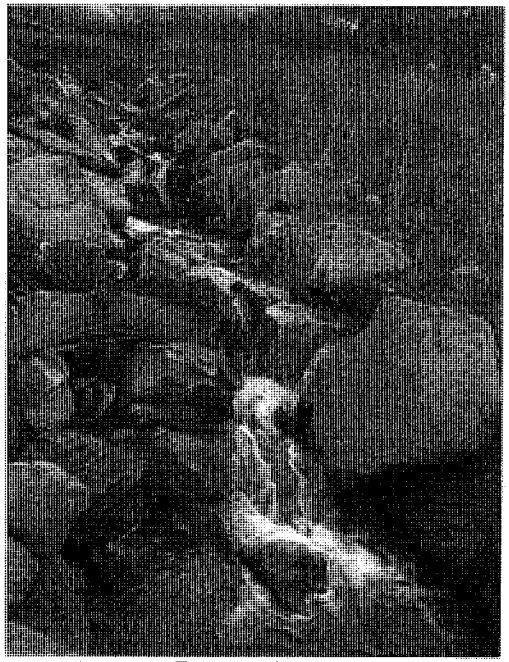
HEN WILDER MITIGATION SITE
USACE NWP (21) 200601071

KDNR # 807-8056
2011 Annual Report
December 12, 2011
(Revised 02-01-12)



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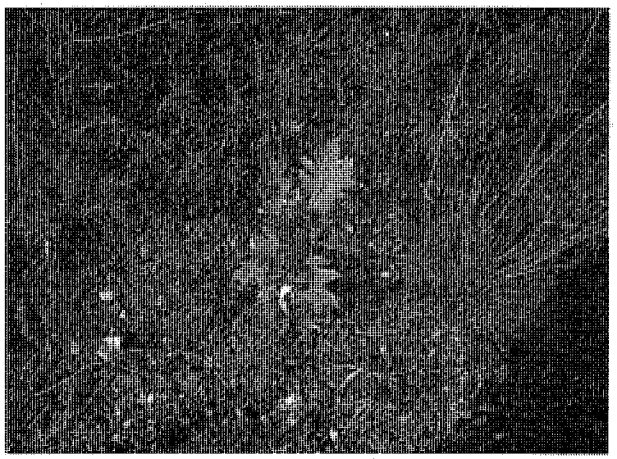


General Site Information	
USACE NWP 21	200601071
Party Responsible for Monitoring	Biological Systems Consultants, Inc.
Date(s) of Monitoring Report	12-12-2011
Mitigation Location	Hen Wilder Branch, Bell County Kentucky
Type of Impact	1,795 Linear Feet of Streams
Type of Mitigation	On-site Stream Restoration
Location	36.7436428° N/ -83.5517565° W

2011 Mitigation Monitoring Report

Performance Measures	2011 Results	Management Activities
Riparian Zone :600 stems/acre / 60' each side	Planted Fall of 2010	Plant Additional Trees on Fill Face
Bank stability	Stable	Stabilize Side and Top Drain
Illustration of progressive increase in EIUs	Achieved	Corrected Top Drain Headcut and Concentrated Water to One Side, Added Woody Debris and Log Structures

Report Introduction
This report summarizes the first year (Year 1) monitoring activities at the Hen Wilder mitigation site. Included are a site description, the performance measures, an explanation of monitoring methods, vegetation surveys and photo-documentation. Vegetation and EKSAP grading of the sites occurred December 7, 2011 by Biological Systems Consultants personnel.

What is the Hen Wilder Mitigation Site?
The site was established to compensate for the impacts to 1,795 LF of stream due to the nearby mining operation.

1) The Hen Wilder mitigation site includes total reconstruction of one reach after the pond is removed. This includes the corridor between the pond and the toe of the fill. The restoration efforts in this area include removal of pond 1 which is anticipated to be restored to 0.46 (5yrs) and 0.53 at maturity, the restoration of the corridor which is anticipated to score 0.46 at 5 years and 0.51 at maturity, and the construction of a channel along the fill side drain and in the back fill area which is anticipated to score a 0.43 at 5 years and 0.51 at maturity.

