APPENDIX D

Aquatic/Terrestrial Resources Baseline

of KYTC Item I-II5, I-II5.I, I-II8 US 60 from 0.5 miles west of KY 310 to east of Kevil Ballard and McCracken Counties, Kentucky

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I. INTRODUCTION

QK4 has been contracted by the Kentucky Transportation Cabinet (KYTC) to develop an Environmental Assessment (EA) in support of the proposed improvements to US 60. The proposed project will begin east of La Center, approximately 0.5 miles west of KY 310, and extend west to the existing four-lane section east of Kevil in Ballard and McCracken Counties, Kentucky (KYTC Item # 1-115, 1-115.1, and 1-118), herein referred to as the "project." Third Rock Consultants, LLC (Third Rock) has been retained as a subconsultant to QK4 to conduct an Ecological Baseline Study to assess potential impacts to ecological resources resulting from preliminary design alternatives. This report documents the findings and conclusions of that effort and was prepared in accordance with KYTC's *Environmental Guidance Manual* (2014) and Division of Environmental Analysis *Ecological Study Format* – *Guidance and Accountability Form* TC58-43 (2014).

II. PROJECT DESCRIPTION

A. Location

The project involves improvements to approximately 6.7 miles of US 60, beginning at the end of the existing four-lane section east of the community of La Center and ending at the existing four-lane section east of Kevil in Ballard and McCracken Counties, Kentucky.

B. Purpose and Need

The purpose of this project is to reconstruct US 60 to improve the opportunity for freight movement and increase safety by modifying geometrics to meet current design standards.

C. Proposed Alternatives

Three (3) preliminary alternatives have been developed, herein and on project exhibits referred to as Alternative I, Alternative 2, and Alternative 3 (**Exhibit I**, **Appendix A**).

- 1. Alternative I begins east of the bridge over Humphrey Creek, creating a new route on new alignment south of existing US 60. It ends at the improved 4-lane section near Lester Harris Road. For the environmental baselines, the assumed cross-section is a 4-lane divided rural highway.
- 2. Alternative 2 begins east of the bridge over Humphrey Creek, generally following the existing US 60 alignment. For the environmental baselines, the assumed cross-section is a 4-lane divided rural highway with 5-lane urban section through Kevil.
- 3. Alternative 3 begins east of the bridge over Humphrey Creek, creating a new route along the old railroad bed west of Kevil and then generally following the existing US 60 alignment through Kevil to the east. For the environmental baselines, the assumed cross-section is a 4-lane divided rural highway with 5-lane urban section through Kevil.



D. Typical Section

Alternatives will utilize a combination of rural and urban typical sections as illustrated on the detail included in **Appendix B**.

III. CORRESPONDENCE WITH STATE AND FEDERAL AGENCIES

The U.S. Fish and Wildlife Service (USFWS), Kentucky Department of Fish and Wildlife Resources (KDFWR), and Kentucky State Nature Preserves Commission (KSNPC) were contacted to solicit occurrence information for federal or state endangered, threatened, or special concern species, wetlands, and unique natural communities. The Kentucky Division of Water (KDOW) was contacted to solicit input regarding national or state Scenic and Wild Rivers, Outstanding State Resource Waters, or other unique aquatic habitats within the project corridor, as well as historic water quality and biological data collected within the vicinity of the project. The Kentucky Division of Forestry (KDOF) was contacted to solicit information regarding national or state champion trees and the Kentucky Speleological Society (KSS) was contacted to determine if any caves are known to be within a 5-km buffer of the project corridor. Resulting correspondence is included **Appendix C**.

IV. ENVIRONMENTAL SETTING

A. Climate

Based on records from 1981 through 2010 compiled by the Midwestern Regional Climate Center for a weather station in Paducah, Kentucky, approximately 10 miles west of the project, the warmest month of the year is July, with an average maximum temperature of 89.3 degrees Fahrenheit; while the coldest month of the year is January, with an average minimum temperature of 25.8 degrees Fahrenheit. The annual average precipitation is 49.08". The wettest month of the year is May, with an average rainfall of 4.94" (Midwest Climate, 2019). The average length of the growing season for Ballard and McCracken counties, from the last freezing temperature in the spring to the first in the fall, is approximately 202 days (Humphrey, 1976).

B. Physiography

The project lies within the Jackson Purchase or Mississippi Embayment Physiographic Region (KGS, 2019). This is a coastal plain region described as "relatively flat lying, with numerous lakes, ponds, sloughs, and swamps" (KGS, 2019). It is an undulating plain with local relief of not more than 50 feet except near a major stream (McFarlan, 1943).

The project is in the Mississippi Valley Loess Plains III ecoregion (74), within the Loess Plains Level IV subdivision (74b). The Loess Plains is a productive agricultural area composed of gently rolling uplands, broad bottomlands, and terraces (Woods et al., 2002). It is mantled by thick loess and alluvium and is underlain by weak, unconsolidated coastal plain sediments (Woods et al., 2002). Potential natural vegetation is a mosaic of oak-hickory forests and bluestem prairie; grasslands and forested wetlands were once wide-spread but most has now been replaced by cropland (Woods et al., 2003).



al., 2002). High turbidity and siltation are common in the streams and rivers; many channelized streams occur (Woods et al., 2002).

C. Topography

As illustrated on **Exhibit 2** (**Appendix A**), elevations in the project area range from approximately 350 feet above mean sea level (AMSL) to 450 feet AMSL. The topography is predominantly slightly dissected level to sloping uplands with broad ridges that are gently sloping on the sides.

D. Geology

As illustrated on **Exhibit 3** (**Appendix A**), the project is underlain by Alluvium in stream valleys and by Loess and Continental Deposits in uplands. In this area of western Kentucky, where Cretaceous and Tertiary sediments occur at the surface, the deposits are unconsolidated sediment instead of rock and are easily eroded (KGS 1997-2019). This area is relatively flat, with numerous lakes, ponds, and swamps; local relief is generally less than 100 feet (KGS 1997-2019).

E. Soils

Soil types were identified using attributes in the Natural Resource Conservation Service Soil Survey Geographic Database (NRCS SSURGO) for Ballard and McCracken County as illustrated on **Exhibit 4** (**Appendix A**). Soils in the project corridor are comprised almost entirely of silt loam, including a high percentage of Grenada silt loam, Vicksburg silt loam, Loring silt loam, and Calloway silt loam. Also present in the project corridor are areas of Falaya-Collins complex, Center silt loam, Feliciana silt loam, Kurk silt loam, Loring-Purchase complex, Routon silt loam, and Waverly silt loam. The dominant soil types within the project corridor are classified as well drained, moderately well drained, or somewhat poorly drained. Waverly silt loam is a mapped hydric soil occurring within the project corridor.

F. Watershed

The project lies in the Upper Humphrey Creek (HUC 12 – 051402060601), Bayou Creek – Ohio River (HUC 12 – '051402060701), and Middle Humphrey Creek (HUC 12 – 051402060602) watersheds. The proposed alternatives involve crossings of unnamed tributaries to Humphrey Creek, Bayou Creek, and unnamed tributaries to Bayou Creek. Humphrey Creek and Bayou Creek flow directly to the Ohio River. Humphrey Creek, downstream of the project, is included in the Kentucky 2016 303 (d) list (KDOW 2016). The pollutant listed for Humphrey Creek is fecal coliform of an unknow source. Bayou Creek, from the Ohio River to the headwaters, is included in the Kentucky 2016 303(d) list (KDOW 2016). The pollutants listed for Bayou Creek include copper, lead, mercury, sedimentation/siltation, and nutrient/eutrophication biological indicators. The suspected sources of these pollutions are inappropriate waste disposition, industrial point source discharge, and non-irrigated crop production.



According to correspondence with KDOW, no Cold Water Aquatic Habitat, Outstanding State Resource Waters, Exceptional Waters, Reference Reach Waters, Kentucky Wild River or Outstanding National Resource Waters are in the project corridor.

G. Land Use

Land use within the project corridor was digitized by Third Rock using high resolution aerial imagery and is summarized in **Table I** (below). The disturbance area for Alternative I is approximately 140 acres, of which the majority is cultivated crops and hay/pasture, followed by developed, open space. Alternative 2 is approximately 115 acres, of which the majority is developed, open space followed by developed, low intensity. Alternative 3 is approximately 100 acres, of which the majority is deciduous forest followed by cultivated crops.

	Alte	rnative I	Alternative 2		Alternative 3	
Land Cover	Area (ac)	Rel. Abund. (%)	Area (ac)	Rel. Abund. (%)	Area (ac)	Rel. Abund. (%)
Barren Land	0.00	0.00	0.00	0.00	0.69	0.01
Cultivated Crops	66.70	0.48	1.81	0.02	21.73	0.22
Deciduous Forest	7.48	0.05	7.20	0.06	38.03	0.38
Developed, Low Intensity	4.47	0.03	7.57	0.07	5.94	0.06
Developed, Medium Intensity	0.88	0.01	3.04	0.03	1.95	0.02
Developed, Open Space	23.13	0.17	88.93	0.77	19.19	0.19
Emergent Herbaceous Wetlands	0.48	0.00	0.47	0.00	0.38	0.00
Evergreen Forest	0.92	0.01	I.50	0.01	1.57	0.02
Hay/Pasture	35.09	0.25	1.49	0.01	2.86	0.03
Woody Wetlands	0.73	0.01	2.74	0.02	7.46	0.07
Open Water	0.00	0.00	0.09	0.00	0.00	0.00
Total	139.88	1.00	114.84	1.00	99.80	1.00

Table I. Land Use Summary

¹2011 National Land Cover Database

H. Floral Community

Flora belongs to the Mississippi Embayment Section of the Western Mesophytic Forest Region (Braun 1950). This section displays a mosaic of unlike vegetation types, including prairie, oak-hickory forest, swamp forest, and mixed mesophytic communities (Braun 1950). Prairies were once extensive but are now mostly in cultivation. The oak-hickory forest communities, occurring on the rolling and moderately dissected uplands, vary in composition in relation to topography and soils. White oak (*Quercus alba*) and tulip poplar (*Liriodendron tulipifera*) are abundant, as is southern red oak (*Quercus falcata*); hickories are almost always present (Braun 1950). American beech (*Fagus grandifolia*) and sugar maple (*Acer saccharum*) occur in the lowest part of the white oak woods, or on stream slopes (Braun 1950). The understory of the oak woods can include dogwood (*Cornus florida*), wild black



cherry (Prunus serotina), winged elm (Ulmus alata), sour gum (Nyssa sylvatica), and persimmon (Diospyros virginiana) (Braun 1950). Broad alluvial valleys, at lower elevations than the rolling oak upland forests, can be occupied by dense forest of water tolerant oaks, swamp cottonwood (Populus heterophylla), cottonwood (Populus deltoides), American elm (Ulmus americana), sugarberry (Celtis laevigata), river birch (Betula nigra), sycamore (Platanus occidentalis), red maple (Acer rubrum), sweet gum (Liquidambar styraciflua), and bald cypress (Taxodium distichum) (Braun 1950).

V. METHODS

A. Literature and Office Review

Prior to initiating field reconnaissance, various publicly available mapping and data resources were reviewed. Design mapping provided by QK4 on February 5, 2019 was imported into ArcView, where it was integrated with aerial and topographic maps, as well as a variety of environmental shapefiles such as streams, National Wetland Inventory (NWI) mapping, U.S. Geological Survey (USGS) geologic quadrangles, and U.S. Department of Agriculture (USDA) Natural Resources Conservation Service Soils mapping. Each design alternative was evaluated for the potential for impacts to aquatic and terrestrial resources in the project corridor (e.g., stream crossings, wetland intersections, forested bat habitat, etc.). Notes were made regarding resources that would require attention during the field effort. Further results of this review are discussed as appropriate in the following sections.

B. Aquatic Sampling

Aquatic sampling was conducted May 29, 2018, August 12 and 13, 2018, and February 13, 14, and 15, 2019 to establish the baseline biological condition of each resource and evaluate the overall community health of the streams in the project area. Species and habitats observed during the sampling effort were photographed (Photo Log, **Appendix D**); observations and data were recorded on agency-approved field data sheets and forms included in **Appendix E**.

I. Macroinvertebrates

The macroinvertebrate community was sampled on May 29, 2018 using quantitative and qualitative methods described in KDOW (2015a). At each sampling site, quantitative sampling consisted of four (4) composite 0.25-m squared kicknet samples taken from a minimum of two (2) riffle habitats. Qualitative sampling consisted of dip-net sweeps and visual searches of all remaining habitats (leaf packs, depositional areas in pools, root wads, woody debris, slab rocks). Quantitative and qualitative samples were placed in separate containers. Samples were preserved with 95% ethanol and transported to the laboratory for processing. At the laboratory, all samples were processed (sorted), following methods described by KDOW (2015b). A minimum of 300 organisms were removed randomly from the composite kicknet sample. A representative of each unique taxa was picked from each qualitative sample. Macroinvertebrates were identified to the lowest possible taxonomic level and recorded in Third Rock's Macroinvertebrate Laboratory Information Management System (MacLIMS).

2. Fish



Fish sampling was conducted on August 12 and 13, 2018 following methods developed by KDOW (2010). At each sampling site, the fish community was sampled using a Smith-Root backpack electroshocker in conjunction with seining. Fish were identified in the field, enumerated, recorded, and released unharmed. Voucher photographs were taken of each species encountered and are included in **Appendix D**.

3. Water Quality

Grab samples were collected August 12 and 13, 2018 and subsequently analyzed for the following parameters: acidity, alkalinity, chloride, carbon dioxide, hardness, iron, ammonia nitrogen, dissolved oxygen, pH, sulfate, and orthophosphate. Field measurements of water temperature, pH, dissolved oxygen, turbidity, and specific conductance were taken at each site using a Hydrolab multi-parameter water quality instrument. Sampling and analyses were conducted in accordance with current KDOW methodology (2011). A copy of the laboratory chain-of-custody (COC) is included in **Appendix E**.

