

# **Stream Habitat Assessment and Wetland Delineation Report**

**P Ridge South Pit Mine, Amend. #1  
Ohio County, Kentucky**

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## I. INTRODUCTION

### **Introduction**

This report is a description of streams and wetlands located within a 114.3 acre study amendment area in Ohio 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 north of Hartford, Kentucky, in Ohio County (Pleasant Ridge USGS 7.5 minute topographic quadrangle), with its center at Latitude: 37° 35' 24" N, Longitude: 86° 59' 17" W. The site can be accessed from KY2115, off US 231 north of Hartford. See Exhibit 1 for project location.

### **Background and Description**

Topography in the area generally consists of hilly terrain and a wide valley bottom with mild relief. The 114.3-acre study area predominantly consists of forest, with some agricultural lands (approximately 8 acres is currently being pastured). 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, elm, and poplar.

### **Purpose of Project**

The purpose of the project is for Western Kentucky Minerals to expand an existing permitted surface coal mine operation (KDNR Permit No. 892-0116) for continued mining activities.

## 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**

Potential wetlands within the project area were evaluated for the presence of wetland characteristics during November, 2012. On-site wetland determinations were conducted using criteria outlined in the 2010 USACE *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, and a Munsell soil color chart. Potential 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 Soil Survey of Ohio County, Kentucky (USDA). The National Wetland Inventory (NWI) geospatial data for the Pleasant Ridge 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. Four areas exhibiting indicators of hydric soils, wetland hydrology, and hydrophytic plant communities are located within the permit boundary; these areas will be referred to as "wetlands" for the remainder of the document, pending USACE confirmation. Tentative Cowardin classifications are assigned based on dominant vegetation and hydrologic conditions observed during delineations. See Table 2 for a summary of wetland information. See the appendix for Wetland Delineation Forms and photographs.

### **III. EXISTING CONDITIONS**

#### **Streams**

There are two 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 – Intermittent**

**Intermittent Stream 1 (I-1)** is located centrally within the study boundary and flows southward through the study area for approximately 2336 feet. At the southern boundary limit the stream has a drainage area of 179.3 acres. Due to its length, I-1 was assessed at two

locations (upstream and downstream). The stream bottom width was approximately 1.0 foot throughout, while the bankfull width ranged from 4.0 to 9.0 feet.

The EPA stream habitat assessment (Low Gradient) for the upstream section (I-1US) indicates a epifaunal substrate/available cover score in the high marginal range. The substrate consists of an equal mix of silt/clay and sand size materials. Streambed morphology consists of equal riffle and runs, with longer pools sections. At the time of assessment, flow was utilizing 25 to 75 percent of the channel bottom. There was evidence of moderate deposition of new fine material, affecting 50 to 80 percent of the bottom. There was evidence of past channelization that may have been extensive, but no recent evidence was found. This may account for the poor sinuosity score. Bank stability scored in the low marginal (moderately unstable) range for both banks, with obvious erosion problems present. Vegetative protection also scored in the marginal range. The riparian zone width scored high suboptimal along both banks (forested area).

The habitat assessment (Low Gradient) for the downstream section (I-1DS) indicates a epifaunal substrate/available cover again scored in the high marginal range. The substrate, however, consists of a better mix of silt/clay to gravel size materials (except in pools where sand was predominant). Streambed morphology consists of equal, but short, riffles and runs, with very long pools sections. At the time of assessment, flow was utilizing greater than 75 percent of the channel bottom. Again, there was evidence of moderate deposition of new fine material. This section also had evidence of past channelization, resulting in the sinuosity score being in the poor range. Bank stability scored in the poor range for both banks (unstable), with erosion problems present in 60 to 100 percent of streambank areas. Vegetative protection scored in the marginal range, with vegetation covering 50 to 70 percent of the banks. The riparian zone width scored high suboptimal again. The dominant riparian vegetation typically consists of trees, shrubs, and herbaceous species.

I-1 has an average total habitat score of 89, corresponding to a stream quality rating of marginal. Conductivity readings were taken in each section, and averaged 324  $\mu$ S. Stream I-1 is classified, according to Rosgen methodology, as an "F" type throughout.

**Intermittent Stream 2 (I-2)** is located in the southwestern section of the study area, and is a tributary to I-1; with its confluence outside the study boundary. I-2 flows southeasterly for approximately 916 feet (Wetland D is in its headwaters). It has a drainage area of 45.7 acres at the southern boundary, above its confluence with I-1. The stream has a bottom width of 2.5 feet, and a bankfull width of 3.5 feet.

The EPA stream habitat assessment (Low Gradient) for I-2 indicates an epifaunal substrate/available cover score in the low suboptimal range. However, the substrate consists of only silt/clay size material. Streambed morphology consists of long runs, and very short pool sections. At the time of assessment, there was little to no flow found in 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 (sinuosity scored poor), but no recent evidence was found. Bank stability scored in the suboptimal range for the left bank (moderately stable) and high marginal for the right bank (moderately unstable). Vegetative protection scored in the marginal range, while the riparian zone width scored suboptimal. The dominant riparian vegetation typically consists of trees, shrubs, and herbaceous species.

I-2 has a total habitat score of 97, corresponding to a stream quality rating of marginal. A conductivity reading was not taken due to dry conditions. I-2 is classified, according to Rosgen methodology, as an “G” type stream.

### **Stream Assessments - Ephemeral**

The remaining eight streams are ephemeral in nature and occur throughout the study boundary area. Typically these are found in large numbers and grouped for discussion purposes. Since only eight were found, they are discussed individually.

**Ephemeral Stream 1 (E-1)** is located in the eastern section of the study area, and is a tributary to intermittent stream I-1. It flows southwesterly for approximately 1028 feet within a drainage area of 14.8 acres at the confluence with I-1. Due to its length, it was assessed in two reaches (upstream and downstream). The stream has a bottom width of approximately 1.0 feet throughout, but the bankfull width ranges from 3.0 to 8.0 feet.

The EPA stream habitat assessment (High Gradient) for the upstream reach (E-1US) indicates an epifaunal substrate/available cover score in the marginal range (less than desirable available habitat). The substrate consists of only silt/clay size material. Streambed morphology consists of only runs. At the time of assessment, there was little to no flow found in the channel bottom. There was evidence of some deposition of new fine material, affecting 5 to 30 percent of the bottom. Past channelization may have been extensive, but no recent evidence was found. Bank stability scored in the marginal range (moderately unstable). Vegetative protection scored in the marginal (left bank) to suboptimal range (right bank), while the riparian zone width scored suboptimal. The dominant riparian vegetation typically consists of trees, shrubs, and herbaceous species.

The stream habitat assessment (Low Gradient) for the downstream reach (E-1DS) indicates an epifaunal substrate/available cover score again in the marginal range. Like the upstream section, the substrate consists of only silt/clay size material and the streambed morphology consists of only runs. There was little to no flow found in the channel bottom during the assessment. There was evidence of moderate deposition of new fine material, affecting 50 to 80 percent of the bottom. Again, past channelization may have been extensive resulting in a low marginal sinuosity score. Bank stability scored in the marginal range (moderately unstable). Vegetative protection scored in the marginal for both banks, while the riparian zone width scored suboptimal for both. The dominant riparian vegetation typically consists of trees, shrubs, and herbaceous species.

E-1 has an average total habitat score of 84, corresponding to a stream quality rating of marginal. Conductivity readings were not taken due to dry conditions. E-1 is classified, according to Rosgen methodology, as an "F" type stream for both reaches.

**Ephemeral Stream 2 (E-2)** is located in the north-central section of the study area, and is also a tributary to intermittent stream I-1. It flows southeasterly for approximately 1077 feet from Pond 1 to its confluence with I-1. It occurs in a watershed of 24.9 acres. The stream has a bottom width of approximately 1.0 feet, and a bankfull width of approximately 4.0 feet.

The EPA stream habitat assessment (High Gradient) for E-2 indicates an epifaunal substrate/available cover score in the marginal range (less than desirable available habitat). The substrate consists of only silt/clay size material and the streambed morphology consists of only runs. At the time of assessment, there was little to no flow found in the channel bottom. There was evidence of some deposition of new fine material, affecting 5 to 30 percent of the bottom. Again, evidence of past channelization that may have been extensive was found. Bank stability scored in the marginal range (moderately unstable). Vegetative protection also scored in the marginal range. The riparian zone width scored suboptimal. The dominant riparian vegetation typically consists of trees, shrubs, and herbaceous species.

E-2 has a total habitat score of 77, corresponding to a stream quality rating of marginal. A conductivity reading was not taken due to dry conditions. E-2 is classified as a "G" type stream.

**Ephemeral Stream 3 (E-3)** is located in the northwestern section of the study area, and flows to Wetland B/Pond 1. It flows southeasterly for approximately 266 feet to the wetland/pond. It has a drainage area of 4.8 acres. The stream has a bottom width of approximately 0.7 feet, and a bankfull width of approximately 1.5 feet.

The EPA stream habitat assessment (High Gradient) for E-3 indicates an epifaunal substrate/available cover score in the marginal range. The substrate consists of only silt/clay size material and the streambed morphology consists of only runs. At the time of assessment, there was little to no flow found in the channel bottom. There was evidence of some deposition of new fine material. There is evidence of some past channelization, but nothing recent. Bank stability scored in the suboptimal range (moderately stable). Vegetative protection also scored in the suboptimal range. The riparian zone width scored suboptimal. The dominant riparian vegetation typically consists of trees, shrubs, and herbaceous species.

E-3 has a total habitat score of 84, corresponding to a stream quality rating of marginal. A conductivity reading was not taken due to dry conditions. E-3 also classified as a "G" type stream.

**Ephemeral Stream 4 (E-4)** is located in the northeastern section of the study area, and is another tributary to intermittent I-1. It flows southwesterly for approximately 610 feet within a watershed area of 11.7 acres. The stream has a bottom width of approximately 1.0 feet, and a bankfull width of approximately 5.0 feet.

The stream habitat assessment (High Gradient) for E-4 indicates an epifaunal substrate/available cover score in the high marginal range. The substrate consists of a mix of silt/clay to cobble size materials. The streambed morphology again consists of only runs. There was little to no flow found in the channel bottom at the time of assessment. There was evidence of moderate deposition of new fine material. There is evidence of past channelization that may have been extensive, but nothing recent. Bank stability scored in the marginal range (moderately unstable). Vegetative protection scored in the poor range, with less than 50 percent of the streambank surface covered. The riparian zone width, however, scored suboptimal. The dominant riparian vegetation consisted of trees, shrubs, and herbaceous species.

E-4 has a total habitat score of 66, corresponding to a stream quality rating of low marginal. A conductivity reading was not taken due to dry conditions. E-4 classified as a "G" type stream.

**Ephemeral Stream 5 (E-5)** is located in the western section of the study area, and is a tributary to intermittent stream I-2. It flows southeasterly for approximately 1278 feet within a watershed area of 22.3 acres. Due to its length, it was assessed in two reaches (upstream and downstream). The stream has a bottom width of approximately 1.0 feet throughout, and a bankfull width that averages approximately 2.8 feet.

The stream habitat assessment (Low Gradient) for the upstream reach (E-5US) indicates an epifaunal substrate/available cover score in the low suboptimal range. The substrate consists of only silt/clay size material and the streambed morphology consists of only runs. There was little to no flow found in the channel bottom at the time of assessment. There was little evidence of deposition of new fine material. There is some evidence of channelization present, but nothing that occurred recently. Sinuosity scored in the low suboptimal range. Bank stability scored in the optimal range (stable with minimal evidence of erosion). Vegetative protection also scored in the optimal range, with more than 90 percent of the streambank surface covered. The riparian zone width, however, scored marginal (right bank) to suboptimal (left bank). The dominant riparian vegetation again consisted of trees, shrubs, and herbaceous species. The channel is nearly indistinguishable in this reach.

The stream habitat assessment (Low Gradient) for the downstream reach (E-5DS) indicates an epifaunal substrate/available cover score in the marginal range. Like the upper reach, the substrate consists of only silt/clay size material and the streambed morphology consists of only runs. There was little to no flow found in the channel bottom at the time of assessment. There was some evidence of deposition of new fine material affecting 20 to 50 percent of the bottom. There is some evidence of channelization present, but nothing that occurred recently; with sinuosity scoring in the low marginal range. Bank stability again scored in the optimal range (stable with minimal evidence of erosion), but vegetative protection scored in the suboptimal range (with 70 to 90 percent of the streambank surface covered). The riparian zone width scored low suboptimal. The dominant riparian vegetation again consisted of trees, shrubs, and herbaceous species.

E-5 has an average total habitat score of 105, corresponding to a stream quality rating of low suboptimal. A conductivity reading was not taken due to low flow conditions. E-5 classified as an "E" type stream throughout.

**Ephemeral Stream 6 (E-6)** is located in the west-central section of the study area, and is also a tributary to intermittent stream I-2. It flows south for approximately 602 feet within a watershed area of 7.0 acres. The stream has a bottom width of approximately 1.2 feet throughout, and a bankfull width of approximately 2.0 feet.

The stream habitat assessment (Low Gradient) for E-6 indicates an epifaunal substrate/available cover score in the poor range. The substrate consists of predominantly silt/clay size material, with some sand sizes available. The streambed morphology consists of only runs. There was no flow found in the channel bottom at the time of assessment. There was some evidence of deposition of new fine material. There was also some evidence of

channelization present, with sinuosity scoring in the low marginal range. Bank stability scored in the suboptimal range (moderately stable with infrequent evidence of erosion). Vegetative protection also scored in the suboptimal range, with 70 to 90 percent of the streambank surface covered. The riparian zone width scored suboptimal as well. The dominant riparian vegetation consisted of trees, shrubs, herbaceous species, and grasses.

E-6 has a total habitat score of 94, corresponding to a stream quality rating of marginal. A conductivity reading was not taken due to dry conditions. E-6 classified as a “B” type stream.

**Ephemeral Stream 7 (E-7)** is located in the southwest section of the study area, and is a tributary to ephemeral stream E-5. It flows southwesterly for approximately 88 feet within a watershed area of 1.3 acres. The stream has a bottom width of approximately 1.0 feet and a bankfull width of approximately 2.5 feet.

The stream habitat assessment (High Gradient) for E-7 indicates an epifaunal substrate/available cover score in the marginal range. The substrate consists of only silt/clay size material and the streambed morphology consists of only runs. There was no flow found in the channel bottom at the time of assessment. There was some evidence of deposition of new fine material. There was also some evidence of channelization present. Bank stability scored in the suboptimal range (moderately stable with infrequent evidence of erosion). Vegetative protection also scored in the suboptimal range, with 70 to 90 percent of the streambank surface covered. The riparian zone width scored marginal (left bank) to low suboptimal (right bank). The dominant riparian vegetation consisted of trees, shrubs, and herbaceous species.

