

Stream Habitat Assessment and Wetland Delineation Report

**Joes Run Mine Site
Daviess County, Kentucky**

Prepared for:

Western Kentucky Minerals

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I. INTRODUCTION

Introduction

This report is a description of streams and wetlands located within a 131.9 acre study area in Daviess County, Kentucky. Information contained within this document was compiled for the purpose of identifying potential environmental impacts that may be associated with a future coal mining operation. The report will focus on the physical assessment of streams and wetlands. The documentation of existing conditions will aid in determination of the amount of mitigation that will be required for potential impacts on jurisdictional waters of the United States.

The data presented in this report is based upon field investigation, general research, and information supplied by Western Kentucky Minerals, Inc. Information gathered is summarized, supported or illustrated by tables and exhibits. The exhibits and appendix include the following: project vicinity map, aerial map, National Wetlands Inventory map, soils map, USGS topographic quadrangle, floodplain map, cross sections of larger streams, stream habitat assessment forms, wetland delineation forms, and photographic documentation.

Location

The proposed permit study area is located approximately 10 miles east of Owensboro, Kentucky, in Daviess County (Maceo and Philpot USGS 7.5 minute topographic quadrangles), with its center at Latitude: 37° 45' 18" N, Longitude: 86° 53' 22" W. The site can be accessed from Aull Road, off KY 144 east of Owensboro. See Exhibit 1 for project location.

Background and Description

Topography in the area generally consists of wide valley bottoms, with some mild relief and a hilly area to the south. The 131.9 acre study area predominantly consists of agricultural lands, with a block of forest at its southern-most extent (approximately 29.4 acres size), and some canopy along streams. The forest age ranges from mature, second-growth forest to young forest comprised of saplings and thick undergrowth. Dominant tree species include maple species, oak species, sycamore, and sweetgum.

Purpose of Project

The purpose of the project is for Western Kentucky Minerals to establish a surface coal mine operation.

II. STREAM ASSESSMENT AND WETLAND DELINEATION METHODS

Streams

The Environmental Protection Agency's (EPA) *Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers* (1999) was used to assess intermittent and perennial streams in the permit area. Rapid Bioassessment Protocol (RBP) high gradient or low gradient field data sheets were completed for each stream. Documentation for each stream also includes photographs, location, typical cross-section, and total length. The protocol matrix used to assess habitat quality is based on key physical characteristics of the water-body and surrounding land, particularly the catchment of the site under investigation. Habitat is defined as the quality of in-stream and riparian habitat that influences the structure and function of the aquatic community in a stream. This matrix provides an effective means of evaluating and documenting habitat quality at each site. Habitat parameters evaluated are related to overall aquatic life use and are a potential source of limitation to aquatic biota. Site selection for assessment was based upon a probabilistic approach to provide information about the overall status or condition of each site (Barbour, et al. 1999).

For this report, assessments focus on the matrix in which physical characteristics of each stream are evaluated on 10 parameters with scales from 0 to 20, in which 20 represents a pristine situation. Parameters address characteristics including substrate, flow regime, sediment deposition, and riparian zone quality, among others. The potential score for a pristine evaluation is 200 total, but a high habitat assessment score can still represent a poor stream when taking into account conductivity, which contributes to overall ecological integrity.

In addition, each stream was classified by "type", according to the Rosgen methodology, based on various geomorphic parameters (entrenchment ratios, width to depth ratios, slope, etc.) taken from cross-section and contour information.

Stream lengths, channel locations and limits were determined in the field utilizing manual measuring techniques including range finding, pacing, global positioning, and verification of mapping. Stream flow was determined in the field based upon stream status at the time of visit. The final determination of stream quantity and jurisdiction will be decided by the United States Army Corps of Engineers (USACE). USGS mapping was used to determine drainage areas for the streams, making those measurements approximate. See the appendix for stream assessment (RBP) forms and photographs.

Wetlands

The project area was evaluated for the presence of wetland characteristics during July, 2012. See Table 2 for a summary of wetland information. On-site wetland determinations were conducted using criteria outlined in the 2010 USACE's *Draft Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region*. Hydrology, vegetation, and soils were evaluated. Soil characteristics were identified using soil borings, dug pits, and a Munsell soil color chart. Wetland boundaries were defined in the field, surveyed using a hand-held global positioning unit and transferred to project mapping in order to determine approximate wetland areas. Data on soils were taken from the Natural Resources Conservation Service's Web Soil Survey (USDA 2009) and the Soil Survey of Daviess County, Kentucky (USDA). The National Wetland Inventory (NWI) geospatial data for the Maceo and Philpot Quadrangles (U.S. Fish and Wildlife Service) was examined for existing Cowardin classifications (Cowardin et al. 1979). The Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map was consulted for floodplain boundaries. Refer to Exhibits 2 and 3 for locations of delineated wetlands on project mapping. See the appendix for Wetland Delineation Forms and photographs.

III. EXISTING CONDITIONS

Streams

There is one perennial stream, four intermittent streams, and eight ephemeral streams located within the proposed corridor; identified on Exhibits 2 and 3. Refer to Table 1 for a summary of the stream information, which includes RBP scores, conductivity readings where available, stream flow regime type, and drainage area.

Stream Assessments – Perennial

Perennial Stream 1 (P-1) is the downstream section of a stream that runs through the middle of the study boundary in a southwest direction, from boundary to boundary. P-1 flows southwest for approximately 1222 feet to the boundary limit, where the streams drainage area is 1552.4 acres. The stream bottom width was approximately 1.0 foot, while the bankfull width was around 11.0 feet. The current bottom width size is somewhat misleading, since it appears a new channel is forming within a much larger existing incised/entrenched channel bottom.

The EPA stream habitat assessment (Low Gradient) for this stream section indicates a epifaunal substrate/available cover score in the high marginal range. The substrate consists

predominantly of silt/clay size material, with some gravel sizes in the riffles. Streambed morphology consists of long runs, with short riffle and pool sections (the majority of the pools being large and/or deep). At the time of assessment, flow was utilizing over 75 percent of the channel bottom. There was evidence of moderate deposition of new fine material, affecting 50 to 80 percent of the bottom. Some past channelization may have occurred, but no recent evidence was found. The sinuosity ranked as high marginal. Bank stability scored in the poor range for the left bank, with obvious erosion problems present, and low marginal for the right bank. This stream is very incised/entrenched. Vegetative protection scored from marginal (left bank) to suboptimal (right bank). The riparian zone width scored low suboptimal.

P-1 has a total habitat score of 94, corresponding to a stream quality rating of marginal. A conductivity reading was taken, yielding 1530 μ S. P-1 is classified, according to Rosgen methodology, as an "F6" type stream.

Stream Assessments – Intermittent

Intermittent Stream 1 (I-1) is the section of stream upstream of P-1, and flows southwesterly for approximately 3499 feet. It has a drainage area of 496.0 acres at the perennial section (also the point of confluence of I-3 with I-1). The stream has a bottom width ranging from approximately 1.0 to 6.0 feet, and a bankfull width from 2.0 to 10.0 feet; upstream to downstream. It should be noted that the stream is very incised/entrenched throughout. Due to its length, I-1 was assessed in three locations, and noted as upstream, midstream, and downstream.

The EPA stream habitat assessment (Low Gradient) for the upstream section (I-1US) indicates a epifaunal substrate/available cover score in the marginal range. The substrate consists of silt/clay size material. Streambed morphology consists of only long runs. At the time of assessment, there was little flow in the channel. There was evidence of moderate deposition of new fine material. There was evidence of past channelization, but no recent evidence was found (this stream segment starts at a culvert under Aull Road and runs through pasture). Sinuosity scored in the poor range. Bank stability scored in the low marginal (moderately unstable) range for both banks, with obvious erosion problems present. Vegetative protection scored in the high marginal to low suboptimal range, while the riparian zone width scored poor (due to agricultural practices).

The stream habitat assessment (Low Gradient) for the midstream section (I-1MS) indicates a epifaunal substrate/available cover score in the low suboptimal range. Again, the

substrate consists of only silt/clay size material. Streambed morphology consists of equal runs and pool sections (some large and/or deep pools present). At the time of assessment, flow was utilizing over 75 percent of the channel bottom. There is evidence of moderate deposition of new fine material. Evidence of past channelization is present, but no recent evidence was found (segment runs straight through agricultural lands, with sinuosity scoring in the poor range). Bank stability scored as moderately stable for both banks, with infrequent areas of erosion present. Vegetative protection scored in the marginal range, while the riparian zone width again scored poor (due to agricultural practices).

The stream habitat assessment (Low Gradient) for the downstream section (I-1DS) indicates a epifaunal substrate/available cover score in the marginal range. The substrate consists of mostly silt/clay size material, with some traces of gravel present. Streambed morphology consists of long runs and very short pool sections (mostly shallow). At the time of assessment, flow was not utilizing much of the wide channel bottom. There is little evidence of deposition of new fine material in this reach. Again, there is evidence of past channelization, but nothing recent was found (this segment continues straight through agricultural lands, with sinuosity scoring in the poor range). Bank stability scored as moderately unstable for both banks, with areas of erosion present. Vegetative protection scored in the marginal range, while the riparian zone width once again scoring poor (due to agricultural practices).

I-1 has an average total habitat score of 67, corresponding to a stream quality rating in the low marginal range. A conductivity reading 560 μS was taken. Intermittent I-1 is classified, upstream to downstream, as an "F6", "F6", and "G6" type stream.

Intermittent Stream 2 (I-2) is located along the southwestern boundary of the study area, and flows south for approximately 1720 feet within the boundary. It has a drainage area of 422.4 acres at the boundary limit. The stream is also incised/entrenched, with a new channel forming within an older channel. The stream has a bottom width of around 1.5 feet, and a bankfull width of 8.0 feet.

The habitat assessment (Low Gradient) for I-2 indicates the epifaunal substrate/available cover scored in the suboptimal range. The streambed morphology consists of short riffles and runs, with longer pool sections. The substrate in the riffles and runs consisted of silt/clay and gravel size material, while pools appeared to be only silt/clay material. At the time of assessment, little flow was utilizing the channel bottom (flow controlled upstream off-site by an impoundment). There was evidence of moderate deposition of new fine material, affecting 50 to 80 percent of the bottom. Past channelization may have occurred, resulting in the sinuosity score being in the low suboptimal range. Bank stability scored as moderately unstable, with 30

to 60 percent of the banks having areas of erosion. The vegetative protection score was in the suboptimal range, while the riparian zone width scored in the poor range due to agricultural practices (narrow band of trees left along the banks).

I-2 has a total habitat score of 87, corresponding to a stream quality rating of marginal. A conductivity readings was not taken. I-2 is classified, according to Rosgen methodology, as an “F6” type stream.

Intermittent Stream 3 (I-3) is located in the southern portion of the study area and is a tributary to P-1. It flows southwest for approximately 684 feet within the study boundary. It has a drainage area of 601.6 acres at its confluence with P-1. The stream has a bottom width of 3.0 feet, and a bankfull width of 9.0 feet. This stream is very incised/entrenched.

The habitat assessment (Low Gradient) for I-3 indicates the epifaunal substrate/available cover scored in the low suboptimal range. The substrate is a mix of silt/clay, gravel, and cobble size material in runs and silt/clay only in pools. The streambed morphology consists of long runs, and short pool sections. At the time of assessment, flow was present in over 75 percent of the channel bottom. There was moderate deposition of new fine material, affecting 50 to 80 percent of the bottom. Evidence of past channelization is present, which resulted in the sinuosity score being in the high poor range. Bank stability scored in the low marginal range (moderately unstable), with areas of erosion evident. The vegetative protection was found to be marginal to suboptimal, while riparian zone width scored in the poor range.

I-3 has a total habitat score of 75, corresponding to a stream quality rating of marginal. The conductivity reading was 228 μ S. Stream I-3 is classified, according to Rosgen methodology, as a “G6” type stream.

Intermittent Stream 4 (I-4) is also located in the northern portion of the study area, and is a tributary to I-1. It flows south for approximately 1113 feet within the study boundary, with a drainage area of 69.8 acres at its confluence with I-1. The stream has a bottom width of 1.0 feet, and a bankfull width of 2.5 feet.

The EPA habitat assessment (Low Gradient) for I-4 indicates the epifaunal substrate/available cover scored in the marginal range. The substrate consists of only silt/clay size material. The streambed morphology consists of equal runs and pool sections. At the time of assessment, flow covered the channel bottom. There was moderate deposition of new fine material. Evidence of extensive past channelization is present, which may have resulted in the sinuosity score being in the low marginal range. Bank stability scored in the marginal range (moderately unstable), with 30 to 60 percent of banks having areas of erosion. The vegetative protection was found to be suboptimal, while riparian zone width scored in the poor range.

I-4 has a total habitat score of 84, corresponding to a stream quality rating of marginal. The conductivity reading was 670 μ S. Stream I-4 is classified, according to Rosgen methodology, as a “G6” type stream.

Stream Assessments - Ephemeral

The remaining 8 streams are ephemeral in nature and occur primarily in the northern and southern extents of study boundary area. For purposes of discussion, they have been divided into two groups based on drainage area (which generally reflects the length and character of the stream). The following descriptions/characterizations will address streams with drainage areas up to 10 acres and those greater than 10 acres.

There are the five streams with **drainage areas up to 10 acres (E-1, 2, 3, 4, and 8)**. The average length is 256 feet, the average bottom width is 1.1 feet, and the average bankfull width is 2.6 feet.

The EPA stream habitat assessment indicates an average score for epifaunal substrate/available cover being in the mid marginal range. The substrate consists of silt/clay sizes only, which provides little for habitat. Streambed morphology is runs only. During the assessments there was little to no flow in the channels. Typically, some new deposition of fine material was found. There was evidence of some past channelization, but nothing recent. This relates to the low sinuosity scoring. The average score for bank stability indicates they are between the low suboptimal range (moderately stable) and high marginal range (moderately unstable). Vegetative protection scores averaged to be in the high marginal range. The riparian zone width averaged in the suboptimal range, but scores varied greatly between streams and was dependant on their association with agricultural practices. The average total habitat score for these streams was 81, which corresponds to a stream quality rating of marginal. No conductivity readings were taken (limited due to dry conditions). Three of these streams were Rosgen “B6” type streams (E-1, 2, and 3) with “G6” types for the other two.

There are three streams with **drainage areas of greater than 10 acres (E-5, 6, and 7)**. The average length is 493 feet, the average bottom width is 1.2, and the average bankfull width is 2.4 feet.

The stream habitat assessment indicates an average score for epifaunal substrate/available cover also in the mid marginal range. These streams also had substrate that consisted only of silt/clay material. Again, the streambed morphology consisted of runs only. During the assessments there was little to no flow in the channels. Average scores

indicate some new deposition of fine material was found. There was evidence of some past channelization, but not recent; with sinuosity typically in the poor range. The average score for bank stability indicates they are in the low marginal range (moderately unstable). Average vegetative protection scores lie between marginal and suboptimal. The riparian zone width was typically in the poor range; dependant on their association with agricultural practices. The average total habitat score for these streams was 68, which also corresponds to a stream quality rating of marginal. There were no conductivity readings were taken. These streams were all found to be "F6" or "G6" class streams.

Wetlands

Approximately 0.888 acres of wetland area occur within, or adjacent to, the study area boundary. Of the potential sites investigated, only three appear to meet wetland criteria pursuant to the USACE 1987 Delineation Manual and 2010 Regional Supplement. These wetlands sites are spread throughout the site and are associated with stream floodplains. Refer to Exhibits 2 and 3 for locations of delineated wetlands, the appendix for photographs, and Table 2 for the summary of wetland information. Descriptions of the delineated wetlands follow this paragraph. It should be noted that although the areas are referred to as wetlands, these determinations are assigned pending final USACE verifications.

Wetland A is located at the southern study boundary and is a palustrine forested wetland (PFO1A) that is in the floodplain of Joes Run (P-1), but also receives flow from ephemeral streams E-1 and E-2. The wetland has a total area of 0.582 acres. The dominant tree stratum species are sweetgum (*L. styraciflua*), red maple (*A. rubrum*), and swamp chestnut oak (*Quercus michauxii*). The dominant sapling stratum species are pawpaw (*Asimina triloba*), green ash (*Fraxinus pennsylvanica*) and blackgum (*Nyssa sylvatica*). The dominant herbaceous species are smartweed (*Polygonum aviculare*) and false nettle (*Boehmeria cylindrical*). The dominant vine species is trumpet vine (*Campsis radicans*). Hydrophytic vegetation is established by the rapid test. The soil has a silt-clay loam texture, with a gleyed matrix color of 10 YR 6/2, and redox feature of 10 YR 5/6 from 0.5 to 6 inches and a matrix color of 10 YR 5/3 from 6 to 10 inches.. The soil belongs to the Belknap silt loam series, and has a slope of less than 2 percent. The presence of water-stained leaves is a primary indicator of wetland hydrology; while drainage patterns, and crayfish burrows are secondary indicators.

Wetland B is an old dry pond that is now characterized as a palustrine emergent wetland (PEM1H) that is temporarily flooded. The wetland has a total area of 0.084 acres, and

drains to Joes Run. The dominant vegetation within the sapling stratum consists of black willow (*Salix nigra*). A few red maple and sweetgum also occur here. The dominant herbaceous species is switchgrass (*Panicum dichotomiflorum*), but some rushes are present along the edge. Hydrophytic vegetation is established by the rapid test. The soil has a silt-clay loam texture, with a gleyed matrix color of 10 YR 5/2 and a redox feature of 10 YR 5/6 from 0 to 6 inches; and a matrix color of 10 YR 6/1 and a redox feature of 10 YR 4/6 from 6 to 10 inches. The soil belongs to the Belknap silt loam series, and has a slope of less than 2 percent. The presence of surface soil cracks, a concave surface, and crayfish burrows are indicators of wetland hydrology.

Wetland C is a palustrine emergent wetland (PEM1A) that drains to Joes Run and is temporarily flooded. The wetland has a total area of 0.222 acres. The dominant herbaceous species are rushes (*Juncus effusus*), fox sedge (*Carex vulpinoidea*), and Franks sedge (*Carex frankii*). The soil has a silt-clay loam texture, with a uniform gleyed matrix color of 10 YR 5/2 and a redox feature of 5 YR 4/6 from 0 to 10 inches. The soil belongs to the Belknap silt loam series, and has a slope of less than 2 percent. The presence of a sparsely vegetated concave surface and crayfish burrows are secondary indicators of wetland hydrology.