4. Aquatic Habitat

U.S. Environmental Protection Agency's (USEPA) Rapid Bioassessment Protocols (RBP) for Use in Wadeable Streams and Rivers were used to evaluate stream habitat on February 13, 14, and 15, 2019. Physical characteristics and habitat quality were evaluated, and scores recorded on RBP Habitat Assessment Field Data Sheets (Barbour *et al.* 1999).

C. Terrestrial Sampling

Terrestrial sampling was conducted on May 29, 2018, August 12 and 13, 2018, and February 13, 14, and 15, 2019 to establish the baseline biological condition of each resource and evaluate the overall community health of project corridor. Species and habitats observed during the sampling effort were photographed (Photo Log, **Appendix D**); observations and data were recorded on agency-approved field data sheets included in **Appendix E**.

I. Floral

The floral community of the project was examined by walking the proposed alignments. For each unique habitat encountered during the pedestrian survey, the plant community was documented by listing the observed trees, shrubs, and herbaceous vegetation.

2. Faunal

Faunal surveys included searches within each unique habitat for organisms (including avifauna) as well as road kill, scat, tracks, bedding places and overturning rocks and logs.



3. Terrestrial Habitat

Habitat within the footprint of the proposed alternatives was assessed during the pedestrian survey in conjunction with floral and faunal surveys. An area extending a kilometer from the project corridor was examined for caves or sinkholes that could provide suitable roost habitat for bats.

D. Wetland Sampling

Soil mapping of Ballard and McCracken Counties, NWI maps, USGS topographic maps, and aerial maps were analyzed prior to the field visit to identify potential wetland features. Routine wetland delineation was conducted in accordance with the U.S. Army Corps of Engineers (USACE) Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region. Wetlands observed during the sampling effort were photographed (Photo Log, **Appendix D**); observations and data were recorded on agency-approved wetland determination forms included in **Appendix E**.

E. Threatened / Endangered Species Sampling

Literature and office review as well as agency coordination were used to identify potential habitat for each listed species within the project corridor prior to field reconnaissance to identify and quantify suitable habitat. A buffer area extending a kilometer from the project corridor was surveyed for bat roost habitat such as caves or open sinkholes on September 12 and 13, 2018. Potential bat habitat indicated on topographic maps and geologic quadrangles, or those reported by residents or coordinating agencies, was examined in the field for suitability as bat habitat.

VI. RESULTS

A. Literature and Office Review

USFWS indicated four (4) federally-listed species have the potential to occur within the project vicinity, KDFWR indicated no listed species, and KSNPC indicated 17 state-listed species, two (2) of which have a USFWS status of Species of Management Concern (SOMC). A summary of species considered for this baseline are summarized in **Table 2**.

			Corresponding Agency		
Common Name	Scientific Name	Status	USFWS	KDFWR	KSNPC
Mammals					
Gray Bat	Myotis grisescens	Federally Endangered	Х		
Indiana Bat	Myotis sodalis	Federally Endangered	Х		
Northern Long-eared Bat	Myotis septentrionalis	Federally Endangered	Х		
Southeastern Bat	Myotis austroriparius	State Endangered			Х
Little Brown Bat	Myotis lucifugus	State Endangered*			Х
Evening Bat	Nycticeius humeralis	State Special Concern			Х

Table 2. Threatened and Endangered Species



Table 2. Threatened and Endangered Species

			Corresponding Agency		
Common Name	Scientific Name	Status	USFWS	KDFWR	KSNPC
Fish					
Redspotted Sunfish	Lepomis miniatus	State Threatened			Х
Black Buffalo	Ictiobus niger	State Special Concern			Х
Plants					
Lakecress	Armoracia lacustris	State Threatened			Х
Prairie Milkweed	Asclepias hirtella	State Threatened			Х
Cream Wild Indigo	Baptisia bracteata var. glabrescens	State Special Concern			x
Blue-joint Reedgrass	Calamagrostis canadensis var. macouniana	State Historic			x
Brown Bog Sedge	Carex buxbaumii	State Endangered			Х
Large Sedge	Carex gigantea	State Endangered			Х
Woolly Sedge	Carex pellita	State Historic			Х
Bog Rush	Juncus elliottii	State Historic			Х
Bush's Muhly	Muhlenbergia bushii	State Endangered			Х
Reptiles and Amphibia	ns				
Western Mud Snake	Farancia abacura reinwardtii	State Special Concern			x
Northern Crawfish Frog	Rana areolate circulosa	State Special Concern			Х
Birds					
Least Tern	Sterna antillarum	Federally Endangered	Х		
Bell's Vireo	Vireo bellii	State Special Concern*			Х

*USFWS Status of Species of Management Concern

The following sections summarize habitat requirements for the listed species.

I. Gray Bat

Gray bats are restricted to regions where large cave systems occur. Gray bats use caves throughout the year. Generally, the species hibernates in deep, cool caves with a vertical opening or shaft. Within Kentucky, the species is most common in the cave region of the south-central portion of the state. Gray bats disperse nightly from cave roosts to forage along streams (LaVal et al. 1977; LaVal and LaVal 1980). Both male and female adult gray bats select caves that are closely associated with, or in proximity to, large bodies of water (rivers, lakes, or reservoirs). They forage over the bodies of water almost exclusively.



2. Indiana Bat

Indiana bats hibernate during the winter months in limestone caves and abandoned underground mines known as hibernacula. Winter habitat has been documented throughout Kentucky with Priority I hibernacula being found along Pine Mountain in the Dissected Appalachian Plateau, Carter Caves within the Northern Forested Plateau Escarpment, and the Crawford-Mammoth Cave Uplands.

After hibernation, most females depart from the caves and abandoned underground mines during April, while males typically remain longer before migrating to summer habitats. A few males may even occupy the hibernacula during the summer months. During the summer months, Indiana bats travel, forage, and roost within a variety of interconnected forested habitats, including riparian corridors, bottomlands, and uplands. Indiana bats typically roost under exfoliating bark, in cavities of dead and live trees, and in snags (*i.e.*, dead trees or dead portions of live trees). Roost trees with some sun exposure seem to be preferred. Trees greater than 16" in diameter at breast height (DBH) are considered optimal for maternity colony roosts, but trees in excess of 9" DBH appear to provide suitable maternity roosting habitat.

Water sources for the Indiana bat in Kentucky include stream corridors, ponds, and water filled road ruts in forests. Indiana bats generally prefer foraging in wooded areas (LaVal et al. 1977, and Butchkoski and Hassinger 2002), and are frequently associated with streams, floodplain forests, forested wetlands, and impounded water.

3. Northern Long-eared Bat

Northern Long-eared bats are typically found in cracks and crevices within caves and mines during winter months, generally at low densities (Whitaker and Hamilton 1998). These winter hibernacula are often large with high humidity, cool temperatures, and no air currents.

During summer, these bats typically roost singly or in small colonies underneath loose bark or tree cavities, similar to the Indiana bat. Preference for any specific tree species does not appear to exist (more opportunistic in nature). Manmade structures such as bridges, barns, sheds, cabins, and other structures have been known to provide roost habitat as well. Northern long-eared bats switch summer roosts every two (2) to three (3) days and appear more opportunistic in roost selection than Indiana bats (Carter and Feldhammer 2005). These bats have been known to use shorter trees, live trees, and trees with more canopy cover than Indiana bats, but roost selection overlap probably does exist. As with Indiana bats, males appear to more readily use smaller diameter trees as roost site than females.

Water sources for the northern long-eared bat in Kentucky include stream corridors, ponds, and water filled road ruts in forests. The species generally prefers foraging in wooded areas (LaVal et al. 1977, and Butchkoski and Hassinger 2002), and is frequently



associated with streams, floodplain forests, forested wetlands, and impounded water bodies.

4. Southeastern Bat

Southeastern bats roost primarily in caves, where suitable caves are available, or in hollows of bottomland hardwood trees or in structures such as abandoned buildings, bridges, culverts, or bat houses (NatureServe 2019). Roost sites, whether in caves or trees, are often over water. Foraging habitat consists of water bodies, riparian floodplain forests, flatwoods, or wooded wetlands with permanent open water nearby (NatureServe 2019). Kentucky populations of southeastern bats winter in caves (often with Indiana bat) but are rare in most caves in summer, when most roost in large hollow trees (NatureServe 2019).

5. Little Brown Bat

Little brown bats use a wide range of habitats and often use human-made structures for resting and maternity sites; they also use caves and hollow trees (NatureServe 2019). Foraging habitat is generalized; foraging occurs over water, along the margins of lakes and streams, or in woodlands near water (NatureServe 2019). Winter hibernation sites can be caves, tunnels, abandoned mines, and similar sites that have a relatively stable temperature of about 2-12 degrees Celsius (NatureServe 2019). Maternity colonies commonly are in warm sites in buildings (e.g., attics) and other structures; also, infrequently in hollow trees (NatureServe 2019).

6. Evening Bat

Evening bats occur in deciduous, mixed deciduous-coniferous, and pine-dominated forests, which may be interspersed with cultivated areas (NatureServe 2019). Foraging occurs in open areas and around tree canopies (NatureServe 2019). Males tend to roost solitarily; females form nursery colonies in summer, under loose bark, in tree cavities, or in buildings (NatureServe 2019). Roosts also include cavities in live or dead trees, spaces behind loose tree bark, tree foliage, leaf litter, rock crevices, abandoned burrows in the ground, and nooks, spaces, and crevices in many types of human-made structures; rarely caves (NatureServe 2019).

7. Redspotted Sunfish

This small fish occurs in swamps, sloughs, bottomland lakes, pools of creeks and small to medium rivers, and less brackish portions of coastal estuaries (NatureServe 2019). It prefers quiet or moderately flowing waters with heavy vegetation or other cover and a bottom of mud or sand (NatureServe 2019). The redspotted sunfish feeds mainly on benthic insects and crustaceans, sometimes eating terrestrial insects that enter the water (NatureServe 2019).



8. Black Buffalo

Habitat for this fish includes pools and backwaters of small to large rivers, reservoirs, and lakes (NatureServe 2019). Black buffalo are often in strong currents of large rivers; spawning occurs in flooded areas (NatureServe 2019). Black buffalo are known to eat planktonic and bottom organisms such as insects, mollusks, and vegetation (NatureServe 2019).

9. Lakecress

The primary habitat of this wetland plant includes areas surrounding rivers such as oxbows and forested floodplains, pools along rivers, quiet shallow water along lake margins or in the backwaters of slow-moving streams, muddy rocky shores of large ponds and lakes, inundated roadside sloughs with open water, cypress swamps, seasonal sloughs, and open water in marshes (NatureServe 2019).

10. Prairie Milkweed

This green milkweed plant occurs in prairies, old fields, barrens, and glades (LBJWC 2019), and in roadside habitats (Jones 2005).

II. Cream Wild Indigo

This perennial plant with pea-like flowers occurs in prairies and open woods, in well drained, sandy to loamy soils (LBJWC 2019), and in barrens (Jones 2005).

12. Blue-joint Reedgrass

This grass-like plant with conspicuous tufts occurs in swamp margins, marshes, and shores (Jones 2005).

13. Brown Bog Sedge

This plant is found in a variety of wet places, most commonly bogs and wet meadows, plus fens, marshes, wet shores, swamps, prairie swales, wet river bottom prairie, alluvial meadows, pastures, ditches, rarely on rock exposures, and springs (NatureServe 2019). Occurring in sun or semi-shade, usually in calcareous or neutral substrates (NatureServe 2019).

14. Large Sedge

This plant occurs in swamps and wet woods (NatureServe 2019), and wet swamp forests, forest openings, open swamps (Flora of North America 2019).



15. Woolly Sedge

Habitats for this plant include shallow water (Jones 2005) in wet to moist prairies and dolomite prairies, prairie swales, sedge meadows, acidic seeps and calcareous seeps, swamps, openings in floodplain woodlands, edges of poorly drained fields, and roadside ditches (Illinois Wildflowers 2019). Usually, woolly sedge is found in sunny wetlands, where it tolerates degradation of habitat to some extent (Illinois Wildflowers 2019). Occasionally, it will spread into the drier ground of adjacent prairies and meadows (Illinois Wildflowers 2019).

16. Bog Rush

This plant occurs in wet soil (Jones 2005), wet sands, peaty sands, or peat, exposed shores of ponds and lakes, depressions in savannas and flatwoods, moist to wet, much disturbed clearings, roadsides and ditches (Flora of North America 2019).

17. Bush's Muhly

This perennial grass plant occurs in moist woods (Jones 2005) and prairie type habitats (KY Rare Plant Database 2019).

18. Western Mud Snake

This shiny black snake with pink or red belly occurs in western Kentucky along the Ohio and Mississippi River counties and wetlands of adjacent counties (OEPOS 2019). Habitat for this snake includes lowland swamps, slow moving streams with muddy bottoms and aquatic plants (OEPOS 2019). The Western mud snake feeds on salamanders, tadpoles, frogs, and fish; nests are found in cavities in the ground or in rotten logs; and holes are used for hibernation through the winter (OEPOS 2019).

19. Northern Crawfish Frog

This frog occurs in and around a crayfish burrow in an open grassland, pasture, or old field (KDFWR 2019). The burrow can sometimes be a mile or more from the frogs breeding site, which is a pond or seasonal pool (KDFWR 2019).

20. Least Tern

The habitat for this bird is seacoasts, beaches, bays, estuaries, lagoons, lakes, and rivers where it rests and loafs on sandy beaches, mudflats, and salt-pond dikes (NatureServe 2019). Nests are found in shallow depressions on level ground on sandy or gravelly beaches and banks of rivers or lakes, typically in areas with sparse or no vegetation; also, on dredge spoils; on mainland or on barrier island beaches; and on flat gravel-covered rooftops of buildings or other similarly barren artificial sites (NatureServe 2019). Good nesting areas tend to be well beyond the high tide mark, have shell particles/stones/debris



for egg camouflage, and be out of the way of off-road vehicles and public recreation areas, not subject to unusual predation pressure, and adjacent to plentiful sources of small fishes (NatureServe 2019). Interior populations nest mainly on riverine sandbars or salt flats that become exposed during periods of low water (NatureServe 2019).