What are the performance measures for this site?

Performance Measure 1
A minimum of 600 stems per acre in the riparian zone.

Performance Measure 2
Bank stability occurs along mitigation reaches.

Performance Measure 3
Provide progressive increase in EIUs

How were performance measures evaluated?

To assess stream functions, segments of the restoration and enhancement areas were walked and graded using the Rapid Bioassessment Protocol which includes physical (habitat) and specific conductivity inputs to provide the ecological integrity (EII) score for each reach (EKSAP).

To evaluate vegetation, a 0.1 acre transect was surveyed. Additionally the 60' wide riparian zone was evaluated to determine its condition and width.

How is the site developing?

As illustrated the site is developing well. The 60' riparian zone was planted during the fall of 2010 and log structures were added to the channels in 2011. Some bank stability issues are found on the top and side drain of the hollow-fill where recent channel modifications had been made, but the overall channel is considered stable. These unstable sections should be modified to avoid future erosional problems in these areas.

Results for Performance Measure 1
(600 stems/acre)

The stems per acre count for 2011 yielded 711 stems. This exceeds the performance measure for year 1.

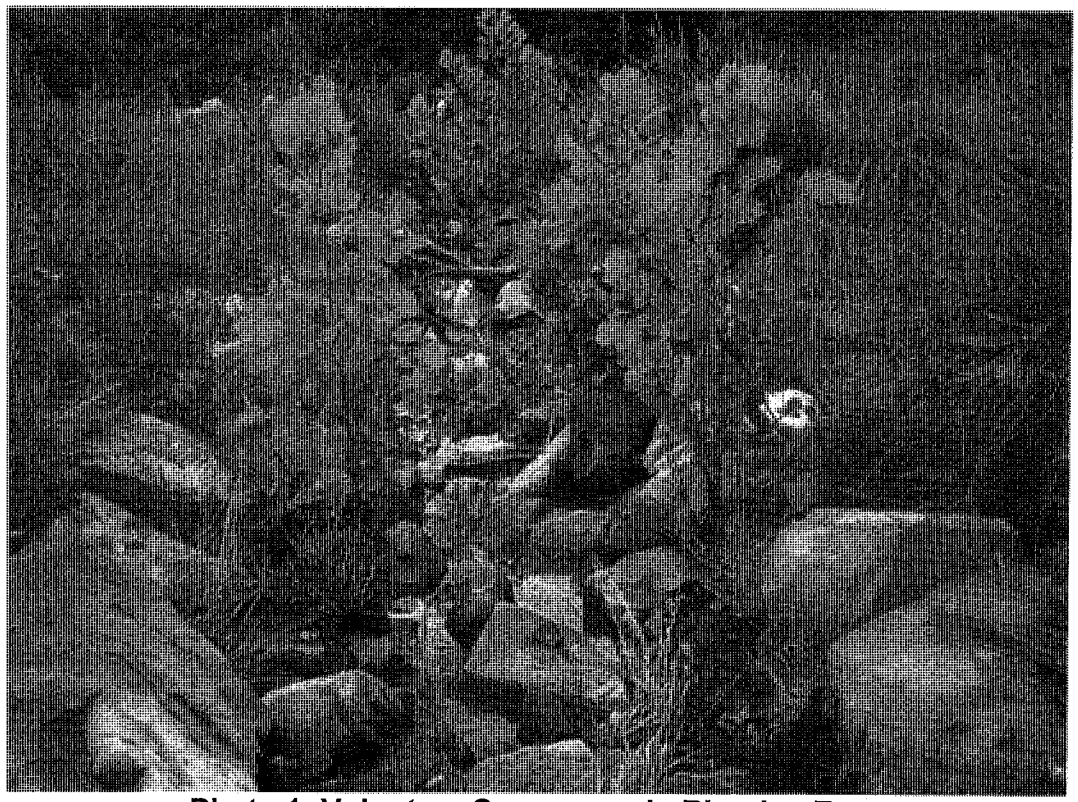


Photo 1: Volunteer Sycamores In Riparian Zone

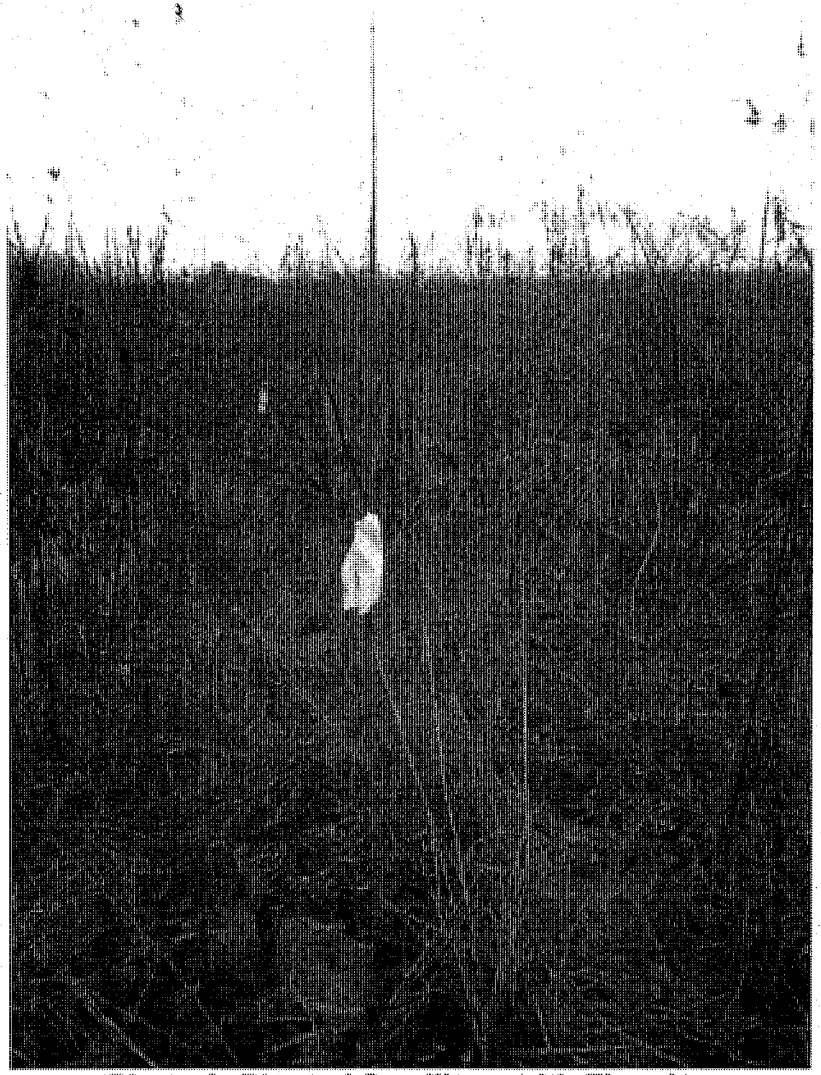


Photo 2: Planted Seedlings with Flagging

Results for Performance Measure 2
(Bank stability)

Back Fill Area
The bank stability score for this reach was 16. This is considered optimal.