V. REFERENCES

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VI. TABLES

Table 1. Summary of Stream Information

Table 2. Summary of Wetland Information

JOES RUN MINE SITE

Table 1: Summary of Stream Information

ID, (Class)	Latitude	Longitude	Habitat Score	Conductivity (μS)	Flow Regime	Stream Length (ft)	Drainage Area (ac)	Date Assessed
P-1, (F6)	37.75008	86.89247	94	1530	perennial	1222	1552.4	7/12/12
I-1DS, (G6)	37.75403	86.88908	65	---	intermittent	1580	496.0	7/12/12
I-1MS, (F6)	37.75636	86.88747	82	560	intermittent	1547		7/12/12
I-1US, (F6)	37.75892	86.88522	54	---	intermittent	372		7/13/12
I-2, (F6)	37.75367	86.89200	74	---	intermittent	1720	422.4	7/12/12
I-3, (G6)	37.75150	86.88967	75	228	intermittent	684	601.6	7/12/12
I-4, (G6)	37.76003	86.88539	84	670	intermittent	1113	69.8	7/13/12
E-1, (B6)	37.74828	86.89247	82	---	ephemeral	268	6.0	7/12/12
E-2, (B6)	37.74906	86.89225	88	---	ephemeral	216	1.4	7/12/12
E-3, B6)	37.74731	86.89072	85	---	ephemeral	198	2.7	7/12/12
E-4, (G6)	37.74703	86.89050	71	---	ephemeral	177	6.9	7/12/12
E-5DS, (F6)	37.75011	86.89117	66	---	ephemeral	371	21.8	7/12/12
E-5US, (G6)	37.74975	86.88994	56	---	ephemeral	461		7/12/12
E-6, (F6)	37.75794	86.88567	76	---	ephemeral	295	12.6	7/13/12
E-7, (F6)	37.75867	86.88664	73	---	ephemeral	352	20.4	7/13/12
E-8, (G6)	37.75714	86.88831	73	---	ephemeral	422	8.9	7/13/12
Perennial				Cumulative Total		1222		
Intermittent				Cumulative Total		7016		
Ephemeral				Cumulative Total		2760		

NOTE: I = Intermittent, E = Ephemeral, DS, MS, US = Stream Segments (Downstream, Mid-stream, and Upstream, respectively). Stream length studied may not reflect future impact lengths.

Table 2. Summary of Wetlands

Wetland	Classification	Total Area Studied (acres)	Connectivity (Yes/No)
Wet A	PFO1A	0.582	Yes
Wet B	PEM1A	0.084	Yes
Wet C	PEM1A	0.222	Yes
Total Wetlands Area Studied =		0.888	

The amount of wetland area studied may not reflect future impact area.

VII. EXHIBITS

Exhibit 1: Vicinity Map

Exhibit 2: USGS Topographic Map

Exhibit 3: Aerial Map

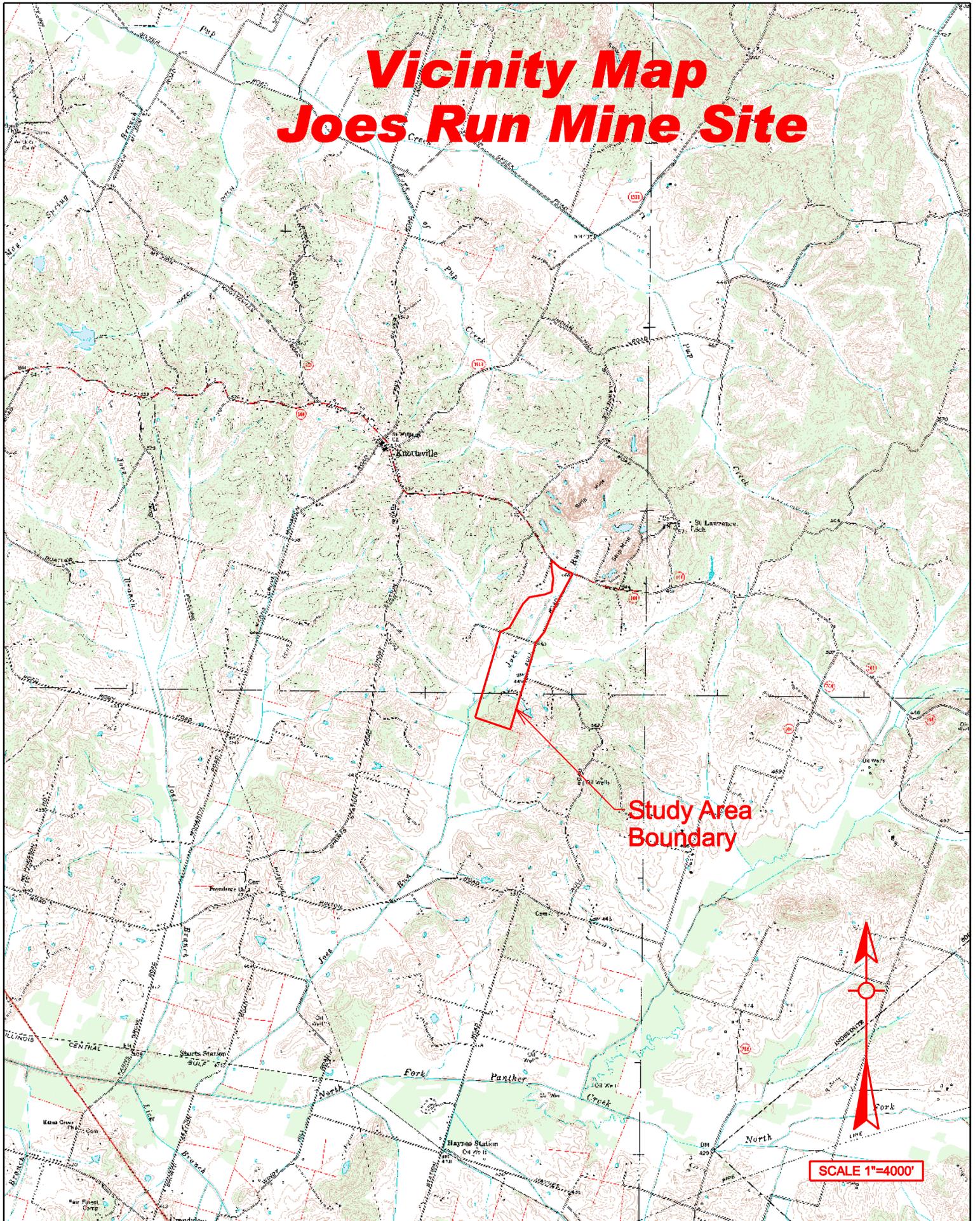
Exhibit 4: National Wetlands Inventory (NWI) Map

Exhibit 5: Soil Map

Exhibit 6: FEMA Flood Insurance Rate Map

Exhibits 7-10: Existing Stream Cross-sections

Vicinity Map Joes Run Mine Site



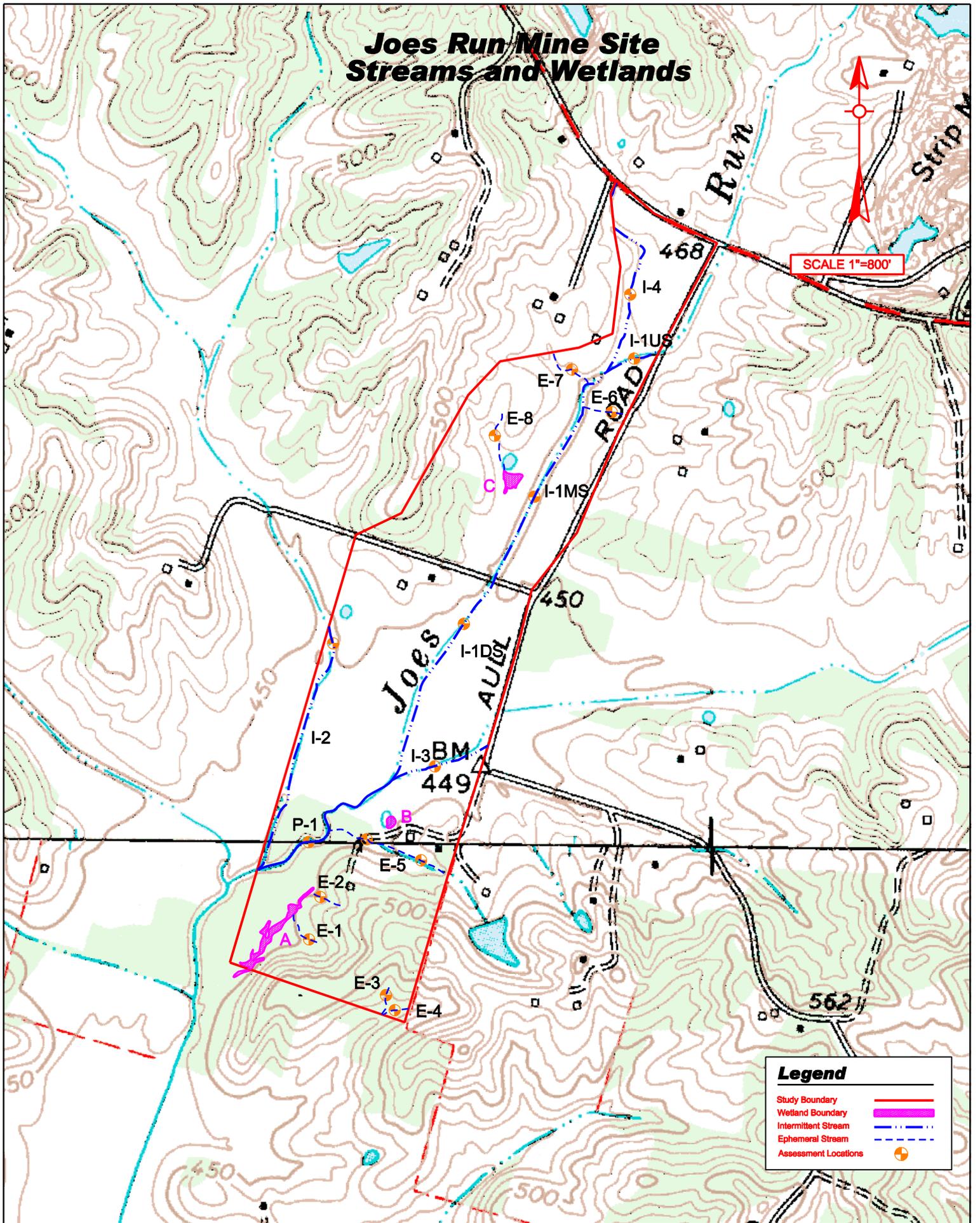
Study Area
Boundary

SCALE 1"=4000'

T.H.E. Engineers, Inc.	PROJECT: JOES RUN MINE SITE - STUDY BOUNDARY			STREAMS: UT'S TO NORTH FORK PANTHER CREEK	
	COUNTY: DAVIESS	STATE: KY	NEAR: KNOTTSVILLE	ITEM: VICINITY MAP	EXHIBIT 1

DATE:

Joese Run Mine Site Streams and Wetlands



SCALE 1"=800'

Legend

- Study Boundary ———
- Wetland Boundary ———
- Intermittent Stream - - - - -
- Ephemeral Stream
- Assessment Locations ●

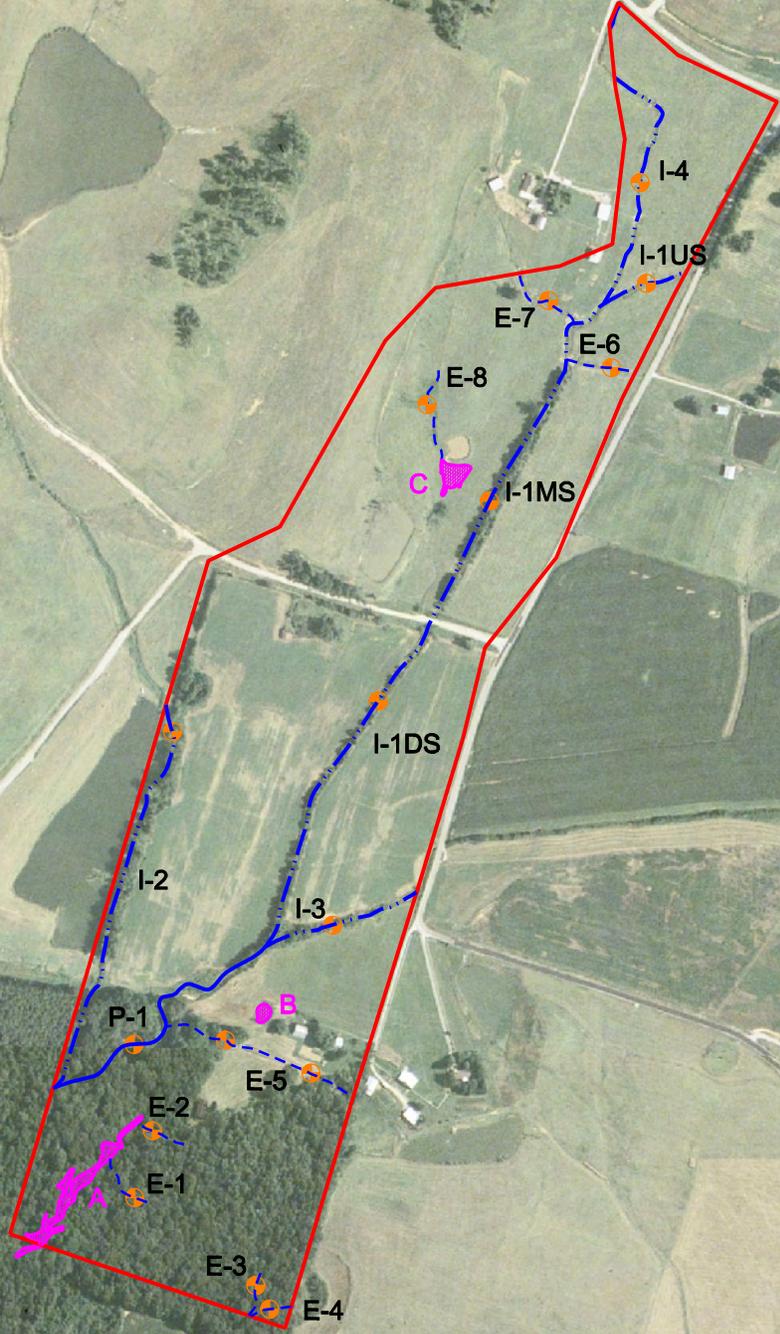
T.H.E. Engineers, Inc.	PROJECT: JOESE RUN MINE SITE - JURISDICTIONAL WATERS DELINEATION			UT's OF NORTH FORK PANTHER CREEK	
	COUNTY: DAVIESS	STATE: KY	NEAR: KNOTTSVILLE	ITEM: QUAD MAP	EXHIBIT 2

DATE:

Joes Run Mine Site Streams and Wetlands



SCALE 1"=800'