21. Bell's Vireo

Habitat for this small bird includes riparian areas, old fields, shrubland, and woodlands (NatureServe 2019). Breeding habitat includes dense brush, willow thickets, streamside thickets, and scrub oak; nests are found in a shrub or low tree, usually averaging about one meter above ground, typically near the edge of a thicket (NatureServe 2019). Bell's vireo may nest in any successional stage forest with dense understory vegetation. Nesting success depends on an optimum microclimate, and adequate shade may be critical for successful nesting at low elevations (NatureServe 2019). In migration and winter, habitat is dense scrub adjacent to watercourses and riparian gallery forests (NatureServe 2019). This bird eats insects and small spiders, rarely fruits, and forages in dense brush, occasionally in treetops (NatureServe 2019).

B. Aquatic Sampling

I. Macroinvertebrates

Sampling results were analyzed using the following community metrics: Taxa Richness, Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) (EPT) Richness, Modified Percent EPT Abundance, Percent Ephemeroptera Abundance, Modified Hilsenhoff Biotic Index (mHBI), Percent Chironomidae and Oligochaeta, and Percent Clingers. These metrics are used to calculate a Macroinvertebrate Bioassessment Index (MBI). Aquatic sampling locations are illustrated on **Exhibit 5** (**Appendix A**).

a. Station I

Macroinvertebrate diversity was low for the unnamed tributary to Humphrey Creek (Station I) with a total of 23 macroinvertebrate taxa recorded. Of the 23 taxa collected, 2 were EPT, which are generally pollution intolerant. EPT comprised 0.7% of the macroinvertebrate community. Conversely pollution tolerant midges and worms comprised 89.4% of the community. Clingers (organisms that need hard, silt-free substrate to "cling" to) composed 11% of the sample, possibly indicating embedded substrates. The mHBI score, an indicator of organic pollution, was 8.33 for Station I. An mHBI score of 0 is the least impaired, while a score of 10 represents the most impaired. The resulting MBI rating was "Very Poor" with a score of 13.4.

b. Station 2

Diversity was low at Bayou Creek (Station 2) with a total of 19 total taxa. One taxon of pollution intolerant EPT was collected and comprised 0.3% of the macroinvertebrate



community. Pollution tolerant midges and worms dominated the macroinvertebrate community of Station 2 comprising 66.2% of the community. Embeddedness of substrates might be a problem at Station 2 with clingers comprising only 9.1% of the macroinvertebrate community. A high mHBI score (8.09) may indicate organic pollution affecting the macroinvertebrate community of Bayou Creek at Station 2. The MBI rating was "Very Poor" with a score of 15.3.

c. Station 3

Station 3 (unnamed tributary to Humphrey Creek) also had low diversity with 19 total taxa collected, of which I taxon was pollution intolerant EPT (*Caenis* sp). *Caenis* sp. comprised 0.3% of the macroinvertebrate community. Almost the entire macroinvertebrate community was comprised of pollution tolerant midges and worms (89.7%). Clingers were mostly absent at Station 3 comprising 4.8% of the community. Like the other streams sampled, organic pollution may be an impairment with a mHBI score of 8.3. The MBI rating was "Very Poor" with a score of 10.7.

d. Station 4

Station 4 (unnamed tributary to Humphrey Creek) had the highest taxa richness of the 4 streams with 24 total taxa but had no EPT taxa collected. Station 4 also had the lowest relative abundance (49.5%) of midges and worms. Clingers were also mostly absent from Station 4 comprising 2% of the community. As indicated by the mHBI score (7.63) organic pollution may be affecting the macroinvertebrate community at Station 4. The MBI rating was "Very Poor" with a score of 17.8.

A summary of the MBI scores and ratings is presented in **Table 3**. Laboratory Bench Sheets and macroinvertebrate data set are included in **Appendix F.**

	Score					
Parameter	Station I	Station 2	Station 3	Station 4		
Taxa Richness	23	19	19	24		
EPT Richness	2	I	I	0		
mHBI	8.33	8.09	8.3	7.63		
%EPT	0.7	0.3	0.3	0		
% Ephemeroptera	0.7	0.3	0.3	0		
%C + O	89.4	66.2	89.7	49.5		
%Clingers	11.0	9.1	4.8	2.0		
MBI Score	13.4	15.3	10.7	17.8		
MBI Rating ¹	Very Poor	Very Poor	Very Poor	Very Poor		

Table 3.	MBI	Scores	and	Ratings
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2. Fish Sampling

A total of 9 species of fish were identified at three (3) of four (4) sampling locations as noted in **Appendix F**. Diversity was low for all stations; darters, madtoms and sculpins, a generally pollution sensitive group, were absent from all stations, except for Station 3 in which a slough darter (*Etheostoma gracile*) was collected. Simple lithophile fish species, which require relatively clean gravel and exhibit simple spawning behavior, were absent from all streams sampled. Pollution tolerant fish species were abundant at all streams sampled. Facultative headwater individuals (FHW) are fish species that are atypical of headwater streams, and their presence tends to increase with impairment. All streams sampled were dominated by FHW individuals. Index of Biotic Integrity (IBI) scores, based on criteria for the Mississippi Valley Interior River (MVIR) ecoregion, are summarized below.

a. Station I

A reach of an unnamed tributary to Humphrey Creek (Station I) was electrofished for 1220 seconds. A total of 282 individuals representing 7 taxa were collected. Stoneroller (*Campostoma anomalum*) was the most abundant species collected, followed by creek chub (*Semotilus atromaculatus*). Station I scored a 39 on the Kentucky Index of Biotic Integrity (KIBI) resulting in a "fair" rating.

b. Station 2

A reach of Bayou Creek (Station 2) was electrofished for 1,012 seconds. A total of 227 individuals representing 8 taxa were collected. Juvenile sunfish (*Lepomis sp.*) and green sunfish (*Lepomis cyanellus*) were the most abundant species collected, followed by mosquitofish (*Gambusia affinis*). Station 2 scored a 56 on the KIBI resulting in a "good" rating.

c. Station 3

A reach of an unnamed tributary to Humphrey Creek (Station 3) was electrofished for 1,133 seconds. A total of 343 individuals representing 9 taxa were collected. Creek chub was the most abundant species collected, followed by stoneroller (*Campostoma anomalum*). Station 3 scored a 48 on the KIBI resulting in a "good" rating.

d. Station 4

An unnamed tributary to Humphrey Creek (Station 4) did not have any flow and was dry during the field visit for the fish survey. Stream 4 has a small drainage area (0.18 mi2) and the flow is intermittent.

A summary of KIBI scores and ratings is presented in Table 4, page 16.



Metric	Station I	Station 2	Station 3	Station 4
Native Species Richness	8	8	9	NA
Darter, Madtom, Sculpin Richness	0	0	Ι	NA
Intolerant Species Richness	0	0	0	NA
Simple Lithophile Species Richness	0	0	0	NA
Insectivore Individuals	7	37	23	NA
Facultative Headwater Individuals	74	92	60	NA
Tolerant Individuals	33	55	53	NA
Total Individuals	282	227	343	NA
Drainage Area (mi2)	3.0	0.95	1.72	0.18
Sampling Effort (seconds)	1,220	1,012	1,133	NA
Fish Capture/Sampling Effort	0.23	0.22	0.3	NA
IBI Score	39	56	48	NA
IBI Class / Rating	Fair	Good	Good	NA

Table 4. KIBI Scores and Ratings

¹ IBI Ratings MVIR Headwater Streams: Very Poor (0-15), Poor (16-31), Fair (33-47), Good (48-66), Excellent (E>67)

3. Water Quality

Measurements of pH, dissolved oxygen, and temperature were within Warmwater Aquatic Habitat (WAH) criteria. Water quality results are presented in **Table 5**; laboratory analytical reports are included in **Appendix F**. Water quality results were compared to surface water standards established by 401 KAR 10:031 (2013) when available and the results are presented in **Table 6** (page 17). All water chemistries were within WAH acute and chronic criteria as illustrated.

Parameter	Station I	Station 2	Station 3
Temperature (°C)	20.8	22.3	20.4
pH (Standard Units)	7.5	7.25	7.75
Dissolved Oxygen (mg/L)	5.5	6.6	6.2
Dissolved Oxygen (% Saturation)	66.1	79.2	75.3
Turbidity (NTU)	0.0	0.1	0.0
Specific Conductance (µS)	252	279	350
RBP Habitat Assessment	105	79	100
Habitat Rating	Poor	Poor	Poor
Hardness (mg/L as CaC)	87	101	68
Ammonia nitrogen (mg/L as N)	< 0.05	< 0.05	< 0.05
Chloride (mg/L)	15	18	49
Iron, Total Recoverable (mg/L)	< 0.02	< 0.02	<0.02
Acidity (mg/L)	<10	<10	<10
Alkalinity (mg/L)	91	103	66

Table 5. Water Quality Results



Parameter	Station I	Station 2	Station 3
Carbon dioxide (mg/L)	86	88	60
Orthophosphosphate (mg/L)	0.17	0.13	0.79
Sulfate (mg/L as S)	5.0	9.0	24

Table 6. Kentucky Surface Water Standards

	Human Health	WAH ²		
Pollutant	DWS	Acute	Chronic	
Dissolved Oxygen (mg/L) ³	-	4.0	5.0	
Specific conductance (µS/cm)⁴	-	No adve	rse effect	
Temperature (°C)⁵	-	31.7	-	
PH (SU) ⁶	-	< 6.0 – 9.0 >		
Alkalinity (mg/L as CaCO3) ⁷	-	Not reduced more than 25%		
Ammonia, un-ionized (mg/L as N) ⁸	-	0.05	-	
Chloride (mg/L)	250	1200	600	
Iron (mg/L) ⁹	0.300	4.000	1.000	
Sulfate (mg/L as S)	250	-	-	

¹ Domestic water supply source (DWS) criteria applies to existing points of public water supply intake.

² Warmwater Aquatic Habitat (WAH) criteria applies to aquatic life in the stream.

³ Dissolved Oxygen concentrations are minimums with the "chronic" criteria as a 24-hour average.

- ⁴ Specific conductance has narrative criteria that it "shall not be changed to the extent that the indigenous aquatic community is adversely affected."
- ⁵ Monthly instantaneous maximum guidelines for May to July range from 23°C to 32°C.

⁶ pH shall also not fluctuate more than 1.0 pH unit over a period of 24 hours.

- ⁷ If natural alkalinity is below 20 mg/L CaCO3, there shall not be a reduction below the natural level. Alkalinity shall not be reduced or increased to a degree that may adversely affect the aquatic community.
- ⁸ Un-ionized ammonia shall be determined from values for total ammonia-N, in mg/L, pH and temperature, by means of the following equation: Y = 1.2 (Total ammonia-N)/(1 + 10pKa-pH); pka = 0.0902 + (2730/(273.2 + Tc)) where: Tc = temperature, degrees Celsius and Y = un-ionized ammonia (mg/L).

⁹ The chronic criterion for iron shall not exceed 3.5 mg/L if aquatic life has not been shown to be adversely affected.

4. Aquatic Habitat

Stream habitat was evaluated in 38 locations (**Exhibit 5**, **Appendix A**). As presented in **Table 7**, page 18, RBP scores ranged from 70 to 142. In the Mississippi Valley Interior River bioregion, RBP scores less than 113 are rated "poor," scores from 114 to 134 are rated "fair," and scores greater than 135 are rated "good" (KDOW 2011). RBP field data sheets are included in **Appendix E**.



Table 7. RBP Habitat Scores						
Stream	Flow Type ¹	Score ²	Rating			
Stream I	E	97	Poor			
Stream 2	E	70	Poor			
Stream 3	Р	116	Fair			
Stream 4		74	Poor			
Stream 5		86	Poor			
Stream 6		87	Poor			
Stream 7	Р	105	Poor			
Stream 8		106	Poor			
Stream 9	Р	113	Poor			
Stream 10	E	84	Poor			
Stream 11	I	99	Poor			
Stream 12	Р		Poor			
Stream 13		103	Poor			
Stream 14		107	Poor			
Stream 15		86	Poor			
Stream 16	Р	125	Fair			
Stream 17		119	Fair			
Stream 18		100	Poor			
Stream 19	Е	89	Poor			
Stream 20	Е	122	Fair			
Stream 21	Е	116	Fair			
Stream 22		106	Poor			
Stream 23		97	Poor			
Stream 24		142	Good			
Stream 25		125	Fair			
Stream 26		100	Poor			
Stream 27	Е	91	Poor			
Stream 28	I		Poor			
Stream 29	I	135	Good			
Stream 30	Е	7	Fair			
Stream 31		121	Fair			
Stream 32	Е	89	Poor			
Stream 33	Е	73	Poor			
Stream 34	E	65	Poor			
Stream 35	Р	105	Poor			
Stream 36		79	Poor			
Stream 37	Р	100	Poor			
Stream 38	Ι	81	Poor			

Table 7. RBP Habitat Scores

P = Perennial; I = Intermittent; E = Ephemeral

² Headwater and Wadeable: 135 and above, good; 114-134, fair; 113 and below, poor.



C. Terrestrial Sampling

No unique species or terrestrial habitats were observed. Coordination with KDOF indicates that there are no state champion trees within the project corridor. Nearly all species encountered are species tolerant of landscape alteration by humans. Floral communities identified during field investigations include species common to narrow stream riparian zones adjacent to cropland, cropland edges, roadsides, utility line corridors, and forest edges. Terrestrial fauna and flora species encountered were noted and are compiled into a single data set included in **Appendix F**.

D. Wetland Sampling

Fourteen (14) wetlands and two (2) ponds were observed within the project corridor. Wetlands are primarily forested (Cowardin Class PFO). It is likely that six (6) of the wetlands may be considered non-jurisdictional by the U.S. Army Corps of Engineers (USACE) due to their lack of connection with surface water. Wetlands are summarized in **Table 9** (Page 21).

