100	

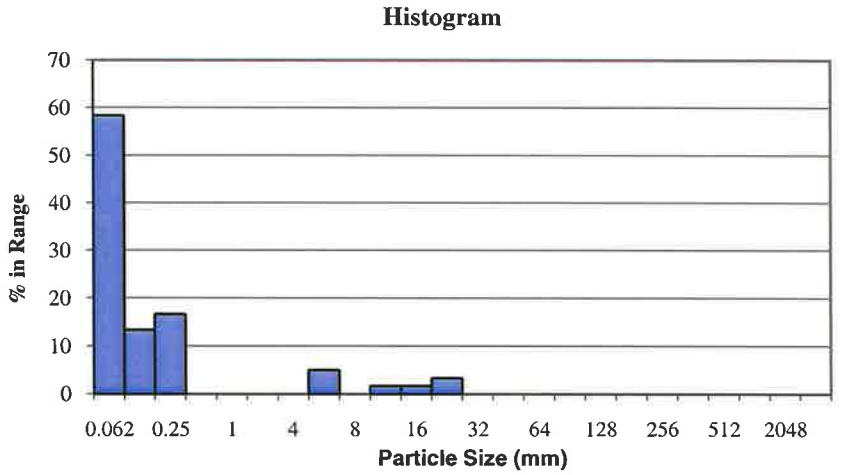
Thompsons Fork Stream Restoration EEP Project No. D06030-A			
Reach	UT	X Sec	4
Date	09/18/10	Sta No.	8+31

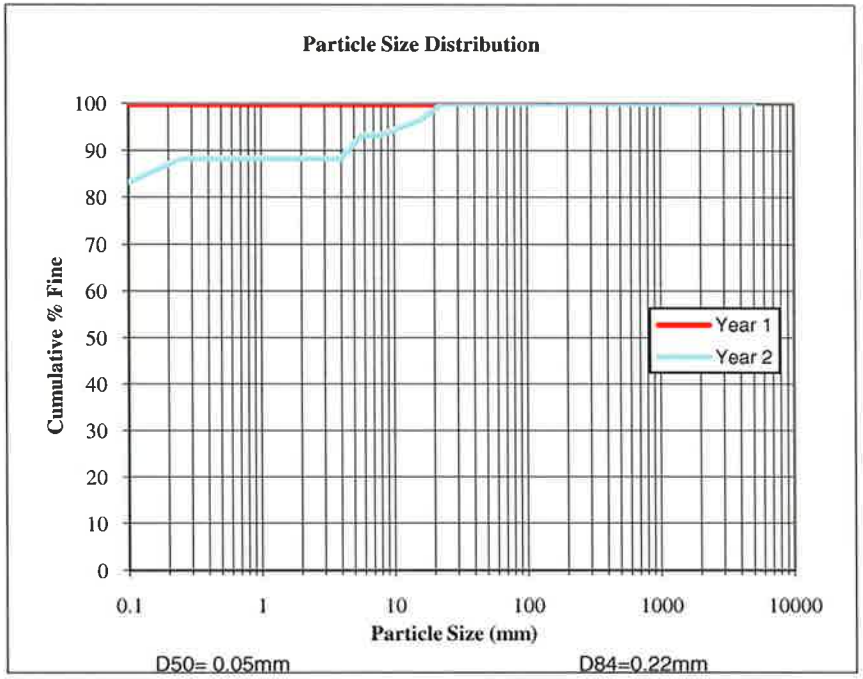




Pebble Count - Riffle				
Material	**Particle Size (mm)**	**Count**	**% in Range**	**% Cumulative**
Silt/Clay	<0.062	35	58	58
Very Fine Sand	0.062-0.125	8	13	72
Fine Sand	0.125-0.25	10	17	88
Medium Sand	0.25-0.5	0	0	88
Coarse Sand	0.5-1.0	0	0	88
Very Coarse Sand	1.0-2.0	0	0	88
Very Fine Gravel	2.0-4.0	0	0	88
Fine Gravel	4.0-5.7	3	5	93
Fine Gravel	5.7-8.0	0	0	93
Medium Gravel	8.0-11.3	1	2	95
Medium Gravel	11.3-16.0	1	2	97
Coarse Gravel	16.0-22.6	2	3	100
Coarse Gravel	22.6-32	0	0	100
Very Coarse Gravel	32-45	0	0	100
Very Coarse Gravel	45-64	0	0	100
Small Cobble	64-90	0	0	100
Small Cobble	90-128	0	0	100
Large Cobble	128-180	0	0	100
Large Cobble	180-256	0	0	100
Small Boulder	256-362	0	0	100
Small Boulder	362-512	0	0	100
Medium Boulder	512-1024	0	0	100
Large Boulder	1024-2048	0	0	100
Bedrock	<2048	0	0	100
Totals		60	100	