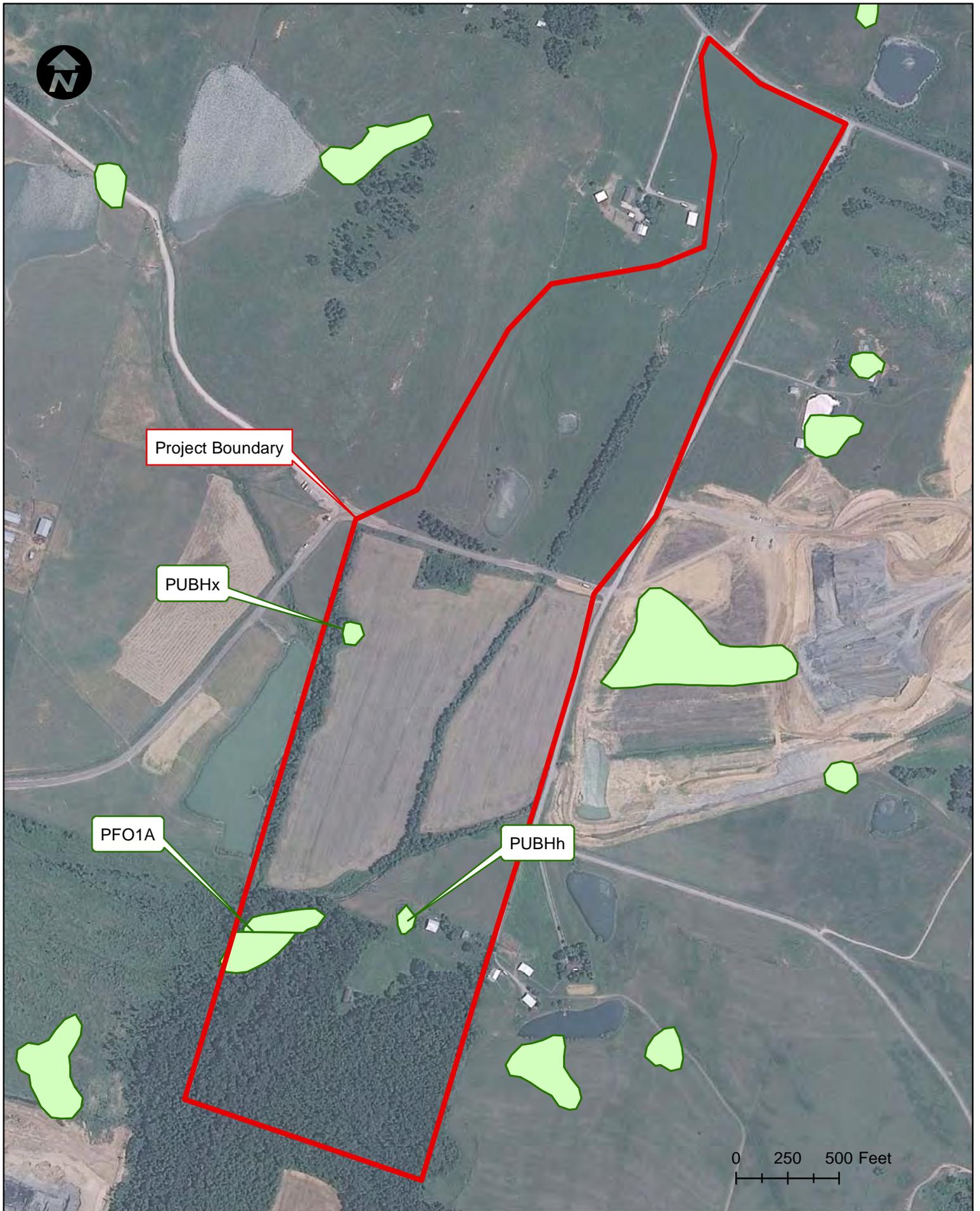


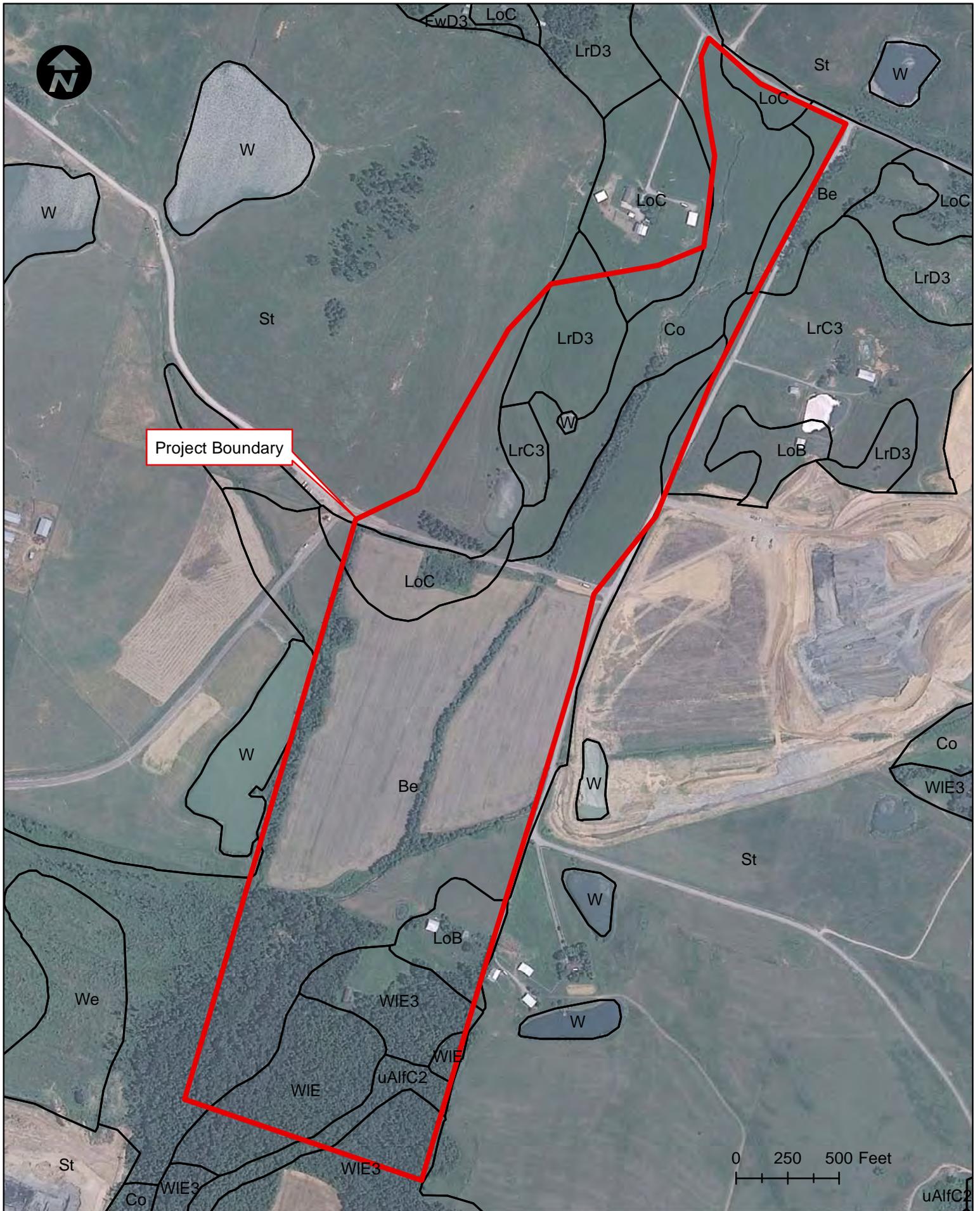
Legend

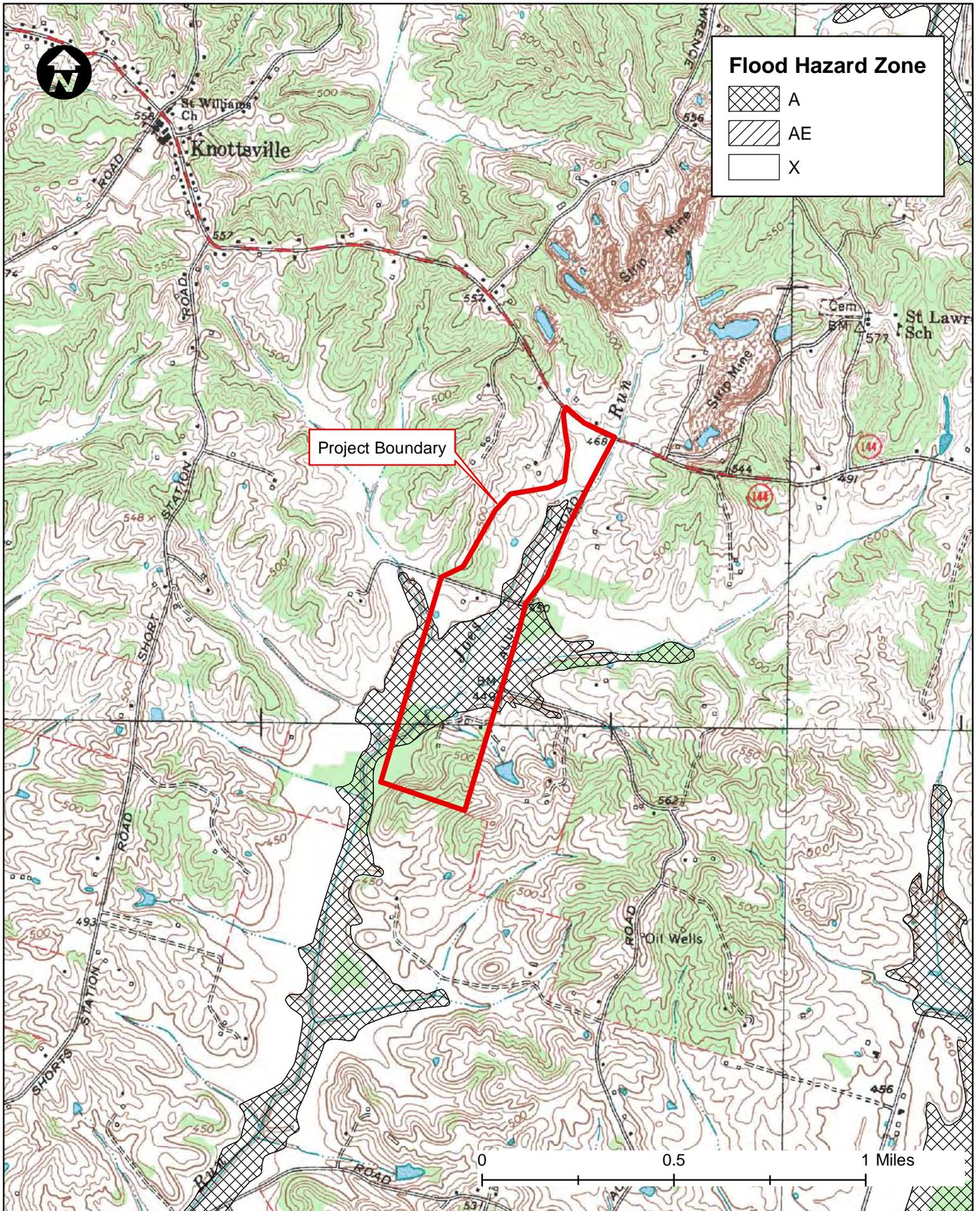
- Study Boundary ———
- Wetland Boundary - - - - -
- Intermittent Stream - · - · -
- Ephemeral Stream - · - · -
- Assessment Locations ●

T.H.E. Engineers, Inc.	PROJECT: JOES RUN MINE SITE - JURISDICTIONAL WATERS DELINEATION			UT's OF NORTH FORK PANTHER CREEK	
	COUNTY: DAVIESS	STATE: KY	NEAR: KNOTTSVILLE	ITEM: AERIAL MAP	EXHIBIT 3

DATE:

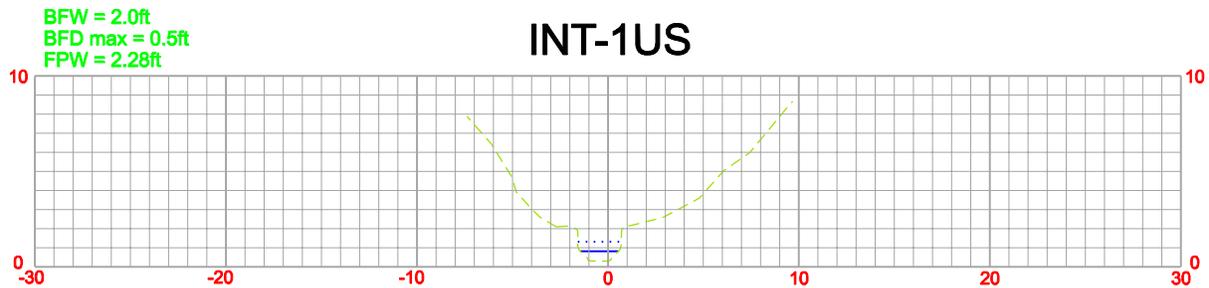
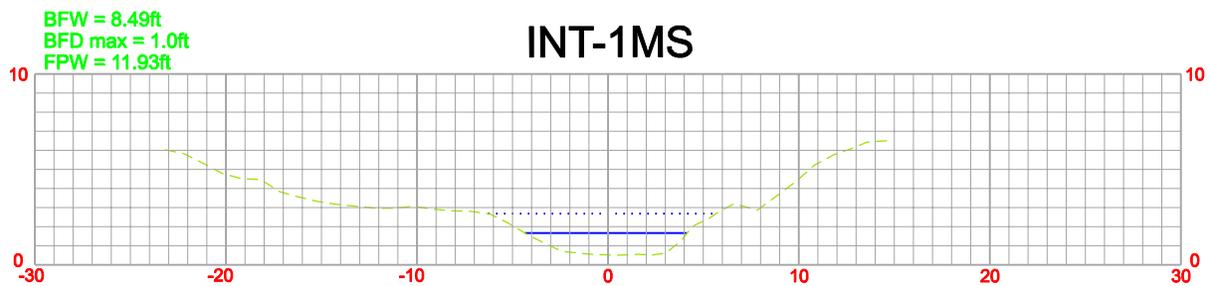
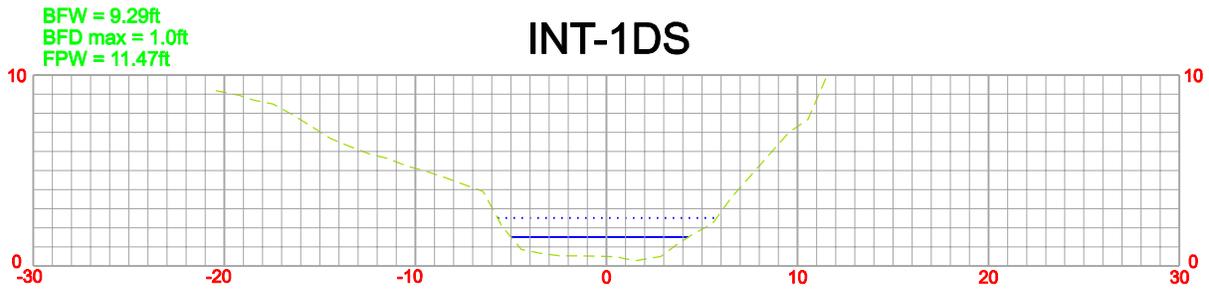
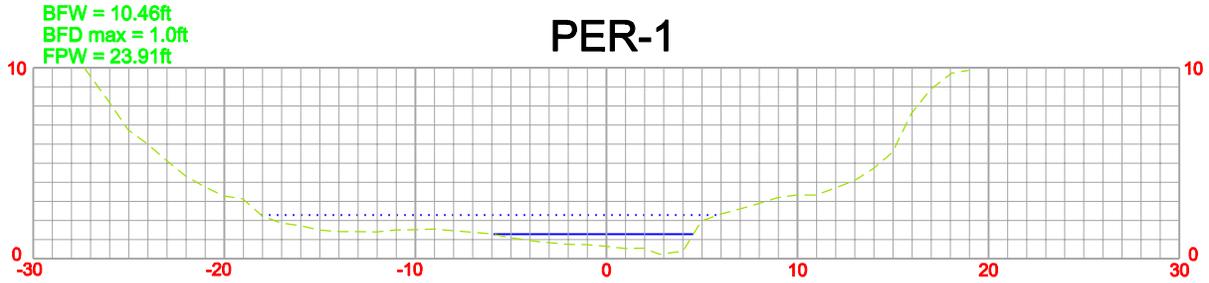






Existing Perennial (PER) & Intermittent (INT) Cross Sections

BF=Bankfull ——
 FP= Floodprone - - - -
 Existing Ground - - - -



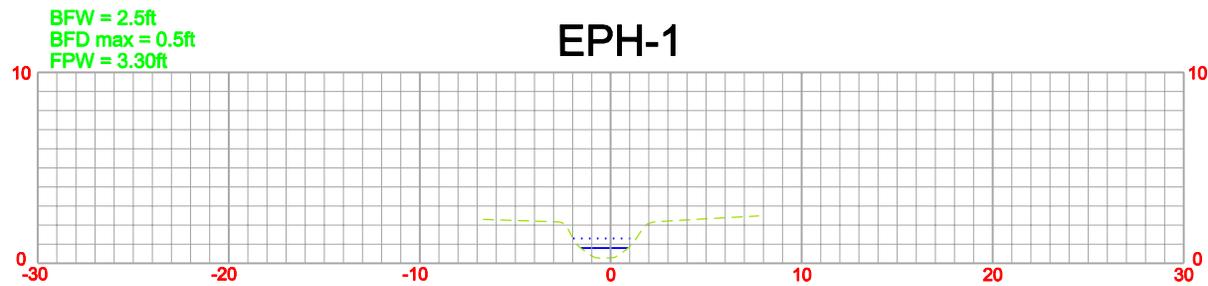
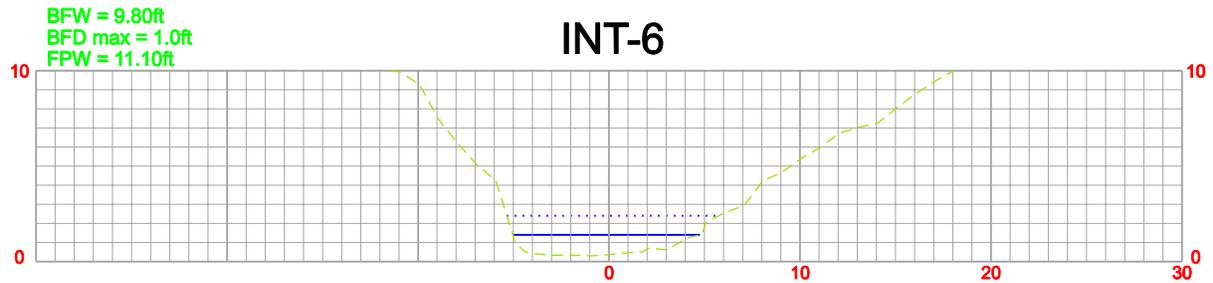
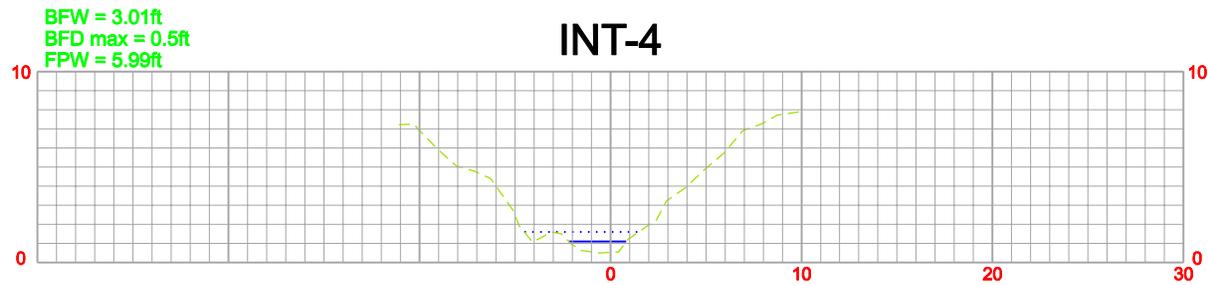
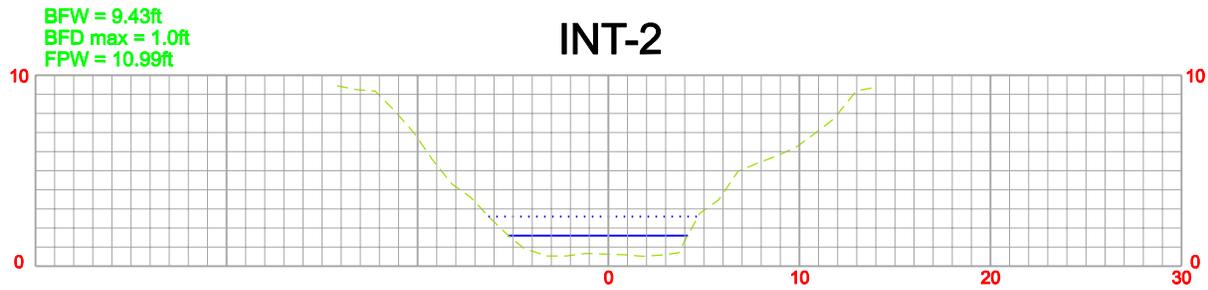
Cross Section Scale: 1"=10'