E. Threatened / Endangered Species Sampling

I. Gray, Indiana, Northern Long-eared, Southeastern, Little Brown, and Evening Bats

The amount of suitable summer foraging and roosting habitat (*i.e.* forests) for Indiana, northern long-eared, southeastern, little brown, and evening bat, and foraging habitat (*i.e.* streams) for the gray bat, within the disturbance limits of each alternative is summarized in **Table 8** (page 20) and illustrated on **Exhibits 6** and **7 (Appendix A)**.

No portals (caves or open sinkholes) representing year-round roosting habitat for gray and southeastern bats, or winter roosting habitat for Indiana, northern long-eared, or little brown bats, were observed within one (1) kilometer of the project. No caves were reported by KSS to be in the 5-km project buffer.

2. Redspotted Sunfish and Black Buffalo Fish

No habitat for these state-listed fish was observed in the project alternatives.

3. Lakecress, Prairie Milkweed, Cream Wild Indigo, Blue-joint Reedgrass, Brown Bog Sedge, Large Sedge, Woolly Sedge, Bog Rush and Bush's Muhly

Wetlands within the footprint of the proposed alternatives may provide habitat for the state listed plants: lakecress, brown bog sedge, woolly sedge, and bog rush, as illustrated on **Exhibits 6** and **7 (Appendix A)** and summarized in **Table 8** (page 20). Woolly sedge and bog rush are reported by the KSNPC as Historic records and are unlikely to occur in the project area.



4. Western Mud Snake and Northern Crawfish Frog

Wetlands E and L may provide habitat for these state-listed species as illustrated on **Exhibits 6** and **7 (Appendix A)** and summarized in **Table 8** (page 20).

5. Least Tern and Bell's Vireo

No habitat was observed in the project area for the federally endangered least tern. Habitat for the Bell's vireo may be present in riparian areas and woodlands within the project area as illustrated on **Exhibits 6** and **7 (Appendix A)** and summarized in **Table 8**. Bell's vireo is a state special concern species and is federally listed as a species of management concern.

Table 0. Listed Species Habitat per Alternative							
Species	Habitat Type	Alt. I	Alt. 2	Alt. 3			
Indiana, northern long-	Summer Foraging						
eared, southeastern, little	and Roosting	18 acres	14 acres	47 acres			
brown, and evening bats	(Forests)						
Gray, Indiana, northern long-eared, southeastern, little brown, and evening bats	Foraging (Streams)	3,594 feet	3,142 feet	6,378 feet			
Brown bog sedge, woolly sedge, and bog rush	Wetlands	0.1 acres	0.6 acres	2.4 acres			
Western Mud Snake, Northern Crawfish Frog, Lakecress	Wetlands E and L	0 acres	0 acres	I.I acres			
Bell's Vireo	Riparian areas and woodlands	18 acres	14 acres	47 acres			

Table 8. Listed Species Habitat per Alternative

VII. IMPACTS AND SUGGESTED MITIGATION MEASURES

A. Significant Ecological Resources

I. Impacts

There are no state wildlife management areas, national or state forests or parks, exemplary natural communities, champion trees, wild or scenic rivers, exceptional waters, or Outstanding National or State Resource Waters in the project corridor.



2. Suggested Mitigation Measures

An effects analysis of the project regarding federally endangered bats that may inhabit forests and forage over streams and wetlands within the project area should be performed as part of a Biological Assessment for this project.

B. Aquatic Ecosystems

I. Impacts

Surface aquatic ecosystems include 38 streams, 14 wetlands, and 2 ponds within the disturbance limits of the alternatives. **Table 9** summarizes aquatic ecosystem impacts by alternative.

	Wetla	n Length and Area Alternativ	(ac) in	St	Drainage Area	
Aquatic Resource	I	2	3	Order	Type ²	(Sq Mi) ³
Stream I UNT Humphrey Creek	0.0	603.3	605.8	2	Е	0.17
Stream 2 UNT Humphrey Creek	587.6	610.8	595.9	I	Е	<0.20*
Stream 3 UNT Humphrey Creek	0.0	200.9	0.0	2	Р	0.17
Stream 4 UNT Humphrey Creek	0.0	124.1	0.0	2	Ι	0.085
Stream 5 UNT Humphrey Creek	256.6	296.7	0.0	3	Ι	0.27
Stream 6 UNT Humphrey Creek	0.0	416.2	349.2	3	-	0.32
Stream 7 UNT Humphrey Creek	0.0	242.9	205.5	3	Р	0.32
Stream 8 UNT Humphrey Creek	0.0	117.7	117.7	2		0.24
Stream 9 UNT Humphrey Creek	0.0	458.4	458.4	2	Р	0.6
Stream 10 UNT Humphrey Creek	207.0	72.7	72.7	I	Е	0.05
Stream II UNT Bayou Creek	327.8	0.0	0.0	2	-	0.09
Stream 12 UNT Bayou Creek	881.3	0.0	0.0	I	Р	0.27
Stream 13 UNT Humphrey Creek	0.0	0.0	273.7	I	Ι	0.02
Stream 14 UNT Humphrey Creek	0.0	0.0	56.2	I		0.001
Stream 15 UNT Humphrey Creek	0.0	0.0	43.5	I	-	0.001
Stream 16 UNT Humphrey Creek	0.0	0.0	788.3	4	Р	1.06
Stream 17 UNT Humphrey Creek	0.0	0.0	69.1	I		0.05
Stream 18 UNT Humphrey Creek	0.0	0.0	264.9	I	-	<0.20*
Stream 19 UNT Humphrey Creek	0.0	0.0	81.7	4	Е	0.47
Stream 20 UNT Humphrey Creek	0.0	0.0	92.4	I	Е	0.0003
Stream 21 UNT Humphrey Creek **	0.0	0.0	317.8	I	Е	<0.20*
Stream 22 UNT Humphrey Creek	0.0	0.0	227.9	3	Ι	0.11
Stream 23 UNT Humphrey Creek	0.0	0.0	112.4	I	I	0.0003
Stream 24 UNT Humphrey Creek	0.0	0.0	159.8		I	<0.20*
Stream 25 UNT Humphrey Creek	0.0	0.0	284.7		I	<0.20*

Table 9. Aquatic Ecosystem Impacts¹



I able 9. Aquatic Ecosystem Impacts							
	Wetla	n Length and Area Alternativ	(ac) in	Sti	ream	Drainage Area	
Aquatic Resource	I	2	3	Order	Type ²	(Sq Mi) ³	
Stream 26 UNT Humphrey Creek	0.0	0.0	63.5	2		0.12	
Stream 27 UNT Humphrey Creek	0.0	0.0	76.5	I	Е	<0.20*	
Stream 28 UNT Humphrey Creek	0.0	0.0	602.7	I	I	<0.20*	
Stream 29 UNT Humphrey Creek	213.2	0.0	0.0	2	I	0.08	
Stream 30 UNT Humphrey Creek	42.8	0.0	0.0	Ι	Е	<0.20*	
Stream 31 UNT Humphrey Creek	257.6	0.0	0.0	2	I	0.05	
Stream 32 UNT Humphrey Creek	202.1	0.0	0.0	Ι	Е	<0.20*	
Stream 33 UNT Humphrey Creek	196.2	0.0	0.0	Ι	Е	<0.20*	
Stream 34 UNT Bayou Creek	224.6	0.0	0.0	I	E	<0.20*	
Stream 35 UNT Humphrey Creek	190.4	270.5	530.6	4	Р	3	
Stream 36 Bayou Creek	210.6	0.0	0.0	3		0.9	
Stream 37 UNT Humphrey Creek	200.0	0.0	0.0	4	Р	1.68	
Stream 38 UNT Humphrey Creek	301.7	217.0	0.0	3		0.15	
Wetland A	0.045	0.132	0.132		PFO		
Wetland B	0.097	0.497	0.653		PFO		
Wetland C**	0.000	0.000	0.000		PEM		
Wetland D**	0.000	0.000	0.000		PEM		
Wetland E**	0.000	0.000	0.620		PFO		
Wetland F	0.000	0.000	0.028		PFO		
Wetland G	0.000	0.000	0.191		PFO		
Wetland H	0.000	0.000	0.137		PFO		
Wetland I**	0.000	0.000	0.062		PFO		
Wetland J**	0.000	0.000	0.060		PFO		
Wetland K**	0.000	0.000	0.033		PFO		
Wetland L	0.000	0.000	0.472		PFO		
Wetland M**	0.000	0.000	0.002		PEM		
Wetland N	0.000	0.000	0.029		PFO		
Wetland O	0.000	0.000	0.000		PFO		
Pond I	0.000	0.091	0.000				
Pond 2	0.000	0.000	0.112				

Table 9. Aquatic Ecosystem Impacts¹

¹Length/acreage within disturbance limits calculated using ArcMap GIS and design mapping provided by QK4 on February 5, 2019.

²P = Perennial; I = Intermittent; E = Ephemeral; PFO = Palustrine Forested; PEM = Palustrine Emergent

³Drainage area calculated using USGS StreamStats.

*Watershed unavailable from USGS StreamStats due to small drainage area.

**Isolated feature



2. Suggested Mitigation Measures

See Sections VII.C. 2 and VII.E. 2 for suggested mitigation measures for streams and wetlands.

C. Streams

I. Impacts

Construction activities and associated erosion will produce short-term and long-term impacts to streams in the project corridor. Potential direct, indirect, and cumulative impacts are summarized below:

- a. During construction, the potential for sedimentation will increase as sediments are exposed, extracted, and moved. Increased sedimentation can cause reduced stream capacity, which can increase flooding potential, and smothering of aquatic habitat.
- b. Because fresh sediment and rock are exposed, levels may increase for parameters such as turbidity, conductivity, and suspended solids.
- c. Potential increases in the amount of impervious surface following construction may contribute to greater and more rapid surface runoff to streams.
- d. Increased runoff during storm events may cause increased instream flows and velocities.
- e. New road surfaces will increase the potential for road salt, oil, antifreeze, and other nonpoint source pollutants to impact aquatic environments.
- f. Removal of the stream canopy will cause an increase in average stream temperatures during warmer months. Higher stream temperatures will support lower concentrations of dissolved oxygen. Both factors will have a negative impact on resident animal communities (fish, amphibians, mussels, macroinvertebrates). In addition, more open canopies and the subsequent increase in sunlight could promote the establishment of excessive algal growths.
- g. If not revegetated, streambanks will be less stable and could erode and release sediment into the stream channel. Increased sediment inputs will reduce instream cover for fish and macroinvertebrates.
- h. Removal of riparian vegetation along streams will also reduce the amount of coarse woody debris (sticks, leaves) entering the stream systems. This material represents an energy source for organisms inhabiting stream systems.
- i. Changes in quality and quantity could cause negative impacts on the aquatic community.

2. Suggested Mitigation Measures

Strict adherence to KYTC's Standard Specifications for Road and Bridge Construction (KYTC 2012) will minimize erosion and instream siltation. Guidance for sediment control is also provided in the Federal Highway Administration Best Management Practices for Erosion and Sediment Control (FHWA 1995). An erosion control plan will be developed for the project and approved by KYTC's Division of Environmental Analysis (DEA) prior to construction. The plan should include stringent erosion control methods, and all erosion control measures should be monitored periodically to ensure that they are functioning as planned. Similarly, KDFWR



recommended numerous BMP for all portions of the project corridor where streams are crossed (see KDFWR response in **Appendix C**).

Regardless of the alternative selected, project impacts are anticipated to require a 404 Permit issued by the USACE and a 401 Water Quality Certification and/or Permit to Construct along a Stream issued by KDOW. All alternatives will require permanent stream loss greater than 300' on a single stream; therefore, mitigation for stream impacts may be required.

D. Terrestrial Ecosystems

I. Impacts

No unique flora or fauna were observed during the field survey. Terrestrial disturbances from construction activities will include disturbance of deciduous forest along the riparian zone of streams and small forests associated with slopes and property boundaries.

Habitat fragmentation created by road construction is undesirable. Roads can act as barriers to terrestrial species (both flora and fauna), diminishing or even preventing migration between previously contiguous communities. Isolated communities are known to be less stable and may consequently be lost. New road construction through intact forest habitat will increase the edge effect. While benefiting species associated with edges, those requiring large uninterrupted habitats will be adversely affected.

All alternatives are likely to increase habitat fragmentation. Alternative 3 would require the most impacts to forested habitat, 39.6 acres. Alternative 2 would require 8.7 acres of forest conversion, and Alternative 2 would require the least amount of forest conversion, 8.4 acres.

2. Suggested Mitigation Methods

Not Applicable

E. Wetlands

I. Impacts

The construction of all alternatives will result in a direct impact to wetlands through filling, grading, and conversion to roadway (**Table 9**, page 21). Alternative 3 would require the most impacts to wetland habitat, 2.4 acres. Alternative 2 would require 0.6 acres of wetland conversion, and Alternative 1 would require the least amount of wetland conversion, 0.1 acres.

2. Suggested Mitigation Methods

Avoidance measures should be used to avoid, reduce, or eliminate impacts to wetlands. Proper BMPs to reduce or eliminate runoff of contaminants should be used, including the proper use of silt fencing to protect wetlands from contamination and sedimentation. Strict adherence to



KYTC's Standard Specifications for Road and Bridge Construction (KYTC 2012) will minimize erosion and instream siltation. Guidance for sediment control is also provided in the Federal Highway Administration Best Management Practices for Erosion and Sediment Control (FHWA 1995). An erosion control plan will be developed for the project and approved by KYTC's Division of Environmental Analysis prior to construction. The plan should include stringent erosion control methods. All erosion control measures should be monitored periodically to ensure that they are functioning as planned.

F. Threatened / Endangered Species

I. Impacts

Impacts to summer roosting and foraging habitat (*i.e.* forests) for the federally endangered Indiana bat, federally threatened northern long-eared bat, and state listed southeastern myotis, little brown bat, and evening bat, will be greater for Alternative 3 (47 acres) than Alternative I (18 acres) or Alternative 2 (14 acres). Impacts to streams, which provide foraging habitat for the federally endangered gray bat and other listed bat species, is also greater for Alternative 3 (6,378 feet), than for Alternative I (3,594 feet), or Alternative 2 (3,142 feet).