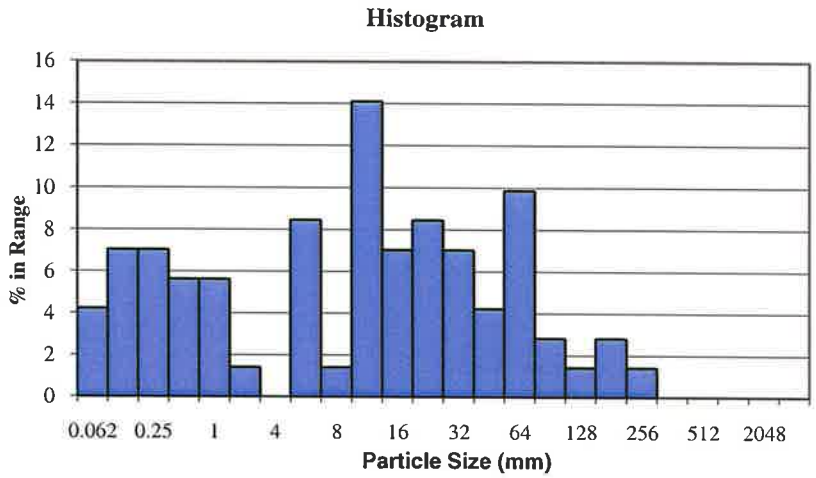
Thompsons Fork Stream Restoration EEP Project No. D06030-A			
Reach	UT	**X Sec**	5
Date	09/18/10	**Sta No.**	17+79

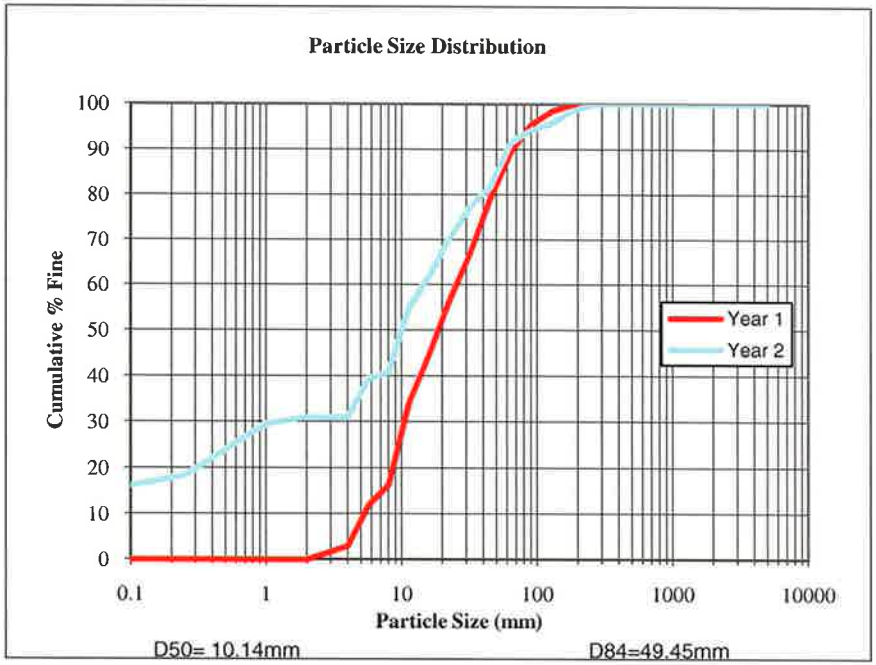




Pebble Count - Riffle				
Material	**Particle Size (mm)**	**Count**	**% in Range**	**% Cumulative**
Silt/Clay	<0.062	3	4	4
Very Fine Sand	0.062-0.125	5	7	11
Fine Sand	0.125-0.25	5	7	18
Medium Sand	0.25-0.5	4	6	24
Coarse Sand	0.5-1.0	4	6	30
Very Coarse Sand	1.0-2.0	1	1	31
Very Fine Gravel	2.0-4.0	0	0	31
Fine Gravel	4.0-5.7	6	8	39
Fine Gravel	5.7-8.0	1	1	41
Medium Gravel	8.0-11.3	10	14	55
Medium Gravel	11.3-16.0	5	7	62
Coarse Gravel	16.0-22.6	6	8	70
Coarse Gravel	22.6-32	5	7	77
Very Coarse Gravel	32-45	3	4	82
Very Coarse Gravel	45-64	7	10	92
Small Cobble	64-90	2	3	94
Small Cobble	90-128	1	1	96
Large Cobble	128-180	2	3	99
Large Cobble	180-256	1	1	100
Small Boulder	256-362	0	0	100
Small Boulder	362-512	0	0	100
Medium Boulder	512-1024	0	0	100
Large Boulder	1024-2048	0	0	100
Bedrock	<2048	0	0	100
Totals		71	100	

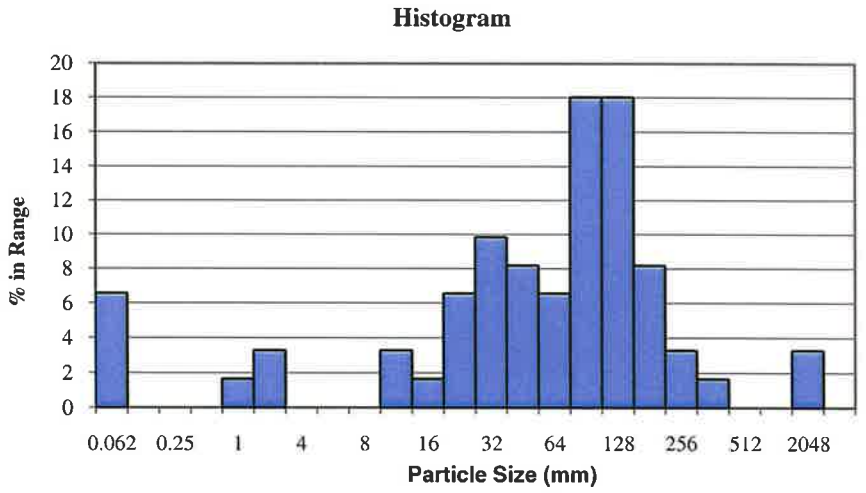
Thompsons Fork Stream Restoration EEP Project No. D06030-A			
Reach	UT	**X Sec**	6
Date	09/18/10	**Sta No.**	17+94