T.H.E. Engineers, Inc.	PROJECT: JOES RUN MINE SITE			STREAM:	
	COUNTY: DAVIESS	STATE: KENTUCKY	NEAR: KNOTTSVILLE	EXISTING CROSS SECTIONS	EXHIBIT 7

DATE:

Existing Intermittent (INT) & Ephemeral (EPH) Cross Sections

BF=Bankfull ——
 FP= Floodprone - - - -
 Existing Ground - - - -



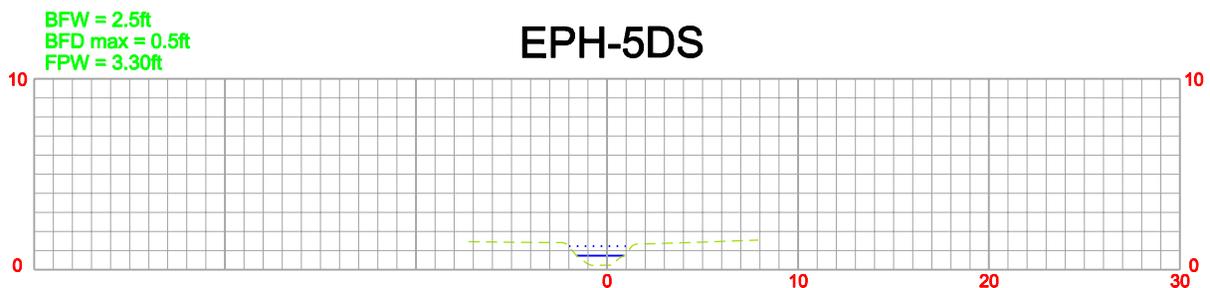
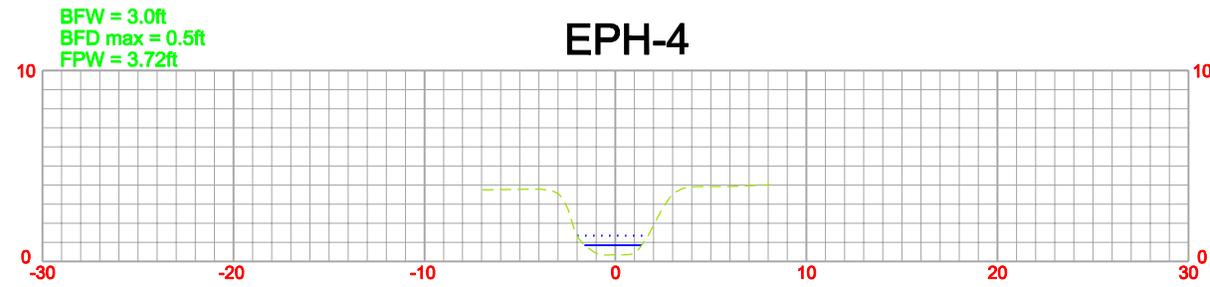
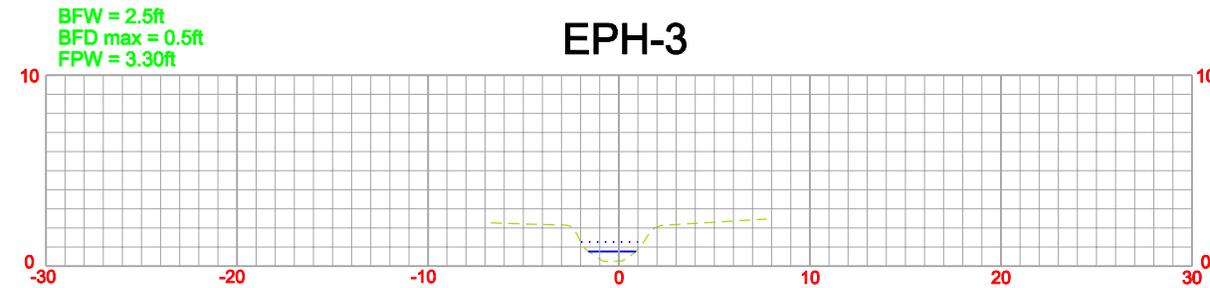
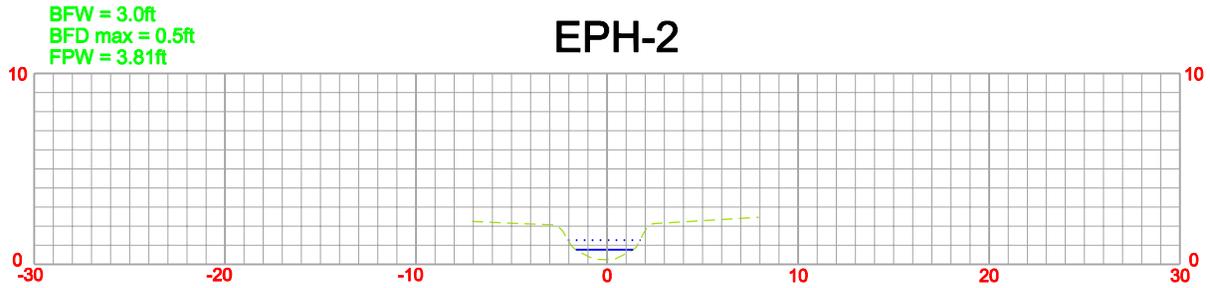
Cross Section Scale: 1"=10'

T.H.E. Engineers, Inc.	PROJECT: JOES RUN MINE SITE		STREAM:	
	COUNTY: DAVIESS	STATE: KENTUCKY	NEAR: KNOTTSVILLE	EXISTING CROSS SECTIONS
				EXHIBIT 8

DATE:

Existing Intermittent (INT) & Ephemeral (EPH) Cross Sections

BF=Bankfull ———
 FP= Floodprone
 Existing Ground - - - -



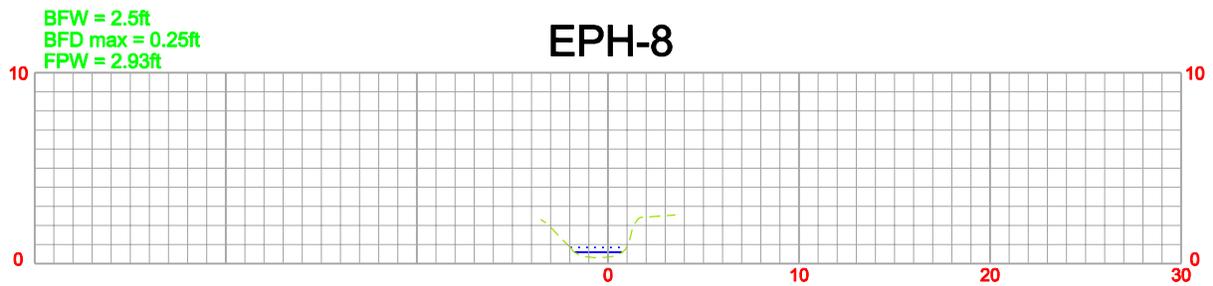
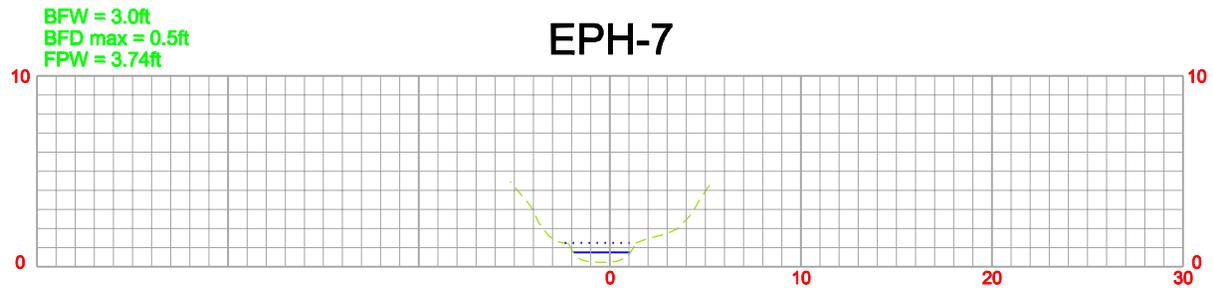
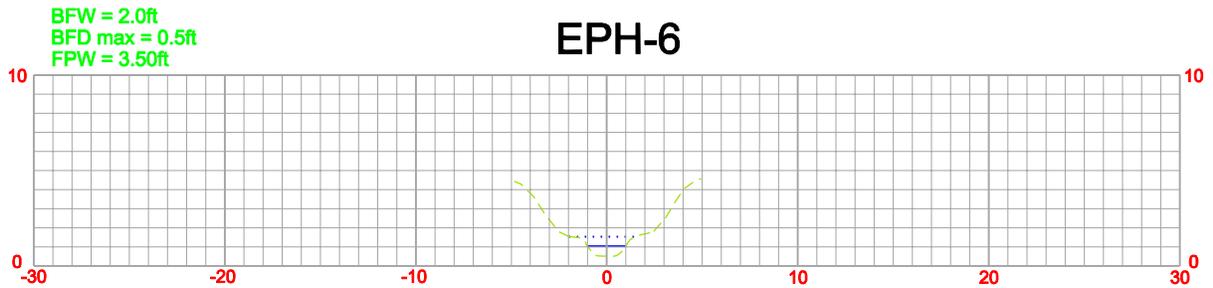
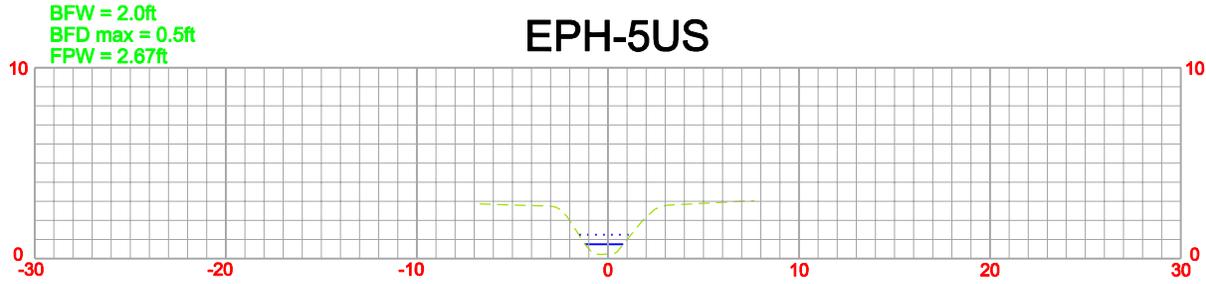
Cross Section Scale: 1"=10'

T.H.E. Engineers, Inc.	PROJECT: JOES RUN MINE SITE			STREAM:	
	COUNTY: DAVIESS	STATE: KENTUCKY	NEAR: KNOTTSVILLE	EXISTING CROSS SECTIONS	EXHIBIT 9

DATE:

Existing Intermittent (INT) & Ephemeral (EPH) Cross Sections

BF=Bankfull ——
 FP= Floodprone - - - -
 Existing Ground - - - -



Cross Section Scale: 1"=10'

T.H.E. Engineers, Inc.	PROJECT: JOES RUN MINE SITE			STREAM:	
	COUNTY: DAVIESS	STATE: KENTUCKY	NEAR: KNOTTSVILLE	EXISTING CROSS SECTIONS	EXHIBIT 10

DATE:

VIII. APPENDIX

- EPA Rapid Bioassessment Protocol Field Data Sheets
 - Photographs
- Wetland Delineation Forms
 - Photographs

Low Gradient Stream Data Sheet

STREAM NAME: <i>P-1 (Joels Run)</i>			LOCATION: <i>Joels Run Mine</i>		
STATION: <i>WP817</i>		DRAINAGE AREA (AC)	BASIN/WATERSHED: <i>Joe's Run North Fork Panther Creek / Green River</i>		
LAT: <i>37° 45' 00.3"</i>		LONG: <i>86° 53' 32.9"</i>	COUNTY: <i>Daviess</i>		USGS 7.5 TOPO:
DATE: <i>7/12/12</i> TIME: 2:29 (CT) <input type="checkbox"/> AM <input checked="" type="checkbox"/> PM			INVESTIGATORS: <i>Bill Sampson and Rick Heil</i>		
TYPE SAMPLE: <input type="checkbox"/> P-CHEM <input type="checkbox"/> Macroinvertebrate <input type="checkbox"/> FISH <input type="checkbox"/> BACT.					
WEATHER: Now <input type="checkbox"/> Past 24 hours <input type="checkbox"/> Has there been a heavy rain in the last 7 days? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No					
<input type="checkbox"/> Heavy rain <input checked="" type="checkbox"/> Steady rain <input type="checkbox"/> Intermittent showers <input checked="" type="checkbox"/> Clear/sunny/overcast Appr. Air Temp. <u>79</u> °F. Inches rainfall in past 24 hours <u>0</u> in <u>65</u> % Cloud Cover					
P-Chem: Temp (°F) <u>76.8</u> D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond. <u>1530</u> <input type="checkbox"/> Grab					
INSTREAM WATERSHED FEATURES (at time of assessment):			LOCAL WATERSHED FEATURES:		
Stream Width EOW <u>3.0</u> ft Stream Width BF <u>11.0</u> ft Stream Bottom Width <u>1.0</u> ft Avg. Bankfull Depth <u>1.0</u> ft Avg. H ₂ O Depth Riffle <u>0.15</u> ft			Predominant Surrounding Land Use: <input type="checkbox"/> Surface Mining <input type="checkbox"/> Construction <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Deep Mining <input type="checkbox"/> Commercial <input type="checkbox"/> Pasture/Grazing <input type="checkbox"/> Oil Wells <input type="checkbox"/> Industrial <input type="checkbox"/> Silviculture <input type="checkbox"/> Land Disposal <input type="checkbox"/> Row Crops <input type="checkbox"/> Urban Runoff/Storm Sewers		
Hydraulic Structures: <input type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments <input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input type="checkbox"/> Other <input type="checkbox"/> Culverts		Stream Flow: <input type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input checked="" type="checkbox"/> Normal <input type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential		Stream Type: <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Ephemeral <input type="checkbox"/> Seep	
Riparian Vegetation: Dominate Type: <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input checked="" type="checkbox"/> Herbaceous Number of Strata: <u>3</u>		Dom. Tree/Shrub Taxa:		Canopy Cover: <input type="checkbox"/> Fully Exposed (0-25%) <input type="checkbox"/> Partially Exposed (25-50%) <input checked="" type="checkbox"/> Partially Shaded (50-75%) <input type="checkbox"/> Fully Shaded (75-100%)	
Channel Alterations: <input type="checkbox"/> Dredging <input type="checkbox"/> Channelization (<input type="checkbox"/> Full <input type="checkbox"/> Partial)		Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C. Riffle <u>10</u> % Run <u>80</u> % Pool <u>10</u> %			
Silt/Clay (<0.06 mm / <0.002 in)		<u>50</u>		<u>100</u>	
Sand (0.06 - 2 mm / 0.002 - 0.08 in)					
Gravel (2 - 64 mm / 0.08 - 2.5 in)		<u>50</u>			
Cobble (64 - 256 mm / 2.5 - 10.1 in)					
Boulders (>256 mm / >10.1 in)					
Bedrock					
Habitat		Condition Category			
Parameter		Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover		Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat" lack of habitat is obvious; substrate unstable or lacking.
SCORE		20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate/ Characterization		Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE		20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Availability		Even mix of large shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE		20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was a straight line. (Note – channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2-1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, “raw” areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities has impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score

94

NOTES/COMMENTS: very incised / entrenched

Low Gradient Stream Data Sheet

STREAM NAME: <i>I-1 (US) (upper Joes Run)</i>			LOCATION: <i>Joes Run Mine</i>		
STATION: <i>WP879</i>		DRAINAGE AREA (AC)	BASIN/WATERSHED: <i>Joe's Run North Fork Panther Creek / Green River</i>		
LAT: <i>37° 45' 32.1"</i>		LONG: <i>86° 53' 06.8"</i>	COUNTY: <i>Daviess</i>		USGS 7.5 TOPO:
DATE: <i>7/13/12</i> TIME: 10:32 (CT <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM)			INVESTIGATORS: <i>Bill Sampson and Rick Heil</i>		
TYPE SAMPLE: <input type="checkbox"/> P-CHEM <input type="checkbox"/> Macroinvertebrate <input type="checkbox"/> FISH <input type="checkbox"/> BACT.					
WEATHER: Now <input type="checkbox"/> Past 24 hours <input type="checkbox"/> Has there been a heavy rain in the last 7 days? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No					
<input type="checkbox"/> Heavy rain <input checked="" type="checkbox"/> Steady rain <input type="checkbox"/> Intermittent showers <input checked="" type="checkbox"/> Clear/sunny/overcast Appr. Air Temp. <u>79</u> °F. Inches rainfall in past 24 hours <u>0.5</u> in % Cloud Cover <u>85</u>					
P-Chem: Temp (°F) _____ D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond. _____ <input type="checkbox"/> Grab					
INSTREAM WATERSHED FEATURES (at time of assessment):			LOCAL WATERSHED FEATURES:		
Stream Width EOW _____ ft Stream Width BF <u>2.0</u> ft Stream Bottom Width <u>1.0</u> ft Avg. Bankfull Depth <u>0.5</u> ft Avg. H ₂ O Depth Riffle <u>0</u> ft			Predominant Surrounding Land Use: <input type="checkbox"/> Surface Mining <input type="checkbox"/> Construction <input type="checkbox"/> Forest <input type="checkbox"/> Deep Mining <input type="checkbox"/> Commercial <input checked="" type="checkbox"/> Pasture/Grazing <input type="checkbox"/> Oil Wells <input type="checkbox"/> Industrial <input type="checkbox"/> Silviculture <input type="checkbox"/> Land Disposal <input type="checkbox"/> Row Crops <input type="checkbox"/> Urban Runoff/Storm Sewers		
Hydraulic Structures: <input type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments <input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input type="checkbox"/> Other <input type="checkbox"/> Culverts		Stream Flow: <input type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input checked="" type="checkbox"/> Normal <input type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential		Stream Type: <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Ephemeral <input type="checkbox"/> Seep	
Riparian Vegetation: Dominate Type: <input type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input checked="" type="checkbox"/> Grasses <input checked="" type="checkbox"/> Herbaceous Number of Strata: <u>2</u>		Dom. Tree/Shrub Taxa: <i>Black Willow</i> <i>Mutiflora Rose</i>		Canopy Cover: <input checked="" type="checkbox"/> Fully Exposed (0-25%) <input type="checkbox"/> Partially Exposed (25-50%) <input type="checkbox"/> Partially Shaded (50-75%) <input type="checkbox"/> Fully Shaded (75-100%)	
Channel Alterations: <input type="checkbox"/> Dredging <input type="checkbox"/> Channelization (<input type="checkbox"/> Full <input type="checkbox"/> Partial)					
Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C		Riffle _____ %		Run <u>100</u> %	
Silt/Clay (<0.06 mm / <0.002 in)				<u>100</u>	
Sand (0.06 - 2 mm / 0.002 - 0.08 in)					
Gravel (2 - 64 mm / 0.08 - 2.5 in)					
Cobble (64 - 256 mm / 2.5 - 10.1 in)					
Boulders (>256 mm / >10.1 in)					
Bedrock					
Habitat		Condition Category			
Parameter		Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover		Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat" lack of habitat is obvious; substrate unstable or lacking.
SCORE		20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate/ Characterization		Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE		20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Availability		Even mix of large shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE		20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was a straight line. (Note – channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2-1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, “raw” areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities has impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score