Impacts to habitat for the state listed plants, brown bog sedge, woolly sedge, and bog rush will be greater for Alternative 3 (2.4 acres) than Alternative I (0.1 acres) or Alternative 2 (0.6 acres).

Impacts to habitat for the state listed western mud snake, northern crawfish frog, and lakecress plant will be greater for Alternative 3 (1.1 acres) than Alternative 1 (0 acres) or Alternative 2 (0 acres).

Impacts to habitat for the state listed Bell's vireo bird will be greater for Alternative 3 (47 acres) than Alternative 1 (18 acres) or Alternative 2 (14 acres).

Impacts to habitat for federal and state listed species is summarized in Table 8 (page 20).

2. Suggested Mitigation Methods

All resources should be utilized to minimize impacts to habitats conducive to threatened and endangered species. BMPs should be applied at stream crossings to minimize erosion and sedimentation in streams. Implementation of a well-developed erosion control plan, as well as the utilization of diversion channels and silt barriers, temporary seeding and mulching of cut and fill slopes, and limiting instream activity will minimize these adverse impacts.

Mitigation for impacts to forested Indiana bat habitat should be addressed by adhering to the September 6, 2012 Indiana Bat Programmatic Agreement between KYTC, Federal Highway Administration (FHWA), and the USFWS and/or Range Wide Consultation and Conservation Strategy. Because the project is not located within 1/2 mile of a known hibernacula or within 1/4 mile of a known summer maternity roost tree, it is covered under the final 4(d) rule, and



compensatory mitigation and seasonal tree clearing restrictions will not be required for impacts to the northern long-eared bat.

Impacts to gray bat habitat and winter roost habitat for Indiana bat, northern long-eared bat, and the state listed southeastern Myotis bat, little brown bat, and evening bat, should be addressed in a Biological Assessment that includes an effects analysis regarding the project's impacts to forests and streams.

VIII. SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

The project will have short-term impacts to ecological resources through some increase in sedimentation during construction. During construction activities there may be an increase in sedimentation entering project streams and wetlands. Construction activities (e.g. heavy equipment operation, demolition, etc.) may result in a temporary increase in ambient noise levels, dust generation, disturbance of wildlife, and increased storm runoff.

Each alternative will require permanent conversion of land to paved roadway. Forests will be fragmented by the new roadway, and each alternative will require the permanent loss of forest habitat.

Impacts to long-term productivity will be higher for Alternative 3, as it will result in the loss of more acres of forest habitat, greater wetland impacts, and longer stream impacts.

IX. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The conversion of forests and edge habitat to pavement and the removal of blocks of mature trees represents an irreversible and irretrievable commitment of resources, as does the filling of wetlands and encapsulation of streams.

X. ALTERNATIVES ANALYSIS AND RECOMMENDATIONS

 Table 10 summarizes potential project impacts to ecological resources within the project corridor.

	Alternative			
Resource Impacts ¹		2	3	
Stream Length	4,299.5 ft	3,631.2 ft	6, 450.7 ft	
Wetland Area	0.1 ac	0.6 ac	2.4 ac	
Forest/Bat Habitat Area	18 ac	I4 ac	47 ac	
Land Converted to Roadway	140 ac	II5 ac	100 ac	
State Listed Brown Bog Sedge, Woolly Sedge, and Bog Rush Habitat	18 ac	I4 ac	47 ac	
State Listed Western Mud Snake, Northern Crawfish Frog, Lakecress Habitat	0 ac	0 ac	I.I ac	
State Listed Bell's Vireo Habitat	18 acres	14 acres	47 acres	

Table 10. Project Impacts by Alternative

¹ Length/acreage within disturbance limits calculated using ArcMap GIS and design mapping provided by QK4 on Feb 5, 2019.



XI. SUMMARY

No habitats of exceptional quality or rarity were identified within the project corridor.

The fish community of the project area streams ranked "fair" and "good," the benthic community ranked "very poor," and habitat assessment for most streams (28 of 38) ranked "poor."

Suitable summer foraging and roosting habitat (forests) for threatened and endangered bats will be permanently lost. Alternative 3 will result in greater loss of forest than Alternative 1 or 2.

Permanent impacts to streams are expected for all alternatives, although they are greater for Alternative 3. Impacts to wetlands are expected, most from Alternative 3. Impacts to water resources are likely to require a 404 permit issued by the USACE. Stream and wetland mitigation may be required.

BMPs to protect streams and wetlands should be implemented.

Based upon evaluation of potential impacts, Alternative 3 will result in the most disturbance of aquatic and terrestrial habitats. Alternatives I and 2 are similar, but Alternative 2 will result in the least amount of disturbance to aquatic and terrestrial habitats.

XII. REFERENCES

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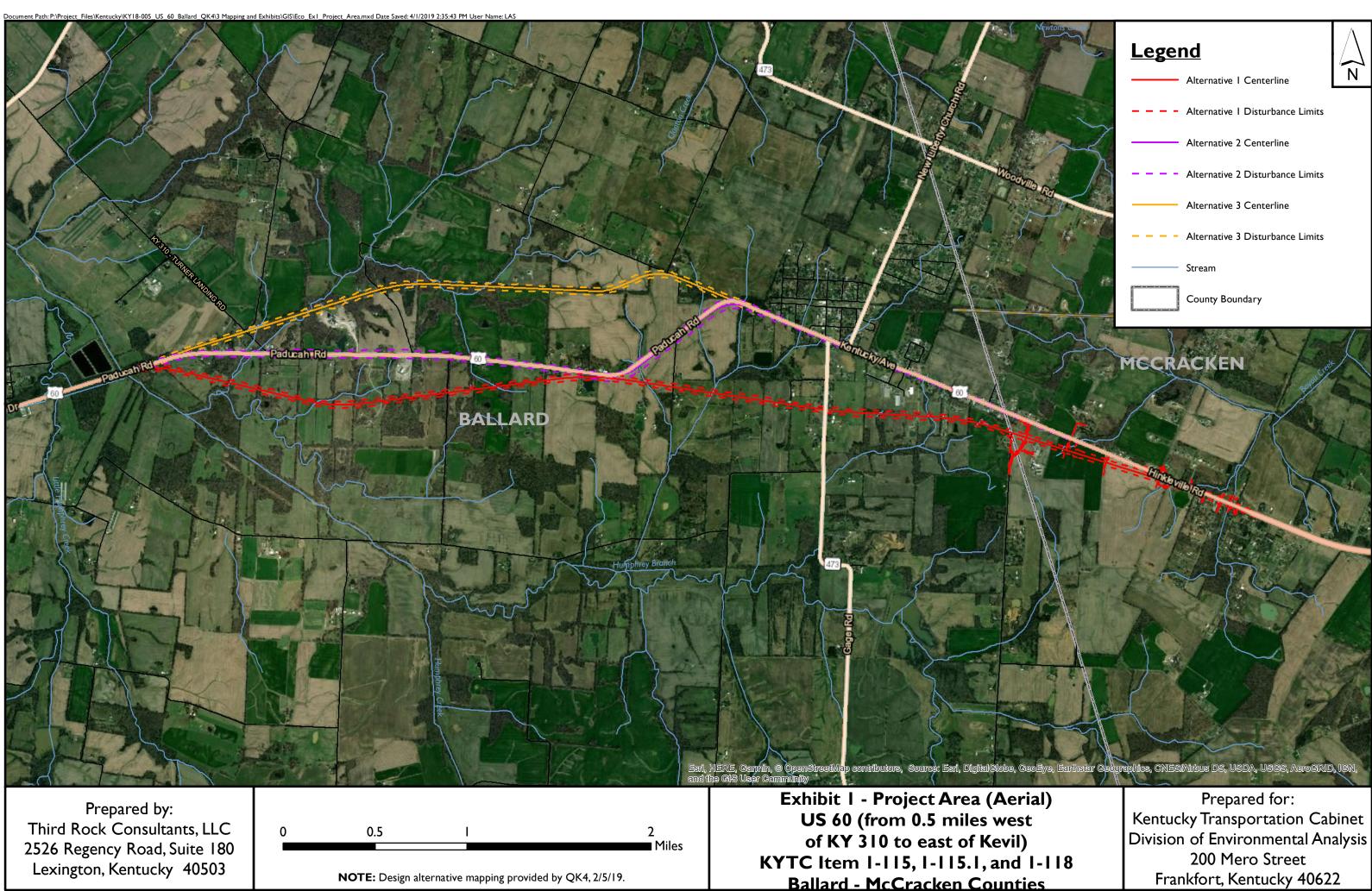
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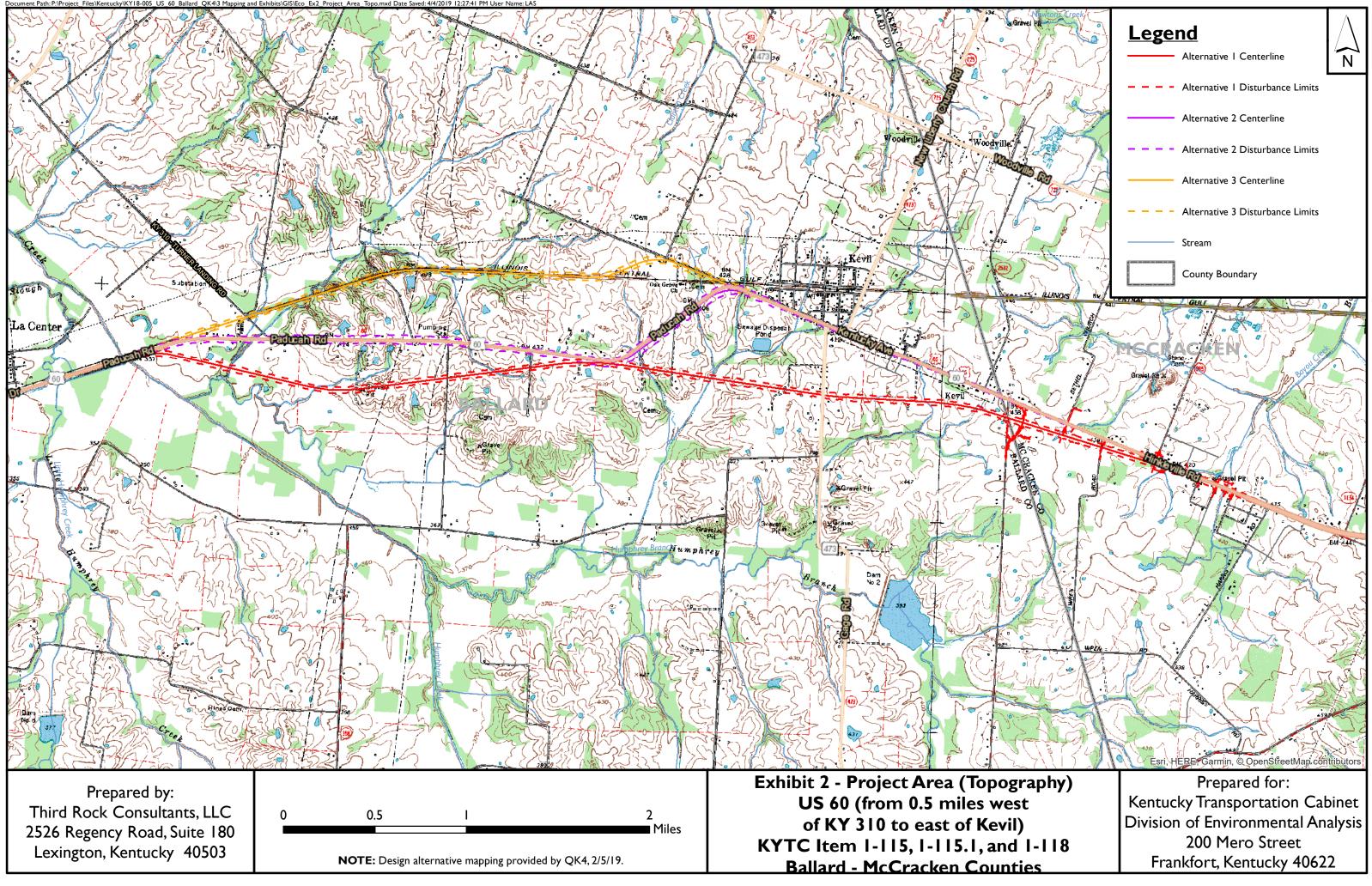
APPENDIX A EXHIBITS I-7

Prepared for KYTC Division of Environmental Analyses Prepared by Third Rock Consultants, LLC, April I, 2019 KY18-005/Ecological Baseline Study 04-1-19