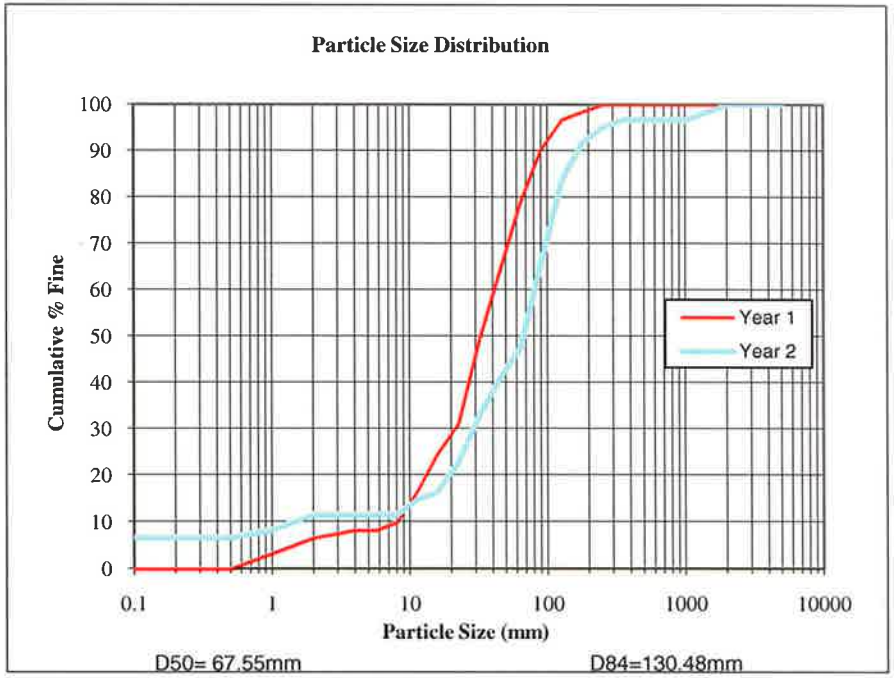




Pebble Count - Riffle				
Material	**Particle Size (mm)**	**Count**	**% in Range**	**% Cumulative**
Silt/Clay	<0.062	4	7	7
Very Fine Sand	0.062-0.125	0	0	7
Fine Sand	0.125-0.25	0	0	7
Medium Sand	0.25-0.5	0	0	7
Coarse Sand	0.5-1.0	1	2	8
Very Coarse Sand	1.0-2.0	2	3	11
Very Fine Gravel	2.0-4.0	0	0	11
Fine Gravel	4.0-5.7	0	0	11
Fine Gravel	5.7-8.0	0	0	11
Medium Gravel	8.0-11.3	2	3	15
Medium Gravel	11.3-16.0	1	2	16
Coarse Gravel	16.0-22.6	4	7	23
Coarse Gravel	22.6-32	6	10	33
Very Coarse Gravel	32-45	5	8	41
Very Coarse Gravel	45-64	4	7	48
Small Cobble	64-90	11	18	66
Small Cobble	90-128	11	18	84
Large Cobble	128-180	5	8	92
Large Cobble	180-256	2	3	95
Small Boulder	256-362	1	2	97
Small Boulder	362-512	0	0	97
Medium Boulder	512-1024	0	0	97
Large Boulder	1024-2048	2	3	100
Bedrock	<2048	0	0	100
Totals		61	100	

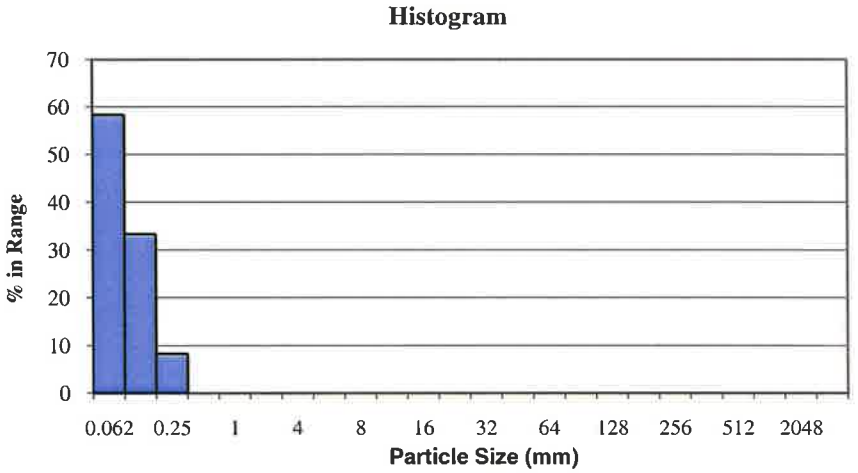
Thompsons Fork Stream Restoration EEP Project No. D06030-A			
Reach	Mainstem	**X Sec**	7
Date	09/18/10	**Sta No.**	21+11