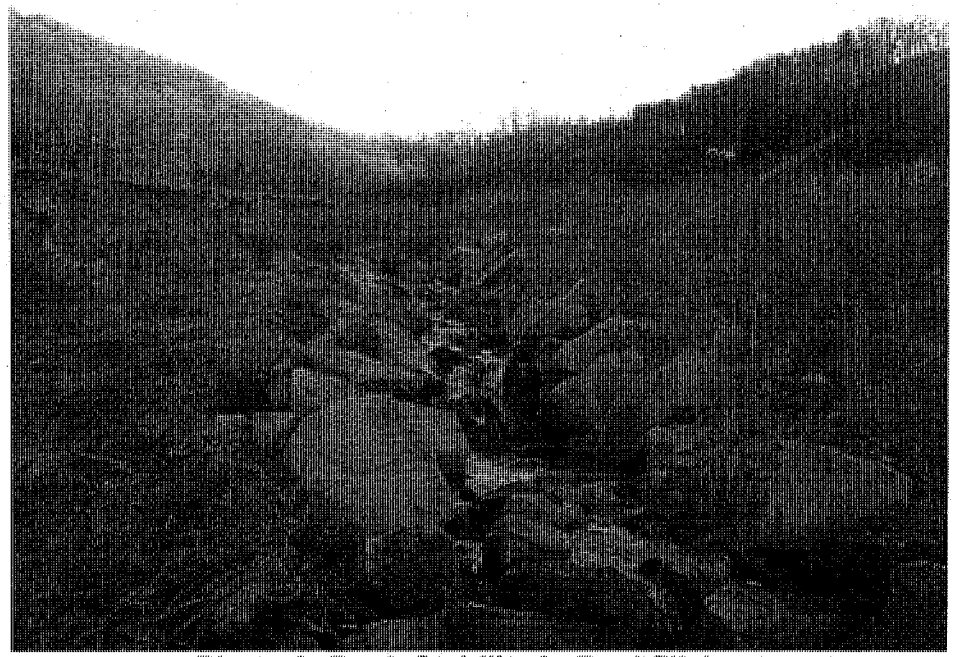


Photo 3: Bank Stability in Backfill Area

Side Drain

The bank stability score for this reach was 15. This is considered suboptimal.

Photo 4: Bank Stability in Side Drain

Photo 5: Unstable Section of Top Drain at Intersection with Side Drain.

Photo 6: Top Drain Section (Banks Need Stabilized)

Results for Performance Measure 3
(Progressive Increase In EIUs)

Backfill Area
The EII score for the back fill area was 0.58. The habitat score was 112 with a conductivity of 170. The total length of stream in this section was 780', therefore the EIUs in this reach total 452.4 which exceeds the performance measure in this reach.