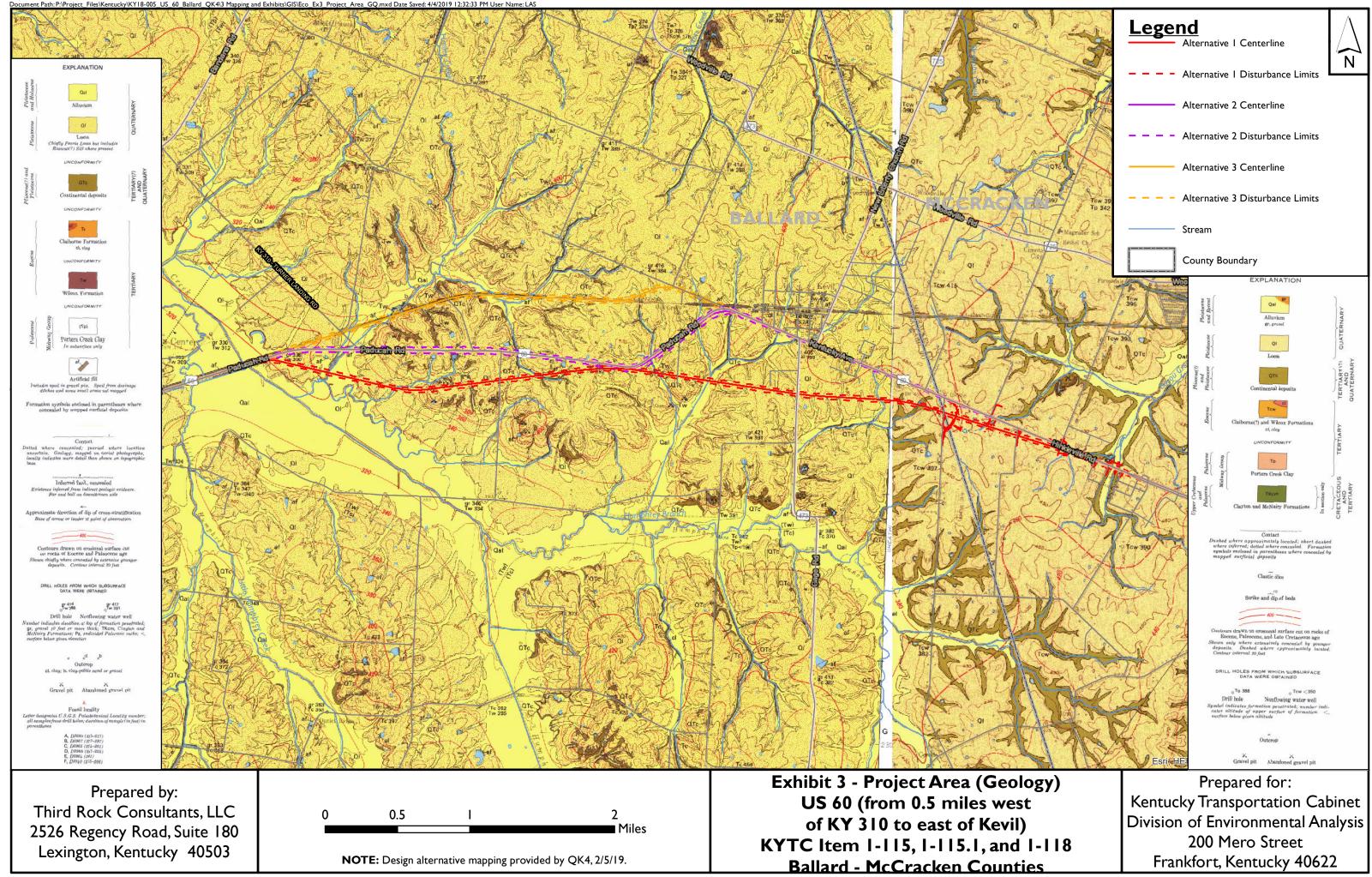


NOTE: Design alternative mapping provided by QK4, 2/5/19.

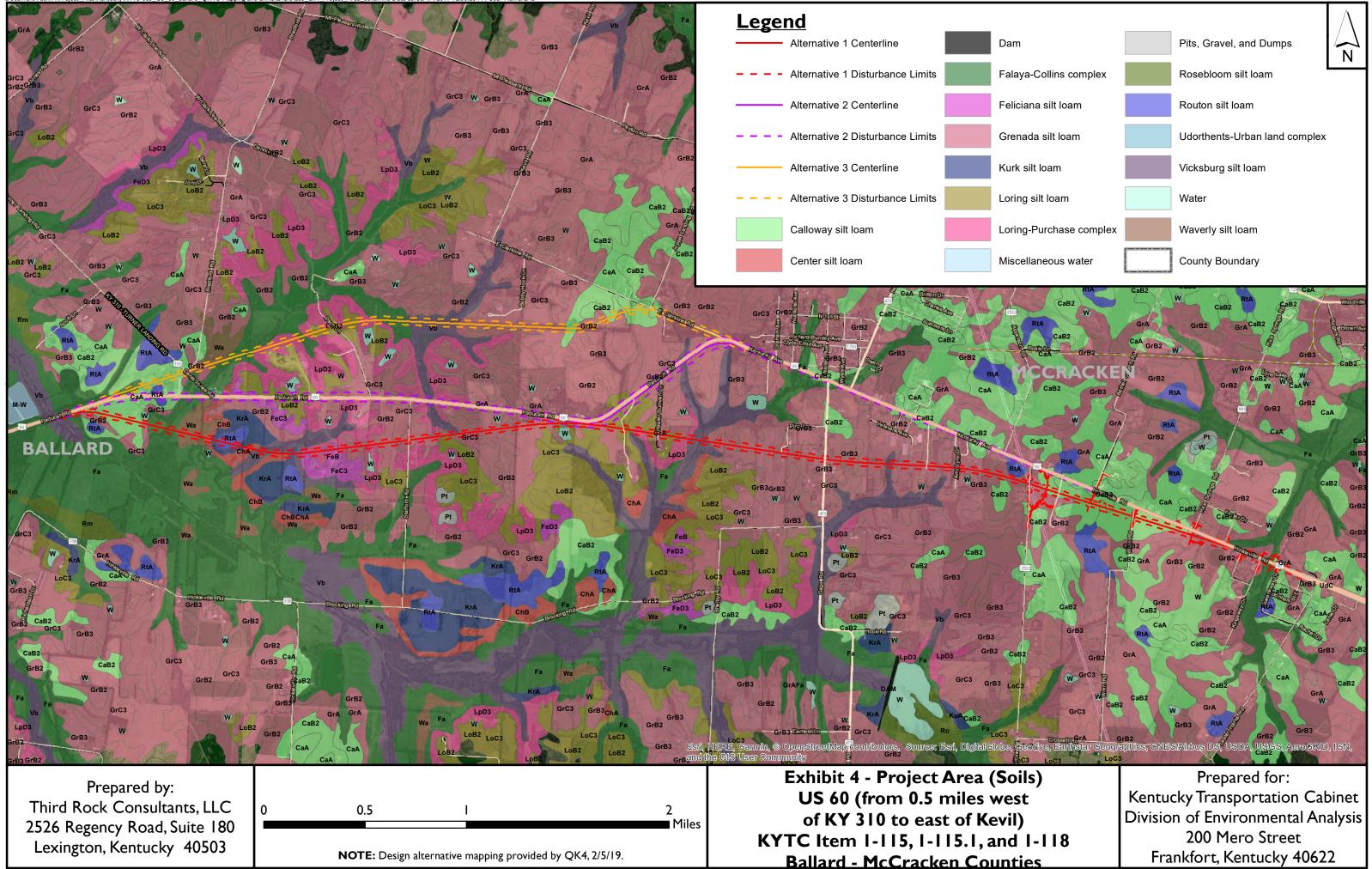
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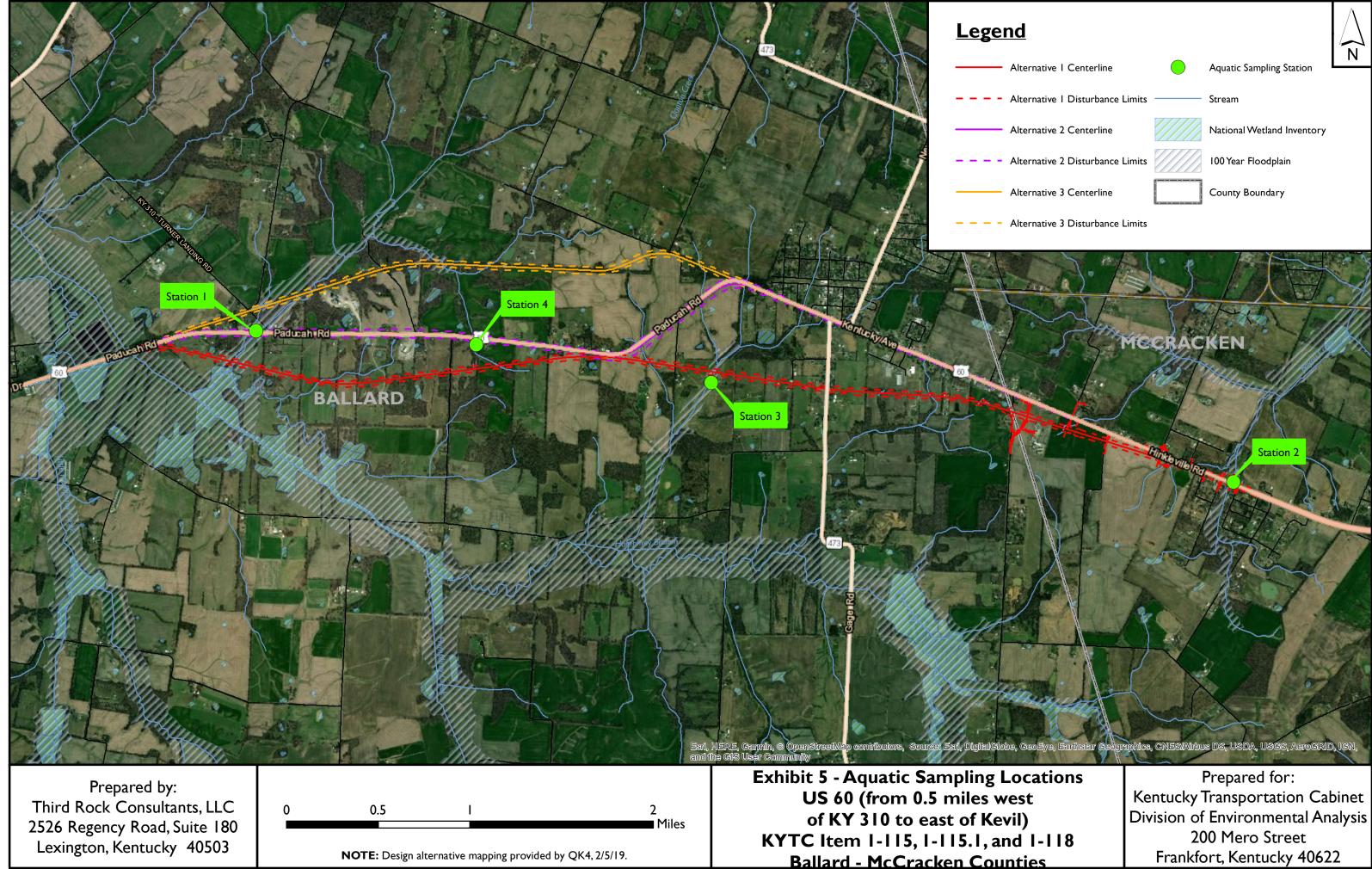
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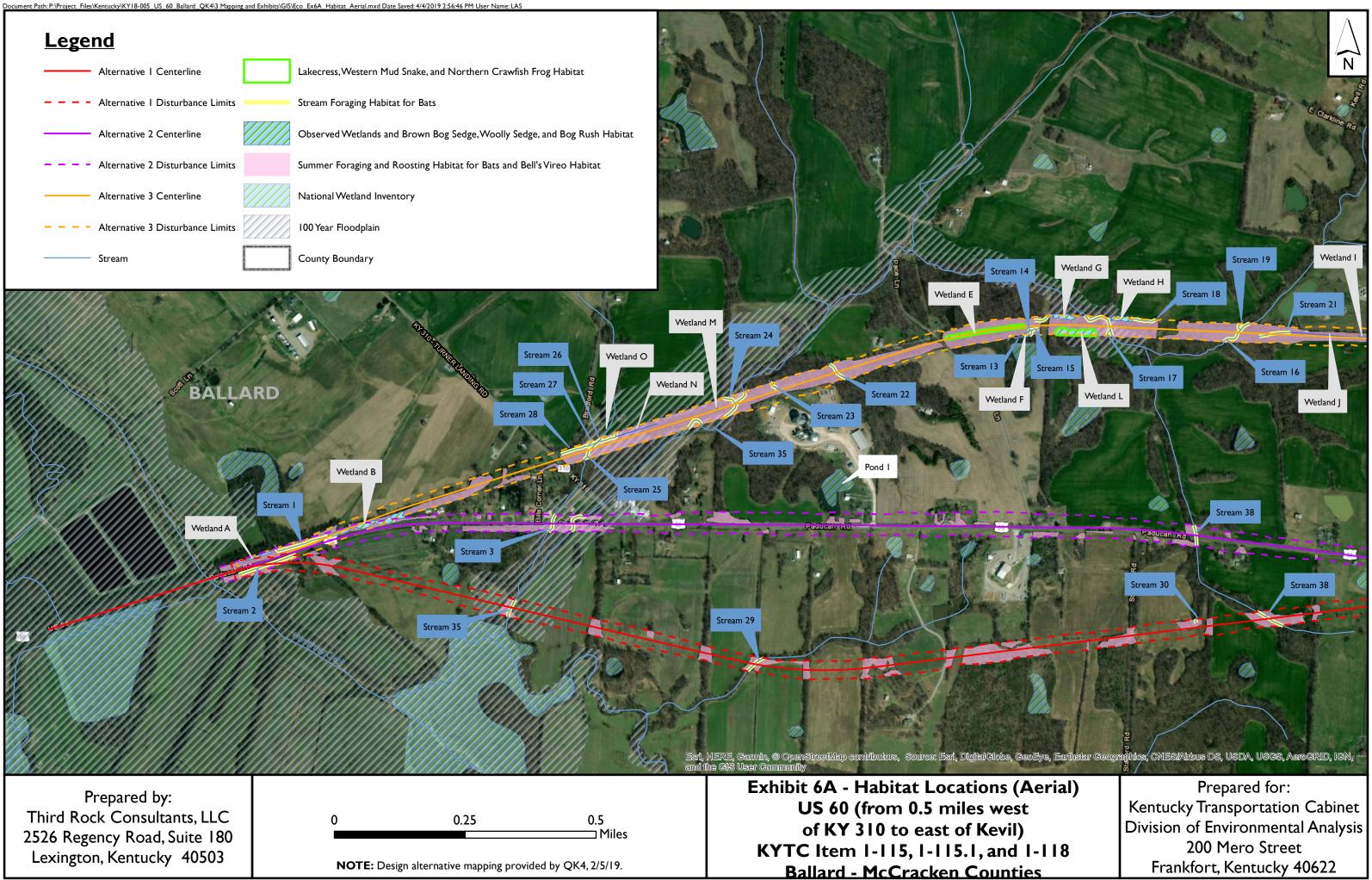