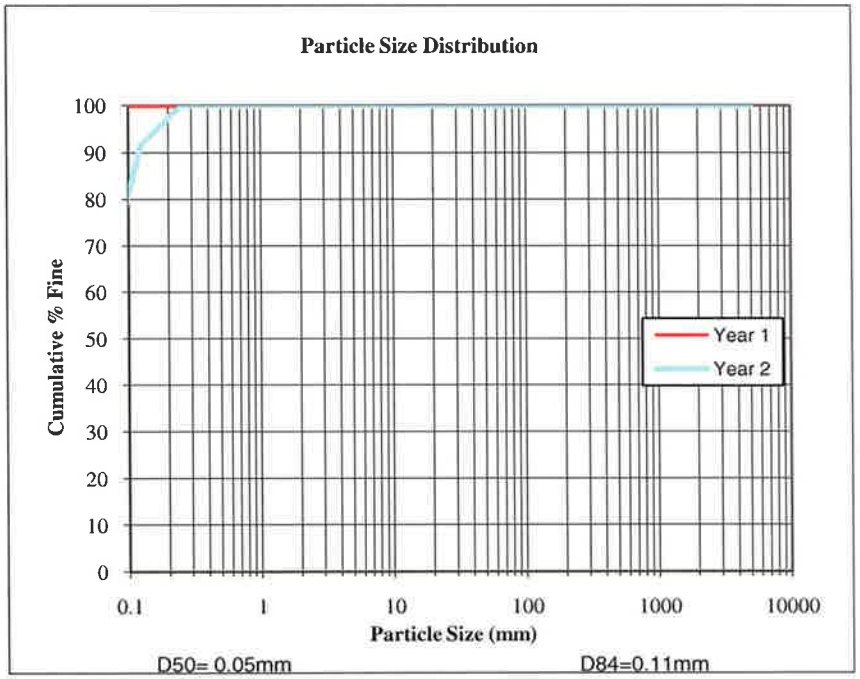




Pebble Count - Pool				
Material	**Particle Size (mm)**	**Count**	**% in Range**	**% Cumulative**
Silt/Clay	<0.062	35	58	58
Very Fine Sand	0.062-0.125	20	33	92
Fine Sand	0.125-0.25	5	8	100
Medium Sand	0.25-0.5	0	0	100
Coarse Sand	0.5-1.0	0	0	100
Very Coarse Sand	1.0-2.0	0	0	100
Very Fine Gravel	2.0-4.0	0	0	100
Fine Gravel	4.0-5.7	0	0	100
Fine Gravel	5.7-8.0	0	0	100
Medium Gravel	8.0-11.3	0	0	100
Medium Gravel	11.3-16.0	0	0	100
Coarse Gravel	16.0-22.6	0	0	100
Coarse Gravel	22.6-32	0	0	100
Very Coarse Gravel	32-45	0	0	100
Very Coarse Gravel	45-64	0	0	100
Small Cobble	64-90	0	0	100
Small Cobble	90-128	0	0	100
Large Cobble	128-180	0	0	100
Large Cobble	180-256	0	0	100
Small Boulder	256-362	0	0	100
Small Boulder	362-512	0	0	100
Medium Boulder	512-1024	0	0	100
Large Boulder	1024-2048	0	0	100
Bedrock	<2048	0	0	100
Totals		60	100	

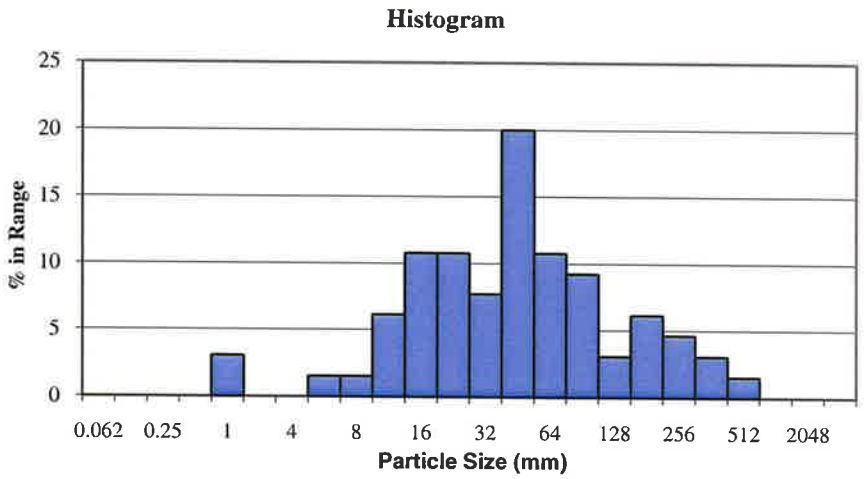
Thompsons Fork Stream Restoration EEP Project No. D06030-A			
Reach	Mainstem	**X Sec**	8
Date	09/18/10	**Sta No.**	20+77