54

NOTES/COMMENTS: very incised / entrenched

Low Gradient Stream Data Sheet

STREAM NAME: <i>I-1 (MS) (Joels Run)</i>			LOCATION: <i>Joels Run Mine</i>		
STATION: <i>WP824</i>		DRAINAGE AREA (AC)	BASIN/WATERSHED: <i>Joel's Run North Fork Panther Creek / Green River</i>		
LAT: <i>37° 45' 22.9"</i>		LONG: <i>86° 53' 14.9"</i>	COUNTY: <i>Daviess</i>		USGS 7.5 TOPO:
DATE: <i>7/13/12</i> TIME: 8:05 (CT) <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM			INVESTIGATORS: <i>Bill Sampson and Rick Heil</i>		
TYPE SAMPLE: <input type="checkbox"/> P-CHEM <input type="checkbox"/> Macroinvertebrate <input type="checkbox"/> FISH <input type="checkbox"/> BACT.					
WEATHER: Now <input type="checkbox"/> Past 24 hours <input type="checkbox"/> Has there been a heavy rain in the last 7 days? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No					
<input type="checkbox"/> Heavy rain <input checked="" type="checkbox"/> Steady rain <input checked="" type="checkbox"/> Intermittent showers <input type="checkbox"/> Clear/sunny/overcast Appr. Air Temp. <u>74</u> °F. Inches rainfall in past 24 hours <u>0.5</u> in _____ % Cloud Cover					
P-Chem: Temp (°F) <u>71.6</u> D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond. <u>560</u> <input type="checkbox"/> Grab					
INSTREAM WATERSHED FEATURES (at time of assessment):			LOCAL WATERSHED FEATURES:		
Stream Width EOW <u>2.4</u> ft Stream Width BF <u>7.0</u> ft Stream Bottom Width <u>1.5</u> ft Avg. Bankfull Depth <u>1.0</u> ft Avg. H ₂ O Depth Riffle <u>0.1</u> ft			Predominant Surrounding Land Use: <input type="checkbox"/> Surface Mining <input type="checkbox"/> Construction <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Deep Mining <input type="checkbox"/> Commercial <input checked="" type="checkbox"/> Pasture/Grazing <input type="checkbox"/> Oil Wells <input type="checkbox"/> Industrial <input type="checkbox"/> Silviculture <input type="checkbox"/> Land Disposal <input type="checkbox"/> Row Crops <input type="checkbox"/> Urban Runoff/Storm Sewers		
Hydraulic Structures: <input type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments <input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input type="checkbox"/> Other <input type="checkbox"/> Culverts		Stream Flow: <input type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input checked="" type="checkbox"/> Normal <input type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential		Stream Type: <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Ephemeral <input type="checkbox"/> Seep	
Riparian Vegetation: Dominate Type: <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input checked="" type="checkbox"/> Herbaceous Number of Strata: <u>3</u>		Dom. Tree/Shrub Taxa: <i>Red Maple</i> <i>Sassafras</i> <i>Sycamore</i> <i>Cherry</i>		Canopy Cover: <input type="checkbox"/> Fully Exposed (0-25%) <input type="checkbox"/> Partially Exposed (25-50%) <input type="checkbox"/> Partially Shaded (50-75%) <input checked="" type="checkbox"/> Fully Shaded (75-100%)	
Channel Alterations: <input type="checkbox"/> Dredging <input type="checkbox"/> Channelization (<input type="checkbox"/> Full <input type="checkbox"/> Partial)					
Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C		Riffle _____ %		Run <u>50</u> %	
Pool <u>50</u> %					
Silt/Clay (<0.06 mm / <0.002 in)		<i>100</i>			
Sand (0.06 - 2 mm / 0.002 - 0.08 in)					
Gravel (2 - 64 mm / 0.08 - 2.5 in)					
Cobble (64 - 256 mm / 2.5 - 10.1 in)					
Boulders (>256 mm / >10.1 in)					
Bedrock					
Habitat		Condition Category			
Parameter		Optimal		Suboptimal	
		Marginal		Poor	
1. Epifaunal Substrate/ Available Cover		Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient.		30-50% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	
		10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.		Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.	
SCORE		20 19 18 17 16		15 14 13 12 11	
		10 9 8 7 6		5 4 3 2 1 0	
2. Pool Substrate/ Characterization		Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.		Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	
		All mud or clay or sand bottom; little or no root mat; no submerged vegetation.		Hard-pan clay or bedrock; no root mat or vegetation.	
SCORE		20 19 18 17 16		15 14 13 12 11	
		10 9 8 7 6		5 4 3 2 1 0	
3. Pool Availability		Even mix of large shallow, large-deep, small-shallow, small-deep pools present.		Majority of pools large-deep; very few shallow.	
		Shallow pools much more prevalent than deep pools.		Majority of pools small-shallow or pools absent.	
SCORE		20 19 18 17 16		15 14 13 12 11	
		10 9 8 7 6		5 4 3 2 1 0	

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was a straight line. (Note – channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2-1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, “raw” areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities has impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score

82

NOTES/COMMENTS:

Low Gradient Stream Data Sheet

STREAM NAME: <i>I-1 (DS) (Joes Run)</i>			LOCATION: <i>Joes Run Mine</i>		
STATION: <i>WP821</i>		DRAINAGE AREA (AC)	BASIN/WATERSHED: <i>Joe's Run North Fork Panther Creek / Green River</i>		
LAT: <i>37° 45' 14.5"</i>		LONG: <i>86° 53' 20.7"</i>	COUNTY: <i>Daviess</i>		USGS 7.5 TOPO:
DATE: <i>7/12/12</i> TIME: 4:35 (CT) <input type="checkbox"/> AM <input checked="" type="checkbox"/> PM			INVESTIGATORS: <i>Bill Sampson, Rick Heil, and Derek Smith</i>		
TYPE SAMPLE: <input type="checkbox"/> P-CHEM <input type="checkbox"/> Macroinvertebrate <input type="checkbox"/> FISH <input type="checkbox"/> BACT.					
WEATHER: Now <input type="checkbox"/> Past 24 hours <input type="checkbox"/> Has there been a heavy rain in the last 7 days? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No					
<input type="checkbox"/> Heavy rain <input checked="" type="checkbox"/> Steady rain <input type="checkbox"/> Intermittent showers <input checked="" type="checkbox"/> Clear/sunny/overcast Appr. Air Temp. <u>78</u> °F. Inches rainfall in past 24 hours <u>0.5</u> in <u>50</u> % Cloud Cover					
P-Chem: Temp (°F) _____ D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond. _____ <input type="checkbox"/> Grab					
INSTREAM WATERSHED FEATURES (at time of assessment):			LOCAL WATERSHED FEATURES:		
Stream Width EOW _____ ft Stream Width BF <u>10.0</u> ft Stream Bottom Width <u>6.0</u> ft Avg. Bankfull Depth <u>1.0</u> ft Avg. H ₂ O Depth Riffle <u>0</u> ft			Predominant Surrounding Land Use: <input type="checkbox"/> Surface Mining <input type="checkbox"/> Construction <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Deep Mining <input type="checkbox"/> Commercial <input type="checkbox"/> Pasture/Grazing <input type="checkbox"/> Oil Wells <input type="checkbox"/> Industrial <input type="checkbox"/> Silviculture <input type="checkbox"/> Land Disposal <input checked="" type="checkbox"/> Row Crops <input type="checkbox"/> Urban Runoff/Storm Sewers		
Hydraulic Structures: <input type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments <input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input type="checkbox"/> Other <input type="checkbox"/> Culverts		Stream Flow: <input type="checkbox"/> Dry <input checked="" type="checkbox"/> Pooled <input type="checkbox"/> Low <input type="checkbox"/> Normal <input type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential		Stream Type: <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Ephemeral <input type="checkbox"/> Seep	
Riparian Vegetation: Dominate Type: <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input checked="" type="checkbox"/> Herbaceous Number of Strata: <u>3</u>		Dom. Tree/Shrub Taxa: <i>Sweetgum</i> <i>Red Maple</i> <i>Red Cedar</i> <i>Poplar</i> <i>Black Cherry</i>		Canopy Cover: <input type="checkbox"/> Fully Exposed (0-25%) <input type="checkbox"/> Partially Exposed (25-50%) <input checked="" type="checkbox"/> Partially Shaded (50-75%) <input type="checkbox"/> Fully Shaded (75-100%)	
Channel Alterations: <input type="checkbox"/> Dredging <input type="checkbox"/> Channelization (<input type="checkbox"/> Full <input type="checkbox"/> Partial)					
Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C		Riffle _____ %		Run <u>95</u> %	
Silt/Clay (<0.06 mm / <0.002 in)				<u>89</u>	
Sand (0.06 - 2 mm / 0.002 - 0.08 in)					
Gravel (2 - 64 mm / 0.08 - 2.5 in)				<u>10</u>	
Cobble (64 - 256 mm / 2.5 - 10.1 in)				<u>1</u>	
Boulders (>256 mm / >10.1 in)					
Bedrock					
Habitat		Condition Category			
Parameter		Optimal		Suboptimal	
Marginal		Poor			
1. Epifaunal Substrate/ Available Cover		Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).		30-50% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	
SCORE		20 19 18 17 16		15 14 13 12 11	
				10 9 8 7 6	
2. Pool Substrate/ Characterization		Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.		Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	
SCORE		20 19 18 17 16		15 14 13 12 11	
				10 9 8 7 6	
				5 4 3 2 1 0	
3. Pool Availability		Even mix of large shallow, large-deep, small-shallow, small-deep pools present.		Majority of pools large-deep; very few shallow.	
SCORE		20 19 18 17 16		15 14 13 12 11	
				10 9 8 7 6	
				5 4 3 2 1 0	

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was a straight line. (Note – channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2-1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, “raw” areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities has impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score

65

NOTES/COMMENTS: very incised / entrenched

Low Gradient Stream Data Sheet

STREAM NAME: <i>I-2</i>			LOCATION: <i>Joels Run Mine</i>		
STATION: <i>WP819</i>		DRAINAGE AREA (AC)	BASIN/WATERSHED: <i>Joe's Run North Fork Panther Creek / Green River</i>		
LAT: <i>37° 45' 13.2"</i>		LONG: <i>86° 53' 31.2"</i>	COUNTY: <i>Daviess</i>		USGS 7.5 TOPO:
DATE: <i>7/12/12</i> TIME: 3:35 (CT) <input type="checkbox"/> AM <input checked="" type="checkbox"/> PM			INVESTIGATORS: <i>Bill Sampson, Rick Heil, and Derek Smith</i>		
TYPE SAMPLE: <input type="checkbox"/> P-CHEM <input type="checkbox"/> Macroinvertebrate <input type="checkbox"/> FISH <input type="checkbox"/> BACT.					
WEATHER: Now <input type="checkbox"/> Past 24 hours <input type="checkbox"/> Has there been a heavy rain in the last 7 days? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No					
<input type="checkbox"/> Heavy rain <input checked="" type="checkbox"/> Steady rain <input checked="" type="checkbox"/> Intermittent showers <input type="checkbox"/> Clear/sunny/overcast Appr. Air Temp. <u>80</u> °F. Inches rainfall in past 24 hours <u>0.5</u> in <u>45</u> % Cloud Cover					
P-Chem: Temp (°F) _____ D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond. _____ <input type="checkbox"/> Grab					
INSTREAM WATERSHED FEATURES (at time of assessment):			LOCAL WATERSHED FEATURES:		
Stream Width EOW <u>3.0</u> ft Stream Width BF <u>8.0</u> ft Stream Bottom Width <u>1.5</u> ft Avg. Bankfull Depth <u>1.0</u> ft Avg. H ₂ O Depth Riffle _____ ft			Predominant Surrounding Land Use: <input type="checkbox"/> Surface Mining <input type="checkbox"/> Construction <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Deep Mining <input type="checkbox"/> Commercial <input type="checkbox"/> Pasture/Grazing <input type="checkbox"/> Oil Wells <input type="checkbox"/> Industrial <input type="checkbox"/> Silviculture <input type="checkbox"/> Land Disposal <input checked="" type="checkbox"/> Row Crops <input type="checkbox"/> Urban Runoff/Storm Sewers		
Hydraulic Structures: <input type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments <input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input type="checkbox"/> Other <input type="checkbox"/> Culverts		Stream Flow: <input type="checkbox"/> Dry <input type="checkbox"/> Pooled <input checked="" type="checkbox"/> Low <input type="checkbox"/> Normal <input type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential		Stream Type: <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Ephemeral <input type="checkbox"/> Seep	
Riparian Vegetation: Dominate Type: <input type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input checked="" type="checkbox"/> Grasses <input checked="" type="checkbox"/> Herbaceous Number of Strata: <u>3</u>		Dom. Tree/Shrub Taxa: <i>Sycamore</i> <i>Red Maple</i> <i>Cherry</i>		Canopy Cover: <input type="checkbox"/> Fully Exposed (0-25%) <input type="checkbox"/> Partially Exposed (25-50%) <input type="checkbox"/> Partially Shaded (50-75%) <input checked="" type="checkbox"/> Fully Shaded (75-100%)	
Channel Alterations: <input type="checkbox"/> Dredging <input type="checkbox"/> Channelization (<input type="checkbox"/> Full <input type="checkbox"/> Partial)					
Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C		Riffle <u>25</u> %		Run <u>25</u> %	
Silt/Clay (<0.06 mm / <0.002 in)		<u>50</u>		<u>50</u>	
Sand (0.06 - 2 mm / 0.002 - 0.08 in)					
Gravel (2 - 64 mm / 0.08 - 2.5 in)		<u>50</u>		<u>50</u>	
Cobble (64 - 256 mm / 2.5 - 10.1 in)					
Boulders (>256 mm / >10.1 in)					
Bedrock					
Habitat		Condition Category			
Parameter		Optimal		Suboptimal	
		Marginal		Poor	
1. Epifaunal Substrate/ Available Cover		Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).		30-50% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	
		10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.		Less than 10% stable habitat" lack of habitat is obvious; substrate unstable or lacking.	
SCORE		20 19 18 17 16		15 14 13 12 11	
		10 9 8 7 6		5 4 3 2 1 0	
2. Pool Substrate/ Characterization		Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.		Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	
		All mud or clay or sand bottom; little or no root mat; no submerged vegetation.		Hard-pan clay or bedrock; no root mat or vegetation.	
SCORE		20 19 18 17 16		15 14 13 12 11	
		10 9 8 7 6		5 4 3 2 1 0	
3. Pool Availability		Even mix of large shallow, large-deep, small-shallow, small-deep pools present.		Majority of pools large-deep; very few shallow.	
		Shallow pools much more prevalent than deep pools.		Majority of pools small-shallow or pools absent.	
SCORE		20 19 18 17 16		15 14 13 12 11	
		10 9 8 7 6		5 4 3 2 1 0	

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was a straight line. (Note – channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2-1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, “raw” areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities has impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score