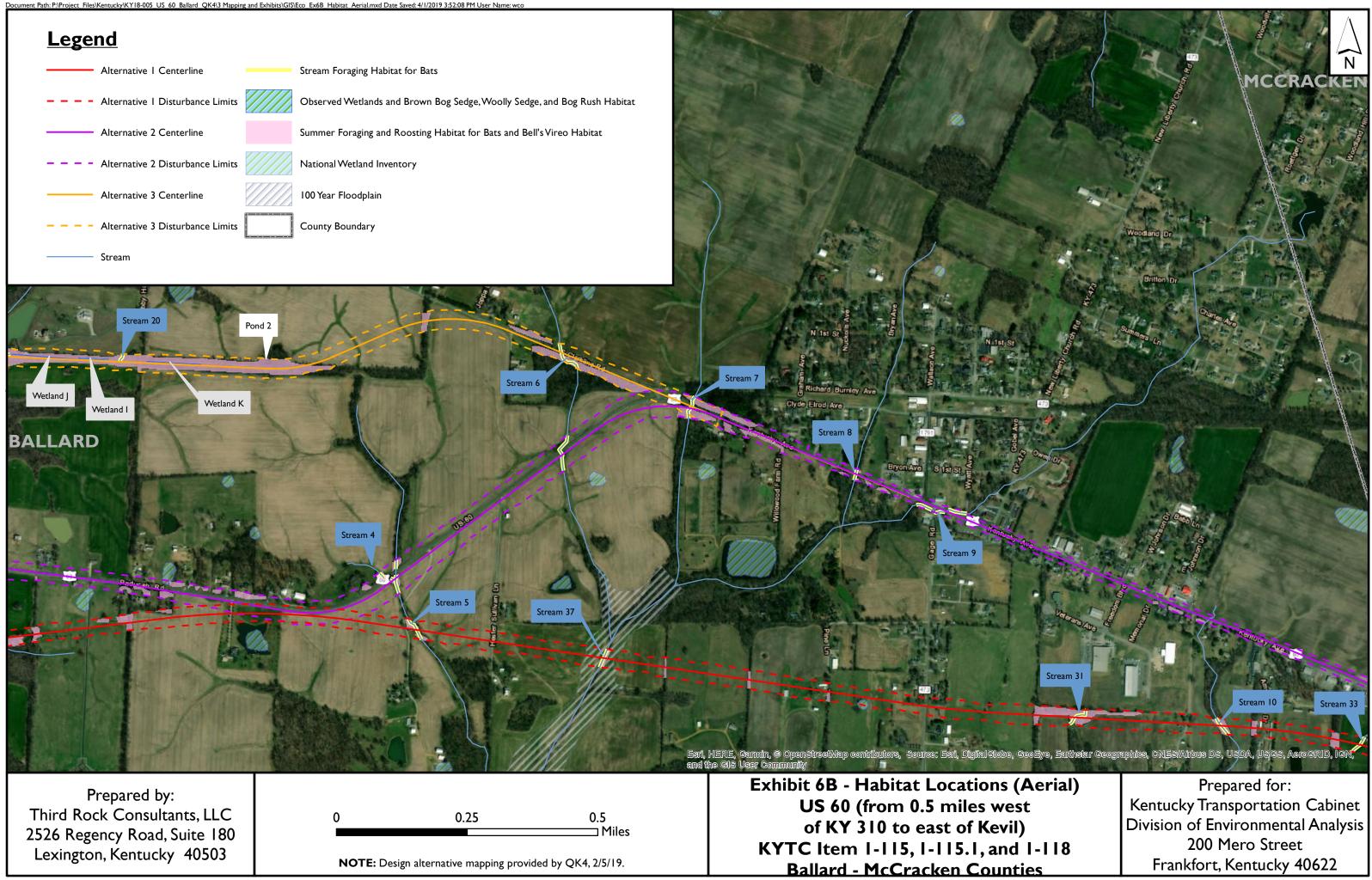


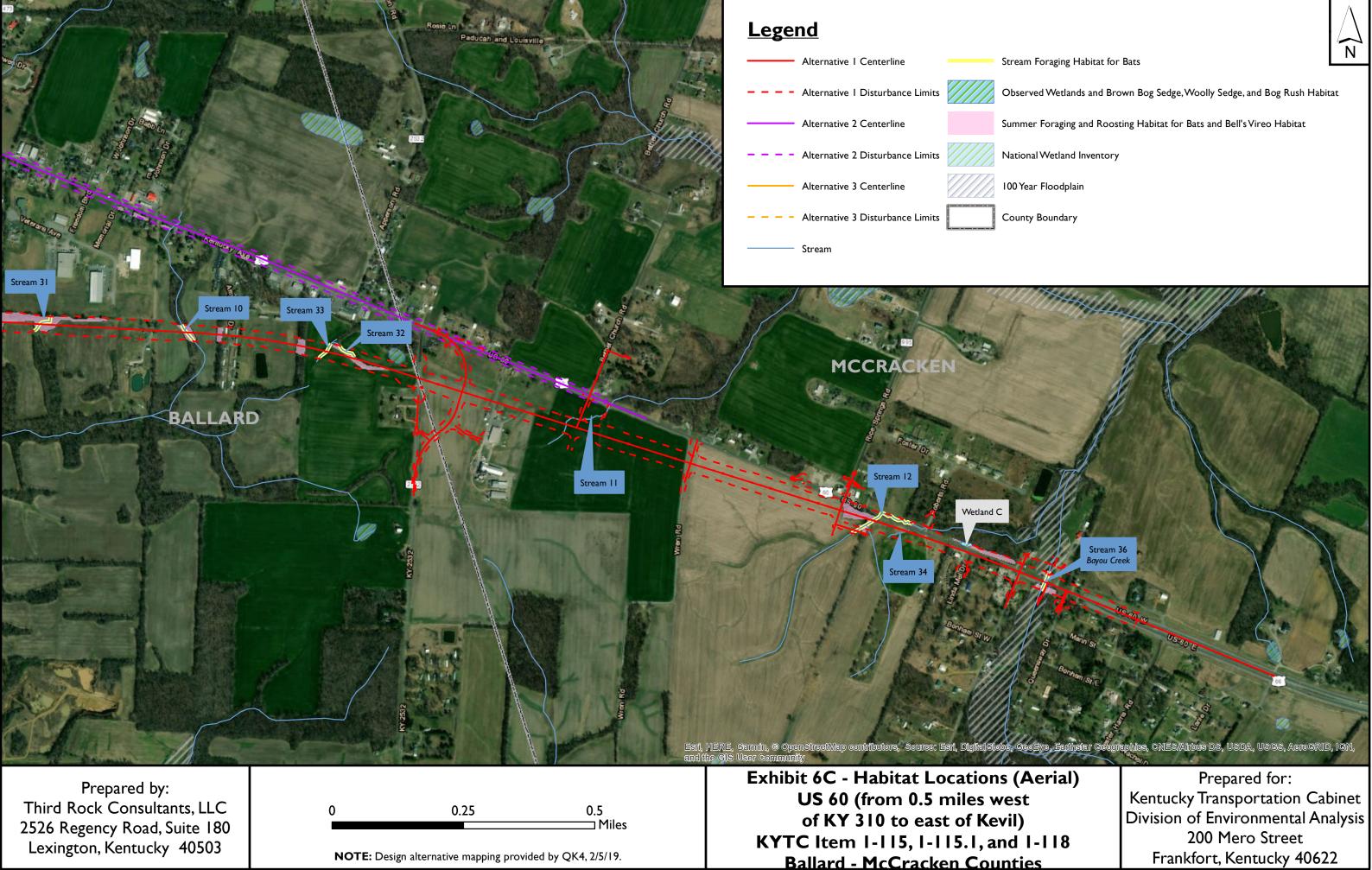
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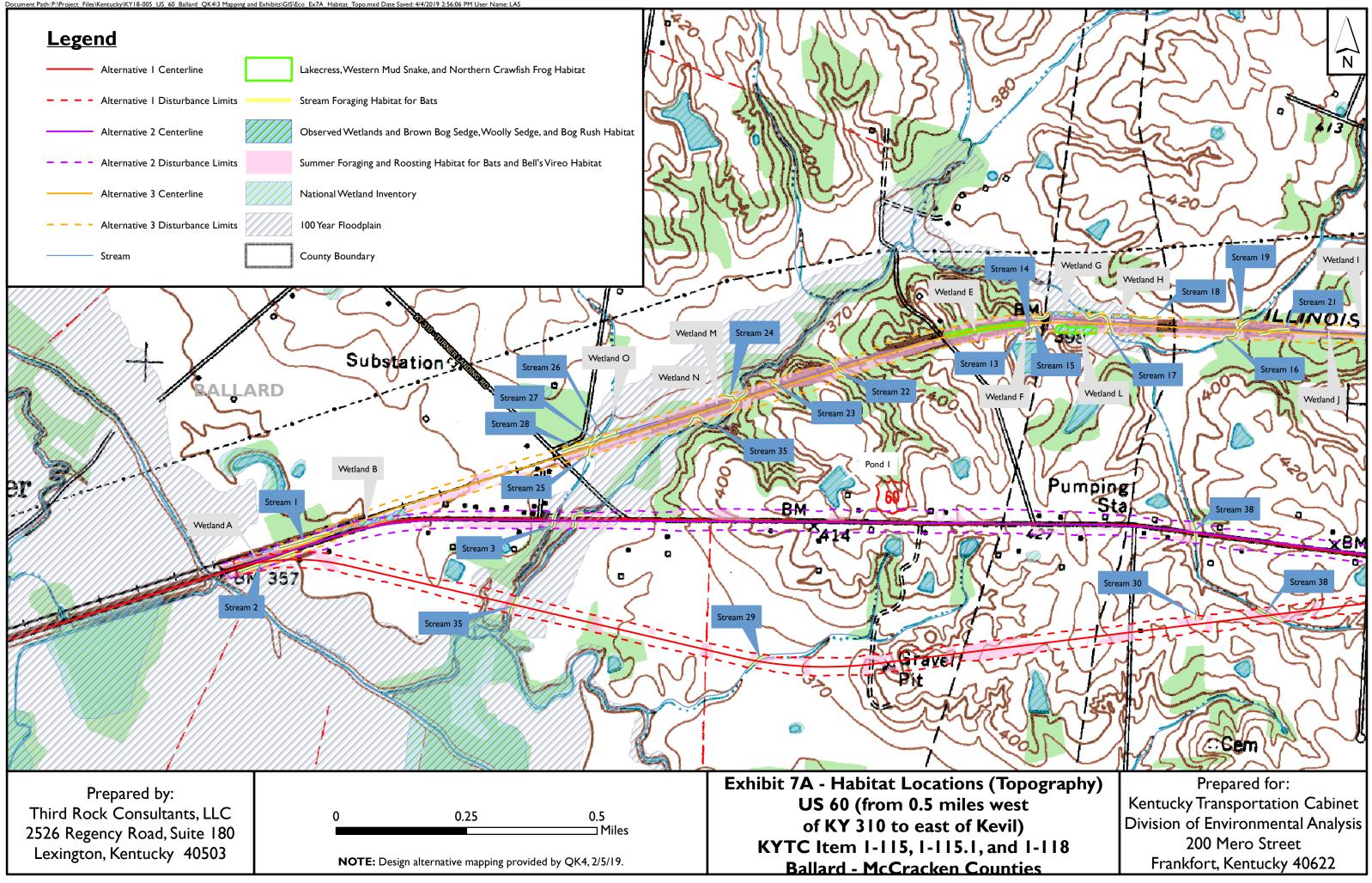
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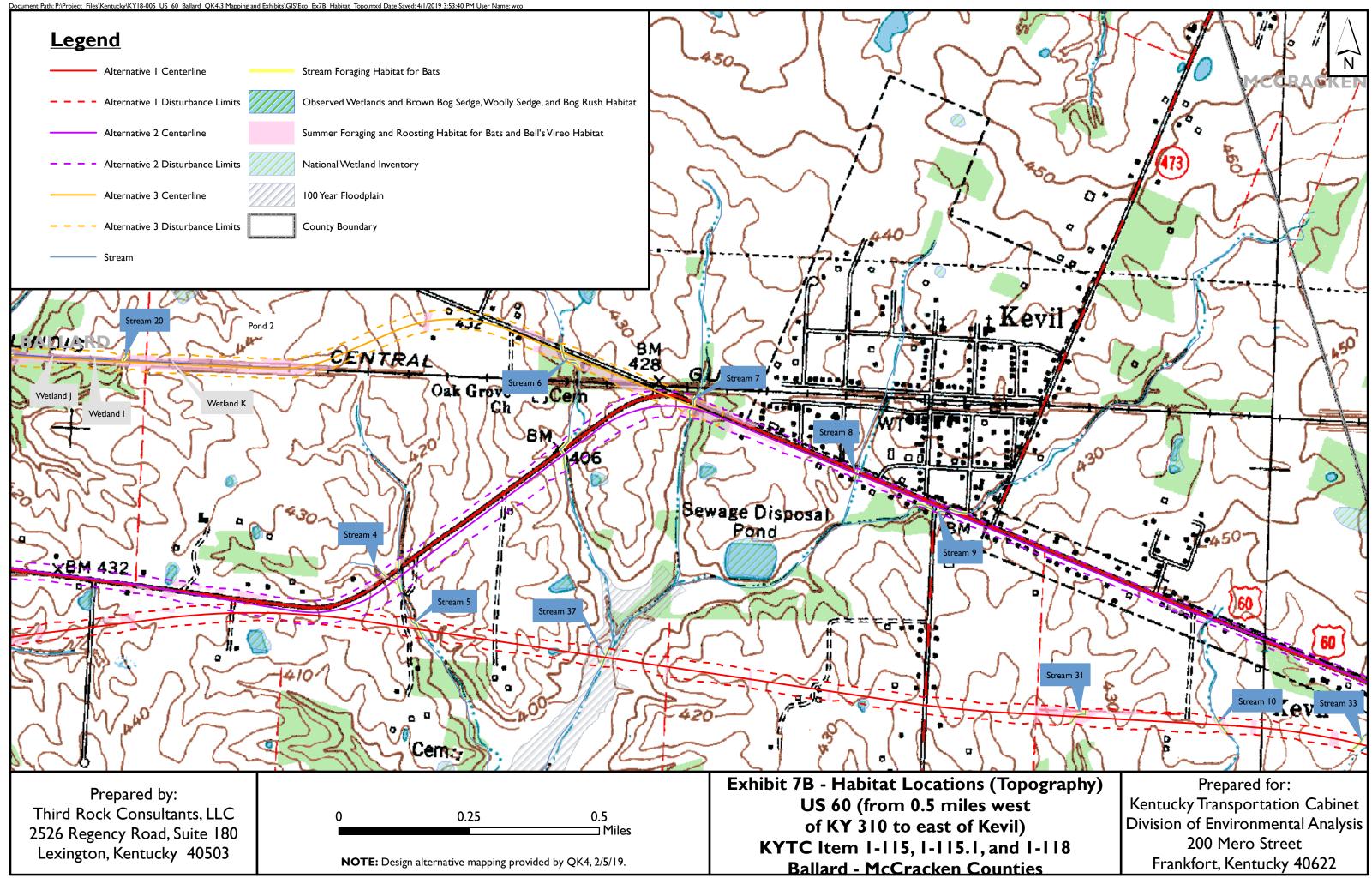