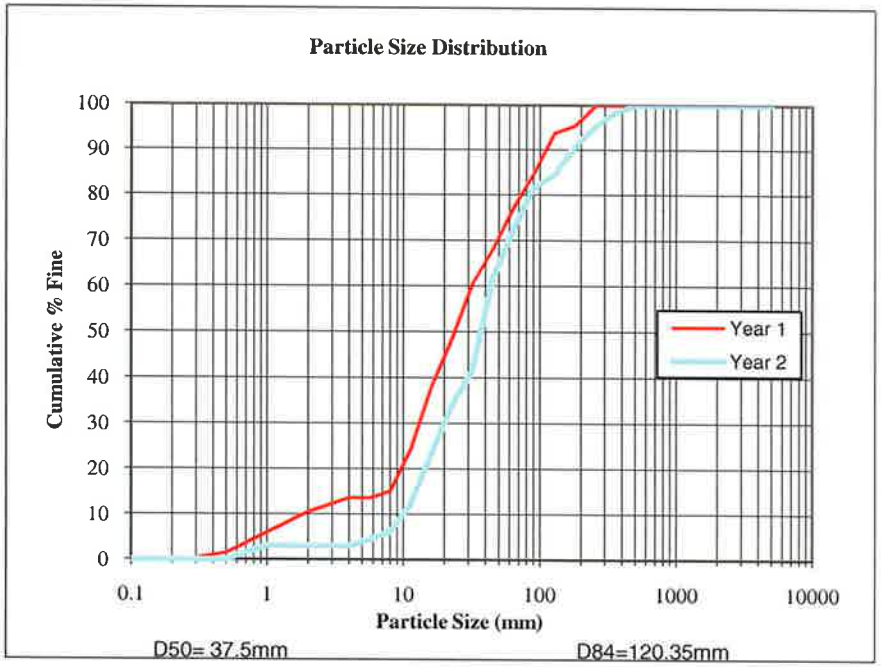




Pebble Count - Riffle				
Material	**Particle Size (mm)**	**Count**	**% in Range**	**% Cumulative**
Silt/Clay	<0.062	0	0	0
Very Fine Sand	0.062-0.125	0	0	0
Fine Sand	0.125-0.25	0	0	0
Medium Sand	0.25-0.5	0	0	0
Coarse Sand	0.5-1.0	2	3	3
Very Coarse Sand	1.0-2.0	0	0	3
Very Fine Gravel	2.0-4.0	0	0	3
Fine Gravel	4.0-5.7	1	2	5
Fine Gravel	5.7-8.0	1	2	6
Medium Gravel	8.0-11.3	4	6	12
Medium Gravel	11.3-16.0	7	11	23
Coarse Gravel	16.0-22.6	7	11	34
Coarse Gravel	22.6-32	5	8	42
Very Coarse Gravel	32-45	13	20	62
Very Coarse Gravel	45-64	7	11	72
Small Cobble	64-90	6	9	82
Small Cobble	90-128	2	3	85
Large Cobble	128-180	4	6	91
Large Cobble	180-256	3	5	95
Small Boulder	256-362	2	3	98
Small Boulder	362-512	1	2	100
Medium Boulder	512-1024	0	0	100
Large Boulder	1024-2048	0	0	100
Bedrock	<2048	0	0	100
Totals		65	100	

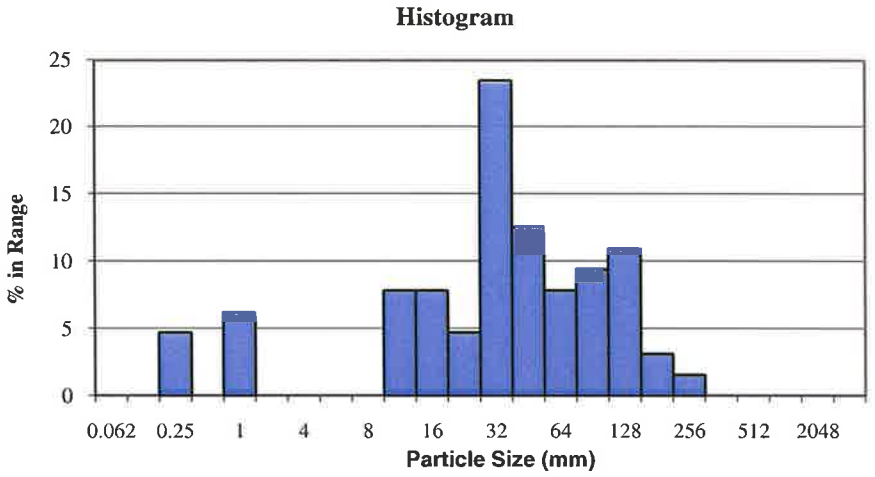
Thompsons Fork Stream Restoration EEP Project No. D06030-A			
Reach	Mainstem	**X Sec**	9
Date	09/18/10	**Sta No.**	7+76