74

NOTES/COMMENTS: very incised / entrenched

Low Gradient Stream Data Sheet

STREAM NAME: <i>I-3</i>			LOCATION: <i>Joels Run Mine</i>						
STATION: <i>WP822</i>		DRAINAGE AREA (AC)	BASIN/WATERSHED: <i>Joe's Run North Fork Panther Creek / Green River</i>						
LAT: <i>37° 45' 05.4"</i>		LONG: <i>86° 53' 22.8"</i>	COUNTY: <i>Daviess</i>		USGS 7.5 TOPO:				
DATE: <i>7/12/12</i> TIME: 5:04 (CT) <input type="checkbox"/> AM <input checked="" type="checkbox"/> PM			INVESTIGATORS: <i>Bill Sampson, Rick Heil, and Derek Smith</i>						
TYPE SAMPLE: <input type="checkbox"/> P-CHEM <input type="checkbox"/> Macroinvertebrate <input type="checkbox"/> FISH <input type="checkbox"/> BACT.									
WEATHER: Now <input type="checkbox"/> Past 24 hours <input type="checkbox"/> Has there been a heavy rain in the last 7 days? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No									
<input type="checkbox"/> Heavy rain <input checked="" type="checkbox"/> Steady rain <input checked="" type="checkbox"/> Intermittent showers <input type="checkbox"/> Clear/sunny/overcast Appr. Air Temp. <u>78</u> °F. Inches rainfall in past 24 hours <u>0.5</u> in <u>60</u> % Cloud Cover									
P-Chem: Temp (°F) <u>75.2</u> D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond. _____ <input type="checkbox"/> Grab									
INSTREAM WATERSHED FEATURES (at time of assessment):			LOCAL WATERSHED FEATURES:						
Stream Width EOW <u>4.0</u> ft Stream Width BF <u>9.0</u> ft Stream Bottom Width <u>3.0</u> ft Avg. Bankfull Depth <u>1.0</u> ft Avg. H ₂ O Depth Riffle <u>0.15</u> ft			Predominant Surrounding Land Use: <input type="checkbox"/> Surface Mining <input type="checkbox"/> Construction <input type="checkbox"/> Forest <input type="checkbox"/> Deep Mining <input type="checkbox"/> Commercial <input checked="" type="checkbox"/> Pasture/Grazing <input type="checkbox"/> Oil Wells <input type="checkbox"/> Industrial <input type="checkbox"/> Silviculture <input type="checkbox"/> Land Disposal <input checked="" type="checkbox"/> Row Crops <input type="checkbox"/> Urban Runoff/Storm Sewers						
Hydraulic Structures: <input type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments <input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input type="checkbox"/> Other <input type="checkbox"/> Culverts		Stream Flow: <input type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input checked="" type="checkbox"/> Normal <input type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential		Stream Type: <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Ephemeral <input type="checkbox"/> Seep					
Riparian Vegetation: Dominate Type: <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input checked="" type="checkbox"/> Herbaceous Number of Strata: <u>3</u>		Dom. Tree/Shrub Taxa: <i>Blackjack Oak</i> <i>Cherry</i> <i>Shingle Oak</i>		Canopy Cover: <input type="checkbox"/> Fully Exposed (0-25%) <input checked="" type="checkbox"/> Partially Exposed (25-50%) <input type="checkbox"/> Partially Shaded (50-75%) <input type="checkbox"/> Fully Shaded (75-100%)					
Channel Alterations:									
<input type="checkbox"/> Dredging <input type="checkbox"/> Channelization (<input type="checkbox"/> Full <input type="checkbox"/> Partial)									
Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C		Riffle _____ %		Run <u>85</u> %					
Pool <u>15</u> %									
Silt/Clay (<0.06 mm / <0.002 in)		<u>80</u>							
Sand (0.06 - 2 mm / 0.002 - 0.08 in)		<u>15</u>							
Gravel (2 - 64 mm / 0.08 - 2.5 in)		<u>5</u>							
Cobble (64 - 256 mm / 2.5 - 10.1 in)									
Boulders (>256 mm / >10.1 in)									
Bedrock									
Habitat		Condition Category							
Parameter		Optimal		Suboptimal		Marginal		Poor	
1. Epifaunal Substrate/ Available Cover		Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).		30-50% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).		10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.		Less than 10% stable habitat" lack of habitat is obvious; substrate unstable or lacking.	
SCORE		20 19 18 17 16		15 14 13 12 11		10 9 8 7 6		5 4 3 2 1 0	
2. Pool Substrate/ Characterization		Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.		Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.		All mud or clay or sand bottom; little or no root mat; no submerged vegetation.		Hard-pan clay or bedrock; no root mat or vegetation.	
SCORE		20 19 18 17 16		15 14 13 12 11		10 9 8 7 6		5 4 3 2 1 0	
3. Pool Availability		Even mix of large shallow, large-deep, small-shallow, small-deep pools present.		Majority of pools large-deep; very few shallow.		Shallow pools much more prevalent than deep pools.		Majority of pools small-shallow or pools absent.	
SCORE		20 19 18 17 16		15 14 13 12 11		10 9 8 7 6		5 4 3 2 1 0	

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was a straight line. (Note – channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2-1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, “raw” areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities has impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score

75

NOTES/COMMENTS: very incised / entrenched

Low Gradient Stream Data Sheet

STREAM NAME: <i>I-4</i>			LOCATION: <i>Joels Run Mine</i>						
STATION: <i>WP877</i>		DRAINAGE AREA (AC)	BASIN/WATERSHED: <i>Joe's Run North Fork Panther Creek / Green River</i>						
LAT: <i>37° 45' 36.1"</i>		LONG: <i>86° 53' 7.4"</i>	COUNTY: <i>Daviess</i>		USGS 7.5 TOPO:				
DATE: <i>7/13/12</i> TIME: 10:15 (CT) <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM			INVESTIGATORS: <i>Bill Sampson and Rick Heil</i>						
TYPE SAMPLE: <input type="checkbox"/> P-CHEM <input type="checkbox"/> Macroinvertebrate <input type="checkbox"/> FISH <input type="checkbox"/> BACT.									
WEATHER: Now <input type="checkbox"/> Past 24 hours <input type="checkbox"/> Has there been a heavy rain in the last 7 days? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No									
<input type="checkbox"/> Heavy rain <input checked="" type="checkbox"/> Steady rain <input checked="" type="checkbox"/> Intermittent showers <input type="checkbox"/> Clear/sunny/overcast Appr. Air Temp. <u>78</u> °F. Inches rainfall in past 24 hours <u>0.5</u> in % Cloud Cover <u>95</u>									
P-Chem: Temp (°F) <u>72.7</u> D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond. <u>670</u> <input type="checkbox"/> Grab									
INSTREAM WATERSHED FEATURES (at time of assessment):			LOCAL WATERSHED FEATURES:						
Stream Width EOW <u>1-2</u> ft Stream Width BF <u>2.5</u> ft Stream Bottom Width <u>1.0</u> ft Avg. Bankfull Depth <u>0.5</u> ft Avg. H ₂ O Depth Riffle <u>0.1</u> ft			Predominant Surrounding Land Use: <input type="checkbox"/> Surface Mining <input type="checkbox"/> Construction <input type="checkbox"/> Forest <input type="checkbox"/> Deep Mining <input type="checkbox"/> Commercial <input checked="" type="checkbox"/> Pasture/Grazing <input type="checkbox"/> Oil Wells <input type="checkbox"/> Industrial <input type="checkbox"/> Silviculture <input type="checkbox"/> Land Disposal <input type="checkbox"/> Row Crops <input type="checkbox"/> Urban Runoff/Storm Sewers						
Hydraulic Structures: <input type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments <input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input type="checkbox"/> Other <input type="checkbox"/> Culverts		Stream Flow: <input type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input checked="" type="checkbox"/> Normal <input type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential		Stream Type: <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Ephemeral <input type="checkbox"/> Seep					
Riparian Vegetation: Dominate Type: <input type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input checked="" type="checkbox"/> Grasses <input checked="" type="checkbox"/> Herbaceous Number of Strata: <u>2</u>		Dom. Tree/Shrub Taxa: <i>Red Maple</i> <i>Multiflora Rose</i> <i>Cherry</i> <i>Witchhazel</i>		Canopy Cover: <input checked="" type="checkbox"/> Fully Exposed (0-25%) <input type="checkbox"/> Partially Exposed (25-50%) <input type="checkbox"/> Partially Shaded (50-75%) <input type="checkbox"/> Fully Shaded (75-100%)					
Channel Alterations: <input type="checkbox"/> Dredging <input type="checkbox"/> Channelization (<input type="checkbox"/> Full <input type="checkbox"/> Partial)									
Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C		Riffle _____ %		Run <u>50</u> %					
Pool <u>50</u> %									
Silt/Clay (<0.06 mm / <0.002 in)		<u>100</u>							
Sand (0.06 - 2 mm / 0.002 - 0.08 in)									
Gravel (2 - 64 mm / 0.08 - 2.5 in)									
Cobble (64 - 256 mm / 2.5 - 10.1 in)									
Boulders (>256 mm / >10.1 in)									
Bedrock									
Habitat		Condition Category							
Parameter		Optimal		Suboptimal		Marginal		Poor	
1. Epifaunal Substrate/ Available Cover		Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).		30-50% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).		10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.		Less than 10% stable habitat" lack of habitat is obvious; substrate unstable or lacking.	
SCORE		20 19 18 17 16		15 14 13 12 11		10 9 8 7 6		5 4 3 2 1 0	
2. Pool Substrate/ Characterization		Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.		Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.		All mud or clay or sand bottom; little or no root mat; no submerged vegetation.		Hard-pan clay or bedrock; no root mat or vegetation.	
SCORE		20 19 18 17 16		15 14 13 12 11		10 9 8 7 6		5 4 3 2 1 0	
3. Pool Availability		Even mix of large shallow, large-deep, small-shallow, small-deep pools present.		Majority of pools large-deep; very few shallow.		Shallow pools much more prevalent than deep pools.		Majority of pools small-shallow or pools absent.	
SCORE		20 19 18 17 16		15 14 13 12 11		10 9 8 7 6		5 4 3 2 1 0	

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was a straight line. (Note – channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2-1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, “raw” areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities has impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score

84

NOTES/COMMENTS: incised / entrenched

Low Gradient Stream Data Sheet

STREAM NAME: <i>E-1</i>			LOCATION: <i>Joels Run Mine</i>		
STATION: <i>WP795</i>		DRAINAGE AREA (AC)	BASIN/WATERSHED: <i>Joe's Run North Fork Panther Creek / Green River</i>		
LAT: <i>37° 44' 53.8"</i>		LONG: <i>86° 53' 32.9"</i>	COUNTY: <i>Daviess</i>		USGS 7.5 TOPO:
DATE: <i>7/12/12</i> TIME: 10:50 (CT) <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM			INVESTIGATORS: <i>Bill Sampson, Rick Heil, and Derek Smith</i>		
TYPE SAMPLE: <input type="checkbox"/> P-CHEM <input type="checkbox"/> Macroinvertebrate <input type="checkbox"/> FISH <input type="checkbox"/> BACT.					
WEATHER: Now <input type="checkbox"/> Past 24 hours <input type="checkbox"/> Has there been a heavy rain in the last 7 days? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No					
<input type="checkbox"/> Heavy rain <input checked="" type="checkbox"/> Appr. Air Temp. <u>80</u> °F. Inches rainfall in past 24 hours <u>0</u> in <input type="checkbox"/> Steady rain <input type="checkbox"/> Intermittent showers <u>35</u> % Cloud Cover <input checked="" type="checkbox"/> Clear/sunny/overcast					
P-Chem: Temp (°F) _____ D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond. _____ <input type="checkbox"/> Grab					
INSTREAM WATERSHED FEATURES (at time of assessment):			LOCAL WATERSHED FEATURES:		
Stream Width EOW _____ ft Stream Width BF <u>2-2.5</u> ft Stream Bottom Width <u>1.0</u> ft Avg. Bankfull Depth <u>0.5</u> ft Avg. H ₂ O Depth Riffle <u>0</u> ft			Predominant Surrounding Land Use: <input type="checkbox"/> Surface Mining <input type="checkbox"/> Construction <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Deep Mining <input type="checkbox"/> Commercial <input type="checkbox"/> Pasture/Grazing <input type="checkbox"/> Oil Wells <input type="checkbox"/> Industrial <input type="checkbox"/> Silviculture <input type="checkbox"/> Land Disposal <input type="checkbox"/> Row Crops <input type="checkbox"/> Urban Runoff/Storm Sewers		
Hydraulic Structures: <input type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments <input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input type="checkbox"/> Other <input type="checkbox"/> Culverts		Stream Flow: <input type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input checked="" type="checkbox"/> Normal <input type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential		Stream Type: <input type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input checked="" type="checkbox"/> Ephemeral <input type="checkbox"/> Seep	
Riparian Vegetation: Dominate Type: <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input checked="" type="checkbox"/> Herbaceous Number of Strata: <u>3</u>		Dom. Tree/Shrub Taxa: <i>Red Maple</i> <i>Ash</i> <i>Poplar</i> <i>Sweetgum</i>		Canopy Cover: <input type="checkbox"/> Fully Exposed (0-25%) <input type="checkbox"/> Partially Exposed (25-50%) <input type="checkbox"/> Partially Shaded (50-75%) <input checked="" type="checkbox"/> Fully Shaded (75-100%)	
Channel Alterations: <input type="checkbox"/> Dredging <input type="checkbox"/> Channelization <input type="checkbox"/> Full <input type="checkbox"/> Partial					
Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C		Riffle _____ %		Run <u>100</u> %	
Silt/Clay (<0.06 mm / <0.002 in)				<u>100</u>	
Sand (0.06 - 2 mm / 0.002 - 0.08 in)					
Gravel (2 - 64 mm / 0.08 - 2.5 in)					
Cobble (64 - 256 mm / 2.5 - 10.1 in)					
Boulders (>256 mm / >10.1 in)					
Bedrock					
Habitat		Condition Category			
Parameter		Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover		Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat" lack of habitat is obvious; substrate unstable or lacking.
SCORE		20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate/ Characterization		Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE		20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Availability		Even mix of large shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE		20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was a straight line. (Note – channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2-1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, “raw” areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities has impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score

82

NOTES/COMMENTS:

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles	Occurrence of riffles relatively frequent; spacing between riffles 5 to 7 stream widths. Variety of habitat is key. In streams where riffles are continuous, boulders or logs are important.	Occurrence of riffles infrequent; distance between riffles divided by stream width is between 7 and 15.	Occasional riffle or bend: bottom contours provide some habitat; distance between riffles divided by stream width is between 15 and 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by stream width is > than 25.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score

88

NOTES/COMMENTS: some entrenchment

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles	Occurrence of riffles relatively frequent; spacing between riffles 5 to 7 stream widths. Variety of habitat is key. In streams where riffles are continuous, boulders or logs are important.	Occurrence of riffles infrequent; distance between riffles divided by stream width is between 7 and 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by stream width is between 15 and 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by stream width is > than 25.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score

85

NOTES/COMMENTS:

High Gradient Stream Data Sheet

STREAM NAME: <i>E-4</i>			LOCATION: <i>Joels Run Mine</i>		
STATION: <i>WP800</i>		DRAINAGE AREA (AC)	BASIN/WATERSHED: <i>Joe's Run N. Fork Panther Creek / Green River</i>		
LAT: <i>37° 44' 49.3"</i>		LONG: <i>86° 53' 25.8"</i>	COUNTY: <i>Daviess</i> USGS 7.5 TOPO:		
DATE: <i>7/12/12</i>		TIME: <i>11:52 (CT)</i> <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM	INVESTIGATORS: <i>Bill Sampson and Rick Heil</i>		
TYPE SAMPLE: <input type="checkbox"/> P-CHEM <input type="checkbox"/> Macroinvertebrate <input type="checkbox"/> FISH <input type="checkbox"/> BACT.					
WEATHER: Now <input type="checkbox"/> Past 24 hours <input type="checkbox"/> Has there been a heavy rain in the last 7 days? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No					
<input type="checkbox"/> <input type="checkbox"/> Heavy rain <input type="checkbox"/> Steady rain <input type="checkbox"/> Intermittent showers <input checked="" type="checkbox"/> Clear/sunny/overcast					
Air temperature <i>83</i> °F. Inches rainfall in past 24 hours <i>0</i> in					
% Cloud Cover <i>35</i>					
P-Chem: Temp (°F) _____ D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond. µs _____ <input type="checkbox"/> Grab					
INSTREAM WATERSHED FEATURES (at time of assessment):			LOCAL WATERSHED FEATURES:		
Stream Width EOW _____ ft			Predominant Surrounding Land Use:		
Stream Width BF <i>3.0</i> ft			<input type="checkbox"/> Surface Mining <input type="checkbox"/> Construction <input checked="" type="checkbox"/> Forest		
Stream Bottom Width <i>1.5</i> ft			<input type="checkbox"/> Deep Mining <input type="checkbox"/> Commercial <input type="checkbox"/> Pasture/Grazing		
Avg. Bankfull Depth <i>0.5</i> ft			<input type="checkbox"/> Oil Wells <input type="checkbox"/> Industrial <input type="checkbox"/> Silviculture		
Avg. H ₂ O Depth Riffle <i>0</i> ft			<input type="checkbox"/> Land Disposal <input checked="" type="checkbox"/> Row Crops <input type="checkbox"/> Urban Runoff/Storm Sewers		
Hydraulic Structures:		Stream Flow:		Stream Type:	
<input type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments		<input type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input type="checkbox"/> Normal		<input type="checkbox"/> Perennial <input type="checkbox"/> Intermittent	
<input type="checkbox"/> Island <input type="checkbox"/> Waterfalls		<input type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential		<input checked="" type="checkbox"/> Ephemeral <input type="checkbox"/> Seep	
<input type="checkbox"/> Other <input type="checkbox"/> Culverts					
Riparian Vegetation:		Dom. Tree/Shrub Taxa:		Canopy Cover:	
Dominate Type:		<i>Spicebush</i>		<input type="checkbox"/> Fully Exposed (0-25%)	
<input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs		<i>Red Maple</i>		<input type="checkbox"/> Partially Exposed (25-50%)	
<input type="checkbox"/> Grasses <input checked="" type="checkbox"/> Herbaceous		<i>Ash</i>		<input type="checkbox"/> Partially Shaded (50-75%)	
Number of Strata: <i>3</i>		<i>Sweetgum</i>		<input checked="" type="checkbox"/> Fully Shaded (75-100%)	
				Channel Alterations:	
				<input type="checkbox"/> Dredging	
				<input type="checkbox"/> Channelization	
				<input type="checkbox"/> Full <input type="checkbox"/> Partial	
Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C		Riffle _____ %		Run <i>100</i> %	
				Pool _____ %	
Silt/Clay (<0.06 mm / <0.002 in)				<i>100</i>	
Sand (0.06-2 mm / 0.002 – 0.08 in)					
Gravel (2-64 mm / 0.08 – 2.5 in)					
Cobble (64-256 mm / 2.5 – 10.1 in)					
Boulders (>256 mm / >10.1 in)					
Bedrock					
Habitat		Condition Category			
Parameter		Optimal		Marginal	
Suboptimal		Poor			
1. Epifaunal Substrate/ Available Cover		Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).		40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	
SCORE		20 19 18 17 16		15 14 13 12 11	
				10 9 8 7 6	
2. Embeddedness		Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.		20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	
SCORE		20 19 18 17 16		15 14 13 12 11	
				10 9 8 7 6	
3. Velocity/Depth Regime		All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow. Deep > 1.5 feet.		Only 2 of the 4 habitat regimes present (if fast-shallow or slow shallow are missing, score low)	
SCORE		20 19 18 17 16		15 14 13 12 11	
				10 9 8 7 6	
				5 4 3 2 1 0	