E-7 has a total habitat score of 94, corresponding to a stream quality rating of marginal. A conductivity reading was not taken due to dry conditions. E-7 classified as an “F” type stream.

**Ephemeral Stream 8 (E-8)** is located in the west-central section of the study area, and is also a tributary to ephemeral stream E-5. It flows southeasterly for approximately 200 feet within a watershed area of 8.6 acres. The stream has a bottom width of approximately 1.0 feet and a bankfull width of approximately 3.0 feet.

The stream habitat assessment (Low Gradient) for E-8 indicates an epifaunal substrate/available cover score in the suboptimal range. The substrate consists of only silt/clay size material. The streambed morphology consists of long runs and very short shallow pool sections. There was flow found in the channel bottom, bank to bank, at the time of assessment. There was little evidence of the deposition of new fine material. There was little evidence of past channelization found, but sinuosity still scored marginal. Bank stability scored in the optimal range (stable with little evidence of erosion). Vegetative protection also scored in the

optimal range, with greater than 90 percent of the streambank surface covered. The riparian zone width scored suboptimal. The dominant riparian vegetation consisted of trees, shrubs, and herbaceous species.

E-8 has a total habitat score of 142, corresponding to a stream quality rating of high suboptimal. A conductivity reading of 386  $\mu$ S was taken. E-8 classified as a “B” type stream.

## **Wetlands**

Four wetland areas totaling approximately 0.769 acres of occur within, or adjacent to, the study area boundary. Two wetlands are associated with pond, with the remaining two associated with streams floodplains (note no FEMA designated floodplains within the study boundary). 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. Again, although these areas are referred to as wetlands, these determinations are assigned pending final USACE verifications.

**Wetland A** is located along the edge of Pond 2, and is a palustrine, fringe, emergent wetland (PEM1H). The wetland has a total area of 0.026 acres. Overflow from pond would drain to tributary I-1. Herbaceous vegetation is prevalent at this site dominated by barnyard grass (*Echinochloa crus-galli*), sedge (*Carex sp.*), spikerush (*Eleocharis obtusa*) and water buttercup (*Ranunculus flabellaris*). Hydrophytic vegetation is established by the rapid test, as both dominants are FACW (*E. crus-galli*) and OBL (*E. obtusa*). The soil has a silt-clay loam texture, with a matrix color of 10YR 5/3 and a redox feature of 7.5YR 5/6 from 0 to 3 inches; and a matrix color of 10YR 5/6 from 3 to 10 inches. Soils lack a defined indicator, but are assumed hydric by the 1987 Manual specification of OBL/FACW dominant plants and a sharp boundary between wetland and upland communities. Wetland hydrology confirmed by two primary indicators, surface water and saturation.

**Wetland B** is located along the northern edge of Pond 1, and is a palustrine, fringe, emergent wetland (PEM1H). The wetland has a total area of 0.332 acres, and drains to tributary E-2. Herbaceous vegetation is prevalent at this site dominated by false nettle (*Boehmeria cylindrica*), sedge (*Carex sp.*) and *E. crus-galli*. However, a few alders (*Alnus sp.*) are present at two pond coves. Hydrophytic vegetation is established by the rapid test. The soil has a silt-clay loam texture, with a gleyed matrix color of 10YR 4/2 and a redox feature of 7.5YR 5/6 from 0 to 5 inches and a gleyed matrix color of 10YR 3/1 and no redox feature from 5 to 10 inches; these characteristics satisfy requirements for hydric soil indicator F3: Depleted Matrix. The primary indicators surface water and saturation establish wetland hydrology.

**Wetland C** is located at the confluence of tributaries E-5 and E-8, and is a palustrine, forested wetland which is saturated (PFO1B). This site has a total area of 0.014 acres, and is drained by tributary E-5. The dominant tree stratum species are black willow (*Salix nigra*), red maple (*Acer rubrum*) and silver maple (*A. saccharinum*). The dominant sapling stratum species are *S. nigra* and *A. rubrum*. The only herbaceous species present was sedge (*Carex sp.*). The soil has a sandy texture with a brown color from 1 to 10 inches; and the top one inch consists of an organic layer. Although the soil does not have a distinct indicator, hydric conditions are assumed due to the dominance of FACW and OBL plants and a distinct break between upland and wetland communities. High water table and saturation are primary indicators confirming wetland hydrology.

**Wetland D** is located within a swale adjacent to tributary I-2, and is a palustrine, forested wetland that is temporarily flooded (PFO1A). The wetland has a total area of 0.397 acres, and is drained by tributary I-2. The dominant tree stratum species are red maple (*Acer rubrum*), sycamore (*Platanus occidentalis*) and sweetgum (*Liquidambar styraciflua*). The dominant sapling stratum species are spicebush (*Lindera benzoin*), *A. rubrum*, *L. styraciflua* and elderberry (*Sambucus sp.*). The dominant herbaceous species are goldenrod (*Solidago sp.*) and Christmas fern (*Polystichum acrostichoides*). Hydrophytic vegetation is established by the Dominance Test. This area had been recently logged; therefore, soils and vegetation were both significantly disturbed. The soil has a silt-clay loam texture, with a matrix color of 2.5 YR 4/1 and a redox feature of 2.5YR 4/6 from 0 to 6 inches, a matrix color of 2.5YR 4/2 and a redox feature of 2.5YR 4/6 from 6 to 8 inches, and a matrix color of 2.5YR 4/2 and a redox feature of 2.5YR 4/6 from 8 to 12 inches; soils examined satisfy hydric soil indicator F3:Depleted Matrix. The presence of surface water, a shallow water table and saturation are primary indicators establishing wetland hydrology.

**Ponds** – There are two small ponds within the project study boundary, both associated with wetlands (see wetland discussions above). One pond (Pond 1) is also associated with ephemeral streams (E-2 and E-3). See Table 3 for a summary of information on these resources.

## V. REFERENCES

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## **VI. TABLES**

Table 1. Summary of Stream Information

Table 2. Summary of Wetland Information

Table 3. Summary of Pond/Open Waters

**Table 1: Summary of Stream Study Information**

Stream	Latitude	Longitude	Habitat Score	Conductivity (µS)	Stream Type	Studied Length (ft)	Drainage Area (ac)	Rosgen Class*
I-1	37.589528	86.986278	89 ave	324 ave	Intermittent	2336	179.3	F5/6,F5
I-2	37.587667	86.988722	97	-----	Intermittent	916	45.7	G6c
E-1	37.590278	86.984667	84 ave	-----	Ephemeral	1028	14.8	F6g,F6
E-2	37.590694	86.986917	77	-----	Ephemeral	1077	24.9	G6f
E-3	37.592833	86.990694	84	-----	Ephemeral	266	4.8	G6b
E-4	37.591722	86.985417	66	-----	Ephemeral	610	11.7	G6
E-5	37.589028	86.990056	105 ave	-----	Ephemeral	1278	22.3	E6, E6
E-6	37.589694	86.989000	94	-----	Ephemeral	602	7.0	B6
E-7	37.589083	86.989972	94	-----	Ephemeral	88	1.3	F6
E-8	37.590167	86.991389	142	386	Ephemeral	200	8.6	B6
<b>Intermittent Totals</b>						<b>3252</b>		
<b>Ephemeral Totals</b>						<b>5149</b>		

\*For streams with multiple assessment reaches, the classifications are listed upstream to downstream.

**Table 2. Summary of Wetlands**

Wetland	Latitude	Longitude	Classification	Connectivity	Wetland Area (acres)	Area in Study Boundary
A	37.588278	86.984944	PEM1H	Yes	0.026	0.026
B	37.592917	86.989028	PEM1H	Yes	0.332	0.332
C	37.590000	86.991139	PFO1B	Yes	0.014	0.014
D	37.588306	86.990111	PFO1A	Yes	0.397	0.397
<b>Totals</b>					<b>0.769</b>	<b>0.769</b>

**Table 3. Summary of Ponds (Open Water)**

<b>Pond</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Associated With</b>	<b>Total Area (Acres)</b>	<b>Area in Boundary (Acres)</b>
1	37.592274	86.989163	Wetland B, E-2, E-3	0.922	0.922
2	37.588653	86.984833	Wetland A	0.089	0.089
<b>Totals</b>				<b>1.011</b>	<b>1.011</b>

**NOTE :** Data provided in these tables are for baseline study purposes only. The amount of streams, wetlands, and pond areas studied **may not reflect future impact lengths or acreages.**

## **VII. EXHIBITS**

Exhibit 1: Vicinity Map

Exhibit 2: USGS Topographic Map

Exhibit 3: Aerial Map

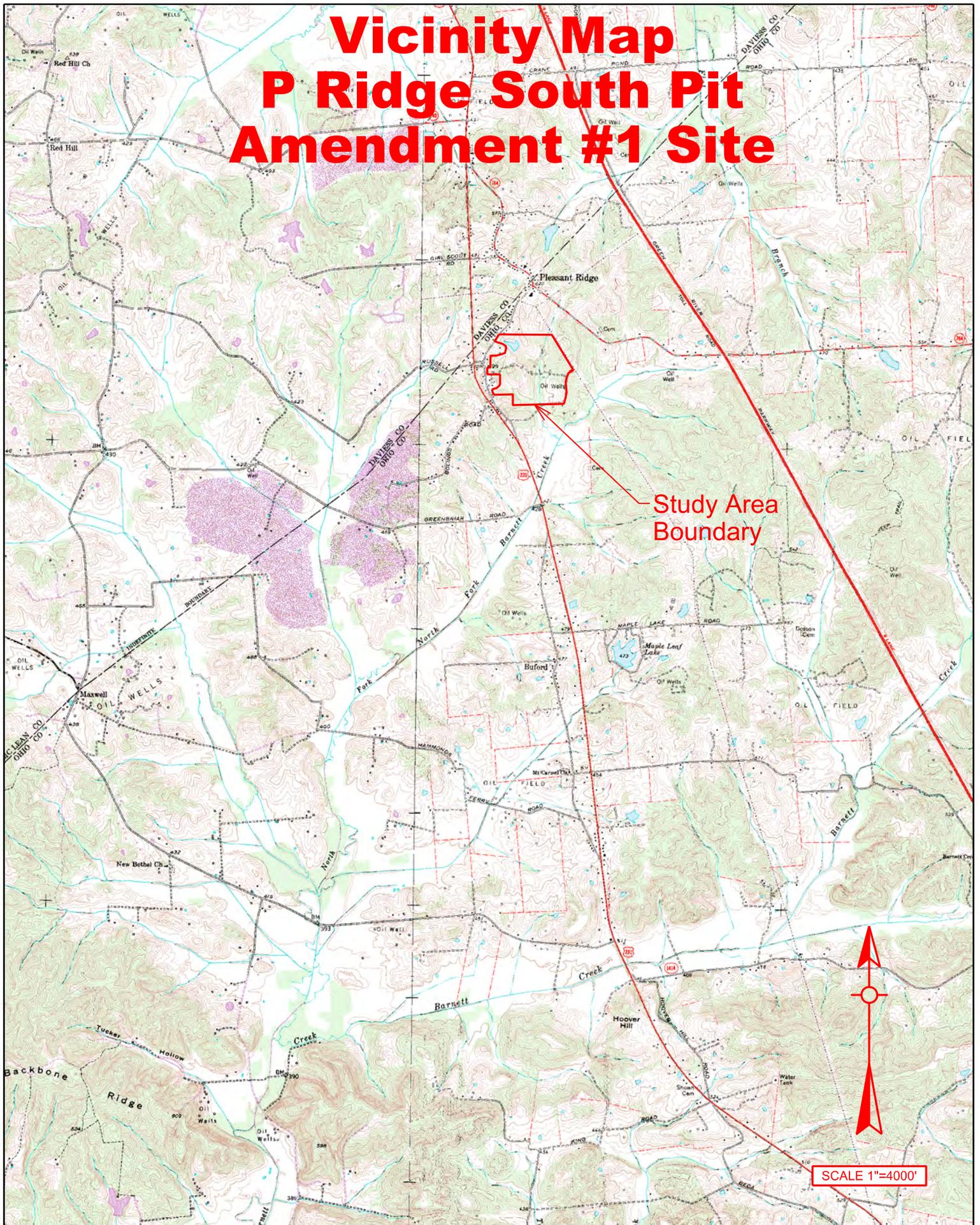
Exhibit 4: National Wetlands Inventory (NWI) Map

Exhibit 5: Soil Map

Exhibit 6: FEMA Flood Insurance Rate Map

Exhibits 7-10: Existing Stream Cross-sections

# Vicinity Map P Ridge South Pit Amendment #1 Site



SCALE 1"=4000'

T.H.E.  
Engineers, Inc.

PROJECT: P RIDGE SOUTH PIT, AMEND NO.1 SITE - STUDY BOUNDARY

STREAMS: UT's OF NORTH FORK BARNETT CREEK

COUNTY: OHIO

STATE: KY

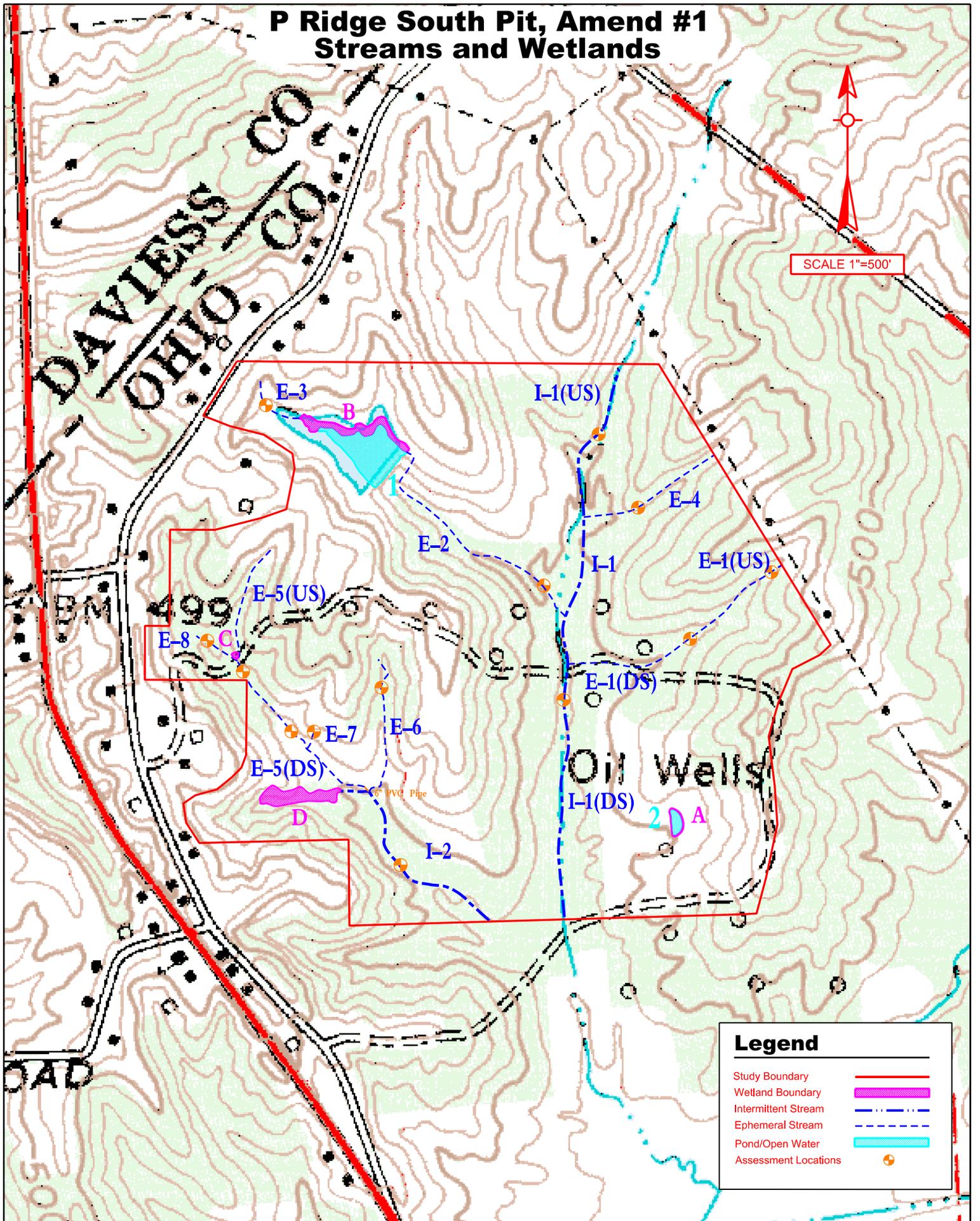
NEAR: PLEASANT RIDGE

ITEM: VICINITY MAP

EXHIBIT 1

DATE:

# P Ridge South Pit, Amend #1 Streams and Wetlands



SCALE 1"=500'

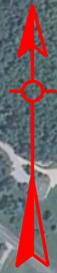
**Legend**

- Study Boundary ———
- Wetland Boundary ———
- Intermittent Stream - - - - -
- Ephemeral Stream - - - - -
- Pond/Open Water ▭
- Assessment Locations ●

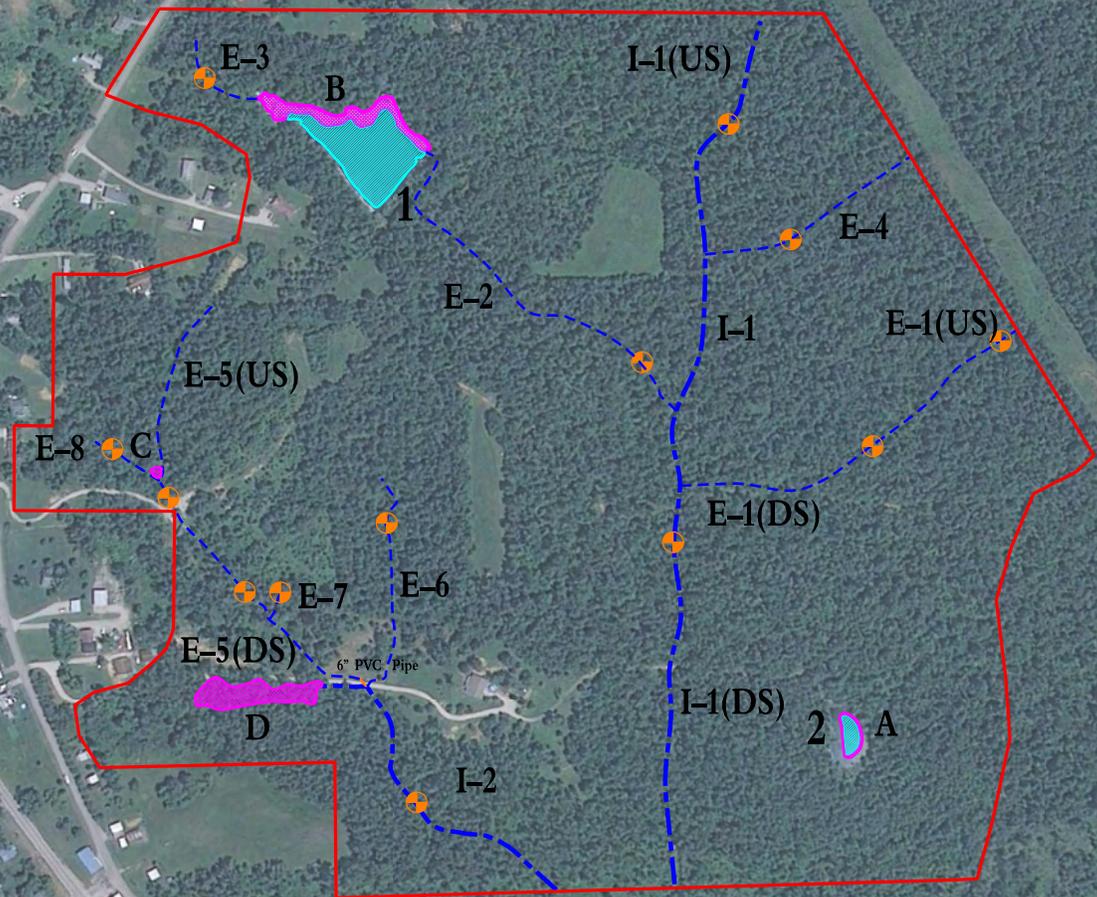
T.H.E. Engineers, Inc.	PROJECT: P RIDGE SOUTH PIT, AMEND. #1 SITE - JURISDICTIONAL WATERS DELINEATION	STREAM: UT'S OF NORTH FORK BARNETT CREEK	
	COUNTY: OHIO	STATE: KY	NEAR: PLEASANT RIDGE
		ITEM: QUAD MAP	EXHIBIT 2

DATE:

# P Ridge South Pit, Amend. #1 Streams and Wetlands



SCALE 1"=500'



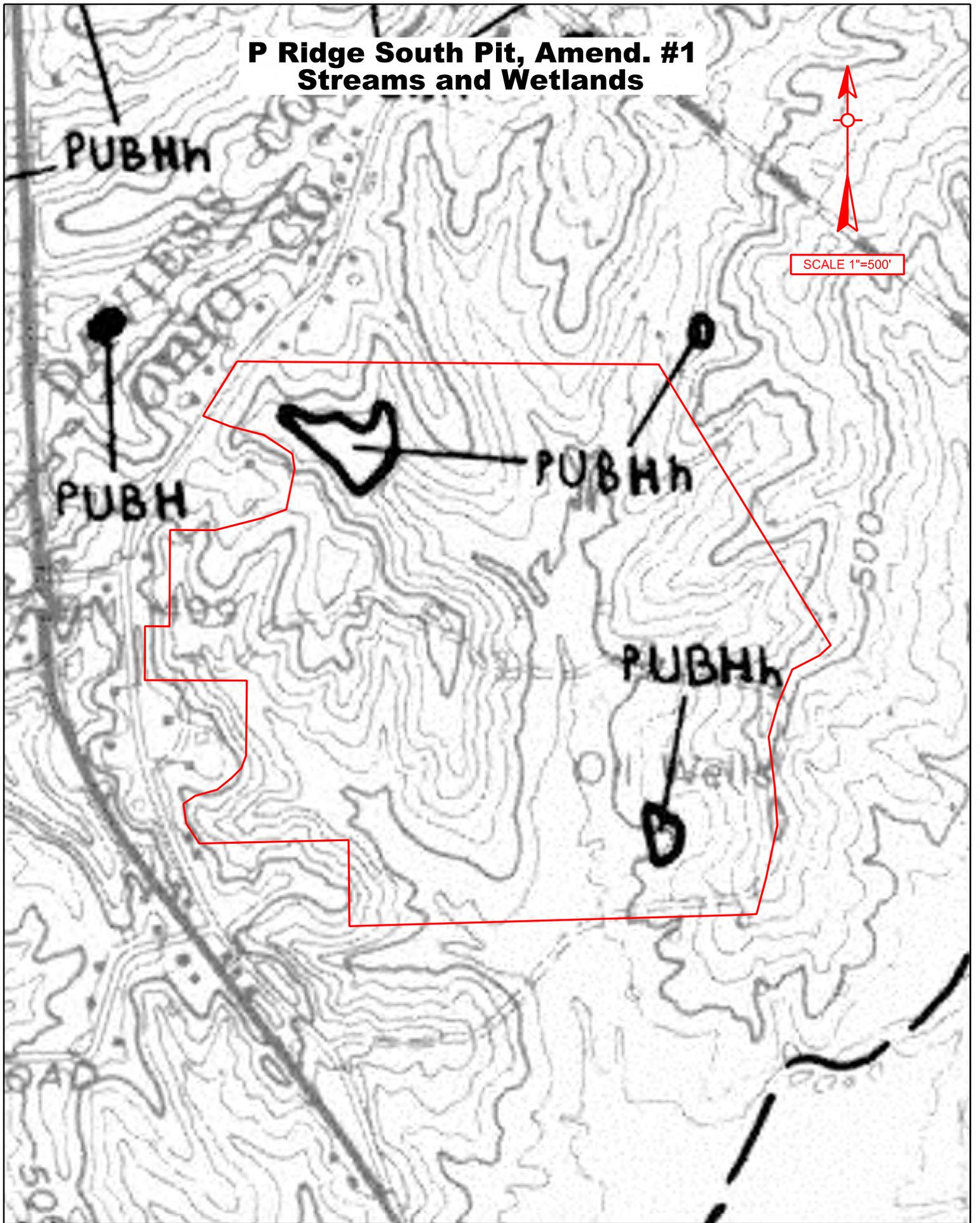
**Legend**

- Study Boundary ———
- Wetland Boundary ▨
- Intermittent Stream - - - - -
- Ephemeral Stream . . . . .
- Pond/Open Water ▨
- Assessment Locations ⊕

<b>T.H.E. Engineers, Inc.</b>	PROJECT: P RIDGE SOUTH PIT, AMEND. #1 SITE - JURISDICTIONAL WATERS DELINEATION		STREAM: UT'S OF NORTH FORK BARNETT CREEK		
	COUNTY: OHIO	STATE: KY	NEAR: PLEASANT RIDGE	ITEM: AERIAL MAP	EXHIBIT 3

DATE:

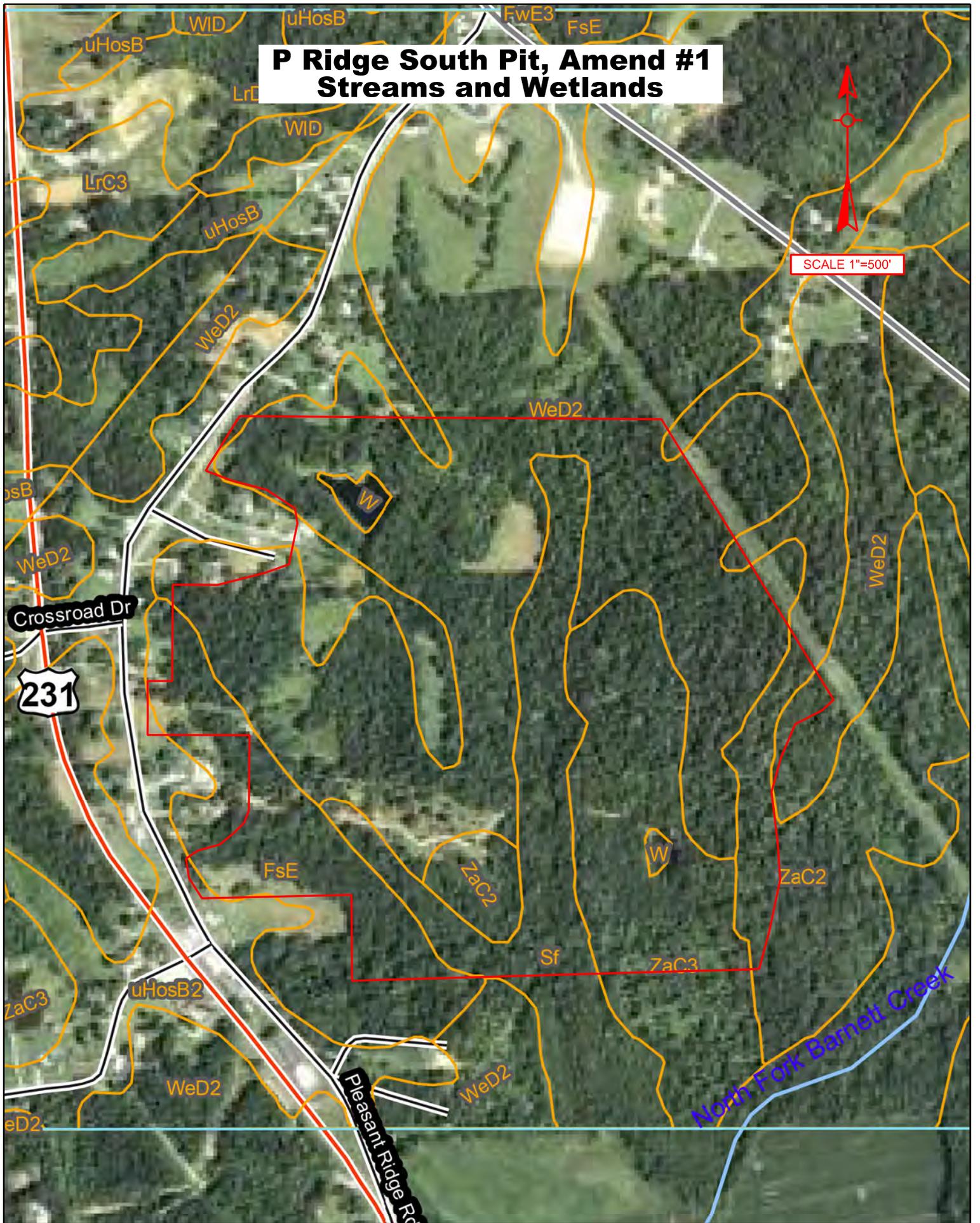
# P Ridge South Pit, Amend. #1 Streams and Wetlands



T.H.E. Engineers, Inc.	PROJECT: P RIDGE SOUTH PIT, AMEND #1 SITE - JURISDICTIONAL WATERS DELINEATION		STREAM: UT'S OF NORTH FORK BARNETT CREEK	
	COUNTY: OHIO	STATE: KY	NEAR: PLEASANT RIDGE	ITEM: NWI MAP

EXHIBIT 4  
DATE:

# P Ridge South Pit, Amend #1 Streams and Wetlands



T.H.E. Engineers, Inc.	PROJECT: P RIDGE SOUTH PIT, AMEND. #1 SITE - JURISDICTIONAL WATERS DELINEATION		STREAM: UT'S OF NORTH FORK BARNETT CREEK		
	COUNTY: OHIO	STATE: KY	NEAR: PLEASANT RIDGE	ITEM: SOIL MAP	EXHIBIT 5

DATE:

**P Ridge South Pit,  
Amendment No. 1**



SCALE 1"=500'

2115

*North Fork  
Barnett Creek*

T.H.E. Engineers, Inc.	PROJECT: P RIDGE SOUTH PIT, AMEND #1 SITE - JURISDICTIONAL WATERS DELINEATION	STREAM: UT'S OF NORTH FORK BARNETT CREEK		
	COUNTY: OHIO	STATE: KY	NEAR: PLEASANT RIDGE	ITEM: FEMA MAP

DATE:

# Existing Intermittent (INT) Cross Sections

BF=Bankfull  
 FP= Floodprone  
 Existing Ground

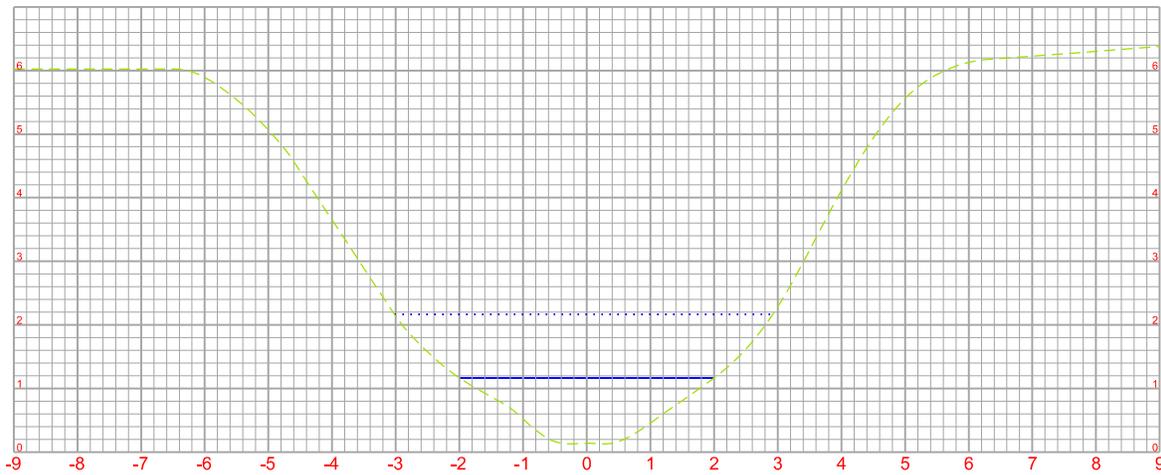
BFW = 9.0ft  
 BFD max = 1.0ft  
 FPW = 10.41ft

## I-1 DS



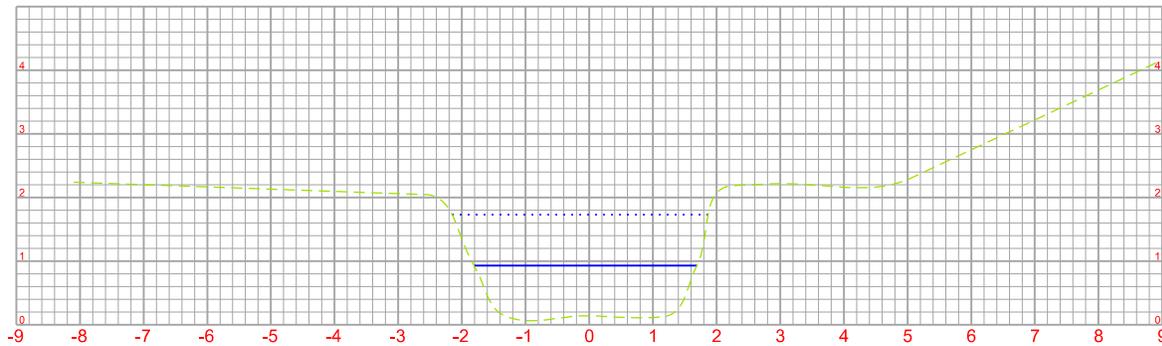
BFW = 4.0ft  
 BFD max = 1.0ft  
 FPW = 5.93ft

## I-1 US



BFW = 3.5ft  
 BFD max = 0.8ft  
 FPW = 4.02ft

## I-2



Cross Section Scale: 1"=3'

T.H.E. Engineers, Inc.	PROJECT: P RIDGE SOUTH PIT, AMEND. #1 SITE			STREAM: I-1(DS), I-1(US), I-2	
	COUNTY: OHIO	STATE: KY	NEAR: PLEASANT RIDGE	EXISTING CROSS SECTIONS	EXHIBIT 7

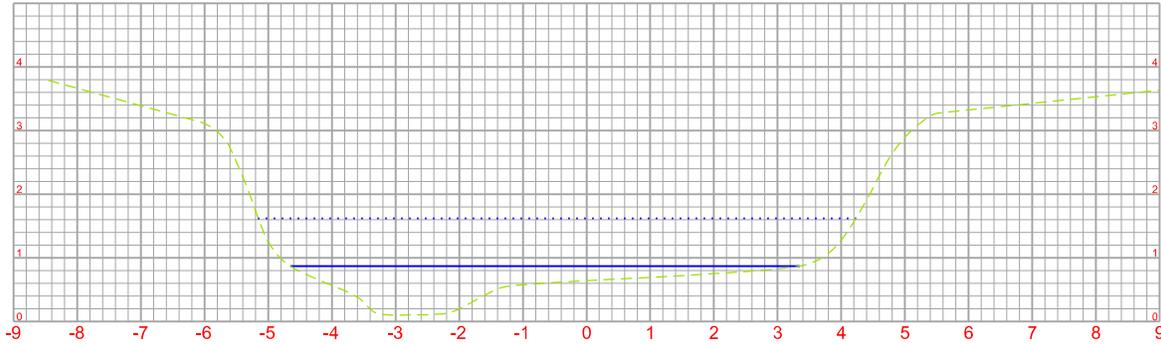
DATE:

# Existing Ephemeral (EPH) Cross Sections

BF=Bankfull  
 FP= Floodprone  
 Existing Ground

BFW = 8.0ft  
 BFD max = 0.75ft  
 FPW = 9.40ft

## E-1 DS



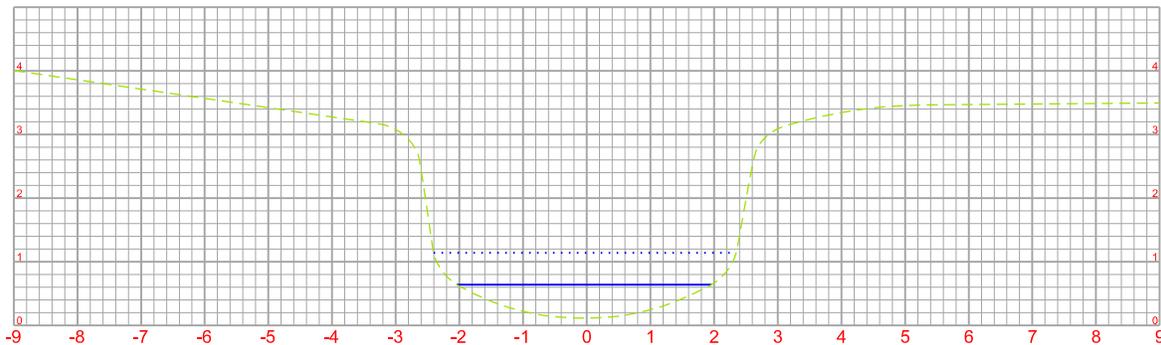
BFW = 3.0ft  
 BFD max = 0.3ft  
 FPW = 3.77ft

## E-1 US



BFW = 4.0ft  
 BFD max = 0.5ft  
 FPW = 4.78ft

## E-2



Cross Section Scale: 1"=3'

T.H.E. Engineers, Inc.	PROJECT: P RIDGE SOUTH PIT, AMEND. #1 SITE			STREAM: E-1(DS), E-1(US), E-2	
	COUNTY: OHIO	STATE: KY	NEAR: PLEASANT RIDGE	EXISTING CROSS SECTIONS	EXHIBIT 8

DATE:

# Existing Ephemeral (EPH) Cross Sections

BF=Bankfull  
 FP= Floodprone  
 Existing Ground

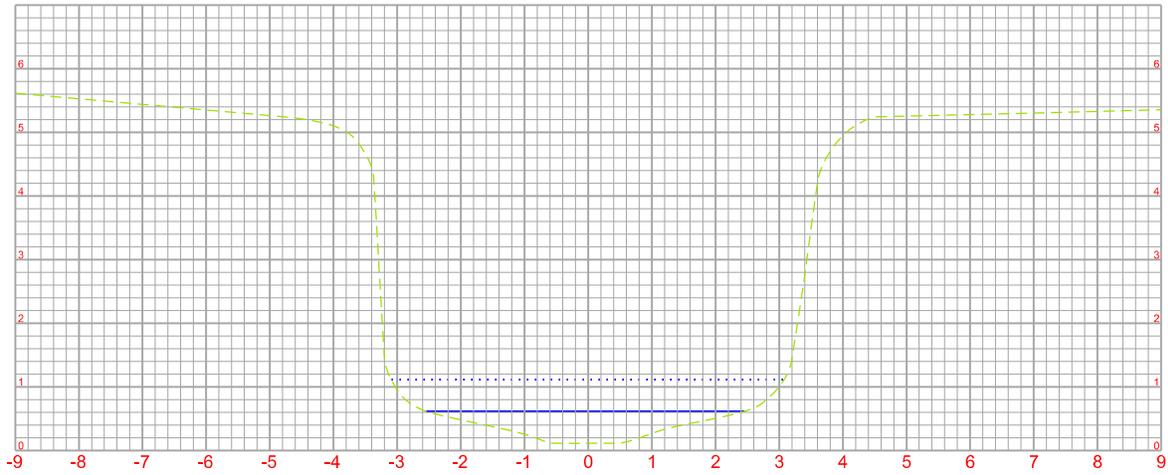
BFW = 1.5ft  
 BFD max = 0.3ft  
 FPW = 1.98ft

### E-3



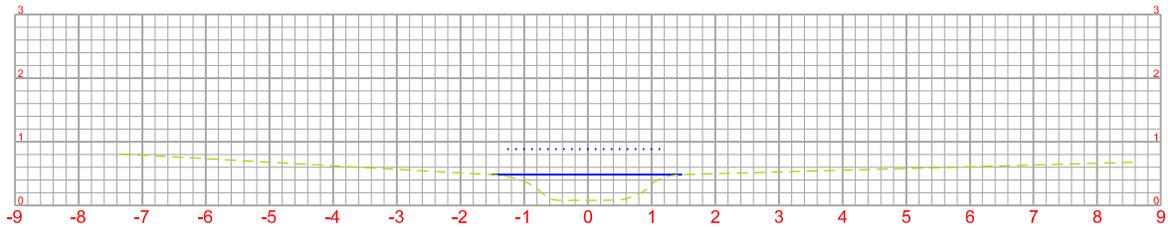
BFW = 5.0ft  
 BFD max = 0.5ft  
 FPW = 6.15ft

### E-4



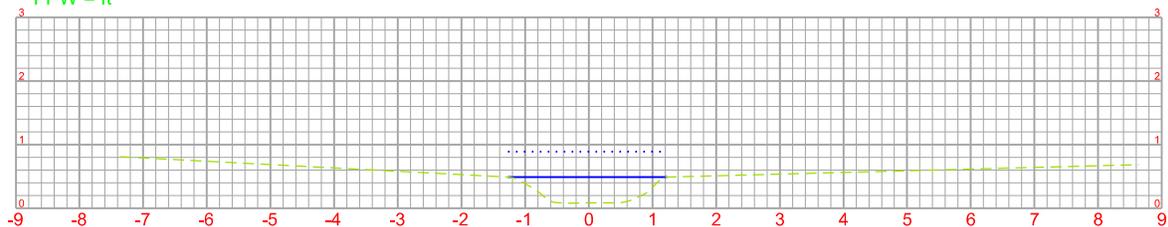
BFW = 3.0ft  
 BFD max = 0.4ft  
 FPW = ft

### E-5 DS



BFW = 2.5ft  
 BFD max = 0.4ft  
 FPW = ft

### E-5 US



Cross Section Scale: 1"=3'

T.H.E. Engineers, Inc.	PROJECT: P RIDGE SOUTH PIT, AMEND. #1 SITE			STREAM: E-3, E-4, E-5(DS), E-5(US)	
	COUNTY: OHIO	STATE: KY	NEAR: PLEASANT RIDGE	EXISTING CROSS SECTIONS	EXHIBIT 9

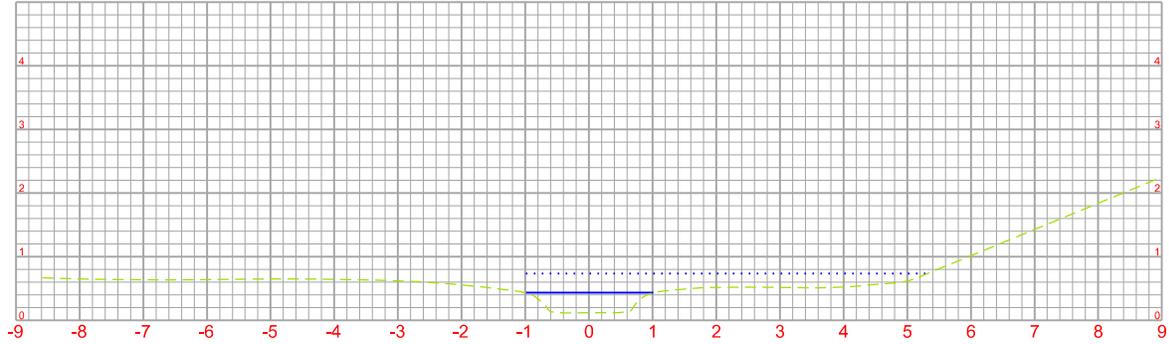
DATE:

# Existing Ephemeral (EPH) Cross Sections

BF=Bankfull  
 FP= Floodprone  
 Existing Ground

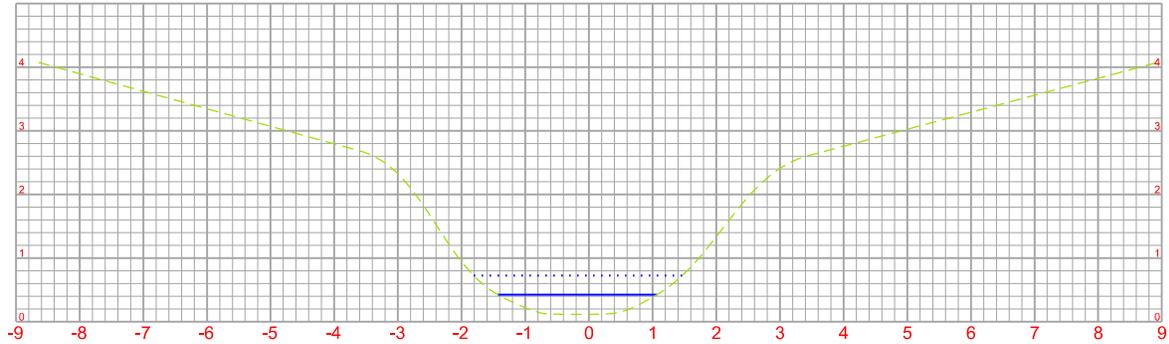
BFW = 2.0ft  
 BFD max = 0.3ft  
 FPW = ft

## E-6



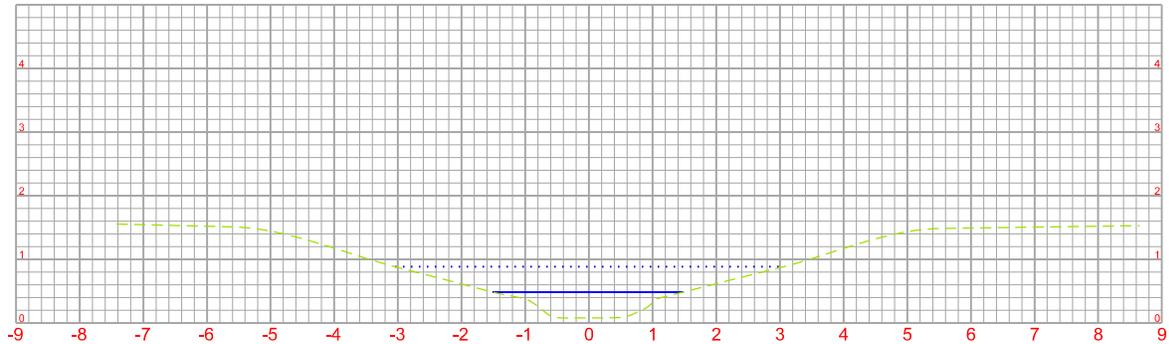
BFW = 2.5ft  
 BFD max = 0.3ft  
 FPW = 3.27ft

## E-7



BFW = 3.0ft  
 BFD max = 0.4ft  
 FPW = 6.10ft

## E-8



Cross Section Scale: 1"=3'

T.H.E. Engineers, Inc.	PROJECT: P RIDGE SOUTH PIT, AMEND. #1 SITE			STREAM: E-6, E-7, E-8	
	COUNTY: OHIO	STATE: KY	NEAR: PLEASANT RIDGE	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>I-1 US</i>			LOCATION: <i>P. Ridge South Pit</i>		
STATION: <i>WP1626</i>		DRAINAGE AREA (AC)	BASIN/WATERSHED: <i>Green River/Barnett Creek</i>		
LAT: <i>37-35-35.1</i>		LONG: <i>86-59-14.1</i>	COUNTY: <i>Ohio</i>		USGS 7.5 TOPO: <i>Pleasant Ridge</i>
DATE: <i>11-29-12</i> TIME: 2:11 ET <input type="checkbox"/> AM <input checked="" type="checkbox"/> PM			INVESTIGATORS: <i>Bill Sampson, Laura Heil, Derrick 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"/> Heavy rain <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Steady rain <input type="checkbox"/> Intermittent showers <input checked="" type="checkbox"/> Clear/sunny					
Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
Air temperature <u>52</u> °F. Inches rainfall in past 24 hours <u>0</u> in					
% Cloud Cover <u>10</u>					
P-Chem: Temp (°F) <u>48.0</u> D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond. <u>345</u> <input type="checkbox"/> Grab					
<b>INSTREAM WATERSHED FEATURES</b>			<b>LOCAL WATERSHED FEATURES:</b>		
Stream Width EOW <u>1.25</u> ft			Predominant Surrounding Land Use:		
Stream Width BF <u>4.0</u> ft			<input type="checkbox"/> Surface Mining	<input type="checkbox"/> Construction	<input checked="" type="checkbox"/> Forest
Stream Bottom Width <u>1.0</u> ft			<input type="checkbox"/> Deep Mining	<input type="checkbox"/> Commercial	<input type="checkbox"/> Pasture/Grazing
Avg. Bankfull Depth <u>1.0</u> ft			<input type="checkbox"/> Oil Wells	<input type="checkbox"/> Industrial	<input type="checkbox"/> Silviculture
Avg. H <sub>2</sub> O Depth Riffle <u>0.1</u> ft			<input type="checkbox"/> Land Disposal	<input 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 checked="" type="checkbox"/> Normal
<input type="checkbox"/> Island	<input type="checkbox"/> Waterfalls	<input type="checkbox"/> High	<input type="checkbox"/> Very Rapid or Torrential	<input type="checkbox"/> Perennial	<input checked="" type="checkbox"/> Intermittent
<input type="checkbox"/> Other	<input type="checkbox"/> Culverts				
Riparian Vegetation:		Dom. Tree/Shrub Taxa		Channel Alterations;	
Dominate Type:		<i>Pinoak</i>		<input type="checkbox"/> Dredging	
<input checked="" type="checkbox"/> Trees	<input checked="" type="checkbox"/> Shrubs	<i>Sycamore</i>		<input type="checkbox"/> Channelization	
<input type="checkbox"/> Grasses	<input checked="" type="checkbox"/> Herbaceous	<i>Cherry</i>		( <input type="checkbox"/> Full <input type="checkbox"/> Partial )	
Number of Strata <u>3</u>		<i>Sweetgum</i>			
		<i>Elm</i>			
Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C		Riffle <u>25</u> %	Run; <u>25</u> %	Pool <u>50</u> %	
Silt/Clay (<0.06 mm)		<u>50</u>	<u>50</u>	<u>50</u>	
Sand (0.06-2 mm)		<u>50</u>	<u>50</u>	<u>50</u>	
Gravel (2-64 mm)					
Cobble (64-256 mm)					
Boulders (>256 mm)					
Bedrock					
<b>Habitat</b>		<b>Condition Category</b>			
<b>Parameter</b>		<b>Optimal</b>	<b>Suboptimal</b>	<b>Marginal</b>	<b>Poor</b>
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.
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>

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 despoits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>

**Total Score**

**85**

**NOTES/COMMENTS; Channel very incised/entrenched. F5/6 Rosgen stream type.**

## Low Gradient Stream Data Sheet

STREAM NAME: <i>I-1 DS</i>			LOCATION: <i>P. Ridge South Pit</i>		
STATION: <i>WP1614</i>		DRAINAGE AREA (AC)	BASIN/WATERSHED: <i>Green River/Barnett Creek</i>		
LAT: <i>37-35-22.3</i>		LONG: <i>86-59-10.6</i>	COUNTY: <i>Ohio</i>		USGS 7.5 TOPO: <i>Pleasant Ridge</i>
DATE: <i>11-29-12</i> TIME: 11:09 ET <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM			INVESTIGATORS: <i>Bill Sampson, Laura Heil, Derrick 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"/> Heavy rain <input type="checkbox"/> Steady rain <input type="checkbox"/> Intermittent showers <input checked="" type="checkbox"/> Clear/sunny					
Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Air temperature <u>35</u> °F. Inches rainfall in past 24 hours <u>0</u> in <u>10</u> % Cloud Cover					
P-Chem: Temp (°F) <u>56.5</u> D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond. <u>303</u> <input type="checkbox"/> Grab					
<b>INSTREAM WATERSHED FEATURES</b>			<b>LOCAL WATERSHED FEATURES:</b>		
Stream Width EOW <u>2.0</u> ft Stream Width BF <u>9.0</u> ft Stream Bottom Width <u>1.0</u> ft Avg. Bankfull Depth <u>1.0</u> ft Avg. H <sub>2</sub> 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 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:		Stream Flow;		Stream Type;	
<input type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments <input type="checkbox"/> Island <input type="checkbox"/> Other <input type="checkbox"/> Waterfalls <input type="checkbox"/> Culverts		<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		<input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Ephemeral <input type="checkbox"/> Seep	
Riparian Vegetation:		Dom. Tree/Shrub Taxa	Canopy Cover;		Channel Alterations;
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>		<i>Tulip poplar</i> <i>Sycamore</i> <i>Red oak</i> <i>Beech</i> <i>Redbud</i>	<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%) <i>Logged downstream</i>		<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>20</u> %	Run; <u>20</u> %		Pool <u>60</u> %
Silt/Clay (<0.06 mm)		<u>20</u>	<u>20</u>		<u>20</u>
Sand (0.06-2 mm)		<u>40</u>	<u>40</u>		<u>80</u>
Gravel (2-64 mm)		<u>40</u>	<u>40</u>		
Cobble (64-256 mm)					
Boulders (>256 mm)					
Bedrock					
<b>Habitat</b>		<b>Condition Category</b>			
<b>Parameter</b>		<b>Optimal</b>	<b>Suboptimal</b>	<b>Marginal</b>	<b>Poor</b>
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.
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>

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 despoits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>

**Total Score**

**93**

**NOTES/COMMENTS; Channel incised/entrenched. Bankfull channel has formed. F5 Rosgen stream type.**

## Low Gradient Stream Data Sheet

STREAM NAME: <i>I-2</i>			LOCATION: <i>P. Ridge South Pit</i>		
STATION: <i>WP91</i>		DRAINAGE AREA (AC)	BASIN/WATERSHED: <i>Green River/Barnett Creek</i>		
LAT: <i>37-35-15.6</i>		LONG: <i>86-59-19.4</i>	COUNTY; <i>Ohio</i> USGS 7.5 TOPO; <i>Pleasant Ridge</i>		
DATE: <i>11-29-12</i> TIME: 3:30 ET <input type="checkbox"/> AM <input checked="" type="checkbox"/> PM			INVESTIGATORS; <i>Rick Heil, Peggy Measel</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 type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
<input type="checkbox"/> Heavy rain      Air temperature <u>55</u> °F.      Inches rainfall in past 24 hours <u>0</u> in <input type="checkbox"/> Steady rain <input type="checkbox"/> Intermittent showers <u>10</u> % Cloud Cover <input checked="" type="checkbox"/> Clear/sunny					
P-Chem: Temp (°F) <u>N/A</u> D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond. <u>N/A</u> <input type="checkbox"/> Grab					
<b>INSTREAM WATERSHED FEATURES</b>			<b>LOCAL WATERSHED FEATURES:</b>		
Stream Width EOW _____ ft Stream Width BF <u>3.5</u> ft Stream Bottom Width <u>2.5</u> ft Avg. Bankfull Depth <u>0.8</u> ft Avg. H <sub>2</sub> 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 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 checked="" type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input type="checkbox"/> Normal <input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential <input type="checkbox"/> Other <input type="checkbox"/> Culverts				<input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Ephemeral <input type="checkbox"/> Seep	
Riparian Vegetation:		Dom. Tree/Shrub Taxa	Canopy Cover;		Channel Alterations;
Dominate Type: <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input checked="" type="checkbox"/> Grasses <input checked="" type="checkbox"/> Herbaceous Number of Strata <u>4</u>		<i>Tulip poplar</i> <i>Sycamore</i> <i>Beech</i> <i>White Ash</i>	<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%)		<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>90</u> %		Pool <u>10</u> %
Silt/Clay (<0.06 mm)			<u>100</u>		<u>100</u>
Sand (0.06-2 mm)					
Gravel (2-64 mm)					
Cobble (64-256 mm)					
Boulders (>256 mm)					
Bedrock					
<b>Habitat</b>		<b>Condition Category</b>			
<b>Parameter</b>		<b>Optimal</b>	<b>Suboptimal</b>	<b>Marginal</b>	<b>Poor</b>
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.
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>

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 despoits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>

**Total Score**

97

**NOTES/COMMENTS; G6C Rosgen stream type.**

## High Gradient Stream Data Sheet

STREAM NAME: <i>E-1 US</i>			LOCATION: <i>P. Ridge South Pit</i>				
STATION: <i>WP1618</i>		DRAINAGE AREA (AC)	BASIN/WATERSHED		<i>Green River/Barnett Creek</i>		
LAT: <i>37-35-27.6</i>		LONG: <i>86-59-01.0</i>	COUNTY: <i>Ohio</i>		USGS 7.5 TOPO: <i>Pleasant Ridge</i>		
DATE: <i>11-29-12</i>		TIME: 12:07 ET <input type="checkbox"/> AM <input checked="" type="checkbox"/> PM	INVESTIGATORS: <i>Bill Sampson, Laura Heil, Derrick 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"/> Heavy rain <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No							
<input type="checkbox"/> Steady rain Air temperature <u>48</u> °F. Inches rainfall in past 24 hours <u>0</u> in							
<input type="checkbox"/> Intermittent showers <u>10</u> % Cloud Cover							
<input checked="" type="checkbox"/> Clear/sunny							
P-Chem: Temp (°F) <u>N/A</u> D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond.µs <u>N/A</u> <input type="checkbox"/> Grab							
<b>INSTREAM WATERSHED FEATURES</b>			<b>LOCAL WATERSHED FEATURES:</b>				
Stream Width EOW _____ ft			Predominant Surrounding Land Use:				
Stream Width BF <u>3.0</u> ft			<input type="checkbox"/> Surface Mining	<input type="checkbox"/> Construction	<input checked="" type="checkbox"/> Forest		
Stream Bottom Width <u>1.0</u> ft			<input type="checkbox"/> Deep Mining	<input type="checkbox"/> Commercial	<input type="checkbox"/> Pasture/Grazing		
Avg. Bankfull Depth <u>0.3</u> ft			<input type="checkbox"/> Oil Wells	<input type="checkbox"/> Industrial	<input type="checkbox"/> Silviculture		
Avg. H <sub>2</sub> O Depth Riffle _____ ft			<input type="checkbox"/> Land Disposal	<input type="checkbox"/> Row Crops	<input type="checkbox"/> Urban Runoff/Storm Sewers		
Hydraulic Structures:		Stream Flow;		Stream Type;			
<input checked="" type="checkbox"/> Dams	<input type="checkbox"/> Bridge Abutments	<input checked="" type="checkbox"/> Dry	<input type="checkbox"/> Pooled	<input type="checkbox"/> Low	<input type="checkbox"/> Normal		
<input type="checkbox"/> Island	<input type="checkbox"/> Waterfalls	<input type="checkbox"/> High	<input type="checkbox"/> Very Rapid or Torrential	<input checked="" type="checkbox"/> Perennial	<input type="checkbox"/> Intermittent		
<input type="checkbox"/> Other	<input type="checkbox"/> Culverts						
Riparian Vegetation:		Dom. Tree/Shrub Taxa		Canopy Cover;			
Dominated Type:		<i>Chestnut oak</i>		<input type="checkbox"/> Fully Exposed (0-25%)			
<input checked="" type="checkbox"/> Trees	<input checked="" type="checkbox"/> Shrubs	<i>Pinoak</i>		<input type="checkbox"/> Partially Exposed (25-50%)			
<input type="checkbox"/> Grasses	<input checked="" type="checkbox"/> Herbaceous	<i>White oak</i>		<input type="checkbox"/> Partially Shaded (50-75%)			
Number of Strata <u>3</u>		<i>Hophornbeam</i>		<input checked="" type="checkbox"/> Fully Shaded (75-100%)			
Channel Alterations;							
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)				<u>100</u>			
Sand (0.06-2 mm)							
Gravel (2-64 mm)							
Cobble (64-256 mm)							
Boulders (>256 mm)							
Bedrock							
<b>Habitat</b>		<b>Condition Category</b>					
<b>Parameter</b>		<b>Optimal</b>	<b>Suboptimal</b>	<b>Marginal</b>	<b>Poor</b>		
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).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat" lack of habitat is obvious; substrate unstable or lacking.		
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>		
2. Embeddedness		Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.		
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>		
3. Velocity/Depth Regime		All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow. Deep > 1.5 feet.	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes)	Only 2 of the 4 habitat regimes present (if fast-shallow or slow shallow are missing, score low)	Dominated by 1 velocity/depth regime.		
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>		