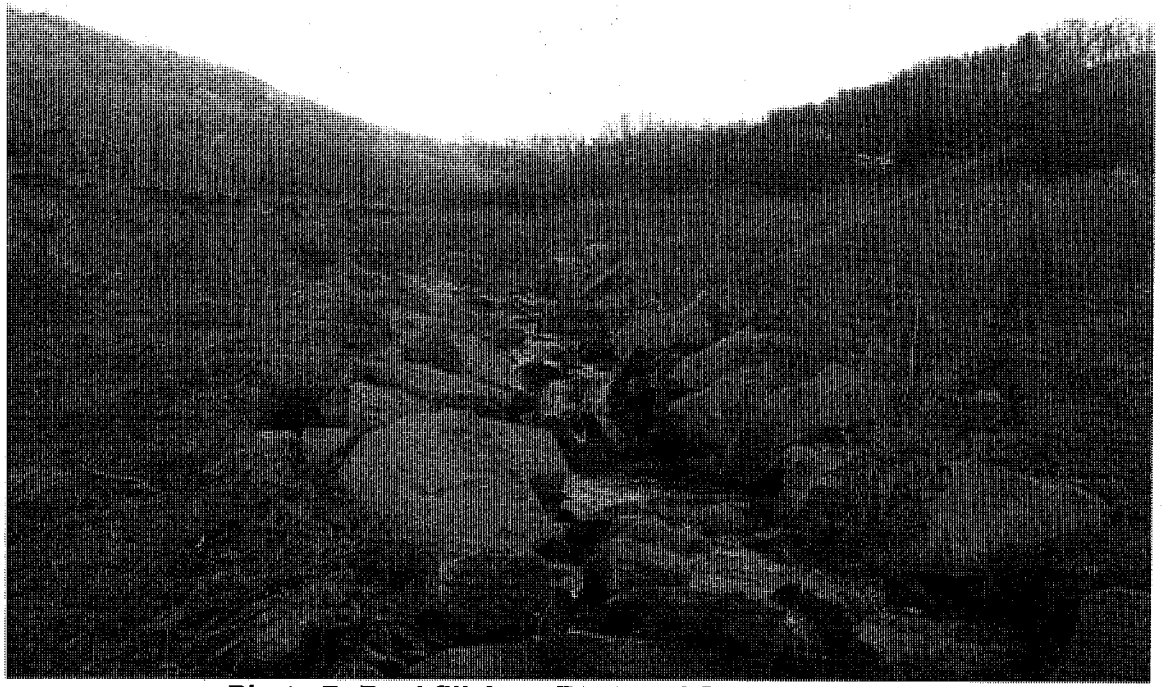


Photo 7: Backfill Area Restored Stream Channel

Side Drain

The EII score for the side drain area was 0.30. The habitat score was 115 and the conductivity level was 390. The total length of stream in this section was 549', therefore the EIUs in this reach total 164.7. This is on target to meet the performance measure at year 5.

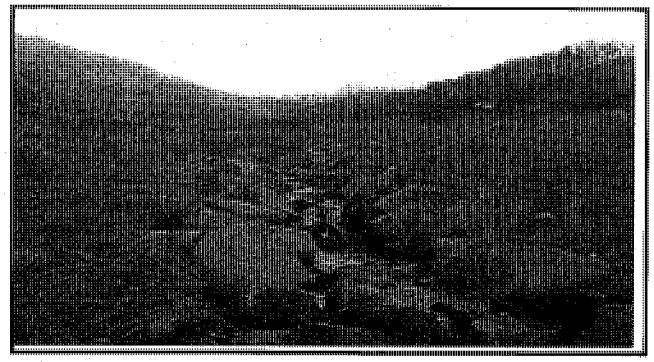
Photo 8: Stream Channel at Side Drain

EII Calculation for High Gradient Streams in Eastern Kentucky Coalfield (Version 2002.6)
****(Family Level Taxonomy - All Habitats)****

Project ID: [illegible]	
Stream Name:	Mine Area Above "B"
Assessment Objectives:	[illegible]

EII	Model
NA	Ecological Integrity Index (MBI + Habitat Integrity + Conductivity)
0.58	Ecological Integrity Index (Habitat Integrity + Conductivity)

Variables	Measure	Units
>>>>>>>	Enter quantitative or categorical measure from Field Data Sheet in shaded cells	
RBP Habitat Parameters		
1. Epifaunal Substrate		no units
2. Embeddedness		no units
3. Velocity/Depth Regime		no units
4. Sediment Deposition		no units
5. Channel Flow Status		no units
6. Channel Alteration		no units
7. Freq. Of Riffles (bends)		no units
8. Bank stability (both combined)		no units
9. Veg. Protection (both combined)		no units
10. Riparian Width (both combined)		no units
Total Habitat Score	112	no units
Habitat Integrity Index		Subindex 0.22
Macroinvertebrate Data - Family Level (All Habitats)		
11. Family Taxa Richness	0	# of taxa sampled
12. Family EPT Richness	0	# of EPT species sampled
13. % Ephemeroptera	0	% Mayflies (0-100)
14. % Chironomidae & Oligochaeta	0	% Midges & Worms (0-100)
15. mFBI	0	no units
Macroinvertebrate Bioassessment	NA	no units NA
Conductivity	170	microMBOs 0.94



EII Calculation for High Gradient Streams in Eastern Kentucky Coalfield (Version 2002.6)
****(Family Level Taxonomy - All Habitats)****

Project ID: [illegible]
Stream Name: [illegible]
Assessment Objective: EII EXISTING CONDITIONS

EII	Model
NA	Ecological Integrity Index (MBI + Habitat Integrity + Conductivity)
0.30	Ecological Integrity Index (Habitat Integrity + Conductivity)