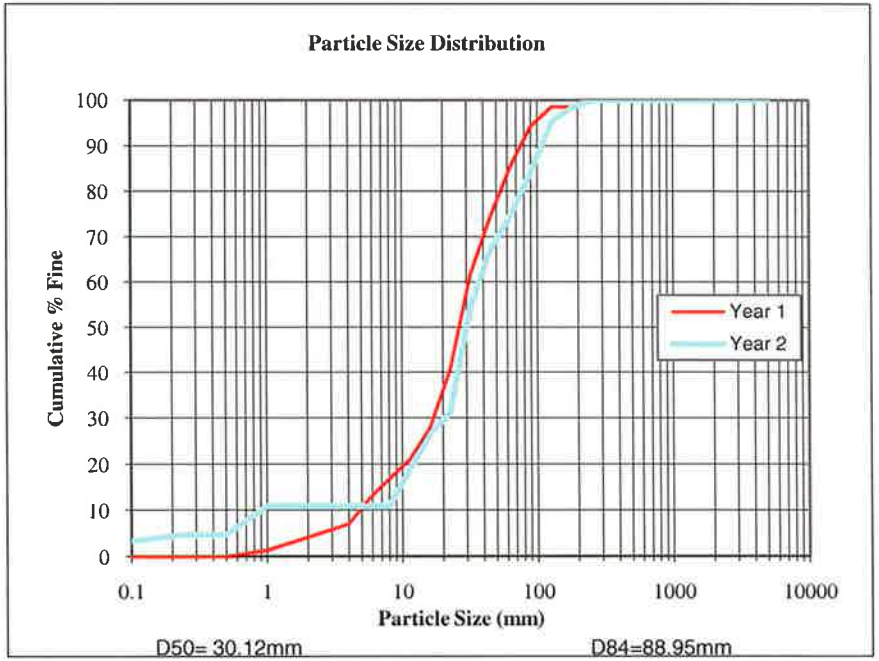




Pebble Count - Riffle				
Material	**Particle Size (mm)**	**Count**	**% in Range**	**% Cumulative**
Silt/Clay	<0.062	0	0	0
Very Fine Sand	0.062-0.125	0	0	0
Fine Sand	0.125-0.25	3	5	5
Medium Sand	0.25-0.5	0	0	5
Coarse Sand	0.5-1.0	4	6	11
Very Coarse Sand	1.0-2.0	0	0	11
Very Fine Gravel	2.0-4.0	0	0	11
Fine Gravel	4.0-5.7	0	0	11
Fine Gravel	5.7-8.0	0	0	11
Medium Gravel	8.0-11.3	5	8	19
Medium Gravel	11.3-16.0	5	8	27
Coarse Gravel	16.0-22.6	3	5	31
Coarse Gravel	22.6-32	15	23	55
Very Coarse Gravel	32-45	8	13	67
Very Coarse Gravel	45-64	5	8	75
Small Cobble	64-90	6	9	84
Small Cobble	90-128	7	11	95
Large Cobble	128-180	2	3	98
Large Cobble	180-256	1	2	100
Small Boulder	256-362	0	0	100
Small Boulder	362-512	0	0	100
Medium Boulder	512-1024	0	0	100
Large Boulder	1024-2048	0	0	100
Bedrock	<2048	0	0	100
Totals		64	100	

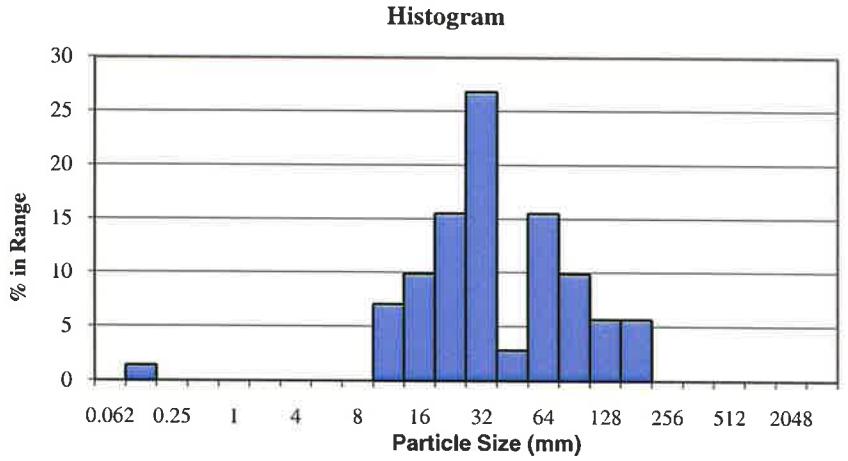
Thompsons Fork Stream Restoration EEP Project No. D06030-A			
Reach	Mainstem	**X Sec**	10
Date	09/18/10	**Sta No.**	7+37