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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 3 2 1 0</b>
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 show with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by stream width is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by stream width is > than 25.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>

**Total Score**

**88**

**NOTES/COMMENTS; Channel somewhat incised/entrenched. F6<sub>G</sub> Rosgen stream type.**

## Low Gradient Stream Data Sheet

STREAM NAME: <i>E-1 DS</i>			LOCATION: <i>P. Ridge South Pit</i>		
STATION: <i>WP1616</i>		DRAINAGE AREA (AC)	BASIN/WATERSHED: <i>Green River/Barnett Creek</i>		
LAT: <i>37-35-25.0</i>		LONG: <i>86-59-04.8</i>	COUNTY: <i>Ohio</i>		USGS 7.5 TOPO: <i>Pleasant Ridge</i>
DATE: <i>11-29-12</i> TIME: 11:41 ET <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM			INVESTIGATORS: <i>Bill Sampson, Laura Heil, Derrick 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 type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
<input type="checkbox"/> Heavy rain <input type="checkbox"/> Steady rain <input type="checkbox"/> Intermittent showers <input checked="" type="checkbox"/> Clear/sunny Air temperature <u>44</u> °F. Inches rainfall in past 24 hours <u>0</u> in <input type="checkbox"/> Land Disposal <input type="checkbox"/> Row Crops <input type="checkbox"/> Urban Runoff/Storm Sewers					
P-Chem: Temp (°F) <u>N/A</u> D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond. <u>N/A</u> <input type="checkbox"/> Grab					
<b>INSTREAM WATERSHED FEATURES</b>			<b>LOCAL WATERSHED FEATURES:</b>		
Stream Width EOW _____ ft Stream Width BF <u>8.0</u> ft Stream Bottom Width <u>1.0</u> ft Avg. Bankfull Depth <u>0.75</u> ft Avg. H <sub>2</sub> 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 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 checked="" type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input type="checkbox"/> Normal <input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential <input type="checkbox"/> Other <input type="checkbox"/> Culverts				<input type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input checked="" type="checkbox"/> Ephemeral <input type="checkbox"/> Seep	
Riparian Vegetation:		Dom. Tree/Shrub Taxa		Canopy Cover;	
Dominate Type: <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses Number of Strata <u>3</u>		<i>Dogwood Sweetgum</i> <i>Sycamore Pinoak</i> <i>Hickory</i> <i>Cherry</i>		<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)				<u>100</u>	
Sand (0.06-2 mm)					
Gravel (2-64 mm)					
Cobble (64-256 mm)					
Boulders (>256 mm)					
Bedrock					
<b>Habitat</b>		<b>Condition Category</b>			
<b>Parameter</b>		<b>Optimal</b>	<b>Suboptimal</b>	<b>Marginal</b>	<b>Poor</b>
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.
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>

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 despoits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>

**Total Score**

**79**

**NOTES/COMMENTS; Channel incised/entrenched. Bankfull channel has formed. F6 Rosgen stream type.**

## High Gradient Stream Data Sheet

STREAM NAME: <i>E-2</i>			LOCATION: <i>P. Ridge South Pit</i>				
STATION: <i>WP1620</i>		DRAINAGE AREA (AC)	BASIN/WATERSHED		<i>Green River/Barnett Creek</i>		
LAT: <i>37-35-26.5</i>		LONG: <i>86-59-12.9</i>	COUNTY: <i>Ohio</i>		USGS 7.5 TOPO: <i>Pleasant Ridge</i>		
DATE: <i>11-29-12</i>		TIME: <i>12:40 ET</i>	<input type="checkbox"/> AM	<input checked="" type="checkbox"/> PM	INVESTIGATORS: <i>Bill Sampson, Laura Heil, Derrick 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"/> Heavy rain <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No							
<input type="checkbox"/> Steady rain							
<input type="checkbox"/> Intermittent showers							
<input checked="" type="checkbox"/> Clear/sunny							
Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No							
Air temperature <i>50</i> °F. Inches rainfall in past 24 hours <i>0</i> in							
% Cloud Cover <i>10</i>							
P-Chem: Temp (°F) <i>N/A</i> D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond.µs <i>N/A</i> <input type="checkbox"/> Grab							
<b>INSTREAM WATERSHED FEATURES</b>			<b>LOCAL WATERSHED FEATURES:</b>				
Stream Width EOW _____ ft			Predominant Surrounding Land Use:				
Stream Width BF <i>4.0</i> ft			<input type="checkbox"/> Surface Mining	<input type="checkbox"/> Construction	<input checked="" type="checkbox"/> Forest		
Stream Bottom Width <i>1.0</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 <sub>2</sub> O Depth Riffle _____ ft			<input type="checkbox"/> Land Disposal	<input type="checkbox"/> Row Crops	<input type="checkbox"/> Urban Runoff/Storm Sewers		
Hydraulic Structures:		Stream Flow;		Stream Type;			
<input checked="" type="checkbox"/> Dams	<input type="checkbox"/> Bridge Abutments	<input checked="" type="checkbox"/> Dry	<input type="checkbox"/> Pooled	<input type="checkbox"/> Low	<input type="checkbox"/> Normal		
<input type="checkbox"/> Island	<input type="checkbox"/> Waterfalls	<input type="checkbox"/> High	<input type="checkbox"/> Very Rapid or Torrential	<input checked="" type="checkbox"/> Perennial	<input type="checkbox"/> Intermittent		
<input type="checkbox"/> Other	<input type="checkbox"/> Culverts						
Riparian Vegetation:		Dom. Tree/Shrub Taxa		Canopy Cover;			
Dominated Type:		<i>Chestnut oak</i>		<input type="checkbox"/> Fully Exposed (0-25%)			
<input checked="" type="checkbox"/> Trees	<input checked="" type="checkbox"/> Shrubs	<i>Sycamore</i>		<input type="checkbox"/> Partially Exposed (25-50%)			
<input type="checkbox"/> Grasses	<input checked="" type="checkbox"/> Herbaceous	<i>Beech</i>		<input type="checkbox"/> Partially Shaded (50-75%)			
Number of Strata <i>3</i>	<i>Red maple</i>		<input checked="" type="checkbox"/> Fully Shaded (75-100%)		Channel Alterations;		
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)				<i>100</i>			
Sand (0.06-2 mm)							
Gravel (2-64 mm)							
Cobble (64-256 mm)							
Boulders (>256 mm)							
Bedrock							
<b>Habitat</b>		<b>Condition Category</b>					
<b>Parameter</b>		<b>Optimal</b>	<b>Suboptimal</b>	<b>Marginal</b>	<b>Poor</b>		
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).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat" lack of habitat is obvious; substrate unstable or lacking.		
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>		
2. Embeddedness		Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.		
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>		
3. Velocity/Depth Regime		All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow. Deep > 1.5 feet.	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes)	Only 2 of the 4 habitat regimes present (if fast-shallow or slow shallow are missing, score low)	Dominated by 1 velocity/depth regime.		
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>		

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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by stream width is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by stream width is > than 25.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>

**Total Score**

77

**NOTES/COMMENTS; Channel very incised/entrenched. G6<sub>r</sub> Rosgen stream**

## High Gradient Stream Data Sheet

STREAM NAME: <i>E-3</i>			LOCATION: <i>P. Ridge South Pit</i>		
STATION: <i>WP1629</i>		DRAINAGE AREA (AC)	BASIN/WATERSHED		<i>Green River/Barnett Creek</i>
LAT: <i>37-35-34.2</i>		LONG: <i>86-59-26.5</i>	COUNTY: <i>Ohio</i>		USGS 7.5 TOPO: <i>Pleasant Ridge</i>
DATE: <i>11-29-12</i>		TIME: 3:32 ET <input type="checkbox"/> AM <input checked="" type="checkbox"/> PM	INVESTIGATORS: <i>Bill Sampson, Laura Heil, Derrick 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"/> Heavy rain <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
<input type="checkbox"/> Steady rain <input type="checkbox"/> Intermittent showers <input checked="" type="checkbox"/> Clear/sunny					
Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
Air temperature <u>50</u> °F. Inches rainfall in past 24 hours <u>0</u> in					
<u>10</u> % Cloud Cover					
P-Chem: Temp (°F) <u>N/A</u> D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond.µs <u>N/A</u> <input type="checkbox"/> Grab					
<b>INSTREAM WATERSHED FEATURES</b>			<b>LOCAL WATERSHED FEATURES:</b>		
Stream Width EOW _____ ft			Predominant Surrounding Land Use:		
Stream Width BF <u>1.5</u> ft			<input type="checkbox"/> Surface Mining	<input type="checkbox"/> Construction	<input checked="" type="checkbox"/> Forest
Stream Bottom Width <u>0.7</u> ft			<input type="checkbox"/> Deep Mining	<input type="checkbox"/> Commercial	<input type="checkbox"/> Pasture/Grazing
Avg. Bankfull Depth <u>0.3</u> ft			<input type="checkbox"/> Oil Wells	<input type="checkbox"/> Industrial	<input type="checkbox"/> Silviculture
Avg. H <sub>2</sub> O Depth Riffle _____ ft			<input type="checkbox"/> Land Disposal	<input type="checkbox"/> Row Crops	<input type="checkbox"/> Urban Runoff/Storm Sewers
Hydraulic Structures:		Stream Flow;		Stream Type;	
<input checked="" type="checkbox"/> Dams	<input type="checkbox"/> Bridge Abutments	<input checked="" type="checkbox"/> Dry	<input type="checkbox"/> Pooled	<input type="checkbox"/> Low	<input type="checkbox"/> Normal
<input type="checkbox"/> Island	<input type="checkbox"/> Waterfalls	<input type="checkbox"/> High	<input type="checkbox"/> Very Rapid or Torrential	<input checked="" type="checkbox"/> Perennial	<input type="checkbox"/> Intermittent
<input type="checkbox"/> Other	<input type="checkbox"/> Culverts			<input checked="" type="checkbox"/> Ephemeral	<input type="checkbox"/> Seep
Riparian Vegetation:		Dom. Tree/Shrub Taxa		Channel Alterations;	
Dominated Type:		<i>Sycamore</i>		Dredging	
<input checked="" type="checkbox"/> Trees	<input checked="" type="checkbox"/> Shrubs	<i>White oak</i>		<input type="checkbox"/> Channelization	<input type="checkbox"/> Full <input type="checkbox"/> Partial
<input type="checkbox"/> Grasses	<input checked="" type="checkbox"/> Herbaceous	<i>Pinoak</i>			
Number of Strata <u>3</u>		<i>Sugar maple</i>			
Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C		Riffle _____ %	Run; <u>100</u> %	Pool _____ %	
Silt/Clay (<0.06 mm)			<u>100</u>		
Sand (0.06-2 mm)					
Gravel (2-64 mm)					
Cobble (64-256 mm)					
Boulders (>256 mm)					
Bedrock					
<b>Habitat</b>		<b>Condition Category</b>			
<b>Parameter</b>	<b>Optimal</b>	<b>Suboptimal</b>	<b>Marginal</b>	<b>Poor</b>	
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).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat" lack of habitat is obvious; substrate unstable or lacking.	
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>	
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.	
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>	
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow. Deep > 1.5 feet.	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes)	Only 2 of the 4 habitat regimes present (if fast-shallow or slow shallow are missing, score low)	Dominated by 1 velocity/depth regime.	
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>	

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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by stream width is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by stream width is > than 25.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>

**Total Score**

**84**

**NOTES/COMMENTS; Channel incised. G6 Rosgen stream type.**

## High Gradient Stream Data Sheet

STREAM NAME: <i>E-4</i>			LOCATION: <i>P. Ridge South Pit</i>		
STATION: <i>WP1623</i>		DRAINAGE AREA (AC)	BASIN/WATERSHED <i>Green River/Barnett Creek</i>		
LAT: <i>37-35-30.2</i>		LONG: <i>86-59-07.5</i>	COUNTY: <i>Ohio</i> USGS 7.5 TOPO: <i>Pleasant Ridge</i>		
DATE: <i>11-29-12</i>		TIME: 1:25 ET <input type="checkbox"/> AM <input checked="" type="checkbox"/> PM	INVESTIGATORS: <i>Bill Sampson, Laura Heil, Derrick 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"/> Heavy rain <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
<input type="checkbox"/> Steady rain      Air temperature <u>50</u> °F.      Inches rainfall in past 24 hours <u>0</u> in <input type="checkbox"/> Intermittent showers <u>10</u> % Cloud Cover <input checked="" type="checkbox"/> Clear/sunny					
P-Chem: Temp (°F) <u>N/A</u> D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond.µs <u>N/A</u> <input type="checkbox"/> Grab					
<b>INSTREAM WATERSHED FEATURES</b>			<b>LOCAL WATERSHED FEATURES:</b>		
Stream Width EOW _____ ft Stream Width BF <u>5.0</u> ft Stream Bottom Width <u>1.0</u> ft Avg. Bankfull Depth <u>0.5</u> ft Avg. H <sub>2</sub> 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 type="checkbox"/> Row Crops <input type="checkbox"/> Urban Runoff/Storm Sewers		
Hydraulic Structures:		Stream Flow;		Stream Type;	
<input checked="" type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments <input checked="" type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input type="checkbox"/> Normal <input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential <input type="checkbox"/> Other <input type="checkbox"/> Culverts				<input type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input checked="" type="checkbox"/> Ephemeral <input type="checkbox"/> Seep	
Riparian Vegetation:		Dom. Tree/Shrub Taxa		Channel Alterations;	
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>		<i>Hercules club</i> <i>Dogwood</i> <i>White oak</i> <i>Red oak</i>		<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%) <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)				<u>40</u>	
Sand (0.06-2 mm)				<u>40</u>	
Gravel (2-64 mm)				<u>10</u>	
Cobble (64-256 mm)				<u>10</u>	
Boulders (>256 mm)					
Bedrock					
<b>Habitat</b>		<b>Condition Category</b>			
<b>Parameter</b>		<b>Optimal</b>	<b>Suboptimal</b>	<b>Marginal</b>	<b>Poor</b>
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).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat" lack of habitat is obvious; substrate unstable or lacking.
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
2. Embeddedness		Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
3. Velocity/Depth Regime		All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow. Deep > 1.5 feet.	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes)	Only 2 of the 4 habitat regimes present (if fast-shallow or slow shallow are missing, score low)	Dominated by 1 velocity/depth regime.
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>