Variables	Measure	Units
>>>>>>>	Enter quantitative or categorical measure from Field Data Sheet in shaded cells	
RBP Habitat Parameters		
1. Epifaunal Substrate	12	no units
2. Embeddedness	12	no units
3. Velocity/Depth Regime	12	no units
4. Sediment Deposition	12	no units
5. Channel Flow Status	12	no units
6. Channel Alteration	12	no units
7. Freq. Of Riffles (bends)	12	no units
8. Bank stability (both combined)	12	no units
9. Veg. Protection (both combined)	12	no units
10. Riparian Width (both combined)	12	no units
Total Habitat Score	115	no units
Habitat Integrity Index		0.25
Macroinvertebrate Data - Family Level (All Habitats)		
11. Family Taxa Richness	0	# of taxa sampled
12. Family EPT Richness	0	# of EPT species sampled
13. % Ephemeroptera	0	% Mayflies (0-100)
14. % Chironomidae & Oligochaeta	0	% Midges & Worms (0-100)
15. mFBI	0	no units
Macroinvertebrate Bioassessment	NA	no units
		NA
Conductivity	390	microMHOs
		0.35

Table 1. Monitoring parameters, success standards, method of determination and 2011 monitoring result

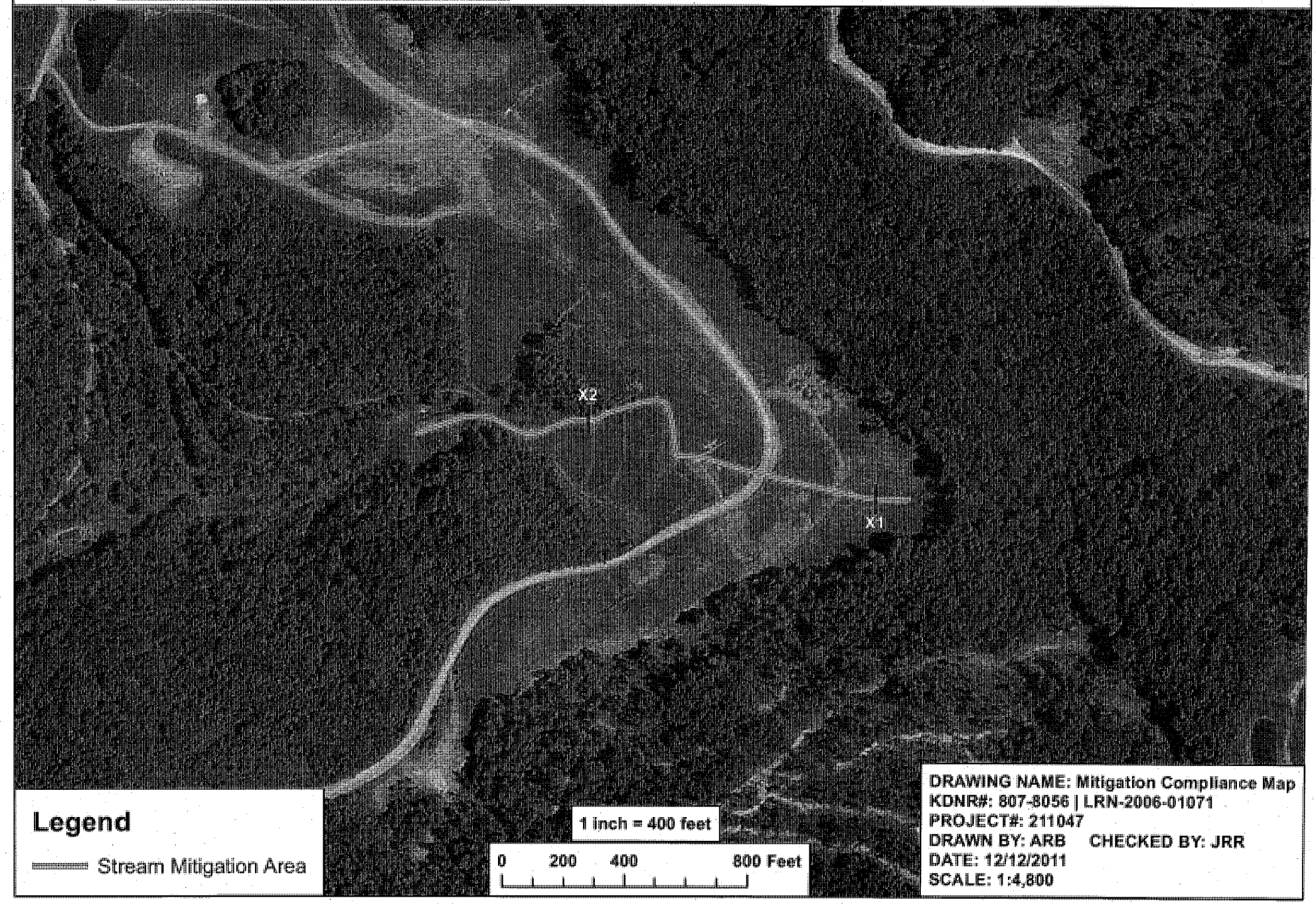