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles	Occurrence of riffles relatively frequent; spacing between riffles 5 to 7 stream widths. Variety of habitat is key. In streams where riffles are continuous, boulders or logs are important.	Occurrence of riffles infrequent; distance between riffles divided by stream width is between 7 and 15.	Occasional riffle on bend; bottom contours provide some habitat; distance between riffles divided by stream width is between 15 and 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by stream width is > than 25.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score

71

NOTES/COMMENTS:

Low Gradient Stream Data Sheet

STREAM NAME: <i>E-5 (US)</i>			LOCATION: <i>Joels Run Mine</i>		
STATION: <i>WP802</i>		DRAINAGE AREA (AC)	BASIN/WATERSHED: <i>Joe's Run North Fork Panther Creek / Green River</i>		
LAT: <i>37° 44' 59.1"</i>		LONG: <i>86° 53' 23.8"</i>	COUNTY: <i>Daviess</i>		USGS 7.5 TOPO:
DATE: <i>7/12/12</i> TIME: 12:26 (CT) <input type="checkbox"/> AM <input checked="" type="checkbox"/> PM			INVESTIGATORS: <i>Bill Sampson, Rick Heil, and Derek Smith</i>		
TYPE SAMPLE: <input type="checkbox"/> P-CHEM <input type="checkbox"/> Macroinvertebrate <input type="checkbox"/> FISH <input type="checkbox"/> BACT.					
WEATHER: Now _____ Past 24 hours _____ Has there been a heavy rain in the last 7 days? <input type="checkbox"/> <input type="checkbox"/> Heavy rain <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> <input type="checkbox"/> Steady rain Appr. Air Temp. <u>83</u> °F. Inches rainfall in past 24 hours <u>0</u> in <input type="checkbox"/> <input type="checkbox"/> Intermittent showers <u>35</u> % Cloud Cover <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Clear/sunny/overcast					
P-Chem: Temp (°F) _____ D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond. _____ <input type="checkbox"/> Grab					
INSTREAM WATERSHED FEATURES (at time of assessment): Stream Width EOW _____ ft Stream Width BF <u>2.0</u> ft Stream Bottom Width <u>1.0</u> ft Avg. Bankfull Depth <u>0.5</u> ft Avg. H ₂ O Depth Riffle _____ ft			LOCAL WATERSHED FEATURES: Predominant Surrounding Land Use: <input type="checkbox"/> Surface Mining <input type="checkbox"/> Construction <input type="checkbox"/> Forest <input type="checkbox"/> Deep Mining <input type="checkbox"/> Commercial <input checked="" type="checkbox"/> Pasture/Grazing <input type="checkbox"/> Oil Wells <input type="checkbox"/> Industrial <input type="checkbox"/> Silviculture <input type="checkbox"/> Land Disposal <input type="checkbox"/> Row Crops <input type="checkbox"/> Urban Runoff/Storm Sewers		
Hydraulic Structures: <input type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments <input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input type="checkbox"/> Other <input type="checkbox"/> Culverts		Stream Flow: <input type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input checked="" type="checkbox"/> Normal <input type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential		Stream Type: <input type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input checked="" type="checkbox"/> Ephemeral <input type="checkbox"/> Seep	
Riparian Vegetation: Dominate Type: <input type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input checked="" type="checkbox"/> Herbaceous Number of Strata: <u>2</u>		Dom. Tree/Shrub Taxa: <i>Sweetgum</i> <i>Ash</i> <i>Red Maple</i> <i>Elm</i>		Canopy Cover: <input checked="" type="checkbox"/> Fully Exposed (0-25%) <input type="checkbox"/> Partially Exposed (25-50%) <input type="checkbox"/> Partially Shaded (50-75%) <input type="checkbox"/> Fully Shaded (75-100%)	
Channel Alterations: <input type="checkbox"/> Dredging <input type="checkbox"/> Channelization <input type="checkbox"/> Full <input type="checkbox"/> Partial					
Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C		Riffle _____ %		Run <u>100</u> %	
Pool _____ %					
Silt/Clay (<0.06 mm / <0.002 in) <u>100</u>					
Sand (0.06 - 2 mm / 0.002 - 0.08 in)					
Gravel (2 - 64 mm / 0.08 - 2.5 in)					
Cobble (64 - 256 mm / 2.5 - 10.1 in)					
Boulders (>256 mm / >10.1 in)					
Bedrock					
Habitat		Condition Category			
Parameter		Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover		Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient.	30-50% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat" lack of habitat is obvious; substrate unstable or lacking.
SCORE		20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate/ Characterization		Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE		20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Availability		Even mix of large shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE		20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was a straight line. (Note – channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2-1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, “raw” areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities has impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score

56

NOTES/COMMENTS:

Low Gradient Stream Data Sheet

STREAM NAME: <i>E-5 (DS)</i>			LOCATION: <i>Joels Run Mine</i>		
STATION: <i>WP803</i>		DRAINAGE AREA (AC)	BASIN/WATERSHED: <i>Joe's Run North Fork Panther Creek / Green River</i>		
LAT: <i>37° 45' 00.4"</i>		LONG: <i>86° 53' 28.2"</i>	COUNTY: <i>Daviess</i>		USGS 7.5 TOPO:
DATE: <i>7/12/12</i> TIME: 12:39 (CT) <input type="checkbox"/> AM <input checked="" type="checkbox"/> PM			INVESTIGATORS: <i>Bill Sampson, Rick Heil, and Derek Smith</i>		
TYPE SAMPLE: <input type="checkbox"/> P-CHEM <input type="checkbox"/> Macroinvertebrate <input type="checkbox"/> FISH <input type="checkbox"/> BACT.					
WEATHER: Now <input type="checkbox"/> Past 24 hours <input type="checkbox"/> Has there been a heavy rain in the last 7 days? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No					
<input type="checkbox"/> Heavy rain <input checked="" type="checkbox"/> Steady rain <input type="checkbox"/> Intermittent showers <input checked="" type="checkbox"/> Clear/sunny/overcast Appr. Air Temp. <u>83</u> °F. Inches rainfall in past 24 hours <u>0</u> in <u>35</u> % Cloud Cover					
P-Chem: Temp (°F) _____ D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond. _____ <input type="checkbox"/> Grab					
INSTREAM WATERSHED FEATURES (at time of assessment):			LOCAL WATERSHED FEATURES:		
Stream Width EOW _____ ft Stream Width BF <u>2.5</u> ft Stream Bottom Width <u>1-1.5</u> ft Avg. Bankfull Depth <u>0.5</u> ft Avg. H ₂ O Depth Riffle <u>0</u> ft			Predominant Surrounding Land Use: <input type="checkbox"/> Surface Mining <input type="checkbox"/> Construction <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Deep Mining <input type="checkbox"/> Commercial <input type="checkbox"/> Pasture/Grazing <input type="checkbox"/> Oil Wells <input type="checkbox"/> Industrial <input type="checkbox"/> Silviculture <input type="checkbox"/> Land Disposal <input type="checkbox"/> Row Crops <input type="checkbox"/> Urban Runoff/Storm Sewers		
Hydraulic Structures: <input type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments <input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input type="checkbox"/> Other <input type="checkbox"/> Culverts		Stream Flow: <input type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input checked="" type="checkbox"/> Normal <input type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential		Stream Type: <input type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input checked="" type="checkbox"/> Ephemeral <input type="checkbox"/> Seep	
Riparian Vegetation: Dominate Type: <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input checked="" type="checkbox"/> Herbaceous Number of Strata: <u>3</u>		Dom. Tree/Shrub Taxa: <i>Sweetgum</i> <i>Sassafras</i> <i>Red Oak</i> <i>Spicebush</i> <i>Cherry</i>		Canopy Cover: <input type="checkbox"/> Fully Exposed (0-25%) <input type="checkbox"/> Partially Exposed (25-50%) <input type="checkbox"/> Partially Shaded (50-75%) <input checked="" type="checkbox"/> Fully Shaded (75-100%)	
Channel Alterations: <input type="checkbox"/> Dredging <input type="checkbox"/> Channelization (<input type="checkbox"/> Full <input type="checkbox"/> Partial)		Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C. Riffle _____ % Run <u>100</u> % Pool _____ %			
Silt/Clay (<0.06 mm / <0.002 in) _____					
Sand (0.06 - 2 mm / 0.002 - 0.08 in) _____					
Gravel (2 - 64 mm / 0.08 - 2.5 in) _____					
Cobble (64 - 256 mm / 2.5 - 10.1 in) _____					
Boulders (>256 mm / >10.1 in) _____					
Bedrock _____					
Habitat		Condition Category			
Parameter		Optimal	Suboptimal		Marginal
1. Epifaunal Substrate/ Available Cover		Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).		10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.
SCORE		20 19 18 17 16	15 14 13 12 11		10 9 8 7 6
2. Pool Substrate/ Characterization		Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.		All mud or clay or sand bottom; little or no root mat; no submerged vegetation.
SCORE		20 19 18 17 16	15 14 13 12 11		10 9 8 7 6
3. Pool Availability		Even mix of large shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.		Shallow pools much more prevalent than deep pools.
SCORE		20 19 18 17 16	15 14 13 12 11		10 9 8 7 6

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was a straight line. (Note – channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2-1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, “raw” areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities has impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score

66

NOTES/COMMENTS:

Low Gradient Stream Data Sheet

STREAM NAME: <i>E-6</i>			LOCATION: <i>Joels Run Mine</i>		
STATION: <i>WP882</i>		DRAINAGE AREA (AC)	BASIN/WATERSHED: <i>Joe's Run North Fork Panther Creek / Green River</i>		
LAT: <i>37° 45' 28.6"</i>		LONG: <i>86° 53' 08.4"</i>	COUNTY: <i>Daviess</i>		USGS 7.5 TOPO:
DATE: <i>7/13/12</i> TIME: 10:53 (CT) <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM			INVESTIGATORS: <i>Bill Sampson and Rick Heil</i>		
TYPE SAMPLE: <input type="checkbox"/> P-CHEM <input type="checkbox"/> Macroinvertebrate <input type="checkbox"/> FISH <input type="checkbox"/> BACT.					
WEATHER: Now <input type="checkbox"/> Past 24 hours <input type="checkbox"/> Has there been a heavy rain in the last 7 days? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No					
<input type="checkbox"/> Heavy rain <input checked="" type="checkbox"/> Steady rain <input checked="" type="checkbox"/> Intermittent showers <input type="checkbox"/> Clear/sunny/overcast Appr. Air Temp. <u>79</u> °F. Inches rainfall in past 24 hours <u>0.5</u> in _____ % Cloud Cover					
P-Chem: Temp (°F) _____ D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond. _____ <input type="checkbox"/> Grab					
INSTREAM WATERSHED FEATURES (at time of assessment):			LOCAL WATERSHED FEATURES:		
Stream Width EOW _____ ft Stream Width BF <u>2.0</u> ft Stream Bottom Width <u>1.0</u> ft Avg. Bankfull Depth <u>0.5</u> ft Avg. H ₂ O Depth Riffle <u>0</u> ft			Predominant Surrounding Land Use: <input type="checkbox"/> Surface Mining <input type="checkbox"/> Construction <input type="checkbox"/> Forest <input type="checkbox"/> Deep Mining <input type="checkbox"/> Commercial <input checked="" type="checkbox"/> Pasture/Grazing <input type="checkbox"/> Oil Wells <input type="checkbox"/> Industrial <input type="checkbox"/> Silviculture <input type="checkbox"/> Land Disposal <input type="checkbox"/> Row Crops <input type="checkbox"/> Urban Runoff/Storm Sewers		
Hydraulic Structures: <input type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments <input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input type="checkbox"/> Other <input type="checkbox"/> Culverts		Stream Flow: <input type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input checked="" type="checkbox"/> Normal <input type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential		Stream Type: <input type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input checked="" type="checkbox"/> Ephemeral <input type="checkbox"/> Seep	
Riparian Vegetation: Dominate Type: <input type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input checked="" type="checkbox"/> Grasses <input checked="" type="checkbox"/> Herbaceous Number of Strata: <u>2</u>		Dom. Tree/Shrub Taxa: <i>Red Cedar</i> <i>Multiflora Rose</i>		Canopy Cover: <input checked="" type="checkbox"/> Fully Exposed (0-25%) <input type="checkbox"/> Partially Exposed (25-50%) <input type="checkbox"/> Partially Shaded (50-75%) <input type="checkbox"/> Fully Shaded (75-100%)	
Channel Alterations: <input type="checkbox"/> Dredging <input type="checkbox"/> Channelization (<input type="checkbox"/> Full <input type="checkbox"/> Partial)		Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C. Riffle _____ % Run <u>100</u> % Pool _____ %			
Silt/Clay (<0.06 mm / <0.002 in) <u>100</u>					
Sand (0.06 - 2 mm / 0.002 - 0.08 in)					
Gravel (2 - 64 mm / 0.08 - 2.5 in)					
Cobble (64 - 256 mm / 2.5 - 10.1 in)					
Boulders (>256 mm / >10.1 in)					
Bedrock					
Habitat		Condition Category			
Parameter		Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover		Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat" lack of habitat is obvious; substrate unstable or lacking.
SCORE		20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate/ Characterization		Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE		20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Availability		Even mix of large shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE		20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was a straight line. (Note – channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2-1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, “raw” areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities has impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score

76

NOTES/COMMENTS: some incised / entrenched

Low Gradient Stream Data Sheet

STREAM NAME: <i>E-7</i>			LOCATION: <i>Joels Run Mine</i>		
STATION: <i>WP874</i>		DRAINAGE AREA (AC)	BASIN/WATERSHED: <i>Joe's Run North Fork Panther Creek / Green River</i>		
LAT: <i>37° 45' 31.2"</i>		LONG: <i>86° 53' 11.9"</i>	COUNTY: <i>Daviess</i>		USGS 7.5 TOPO:
DATE: <i>7/13/12</i> TIME: 9:49 (CT) <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM			INVESTIGATORS: <i>Bill Sampson and Rick Heil</i>		
TYPE SAMPLE: <input type="checkbox"/> P-CHEM <input type="checkbox"/> Macroinvertebrate <input type="checkbox"/> FISH <input type="checkbox"/> BACT.					
WEATHER: Now <input type="checkbox"/> Past 24 hours <input type="checkbox"/> Has there been a heavy rain in the last 7 days? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No					
<input type="checkbox"/> Heavy rain <input checked="" type="checkbox"/> Steady rain <input type="checkbox"/> Intermittent showers <input checked="" type="checkbox"/> Clear/sunny/overcast Appr. Air Temp. <u>78</u> °F. Inches rainfall in past 24 hours <u>0.5</u> in % Cloud Cover <u>90</u>					
P-Chem: Temp (°F) _____ D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond. _____ <input type="checkbox"/> Grab					
INSTREAM WATERSHED FEATURES (at time of assessment):			LOCAL WATERSHED FEATURES:		
Stream Width EOW _____ ft Stream Width BF <u>3.0</u> ft Stream Bottom Width <u>1.0</u> ft Avg. Bankfull Depth <u>0.5</u> ft Avg. H ₂ O Depth Riffle <u>0</u> ft			Predominant Surrounding Land Use: <input type="checkbox"/> Surface Mining <input type="checkbox"/> Construction <input type="checkbox"/> Forest <input type="checkbox"/> Deep Mining <input type="checkbox"/> Commercial <input checked="" type="checkbox"/> Pasture/Grazing <input type="checkbox"/> Oil Wells <input type="checkbox"/> Industrial <input type="checkbox"/> Silviculture <input type="checkbox"/> Land Disposal <input type="checkbox"/> Row Crops <input type="checkbox"/> Urban Runoff/Storm Sewers		
Hydraulic Structures: <input type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments <input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input type="checkbox"/> Other <input type="checkbox"/> Culverts		Stream Flow: <input type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input checked="" type="checkbox"/> Normal <input type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential		Stream Type: <input type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input checked="" type="checkbox"/> Ephemeral <input type="checkbox"/> Seep	
Riparian Vegetation: Dominate Type: <input type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input checked="" type="checkbox"/> Grasses <input checked="" type="checkbox"/> Herbaceous Number of Strata: <u>2</u>		Dom. Tree/Shrub Taxa: <i>Red Maple</i> <i>Sweetgum</i>		Canopy Cover: <input checked="" type="checkbox"/> Fully Exposed (0-25%) <input type="checkbox"/> Partially Exposed (25-50%) <input type="checkbox"/> Partially Shaded (50-75%) <input type="checkbox"/> Fully Shaded (75-100%)	
Channel Alterations: <input type="checkbox"/> Dredging <input type="checkbox"/> Channelization (<input type="checkbox"/> Full <input type="checkbox"/> Partial)		Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C. Riffle _____ % Run <u>100</u> % Pool _____ %			
Silt/Clay (<0.06 mm / <0.002 in) <u>100</u>					
Sand (0.06 - 2 mm / 0.002 - 0.08 in)					
Gravel (2 - 64 mm / 0.08 - 2.5 in)					
Cobble (64 - 256 mm / 2.5 - 10.1 in)					
Boulders (>256 mm / >10.1 in)					
Bedrock					
Habitat		Condition Category			
Parameter		Optimal	Suboptimal		Marginal
1. Epifaunal Substrate/ Available Cover		Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).		10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.
SCORE		20 19 18 17 16	15 14 13 12 11		10 9 8 7 6
2. Pool Substrate/ Characterization		Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.		All mud or clay or sand bottom; little or no root mat; no submerged vegetation.
SCORE		20 19 18 17 16	15 14 13 12 11		10 9 8 7 6
3. Pool Availability		Even mix of large shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.		Shallow pools much more prevalent than deep pools.
SCORE		20 19 18 17 16	15 14 13 12 11		10 9 8 7 6

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was a straight line. (Note – channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2-1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, “raw” areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities has impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score

73

NOTES/COMMENTS:

Low Gradient Stream Data Sheet

STREAM NAME: <i>E-8</i>			LOCATION: <i>Joels Run Mine</i>		
STATION: <i>WP869</i>		DRAINAGE AREA (AC)	BASIN/WATERSHED: <i>Joe's Run North Fork Panther Creek / Green River</i>		
LAT: <i>37° 45' 25.7"</i>		LONG: <i>86° 53' 17.9"</i>	COUNTY: <i>Daviess</i>		USGS 7.5 TOPO:
DATE: <i>7/13/12</i> TIME: 9:30 (CT) <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM			INVESTIGATORS: <i>Bill Sampson and Rick Heil</i>		
TYPE SAMPLE: <input type="checkbox"/> P-CHEM <input type="checkbox"/> Macroinvertebrate <input type="checkbox"/> FISH <input type="checkbox"/> BACT.					
WEATHER: Now <input type="checkbox"/> Past 24 hours <input type="checkbox"/> Has there been a heavy rain in the last 7 days? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No					
<input type="checkbox"/> Heavy rain <input checked="" type="checkbox"/> Steady rain <input checked="" type="checkbox"/> Intermittent showers <input type="checkbox"/> Clear/sunny/overcast Appr. Air Temp. <u>78</u> °F. Inches rainfall in past 24 hours <u>0.5</u> in % Cloud Cover <u>90</u>					
P-Chem: Temp (°F) _____ D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond. _____ <input type="checkbox"/> Grab					
INSTREAM WATERSHED FEATURES (at time of assessment):			LOCAL WATERSHED FEATURES:		
Stream Width EOW _____ ft Stream Width BF <u>2.5</u> ft Stream Bottom Width <u>1.0</u> ft Avg. Bankfull Depth <u>0.25</u> ft Avg. H ₂ O Depth Riffle <u>0</u> ft			Predominant Surrounding Land Use: <input type="checkbox"/> Surface Mining <input type="checkbox"/> Construction <input type="checkbox"/> Forest <input type="checkbox"/> Deep Mining <input type="checkbox"/> Commercial <input checked="" type="checkbox"/> Pasture/Grazing <input type="checkbox"/> Oil Wells <input type="checkbox"/> Industrial <input type="checkbox"/> Silviculture <input type="checkbox"/> Land Disposal <input type="checkbox"/> Row Crops <input type="checkbox"/> Urban Runoff/Storm Sewers		
Hydraulic Structures: <input type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments <input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input type="checkbox"/> Other <input type="checkbox"/> Culverts		Stream Flow: <input type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input checked="" type="checkbox"/> Normal <input type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential		Stream Type: <input type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input checked="" type="checkbox"/> Ephemeral <input type="checkbox"/> Seep	
Riparian Vegetation: Dominate Type: <input type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input checked="" type="checkbox"/> Grasses <input checked="" type="checkbox"/> Herbaceous Number of Strata: <u>2</u>		Dom. Tree/Shrub Taxa: <i>Sweetgum</i>		Canopy Cover: <input checked="" type="checkbox"/> Fully Exposed (0-25%) <input type="checkbox"/> Partially Exposed (25-50%) <input type="checkbox"/> Partially Shaded (50-75%) <input type="checkbox"/> Fully Shaded (75-100%)	
Channel Alterations: <input type="checkbox"/> Dredging <input type="checkbox"/> Channelization (<input type="checkbox"/> Full <input type="checkbox"/> Partial)					
Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C		Riffle _____ %		Run <u>100</u> %	
Silt/Clay (<0.06 mm / <0.002 in)				<u>100</u>	
Sand (0.06 - 2 mm / 0.002 - 0.08 in)					
Gravel (2 - 64 mm / 0.08 - 2.5 in)					
Cobble (64 - 256 mm / 2.5 - 10.1 in)					
Boulders (>256 mm / >10.1 in)					
Bedrock					
Habitat		Condition Category			
Parameter		Optimal	Suboptimal		Marginal
		Poor			
1. Epifaunal Substrate/ Available Cover		Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient.	30-50% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).		10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.
SCORE		20 19 18 17 16	15 14 13 12 11		10 9 8 7 6
2. Pool Substrate/ Characterization		Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.		All mud or clay or sand bottom; little or no root mat; no submerged vegetation.
SCORE		20 19 18 17 16	15 14 13 12 11		10 9 8 7 6
3. Pool Availability		Even mix of large shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.		Shallow pools much more prevalent than deep pools.
SCORE		20 19 18 17 16	15 14 13 12 11		10 9 8 7 6

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was a straight line. (Note – channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2-1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, “raw” areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities has impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score

73

NOTES/COMMENTS: some incised / entrenched



Perennial 1 (P-1) – Looking upstream



Perennial 1 (P-1) – Looking downstream



Intermittent 1 (I-1 DS) – Looking upstream



Intermittent 1 (I-1 MS) – Looking downstream



Intermittent 1 (I-1 US) – Looking downstream



Intermittent 2 (I-2) – Looking upstream



Intermittent 2 (I-2) – Looking downstream



Intermittent 3 (I-3) – Looking upstream



Intermittent 3 (I-3) – Looking downstream



Intermittent 4 (I-4) – Looking upstream



Intermittent 4 (I-4) – Looking downstream



Ephemeral 1 (E-1)



Ephemeral 2 (E-2)



Ephemeral 3 (E-3)



Ephemeral 4 (E-4)



Ephemeral 5 (E-5US)



Ephemeral 5 (E-5DS)



Ephemeral 6 (E-6)



Ephemeral 7 (E-7)



Ephemeral 8 (E-8)

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont (DRAFT)

Project/Site: Wetland A		City/County: Daviess County	Sampling Date: 7/12/12
Applicant/Owner: Joes Run Mine		State: Kentucky	Sampling Point: WP 742
Investigator(s): Derek Smith, Bill Sampson, & Rick Heil		Section, Township, Range:	
Landform (hillslope, terrace, etc.): toe of hill		Local Relief: <input type="checkbox"/> concave <input type="checkbox"/> convex <input type="checkbox"/> none	
Slope: < 2%	Lat: 37° 44' 55.8"	Long: 86° 53' 34.0"	Datum:
Soil Map Unit: Belknap soil series		Cowardin Classification: PFOIA	
Are climatic/hydrologic conditions on the site typical for this time of year? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (if no, explain in Remarks.)			
Are Vegetation, Soil, or Hydrology significantly disturbed? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Are "Normal Circumstances" present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Are Vegetation, Soil, or Hydrology naturally problematic? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		(If needed, explain in Remarks.)	

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Hydric Soil Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Wetland Hydrology Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<p align="center">Is the Sampled Area within a Wetland?</p> <p align="center"><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>
Remarks: Connected to Joes Run	

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size: 30')	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. Sweetgum (<i>Liquidambar styraciflua</i>)	10	Yes	FAC	Number of Dominant Species that are OBL, FACW, or FAC: <u>8</u> (A) Total Number of Dominant Species Across all Strata: <u>8</u> (B) Percent of Dominant Species that are OBL, FACW, or FAC: <u>100</u> (A/B)
2. Red maple (<i>Acer rubrum</i>)	12	Yes	FAC	
3. Swamp chest. Oak (<i>Quercus michauxii</i>)	10	Yes	FACW	
4.				
5.				
Sapling/Shrub Stratum (Plot Size: 15')				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL Species: _____ X 1 = _____ FACW Species: _____ X 2 = _____ FAC Species: _____ X 3 = _____ FACU Species: _____ X 4 = _____ UPL Species: _____ X 5 = _____ Column Totals:(A) _____ (B) _____ Prevalence Index = B/A = _____
1. Red maple (<i>Acer rubrum</i>)	5	No	FAC	
2. Paw paw (<i>Asimina triloba</i>)	18	Yes	FAC	
3. Green ash (<i>Fraxinus pennsylvanica</i>)	15	Yes	FACW	
4. Blackgum (<i>Nyssa sylvatica</i>)	15	Yes	FAC	
5. Tulip poplar (<i>Liriodendron tulipifera</i>)	7	No	FACW	
Herbaceous Stratum (Plot Size: 5')				Hydrophytic Vegetation Indicators: <input type="checkbox"/> Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> Morphological Adaptations ¹ (Provide Supporting Data) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be
1. False nettle (<i>Boehmeria cylindrical</i>)	5	Yes	OBL	
2. Smartweed (<i>Polygonum aviculare</i>)	20	Yes	FAC	
3.				
4.				
5.				
6.				
7.				
8.				
Woody Vine (Plot Size: 5')				Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
1. Trumpet vine (<i>Campsis radicans</i>)	12		FAC	
2.				
Remarks:				

Profile Description (Describe to the depth needed to document the indicator of confirm the absence of indicators.)								
Depth (in)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-0.5								Organic Layer
0.5-6	10YR 6/2	95	10YR 5/6	5	C	M	SiClLo	
6-10	10YR 5/3	100	-----					
¹ Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ² Location: PL=Pore Lining, M=Matrix								
Hydric Soil Indicators: <input type="checkbox"/> Histosol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Stratified Layers (A5) <input type="checkbox"/> 2cm Muck (A10) (LRR N, MLRA 147,148) <input type="checkbox"/> Sandy Gleyed Matrix (S4) <input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6) <input type="checkbox"/> Dark Surface (S7) <input type="checkbox"/> Polyvalue Below Surface (S8)(MLRA 147,148) <input type="checkbox"/> Thin Dark Surface (S9)(MLRA 147,148) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input checked="" type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8) <input type="checkbox"/> Fe-Mn Masses (F12)(LRR N, MLRA 136) <input type="checkbox"/> Umbric Surface (F13)(LRR N, MLRA 136) <input type="checkbox"/> Piedmont Floodplain Soils (F19)(MLRA 148)								
Indicators for Problematic Hydric Soils³ <input type="checkbox"/> 2 cm Muck (A10)(MLRA 147) <input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136,147) <input type="checkbox"/> Red Parent Material (TF2) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (Explain in Remarks) ³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.								
Restrictive Layer (if observed): Type: None Depth (in):				Hydric Soil Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				
Remarks:								

HYDROLOGY

Wetland Hydrology Indicators:		
Primary Indicators (minimum of one required; check all that apply)		
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	<input type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Other (Explain in Remarks)	<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input checked="" type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input checked="" type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input checked="" type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Depth (in): Water Table Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Depth (in): Saturation Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Depth (in): (includes capillary fringe)		Wetland Hydrology Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont (DRAFT)

Project/Site: Wetland B		City/County: Daviess County	Sampling Date: 7/12/12
Applicant/Owner: Joes Run Mine		State: Kentucky	Sampling Point: WP 805
Investigator(s): Derek Smith, Bill Sampson, & Rick Heil		Section, Township, Range:	
Landform (hillslope, terrace, etc.): old pond		Local Relief: <input checked="" type="checkbox"/> concave <input type="checkbox"/> convex <input type="checkbox"/> none	
Slope: < 2%	Lat: 37° 45' 01.5"	Long: 86° 53' 26.4"	Datum:
Soil Map Unit: Belknap soil series		Cowardin Classification: PEMIA	
Are climatic/hydrologic conditions on the site typical for this time of year? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (if no, explain in Remarks.)			
Are Vegetation, Soil, or Hydrology significantly disturbed? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Are "Normal Circumstances" present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Are Vegetation, Soil, or Hydrology naturally problematic? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		(If needed, explain in Remarks.)	

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Is the Sampled Area within a Wetland? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Hydric Soil Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Wetland Hydrology Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Remarks: Connected to Joes Run	

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species that are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across all Strata: <u>2</u> (B) Percent of Dominant Species that are OBL, FACW, or FAC: <u>100</u> (A/B)			
1.							
2.							
3.							
4.							
5.							
Sapling/Shrub Stratum (Plot Size: 15')	Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL Species: _____ X 1 = _____ FACW Species: _____ X 2 = _____ FAC Species: _____ X 3 = _____ FACU Species: _____ X 4 = _____ UPL Species: _____ X 5 = _____ Column Totals:(A) _____ (B) _____ Prevalence Index = B/A = _____						
1. Black willow (<i>Salix nigra</i>)					10	Yes	OBL
2.							
3.							
4.							
5.							
Herbaceous Stratum (Plot Size: 5')	Hydrophytic Vegetation Indicators: <input type="checkbox"/> Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> Morphological Adaptations ¹ (Provide Supporting Data) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be						
1. Switchgrass (<i>Panicum virgatum</i>)					60	Yes	FAC
2. Blunt spikebush (<i>Eleocharis obtuse</i>)					3	No	OBL
3.							
4.							
5.							
6.							
7.							
8.							
Woody Vine (Plot Size:)	Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No						
1.							
2.							
Remarks: Juncus along edge							

Profile Description (Describe to the depth needed to document the indicator of confirm the absence of indicators.)								
Depth (in)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-6	10YR 5/2	95	10YR 5/6	5	C	M	SiClLo	
6-10	10YR 6/1	95	10YR 4/6	5	C	M	SiClLo	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: <input type="checkbox"/> Histosol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Stratified Layers (A5) <input type="checkbox"/> 2cm Muck (A10) (LRR N, MLRA 147,148) <input type="checkbox"/> Sandy Gleyed Matrix (S4) <input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6) <input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> Polyvalue Below Surface (S8)(MLRA 147,148) <input type="checkbox"/> Thin Dark Surface (S9)(MLRA 147,148) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input checked="" type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8) <input type="checkbox"/> Fe-Mn Masses (F12)(LRR N, MLRA 136) <input type="checkbox"/> Umbric Surface (F13)(LRR N, MLRA 136) <input type="checkbox"/> Piedmont Floodplain Soils (F19)(MLRA 148)	Indicators for Problematic Hydric Soils³ <input type="checkbox"/> 2 cm Muck (A10)(MLRA 147) <input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136,147) <input type="checkbox"/> Red Parent Material (TF2) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (Explain in Remarks)
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³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: None Depth (in):	Hydric Soil Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
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Remarks:

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one required; check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	<input checked="" type="checkbox"/> Surface Soil Cracks (B6) <input checked="" type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input checked="" type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Depth (in): Water Table Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Depth (in): Saturation Present? (includes capillary fringe) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Depth (in):	Wetland Hydrology Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont (DRAFT)

Project/Site: Wetland C		City/County: Daviess County	Sampling Date: 7/13/12
Applicant/Owner: Joes Run Mine		State: Kentucky	Sampling Point: WP 825
Investigator(s): Bill Sampson, & Rick Heil		Section, Township, Range:	
Landform (hillslope, terrace, etc.): floodplain		Local Relief: <input type="checkbox"/> concave <input type="checkbox"/> convex <input type="checkbox"/> none	
Slope: < 2%	Lat: 37° 45' 01.5"	Long: 86° 53' 26.4"	Datum:
Soil Map Unit: Belknap soils series		Cowardin Classification: PEMIA	
Are climatic/hydrologic conditions on the site typical for this time of year? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (if no, explain in Remarks.)			
Are Vegetation, Soil, or Hydrology significantly disturbed? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Are "Normal Circumstances" present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Are Vegetation, Soil, or Hydrology naturally problematic? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		(If needed, explain in Remarks.)	

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Is the Sampled Area within a Wetland? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Hydric Soil Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Wetland Hydrology Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Remarks: Connected to Joes Run. Appears to be old pond, filled in.	

VEGETATION – Use scientific names of plants

Tree Stratum (Plot Size:)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species that are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across all Strata: <u>3</u> (B) Percent of Dominant Species that are OBL, FACW, or FAC: <u>100</u> (A/B)			
1.							
2.							
3.							
4.							
5.							
Sapling/Shrub Stratum (Plot Size:)	Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL Species: _____ X 1 = _____ FACW Species: _____ X 2 = _____ FAC Species: _____ X 3 = _____ FACU Species: _____ X 4 = _____ UPL Species: _____ X 5 = _____ Column Totals:(A) _____ (B) _____ Prevalence Index = B/A = _____						
1.							
2.							
3.							
4.							
5.							
Herbaceous Stratum (Plot Size: 5')	Hydrophytic Vegetation Indicators: <input type="checkbox"/> Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> Morphological Adaptations ¹ (Provide Supporting Data) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) <small>¹Indicators of hydric soil and wetland hydrology must be</small>						
1. Fescue (<i>Festuca arundinacea</i>)					10	No	FACU
2. Fox sedge (<i>Carex vulpinoidea</i>)					12	Yes	OBL
3. Rush (<i>Juncus effuses</i>)					20	Yes	FACW
4. Franks sedge (<i>Carex frankii</i>)					12	Yes	OBL
5. Smartweed (<i>Polygonum aviculare</i>)					7	No	FAC
6.							
7.							
8.							
Woody Vine (Plot Size:)	Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No						
1.							
2.							
Remarks: Juncus along edge							

Profile Description (Describe to the depth needed to document the indicator of confirm the absence of indicators.)								
Depth (in)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-2.5	10YR 5/2	65	10YR 4/6	35	C	M	SiClLo	
2.5-10	10YR 5/2	80	10YR 4/6	20	C	M	SiClLo	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: <input type="checkbox"/> Histosol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Stratified Layers (A5) <input type="checkbox"/> 2cm Muck (A10) (LRR N, MLRA 147,148) <input type="checkbox"/> Sandy Gleyed Matrix (S4) <input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6) <input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> Polyvalue Below Surface (S8)(MLRA 147,148) <input type="checkbox"/> Thin Dark Surface (S9)(MLRA 147,148) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input checked="" type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8) <input type="checkbox"/> Fe-Mn Masses (F12)(LRR N, MLRA 136) <input type="checkbox"/> Umbric Surface (F13)(LRR N, MLRA 136) <input type="checkbox"/> Piedmont Floodplain Soils (F19)(MLRA 148)	Indicators for Problematic Hydric Soils³ <input type="checkbox"/> 2 cm Muck (A10)(MLRA 147) <input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136,147) <input type="checkbox"/> Red Parent Material (TF2) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (Explain in Remarks)
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³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: None (but was hard to probe) Depth (in):	Hydric Soil Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
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Remarks:

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one required; check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	<input type="checkbox"/> Surface Soil Cracks (B6) <input checked="" type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input checked="" type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? <input type="checkbox"/> Yes <input type="checkbox"/> No Depth (in): Water Table Present? <input type="checkbox"/> Yes <input type="checkbox"/> No Depth (in): Saturation Present? <input type="checkbox"/> Yes <input type="checkbox"/> No Depth (in): (includes capillary fringe)	Wetland Hydrology Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	



Wetland A – Palustrine Forested



Wetland B – Palustrine Emergent



Wetland C – Palustrine Emergent