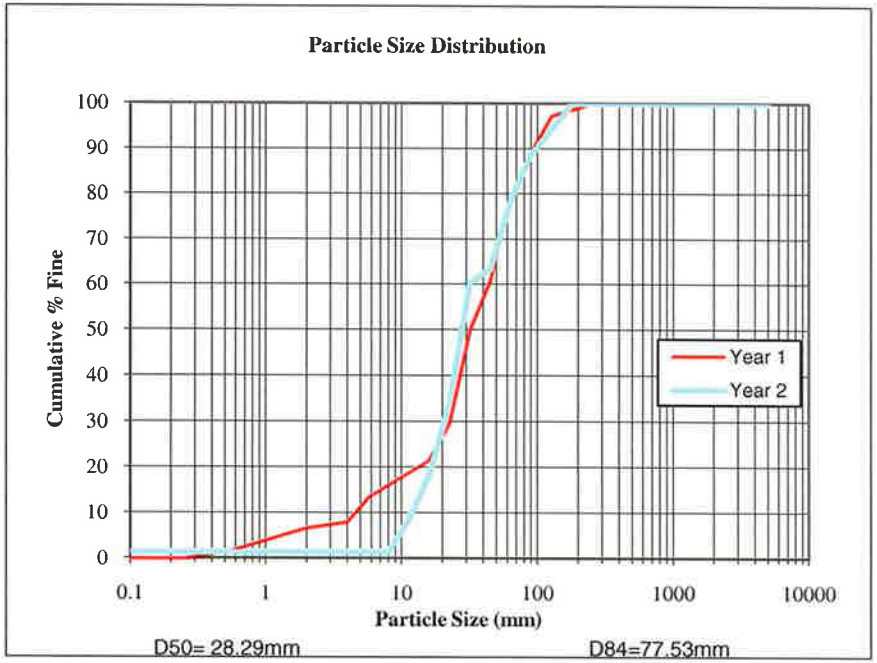




Pebble Count - Riffle				
Material	**Particle Size (mm)**	**Count**	**% in Range**	**% Cumulative**
Silt/Clay	<0.062	0	0	0
Very Fine Sand	0.062-0.125	1	1	1
Fine Sand	0.125-0.25	0	0	1
Medium Sand	0.25-0.5	0	0	1
Coarse Sand	0.5-1.0	0	0	1
Very Coarse Sand	1.0-2.0	0	0	1
Very Fine Gravel	2.0-4.0	0	0	1
Fine Gravel	4.0-5.7	0	0	1
Fine Gravel	5.7-8.0	0	0	1
Medium Gravel	8.0-11.3	5	7	8
Medium Gravel	11.3-16.0	7	10	18
Coarse Gravel	16.0-22.6	11	15	34
Coarse Gravel	22.6-32	19	27	61
Very Coarse Gravel	32-45	2	3	63
Very Coarse Gravel	45-64	11	15	79
Small Cobble	64-90	7	10	89
Small Cobble	90-128	4	6	94
Large Cobble	128-180	4	6	100
Large Cobble	180-256	0	0	100
Small Boulder	256-362	0	0	100
Small Boulder	362-512	0	0	100
Medium Boulder	512-1024	0	0	100
Large Boulder	1024-2048	0	0	100
Bedrock	<2048	0	0	100
Totals		71	100	

Thompsons Fork Stream Restoration EEP Project No. D06030-A			
Reach	Mainstem	**X Sec**	11
Date	09/18/10	**Sta No.**	2+81

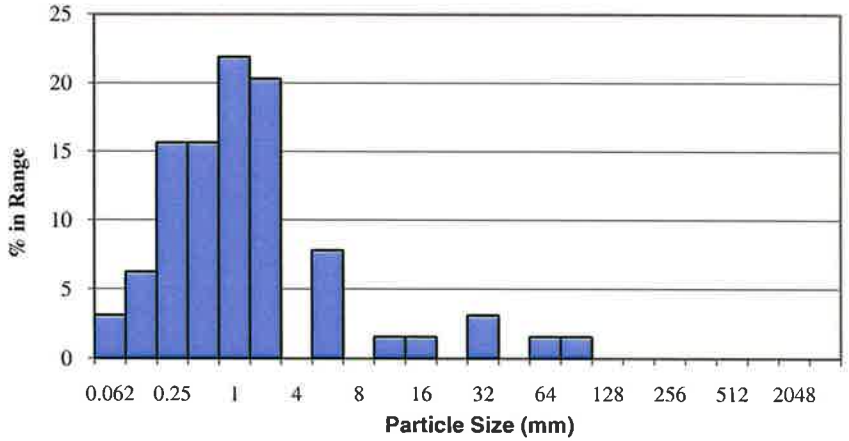




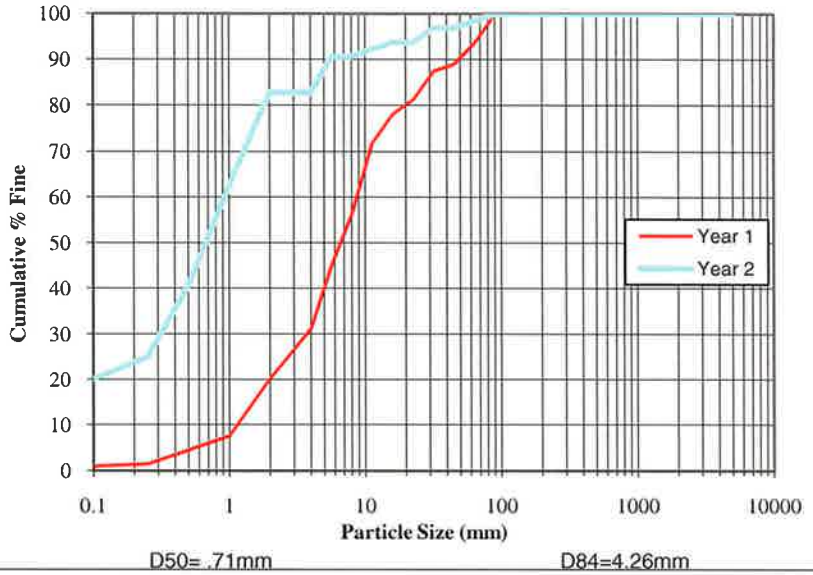
Pebble Count - Pool				
Material	**Particle Size (mm)**	**Count**	**% in Range**	**% Cumulative**
Silt/Clay	<0.062	2	3	3
Very Fine Sand	0.062-0.125	4	6	9
Fine Sand	0.125-0.25	10	16	25
Medium Sand	0.25-0.5	10	16	41
Coarse Sand	0.5-1.0	14	22	63
Very Coarse Sand	1.0-2.0	13	20	83
Very Fine Gravel	2.0-4.0	0	0	83
Fine Gravel	4.0-5.7	5	8	91
Fine Gravel	5.7-8.0	0	0	91
Medium Gravel	8.0-11.3	1	2	92
Medium Gravel	11.3-16.0	1	2	94
Coarse Gravel	16.0-22.6	0	0	94
Coarse Gravel	22.6-32	2	3	97
Very Coarse Gravel	32-45	0	0	97
Very Coarse Gravel	45-64	1	2	98
Small Cobble	64-90	1	2	100
Small Cobble	90-128	0	0	100
Large Cobble	128-180	0	0	100
Large Cobble	180-256	0	0	100
Small Boulder	256-362	0	0	100
Small Boulder	362-512	0	0	100
Medium Boulder	512-1024	0	0	100
Large Boulder	1024-2048	0	0	100
Bedrock	<2048	0	0	100
Totals		64	100	

Thompsons Fork Stream Restoration EEP Project No. D06030-A			
Reach	Mainstem	**X Sec**	12
Date	09/18/10	**Sta No.**	2+68