Parameter / Observation	Success Standards	Method of Determination	2011 Assessment Backfill Area Above HF1	2011 Assessment HF 1 (Year 1)	Projected Scores (Year 5)
	Water Quality				
Field pH	Report Only	Field Meter	8.66 pH (S.U.)	8.28 pH (S.U.)	Report Only
Specific Conductance	Report Only	Field Meter	170 µS/cm (AVG.)	390 µS/cm (AVG.)	Report Only
Dissolved Oxygen	Report Only	Field Meter	5.47 mg/L	5.26 mg/L	Report Only
Habitat Assessment					
Epifaunal Substrate	Minimum 70% favorable substrate	Pebble count; estimate of available	11	13	13
Embeddedness	Maximum 20% embeddedness	Pebble count; measure embeddedness	14	15	17
Velocity / Depth Regime	Maintain step-pool or riffle-pool sequences similar to approved plans	Longitudinal profile	10	11	12
Sediment Deposition	Little or no enlargement of islands or point bars and <5% of the bottom affected by sediment deposition	Pebble counts in pools	14	10	17
Channel Flow Status	Maintain width/depth ratio similar to accordance with plans	Determine from X-sections	14	12	17
Channel Alteration	Maintain minimal channelization similar to approved plans	Longitudinal profile; X-sections	1	4	15