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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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 to 15.	Occasional riffles or bend; bottom contours provide some habitat; distance between riffles divided by stream width is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by stream width is > than 25.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>

**Total Score**

66

**NOTES/COMMENTS; Channel very incised/entrenched. G6 Rosgen stream**

## Low Gradient Stream Data Sheet

STREAM NAME: <i>E-5 US</i>			LOCATION: <i>P. Ridge South Pit</i>		
STATION: <i>WP1633</i>	DRAINAGE AREA (AC)		BASIN/WATERSHED: <i>Green River/Barnett Creek</i>		
LAT: <i>37-35-24.0</i>		LONG: <i>86-59-28.1</i>	COUNTY: <i>Ohio</i> USGS 7.5 TOPO: <i>Pleasant Ridge</i>		
DATE: <i>11-29-12</i> TIME: 4:04 ET <input type="checkbox"/> AM <input checked="" type="checkbox"/> PM			INVESTIGATORS: <i>Bill Sampson, Laura Heil, Derrick 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 type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
<input type="checkbox"/> Heavy rain <input type="checkbox"/> Steady rain <input type="checkbox"/> Intermittent showers <input checked="" type="checkbox"/> Clear/sunny Air temperature <u>50</u> °F. Inches rainfall in past 24 hours <u>0</u> in <input type="checkbox"/> Land Disposal <input type="checkbox"/> Row Crops <input type="checkbox"/> Urban Runoff/Storm Sewers					
P-Chem: Temp (°F) <u>N/A</u> D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond. <u>N/A</u> <input type="checkbox"/> Grab					
<b>INSTREAM WATERSHED FEATURES</b>			<b>LOCAL WATERSHED FEATURES:</b>		
Stream Width EOW _____ ft Stream Width BF <u>2.5</u> ft Stream Bottom Width <u>1.0</u> ft Avg. Bankfull Depth <u>0.4</u> ft Avg. H <sub>2</sub> 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 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 checked="" type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input type="checkbox"/> Normal <input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential <input type="checkbox"/> Other <input type="checkbox"/> Culverts				<input type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input checked="" type="checkbox"/> Ephemeral <input type="checkbox"/> Seep	
Riparian Vegetation:		Dom. Tree/Shrub Taxa		Canopy Cover;	
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>		<i>White oak Silver maple</i> <i>Sycamore American elm</i> <i>Red oak</i> <i>Red maple</i> <i>Black willow</i>		<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)				<u>100</u>	
Sand (0.06-2 mm)					
Gravel (2-64 mm)					
Cobble (64-256 mm)					
Boulders (>256 mm)					
Bedrock					
<b>Habitat</b>		<b>Condition Category</b>			
<b>Parameter</b>	<b>Optimal</b>	<b>Suboptimal</b>	<b>Marginal</b>	<b>Poor</b>	
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.	
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>	
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.	
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>	
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.	
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>	

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 despoits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>

**Total Score**

112

**NOTES/COMMENTS; Not much channel. E6 Rosgen stream type.**

## Low Gradient Stream Data Sheet

STREAM NAME: <i>E-5 DS</i>			LOCATION: <i>P. Ridge South Pit</i>		
STATION: <i>WP1636</i>		DRAINAGE AREA (AC)	BASIN/WATERSHED: <i>Green River/Barnett Creek</i>		
LAT: <i>37-35-20.5</i>		LONG: <i>86-59-24.2</i>	COUNTY: <i>Ohio</i>		USGS 7.5 TOPO: <i>Pleasant Ridge</i>
DATE: <i>11-29-12</i> TIME: 11:41 ET <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM			INVESTIGATORS: <i>Bill Sampson, Laura Heil, Derrick 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"/> Heavy rain <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Steady rain <input type="checkbox"/> Intermittent showers <input checked="" type="checkbox"/> Clear/sunny					
Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
Air temperature <u>48</u> °F. Inches rainfall in past 24 hours <u>0</u> in					
% Cloud Cover <u>10</u>					
P-Chem: Temp (°F) <u>N/A</u> D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond. <u>N/A</u> <input type="checkbox"/> Grab					
<b>INSTREAM WATERSHED FEATURES</b>			<b>LOCAL WATERSHED FEATURES:</b>		
Stream Width EOW _____ ft			Predominant Surrounding Land Use:		
Stream Width BF <u>3.0</u> ft			<input type="checkbox"/> Surface Mining	<input type="checkbox"/> Construction	<input checked="" type="checkbox"/> Forest
Stream Bottom Width <u>1.0</u> ft			<input type="checkbox"/> Deep Mining	<input type="checkbox"/> Commercial	<input type="checkbox"/> Pasture/Grazing
Avg. Bankfull Depth <u>0.4</u> ft			<input type="checkbox"/> Oil Wells	<input type="checkbox"/> Industrial	<input type="checkbox"/> Silviculture
Avg. H <sub>2</sub> O Depth Riffle _____ ft			<input type="checkbox"/> Land Disposal	<input 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 checked="" type="checkbox"/> Dry	<input type="checkbox"/> Pooled	<input type="checkbox"/> Low	<input type="checkbox"/> Normal
<input type="checkbox"/> Island	<input type="checkbox"/> Waterfalls	<input type="checkbox"/> High	<input type="checkbox"/> Very Rapid or Torrential	<input checked="" type="checkbox"/> Perennial	<input type="checkbox"/> Intermittent
<input type="checkbox"/> Other	<input type="checkbox"/> Culverts			<input checked="" type="checkbox"/> Ephemeral	<input type="checkbox"/> Seep
Riparian Vegetation:		Dom. Tree/Shrub Taxa		Channel Alterations;	
Dominate Type:		<i>Pinoak</i>		<input type="checkbox"/> Dredging	
<input checked="" type="checkbox"/> Trees	<input checked="" type="checkbox"/> Shrubs	<i>Sycamore</i>		<input type="checkbox"/> Channelization	
<input type="checkbox"/> Grasses	<input checked="" type="checkbox"/> Herbaceous			<input type="checkbox"/> Full <input type="checkbox"/> Partial	
Number of Strata <u>3</u>					
Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C		Riffle _____ %		Run; <u>100</u> %	
				Pool _____ %	
Silt/Clay (<0.06 mm)				<u>100</u>	
Sand (0.06-2 mm)					
Gravel (2-64 mm)					
Cobble (64-256 mm)					
Boulders (>256 mm)					
Bedrock					
<b>Habitat</b>		<b>Condition Category</b>			
<b>Parameter</b>		<b>Optimal</b>	<b>Suboptimal</b>	<b>Marginal</b>	<b>Poor</b>
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.
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>

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 despoits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>

**Total Score**

**98**

**NOTES/COMMENTS; E6 Rosgen stream type.**

## Low Gradient Stream Data Sheet

STREAM NAME: <i>E-6</i>			LOCATION: <i>P. Ridge South Pit</i>		
STATION: <i>WP61</i>		DRAINAGE AREA (AC)	BASIN/WATERSHED: <i>Green River/Barnett Creek</i>		
LAT: <i>37-35-22.9</i>		LONG: <i>86-59-20.4</i>	COUNTY: <i>Ohio</i> USGS 7.5 TOPO: <i>Pleasant Ridge</i>		
DATE: <i>11-29-12</i> TIME: 3:40 ET <input type="checkbox"/> AM <input checked="" type="checkbox"/> PM			INVESTIGATORS: <i>Rick Heil, Peggy Measel</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"/> Heavy rain <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Steady rain <input type="checkbox"/> Intermittent showers <input checked="" type="checkbox"/> Clear/sunny					
Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
Air temperature <u>50</u> °F. Inches rainfall in past 24 hours <u>0</u> in					
<u>10</u> % Cloud Cover					
P-Chem: Temp (°F) <u>N/A</u> D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond. <u>N/A</u> <input type="checkbox"/> Grab					
<b>INSTREAM WATERSHED FEATURES</b>			<b>LOCAL WATERSHED FEATURES:</b>		
Stream Width EOW _____ ft			Predominant Surrounding Land Use:		
Stream Width BF <u>2.0</u> ft			<input type="checkbox"/> Surface Mining <input type="checkbox"/> Construction <input checked="" type="checkbox"/> Forest		
Stream Bottom Width <u>120</u> ft			<input type="checkbox"/> Deep Mining <input type="checkbox"/> Commercial <input type="checkbox"/> Pasture/Grazing		
Avg. Bankfull Depth <u>0.3</u> ft			<input type="checkbox"/> Oil Wells <input type="checkbox"/> Industrial <input type="checkbox"/> Silviculture		
Avg. H <sub>2</sub> O Depth Riffle _____ ft			<input type="checkbox"/> Land Disposal <input 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 checked="" type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input type="checkbox"/> Normal		<input type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential		<input type="checkbox"/> Perennial <input type="checkbox"/> Intermittent	
<input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input type="checkbox"/> Other <input type="checkbox"/> Culverts				<input checked="" type="checkbox"/> Ephemeral <input type="checkbox"/> Seep	
Riparian Vegetation: Dominate Type:		Dom. Tree/Shrub Taxa		Canopy Cover;	
<input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input checked="" type="checkbox"/> Grasses <input checked="" type="checkbox"/> Herbaceous		<i>Tulip poplar</i> <i>Sycamore</i> <i>Beech</i>		<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%)	
Number of Strata <u>4</u>				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)				<u>80</u>	
Sand (0.06-2 mm)				<u>20</u>	
Gravel (2-64 mm)					
Cobble (64-256 mm)					
Boulders (>256 mm)					
Bedrock					
<b>Habitat</b>		<b>Condition Category</b>			
<b>Parameter</b>		<b>Optimal</b>	<b>Suboptimal</b>	<b>Marginal</b>	<b>Poor</b>
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.
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>

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 despoits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>

**Total Score**

**94**

**NOTES/COMMENTS; B6 Rosgen stream type.**

## High Gradient Stream Data Sheet

STREAM NAME: <i>E-7</i>			LOCATION: <i>P. Ridge South Pit</i>		
STATION: <i>WP1638</i>		DRAINAGE AREA (AC)	BASIN/WATERSHED: <i>Green River/Barnett Creek</i>		
LAT: <i>37-35-20.7</i>		LONG: <i>86-59-23.9</i>	COUNTY: <i>Ohio</i>		USGS 7.5 TOPO: <i>Pleasant Ridge</i>
DATE: <i>11-29-12</i>		TIME: <i>5:15 ET</i> <input type="checkbox"/> AM <input checked="" type="checkbox"/> PM	INVESTIGATORS: <i>Bill Sampson, Laura Heil, Derrick 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"/> Heavy rain <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Steady rain <input type="checkbox"/> Intermittent showers <input checked="" type="checkbox"/> Clear/sunny Has there been a heavy rain in the last 7 days? Air temperature <u><i>48</i></u> °F. Inches rainfall in past 24 hours <u><i>0</i></u> in % Cloud Cover <u><i>0</i></u>					
P-Chem: Temp (°F) <u><i>N/A</i></u> D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond.µs <u><i>N/A</i></u> <input type="checkbox"/> Grab					
<b>INSTREAM WATERSHED FEATURES</b>			<b>LOCAL WATERSHED FEATURES:</b>		
Stream Width EOW _____ ft Stream Width BF <u><i>2.5</i></u> ft Stream Bottom Width <u><i>1.0</i></u> ft Avg. Bankfull Depth <u><i>0.3</i></u> ft Avg. H <sub>2</sub> 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 type="checkbox"/> Row Crops <input type="checkbox"/> Urban Runoff/Storm Sewers		
Hydraulic Structures: <input checked="" type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments <input checked="" type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input type="checkbox"/> Other <input type="checkbox"/> Culverts		Stream Flow; <input checked="" type="checkbox"/> Dry <input 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 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 Number of Strata <u><i>3</i></u>		Dom. Tree/Shrub Taxa <i>Pinoak</i> <i>Hickory</i> <i>Chestnut oak</i> <i>Persimmon</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; 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><i>100</i></u> % Pool _____ %					
Silt/Clay (<0.06 mm)		<u><i>100</i></u>			
Sand (0.06-2 mm)					
Gravel (2-64 mm)					
Cobble (64-256 mm)					
Boulders (>256 mm)					
Bedrock					
<b>Habitat</b>		<b>Condition Category</b>			
<b>Parameter</b>		<b>Optimal</b>	<b>Suboptimal</b>	<b>Marginal</b>	<b>Poor</b>
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).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
2. Embeddedness		Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
3. Velocity/Depth Regime		All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow. Deep > 1.5 feet.	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes)	Only 2 of the 4 habitat regimes present (if fast-shallow or slow shallow are missing, score low)	Dominated by 1 velocity/depth regime.
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>

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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by stream width is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by stream width is > than 25.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>