Histogram



Particle Size Distribution

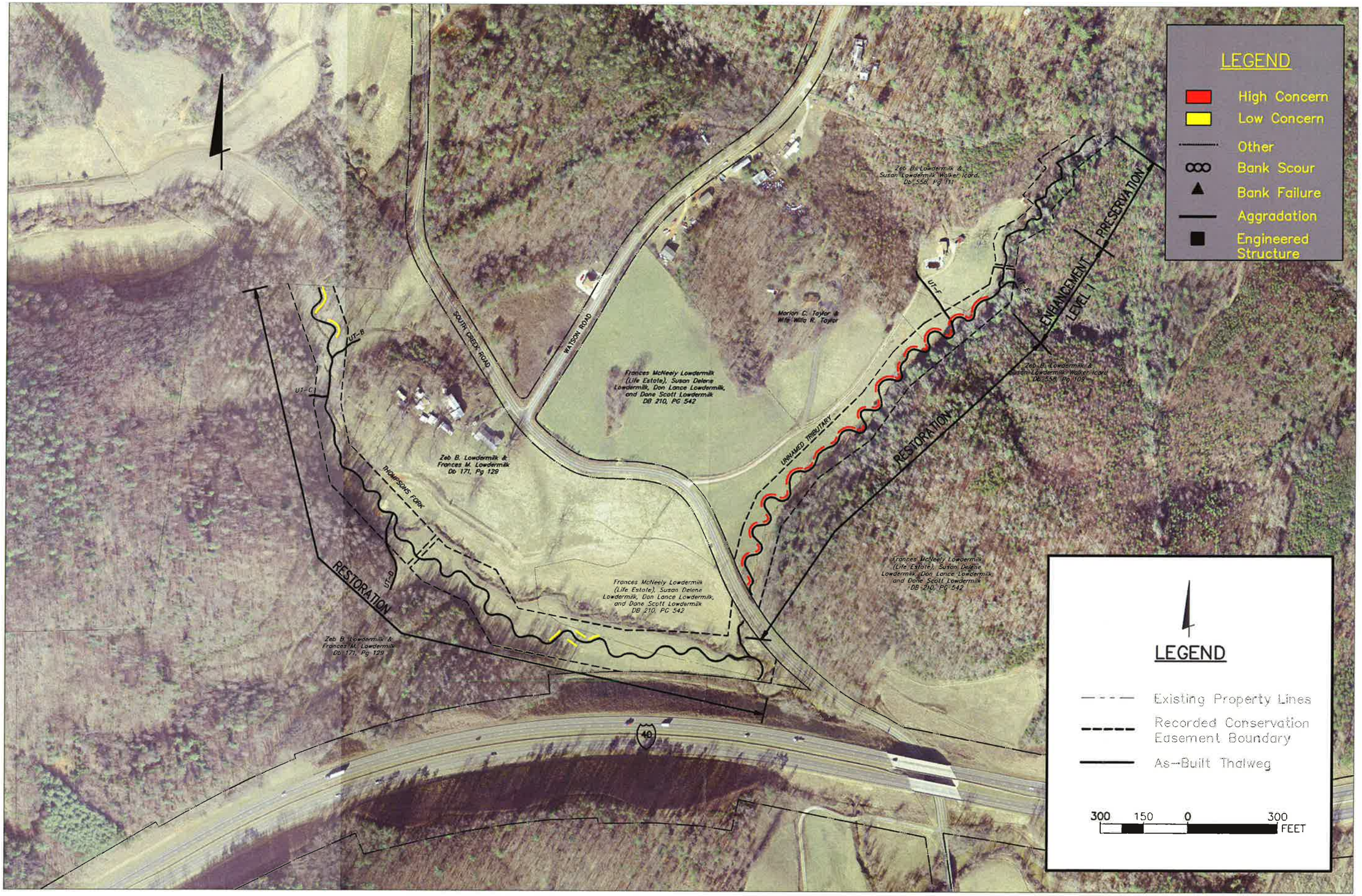


BF 1
Crest Gage at XS-6 on UT.
(EMH&T, Inc. 5/12/10)

BF 2
Crest Gage at XS-7 on Mainstem.
(EMH&T, Inc. 5/12/10)

SPA 1
Wetland vegetation forming within the stream channel on UT1. There are several wetland areas found along this stream.
(EMH&T, Inc. 9/18/10)

SPA 2
Wetland vegetation forming within the stream channel on UT1. There are several wetland areas found along this stream.
(EMH&T, Inc. 9/18/10)



MCDOWELL COUNTY, NORTH CAROLINA
THOMPSONS FORK
AND UNNAMED TRIBUTARY
APPENDIX B
STREAM PROBLEM AREA PLAN VIEW

Job No.	Sheet
2009-0328	1/1
Date: December, 2010	Scale: 1" = 300'

EMH&T
Environmental, Hydrology & Hydraulics, Inc.
5500 New Albany Road, Columbus, OH 43054
Phone: 614.775.4500

\\CMHDATA01\Project01\20090328\2009032Benv\Dwg\Exhibits\Appendix B(12-1-10).dwg<Layout 1> - 1 Xref: [\\CMHARC1\archiveo\2006\20061398\20061398env\dwg\X-Refs\6139Bxbs.dwg] - 4 Images: [\\CMHGIS01\gis\NC\County\McDowell\Imagery\2005_xx_NCFloodplainMappingProgram\10173102.tif, 10174203.tif, 10173204.tif, 10174101.tif] - SavedBy: JCRAMER [12/2/2010 10:06:29 AM] - PlottedBy: JCRAMER [12/17/2010 8:11:46 AM]