Frequency of Riffles	Maintain step-pool or riffle-pool sequences similar to approved plans	Longitudinal profile	16	16	20
Bank Stability	Banks stable	Bank Erosion Index; Observe density & depth of plant roots near bank shear stress	16	15	18
Vegetative Protection	Approved width or riparian zone planted with minimum 300 stems/ acre surviving	Measure replanted width; estimated stem count	9	11	12
Riparian Zone	Riparian zone with a variety of species alive and healthy	Measure replanted width; estimated stem count	6	8	14

Appendix A: Plan-View

BIOLOGICAL SYSTEMS
CONSULTANTS, INC.

Nally & Hamilton Enterprises, Inc.
2011 USACE Mitigation Compliance



Legend

Stream Mitigation Area

1 inch = 400 feet

0 200 400 800 Feet

DRAWING NAME: Mitigation Compliance Map
KDNR#: 807-8056 | LRN-2006-01071
PROJECT#: 211047
DRAWN BY: ARB CHECKED BY: JRR
DATE: 12/12/2011
SCALE: 1:4,800

Appendix B: Pebble Count Spreadsheet

807-8056

HF1

Site: Date: 12/9/11

Location: HUC:

Party: N + 14

Inches	PARTICLE	Millimeters		Dot Count for RIFFLE 1	POOL 2	COMP. 3	RIFFLE (1) TOT #	RIFFLE (1) ITEM %	RIFFLE (1) % CUM	POOL (2) TOT #	POOL (2) ITEM %	POOL (2) % CUM	COMPOSITE (3) TOT #	COMPOSITE (3) ITEM %	COMPOSITE (3) % CUM
							Reach:			Reach:			Reach:		
							Date:			Date:			Date:		
	Silt / Clay	< .062	S/C										4		
	Very Fine	.062 - .125	SAND												
	Fine	.125 - .25													
	Medium	.25 - .50													
	Coarse	.50 - 1.0													
.04 - .08	Very Coarse	1.0 - 2											6		
.08 - .16	Very Fine	2 - 4	GRAVEL												
.16 - .22	Fine	4 - 5.7											8		
.22 - .31	Fine	5.7 - 8											10		
.31 - .44	Medium	8 - 11.3											14		
.44 - .63	Medium	11.3 - 16											32		
.63 - .89	Coarse	16 - 22.6											34		
.89 - 1.3	Coarse	22.6 - 32											36		
1.3 - 1.8	Very Coarse	32 - 45											39		
1.8 - 2.5	Very Coarse	45 - 64											44		
2.5 - 3.5	Small	64 - 90	COBBLE										48		
3.5 - 5.0	Small	90 - 128											50		
5.0 - 7.1	Large	128 - 180											63		
7.1 - 10.1	Large	180 - 256											73		
10.1 - 14.3	Small	256 - 362	BOULDER										91		
14.3 - 20	Small	362 - 512											101		
20 - 40	Medium	512 - 1024													
40 - 80	Large-Vry Large	1024 - 2048													
	Bedrock		BDRK												

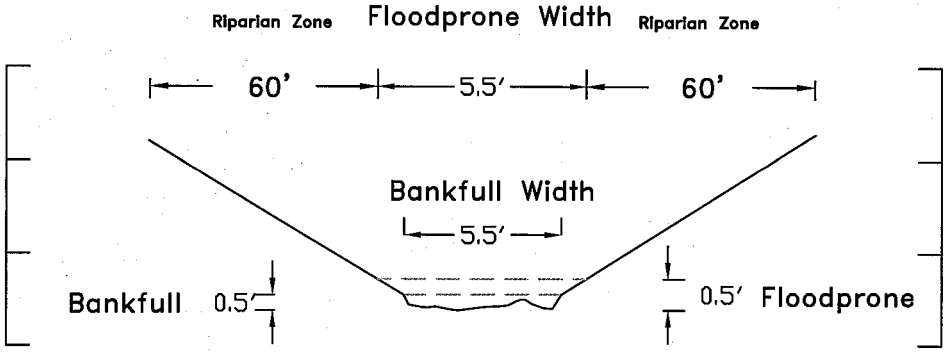
Stream Type: A1 + Valley Type: TOTAL→

BSC #9-1104-7

Appendix C: Cross-Sections

Cross–section X–1

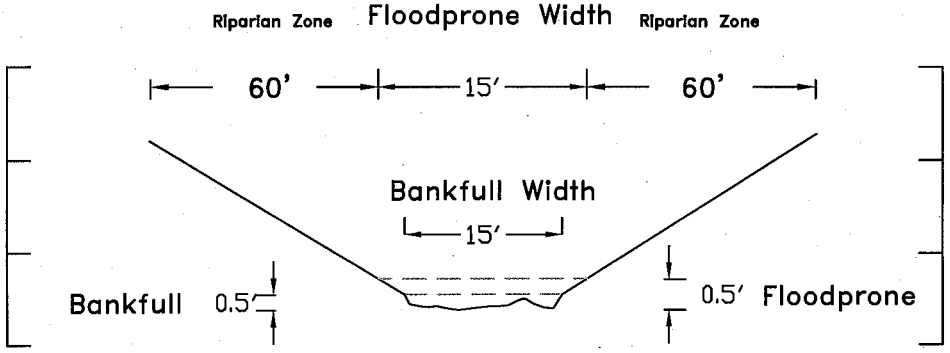
Mine Area



Cross–Section Area = 2.75 sq. ft

Cross–section X–2

Hollowfill Side Drain



Cross–Section Area = 7.5 sq. ft

NOT TO SCALE