**Total Score**

94

**NOTES/COMMENTS; Channel somewhat incised. F6 Rosgen stream type.**

## Low Gradient Stream Data Sheet

STREAM NAME: <i>E-8</i>			LOCATION: <i>P. Ridge South Pit</i>		
STATION: <i>WP1634</i>		DRAINAGE AREA (AC)	BASIN/WATERSHED		<i>Green River/Barnett Creek</i>
LAT: <i>37-35-24.6</i>		LONG: <i>86-59-29.0</i>	COUNTY; <i>Ohio</i>		USGS 7.5 TOPO; <i>Pleasant Ridge</i>
DATE: <i>11-29-12</i> TIME: 4:33 ET <input type="checkbox"/> AM <input checked="" type="checkbox"/> PM			INVESTIGATORS; <i>Bill Sampson, Laura Heil, Derrick 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"/> Heavy rain <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Steady rain <input type="checkbox"/> Intermittent showers <input checked="" type="checkbox"/> Clear/sunny					
Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
Air temperature <u>50</u> °F. Inches rainfall in past 24 hours <u>0</u> in					
% Cloud Cover <u>10</u>					
P-Chem: Temp (°F) <u>50.2</u> D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond. <u>386</u> <input type="checkbox"/> Grab					
<b>INSTREAM WATERSHED FEATURES</b>			<b>LOCAL WATERSHED FEATURES:</b>		
Stream Width EOW <u>1.5</u> ft			Predominant Surrounding Land Use:		
Stream Width BF <u>3.0</u> ft			<input type="checkbox"/> Surface Mining	<input type="checkbox"/> Construction	<input checked="" type="checkbox"/> Forest
Stream Bottom Width <u>1.0</u> ft			<input type="checkbox"/> Deep Mining	<input type="checkbox"/> Commercial	<input type="checkbox"/> Pasture/Grazing
Avg. Bankfull Depth <u>0.4</u> ft			<input type="checkbox"/> Oil Wells	<input type="checkbox"/> Industrial	<input type="checkbox"/> Silviculture
Avg. H <sub>2</sub> O Depth Riffle <u>0.1</u> ft			<input type="checkbox"/> Land Disposal	<input 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"/> Island	<input type="checkbox"/> Waterfalls	<input checked="" type="checkbox"/> High	<input type="checkbox"/> Very Rapid or Torrential	<input checked="" type="checkbox"/> Perennial	<input type="checkbox"/> Intermittent
<input type="checkbox"/> Other	<input type="checkbox"/> Culverts			<input checked="" type="checkbox"/> Ephemeral	<input type="checkbox"/> Seep
Riparian Vegetation:		Dom. Tree/Shrub Taxa		Channel Alterations;	
Dominated Type:		<i>Tulip poplar</i>		<input type="checkbox"/> Dredging	
<input checked="" type="checkbox"/> Trees	<input checked="" type="checkbox"/> Shrubs	<i>Sycamore</i>		<input type="checkbox"/> Channelization	
<input type="checkbox"/> Grasses	<input checked="" type="checkbox"/> Herbaceous	<i>Red oak</i>		<input type="checkbox"/> Full <input type="checkbox"/> Partial	
Number of Strata <u>3</u>		<i>Sweetgum</i>			
		<i>White oak</i>			
Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C		Riffle _____ %		Run; <u>90</u> %	
				Pool <u>10</u> %	
Silt/Clay (<0.06 mm)				<u>100</u>	
Sand (0.06-2 mm)				<u>100</u>	
Gravel (2-64 mm)					
Cobble (64-256 mm)					
Boulders (>256 mm)					
Bedrock					
<b>Habitat</b>		<b>Condition Category</b>			
<b>Parameter</b>		<b>Optimal</b>	<b>Suboptimal</b>	<b>Marginal</b>	<b>Poor</b>
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 <u>scale</u> .)	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.
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>		<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>

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 despoits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
5. Channel Flow Status	Water reaches base of 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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE</b>	<b>20 19 18 17 16</b>	<b>15 14 13 12 11</b>	<b>10 9 8 7 6</b>	<b>5 4 3 2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
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.
<b>SCORE (LB)</b>	<b>Left Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>
<b>SCORE (RB)</b>	<b>Right Bank 10 9</b>	<b>8 7 6</b>	<b>5 4 3</b>	<b>2 1 0</b>

**Total Score**

**142**

**NOTES/COMMENTS; B6 Rosgen stream type.**



Intermittent 1 (I-1) – Upstream Section (US), looking downstream



Intermittent 1 (I-1) – Downstream Section (DS), looking downstream



Intermittent 2 (I-2) – Looking upstream



Intermittent 2 (I-2) – Downstream Section (DS), looking downstream



Ephemeral 1 (E-1) – Upstream Section (US), looking upstream



Ephemeral 1 (E-1) – Downstream Section (US), looking downstream



Ephemeral 2 (E-2)



Ephemeral 3 (E-3)



Ephemeral 4 (E-4)



Ephemeral 5 (E-5) – Upstream Section (US), looking downstream



Ephemeral 5 (E-5) – Downstream Section (DS), looking upstream



Ephemeral 6 (E-6)



Ephemeral 7 (E-7)



Ephemeral 8 (E-8)

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

Project/Site: P. Ridge South Pit/Wetland A		City/County: Ohio	Sampling Date: 11-29-12
Applicant/Owner: Western Kentucky Minerals		State: KY	Sampling Point: WP 1613
Investigator(s): Bill Sampson, Laura Heil, Derrick Smith		Section, Township, Range: Pleasant Ridge	
Landform (hillslope, terrace, etc.): Pond		Local Relief: <input checked="" type="checkbox"/> concave <input type="checkbox"/> convex <input type="checkbox"/> none	
Slope: <2%	Lat: 37° 35' 17.8"	Long: -86° 59' 05.8"	Datum: WGS 84
Soil Map Unit: Wellston silt loam		Cowardin Classification: PEM1H	
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 type="checkbox"/> Yes <input checked="" type="checkbox"/> No Wetland Hydrology Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<p align="center"><b>Is the Sampled Area within a Wetland? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</b></p>
Remarks: Pond 2 fringe. Total fringe area = approx 1,870 sf.	

**VEGETATION – Use scientific names of plants**

Tree Stratum (Plot Size: ft)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. none				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)
2.				
3.				
4.				
5.				
Sapling/Shrub Stratum (Plot Size: ft)				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. none				
2.				
3.				
4.				
5.				
Herbaceous Stratum (Plot Size: 5 ft)				Hydrophytic Vegetation Indicators: <input checked="" type="checkbox"/> Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide Supporting Data) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <i>Echinochloa crus-galli</i> (Barnyard grass)	30	Yes	FACW	
2. <i>Carex sp.</i> (sedge)	15	No	FACW+	
3. <i>Eleocharis obtusa</i> (spikerush)	20	Yes	OBL	
4. <i>Ranunculus flabellaris</i> (Water buttercup)	15	No	OBL	
5.				
6.				
7.				
8.				
Woody Vine (Plot Size: )				Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
1. none				
2.				
Remarks:				

**SOIL**

Profile Description (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (in)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-3"	10YR 5/3	95	7.5 YR 5/6	5			SICLLO	
3-10"	10YR 5/6	100	NONE				SICLLO	Same throughout

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

<b>Hydric Soil Indicators:</b> <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 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)	<b>Indicators for Problematic Hydric Soils<sup>3</sup></b> <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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<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if observed): none</b> Type: None Depth (in):	<b>Hydric Soil Present?</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
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Remarks: assumed hydric by OBL/FACW dominants and sharp community boundary

## HYDROLOGY

<b>Wetland Hydrology Indicators:</b> Primary Indicators (minimum of one required; check all that apply)	<u>Secondary Indicators (minimum of two required)</u>
<input checked="" type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input checked="" 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 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 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)
<b>Field Observations:</b> Surface Water Present? <input checked="" 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 checked="" type="checkbox"/> Yes <input type="checkbox"/> No Depth (in): (includes capillary fringe)	<b>Wetland Hydrology Present?</b> <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: P. Ridge South Pit/Wetland B		City/County: Ohio	Sampling Date: 11-29-12
Applicant/Owner: Western Kentucky Minerals		State: KY	Sampling Point: WP 1627
Investigator(s): Bill Sampson, Laura Heil, Derrick Smith		Section, Township, Range: Pleasant Ridge	
Landform (hillslope, terrace, etc.): Pond		Local Relief: <input checked="" type="checkbox"/> concave <input type="checkbox"/> convex <input type="checkbox"/> none	
Slope: <2%	Lat: 37° 35' 34.5"	Long: -86° 59' 20.5"	Datum: WGS 84
Soil Map Unit: Wellston silt loam		Cowardin Classification: MOSTLY PEM1H WITH PSSIH AT HEAD OF POND	
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	<b>Is the Sampled Area within a Wetland?</b> <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: Pond 1 fringe, along northern shoreline. Probably connected.	

**VEGETATION – Use scientific names of plants**

Tree Stratum (Plot Size: ft)	Absolute % Cover	Dominant Species?	Indicator Status	<b>Dominance Test worksheet:</b>  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. none				
2.				
3.				
4.				
Sapling/Shrub Stratum (Plot Size: ft)				<b>Prevalence Index worksheet:</b>  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. <i>Alnus glutinosa</i> (Alder)	15	Yes	FACW	
2.				
3.				
4.				
Herbaceous Stratum (Plot Size: 5 ft)				<b>Hydrophytic Vegetation Indicators:</b> <input checked="" type="checkbox"/> Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide Supporting Data) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <i>Echinochloa crus-galli</i> (Barnyard grass)	80	Yes	FACW	
2. <i>Carex sp.</i> (sedge)	15	No	FACW+	
3. <i>Boehmeria cylindrical</i> (False nettle)	3	No	FACW	
4.				
5.				
6.				
7.				
Woody Vine (Plot Size: )				<b>Hydrophytic Vegetation Present?</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
1. none				
2.				
Remarks:				

Profile Description (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (in)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-5"	10YR 4/2	95	7.5 YR 5/6	5	C	M	SICLLO	
3-10"	10YR 3/1	100	NONE				SICLLO	Same throughout

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

<b>Hydric Soil Indicators:</b> <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)	<b>Indicators for Problematic Hydric Soils<sup>3</sup></b> <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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<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

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

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b> Primary Indicators (minimum of one required; check all that apply)	<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input 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 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)
<input checked="" type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input checked="" 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"/> 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)
<b>Field Observations:</b> Surface Water Present? <input checked="" 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 checked="" type="checkbox"/> Yes <input type="checkbox"/> No Depth (in): (includes capillary fringe)	<b>Wetland Hydrology Present?</b> <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: P. Ridge South Pit/Wetland C		City/County: Ohio	Sampling Date: 11-29-12
Applicant/Owner: Western Kentucky Minerals		State: KY	Sampling Point: WP 1633
Investigator(s): Bill Sampson, Laura Heil, Derrick Smith		Section, Township, Range: Pleasant Ridge	
Landform (hillslope, terrace, etc.): Bottom		Local Relief: <input type="checkbox"/> concave <input type="checkbox"/> convex <input type="checkbox"/> none Flat	
Slope: <2%	Lat: 37° 35' 24.0"	Long: 86° 59' 28.1"	Datum: WGS 84
Soil Map Unit: Fondorf-Wellston-Rosine silt loam		Cowardin Classification: PFO1B	
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"><b>Is the Sampled Area within a Wetland? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</b></p>
Remarks: At confluence of tributaries E-8 and E-9. Connected. Soils do not appear hydric. Approx 900 sf.	

**VEGETATION – Use scientific names of plants**

Tree Stratum (Plot Size: 15 ft)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. <i>Salix nigra</i> (Black willow)	15	Yes	OBL	Number of Dominant Species that are OBL, FACW, or FAC: <u>6</u> (A)  Total Number of Dominant Species Across all Strata: <u>6</u> (B)  Percent of Dominant Species that are OBL, FACW, or FAC: <u>100</u> (A/B)
2. <i>Acer rubrum</i> (Red maple)	10	Yes	FAC	
3. <i>A. saccharinum</i> (Silver maple)	15	Yes	FACW	
4.				
5.				
Sapling/Shrub Stratum (Plot Size: 15 ft)				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. <i>S. nigra</i> (Black willow)	10	Yes	OBL	
2. <i>A. rubrum</i> (Red maple)	10	Yes	FAC	
3.				
4.				
Herbaceous Stratum (Plot Size: 5 ft)				Hydrophytic Vegetation Indicators: <input checked="" type="checkbox"/> Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide Supporting Data) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <i>Carex</i> sp. (Sedge)	10	Yes	FACW+	
2.				
3.				
4.				
5.				
6.				
7.				
Woody Vine (Plot Size: )				Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
1. none				
2.				
Remarks:				

**SOIL**

Profile Description (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (in)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-1"								Organic layer
1-10"							SANDY	Brown, sandy soil

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>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 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)	<b>Indicators for Problematic Hydric Soils<sup>3</sup></b> <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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<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed): none**  
 Type: None  
 Depth (in):

**Hydric Soil Present?**  Yes  No

Remarks: assumed hydric by OBL/FACW dominants and clear boundary

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b> Primary Indicators (minimum of one required; check all that apply)		<u>Secondary Indicators (minimum of two required)</u>
<input type="checkbox"/> Surface Water (A1) <input checked="" type="checkbox"/> High Water Table (A2) <input checked="" 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"/> 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)	<input type="checkbox"/> Surface Soil Cracks (B6) <input 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 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)
<b>Field Observations:</b> Surface Water Present? <input type="checkbox"/> Yes <input type="checkbox"/> No Depth (in): Water Table Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Depth (in): Saturation Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Depth (in): (includes capillary fringe)		<b>Wetland Hydrology Present?</b> <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: P. Ridge South Pit/Wetland D		City/County: Ohio	Sampling Date: 11-29-12
Applicant/Owner: Western Kentucky Minerals		State: KY	Sampling Point: WP 65
Investigator(s): Bill Sampson, Laura Heil, Derrick Smith		Section, Township, Range: Pleasant Ridge	
Landform (hillslope, terrace, etc.): Terrace		Local Relief: <input type="checkbox"/> concave <input type="checkbox"/> convex <input type="checkbox"/> none Flat	
Slope: <2%	Lat: 37° 35' 17.9"	Long: -86° 59' 24.4"	Datum: WGS 84
Soil Map Unit: Steff silt loam		Cowardin Classification: PFO1A	
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 checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Are "Normal Circumstances" present? <input type="checkbox"/> Yes <input checked="" 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	<b>Is the Sampled Area within a Wetland?</b> <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: Adjacent to tributary I-8. Connected. Recently logged.	

**VEGETATION – Use scientific names of plants**

Tree Stratum (Plot Size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status	<b>Dominance Test worksheet:</b> 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. <i>Platanus occidentalis</i> (Sycamore)	35	Yes	FACW	
2. <i>Acer rubrum</i> (Red maple)	8		FAC	
3. <i>Liquidambar styraciflua</i> (Sweetgum)	8		FAC	
4.				
<b>Sapling/Shrub Stratum (Plot Size: 15 ft)</b>				<b>Prevalence Index worksheet:</b> 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. <i>Lindera benzoin</i> (Spicebush)	60	Yes	FAC	
2. <i>A. rubrum</i> (Red maple)	20	Yes	FAC	
3. <i>L. styraciflua</i> (Sweetgum)	10		FAC	
4. <i>Sambucus racemosa</i> (Elderberry)	10		FACU	
<b>Herbaceous Stratum (Plot Size: 5 ft)</b>				<b>Hydrophytic Vegetation Indicators:</b> <input type="checkbox"/> Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> Dominance Test is >50% <input checked="" type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide Supporting Data) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain) <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <i>Solidago</i> sp. (Goldenrod)	15		-----	
2. <i>Polystichum acrostichoides</i> (Christmas fern)	12		FACU	
3.				
4.				
5.				
6.				
7.				
<b>Woody Vine (Plot Size: )</b>				<b>Hydrophytic Vegetation Present?</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
1. none				
2.				
Remarks:				

**SOIL**





Wetland A



Wetland B



Wetland C



Wetland D