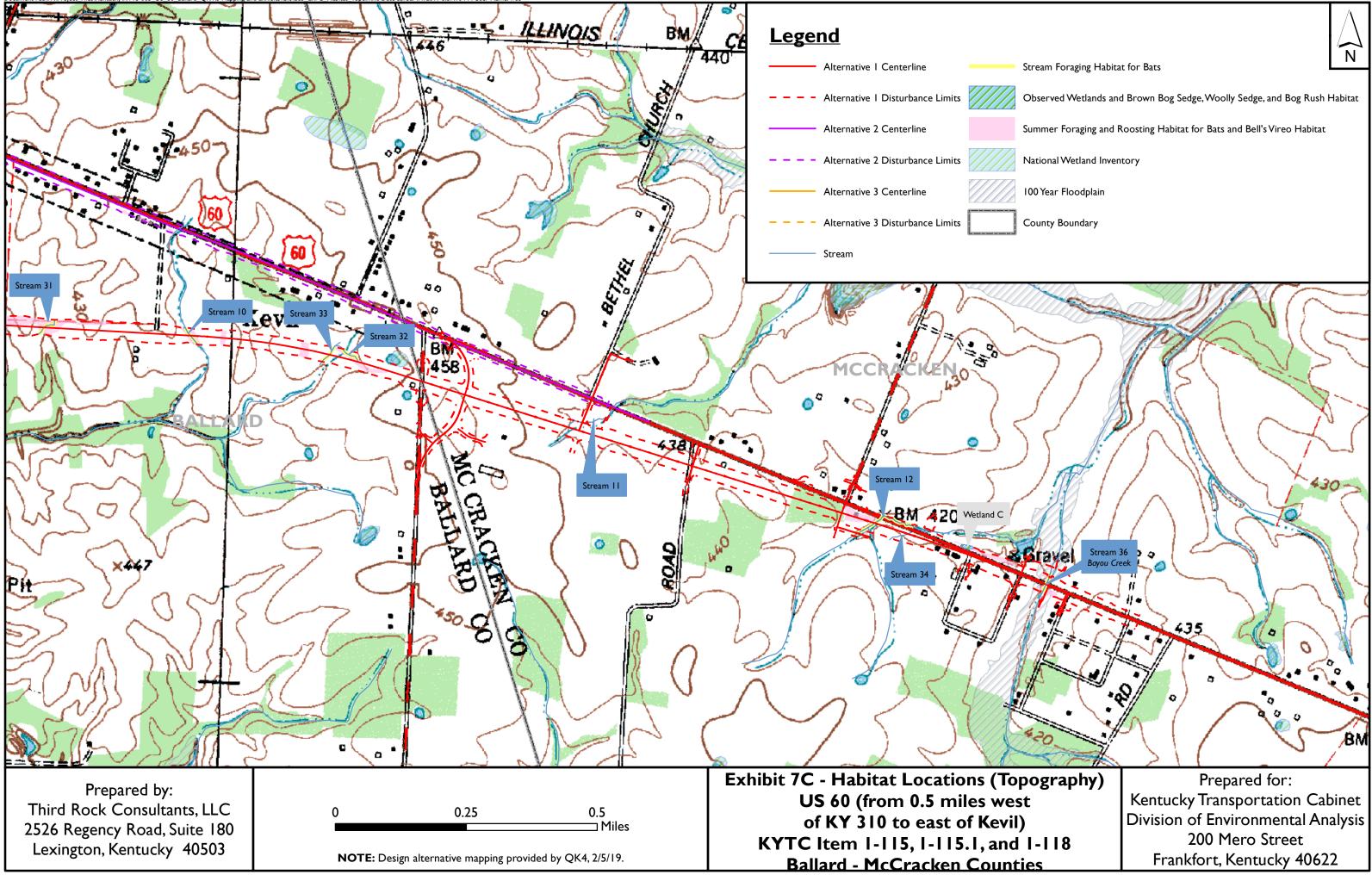


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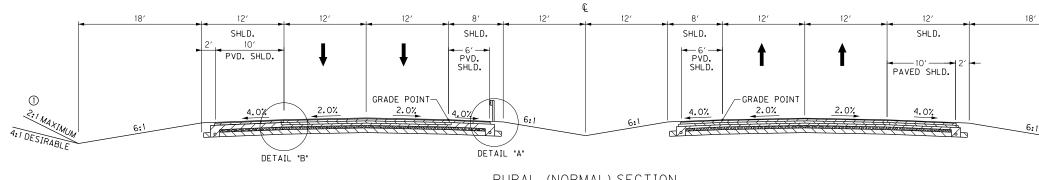


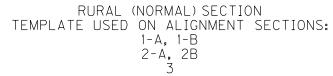


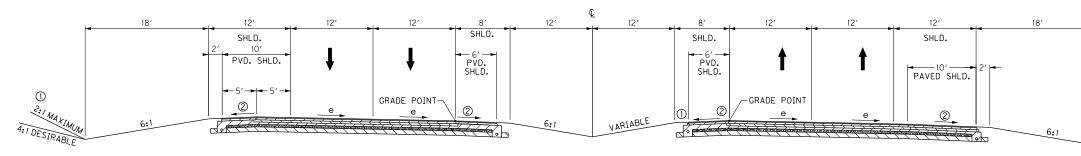
APPENDIX B TYPICAL SECTION

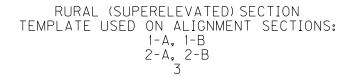
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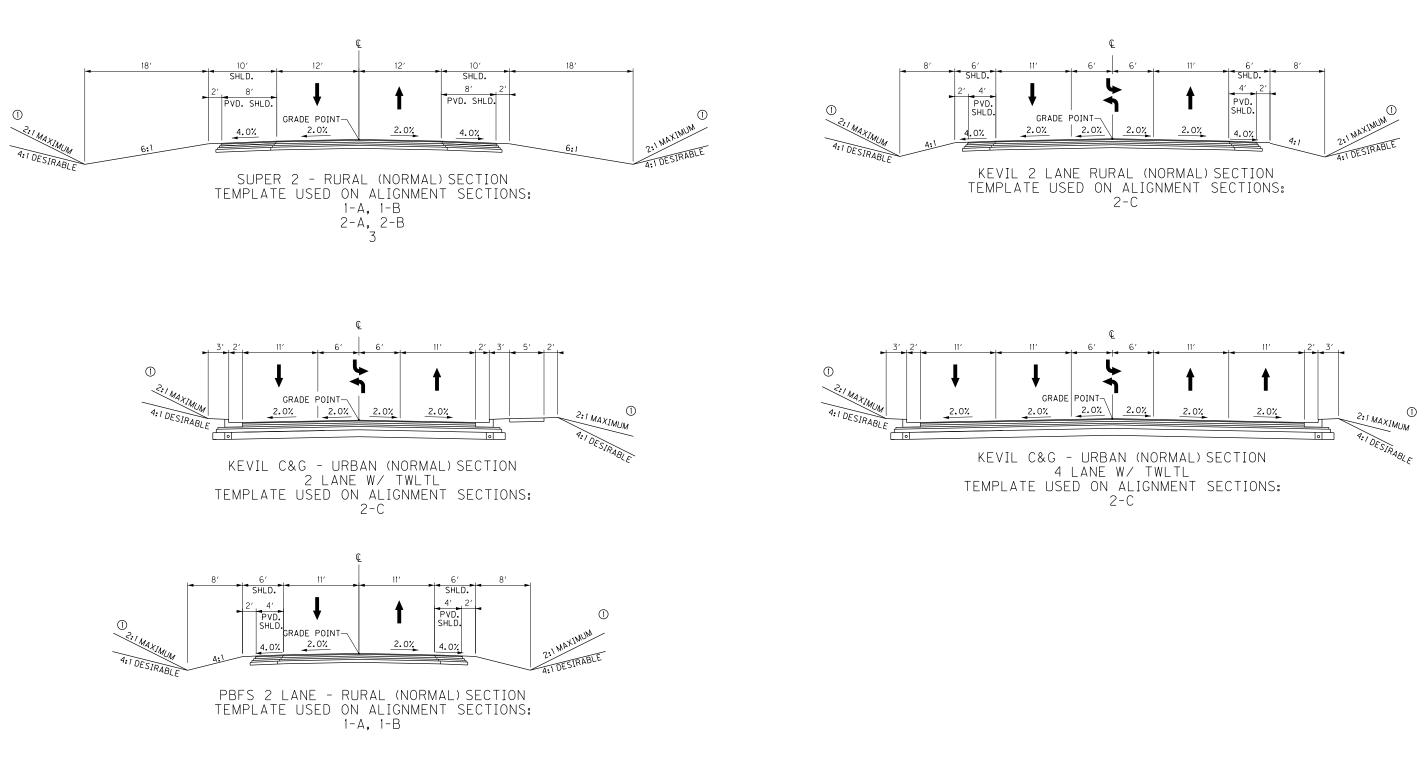
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2019

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APPENDIX C AGENCY CORRESPONDENCE

Prepared for KYTC Division of Environmental Analyses Prepared by Third Rock Consultants, LLC, April I, 2019 KY18-005/Ecological Baseline Study 04-1-19



United States Department of the Interior

FISH AND WILDLIFE SERVICE Kentucky Ecological Services Field Office J C Watts Federal Building, Room 265 330 West Broadway Frankfort, KY 40601-8670 Phone: (502) 695-0468 Fax: (502) 695-1024 http://www.fws.gov/frankfort/



August 02, 2018

In Reply Refer To: Consultation Code: 04EK1000-2018-SLI-1961 Event Code: 04EK1000-2018-E-05129 Project Name: KY18-005_US_60_Ballard_QK4

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

Your concern for the protection of endangered and threatened species is greatly appreciated. The purpose of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.) (ESA) is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. The species list attached to this letter fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the ESA to provide information as to whether any proposed or listed species may be present in the area of a proposed action. This is not a concurrence letter; additional consultation with the Service may be required.

The Information in Your Species List:

The enclosed species list identifies federal trust species and critical habitat that may occur within the boundary that you entered into IPaC. For your species list to most accurately represent the species that may potentially be affected by the proposed project, the boundary that you input into IPaC should represent the entire "action area" of the proposed project by considering all the potential "effects of the action," including potential direct, indirect, and cumulative effects, to federally-listed species or their critical habitat as defined in 50 CFR 402.02. This includes effects of any "interrelated actions" that are part of a larger action and depend on the larger action for their justification and "interdependent actions" that have no independent utility apart from the action under consideration (e.g.; utilities, access roads, etc.) and future actions that are reasonably certain to occur as a result of the proposed project (e.g.; development in response to a new road). If your project is likely to have significant indirect effects that extend well beyond the project footprint (e.g., long-term impacts to water quality), we highly recommend that you

coordinate with the Service early to appropriately define your action area and ensure that you are evaluating all the species that could potentially be affected.

We must advise you that our database is a compilation of collection records made available by various individuals and resource agencies available to the Service and may not be all-inclusive. This information is seldom based on comprehensive surveys of all potential habitats and, thus, does not necessarily provide conclusive evidence that species are present or absent at a specific locality. New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list.

Please note that "critical habitat" refers to specific areas identified as essential for the conservation of a species that have been designated by regulation. Critical habitat usually does not include all the habitat that the species is known to occupy or all the habitat that may be important to the species. Thus, even if your project area does not include critical habitat, the species on the list may still be present.

Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the ESA, the accuracy of this species list should be verified after 90 days. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and associated information. To re-access your project in IPaC, go to the IPaC web site (https://ecos.fws.gov/ipac/), select "Need an updated species list?", and enter the consultation code on this letter.

ESA Obligations for Federal Projects:

Under sections 7(a)(1) and 7(a)(2) of the ESA and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

If a Federal project (a project authorized, funded, or carried out by a federal agency) may affect federally-listed species or critical habitat, the Federal agency is required to consult with the Service under section 7 of the ESA, pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: <u>http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF</u>

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). Recommended contents of a Biological Assessment are described at 50 CFR 402.12. For projects other than major construction activities, the Service suggests that a biological evaluation

similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat.

ESA Obligations for Non-federal Projects:

Proposed projects that do not have a federal nexus (non-federal projects) are not subject to the obligation to consult under section 7 of the ESA. However, section 9 of the ESA prohibits certain activities that directly or indirectly affect federally-listed species. These prohibitions apply to all individuals subject to the jurisdiction of the United States. Non-federal project proponents can request technical assistance from the Service regarding recommendations on how to avoid and/or minimize impacts to listed species. The project proponent can choose to implement avoidance, minimization, and mitigation measures in a proposed project design to avoid ESA violations.

Additional Species-specific Information:

In addition to the species list, IPaC also provides general species-specific technical assistance that may be helpful when designing a project and evaluating potential impacts to species. To access this information from the IPaC site (https://ecos.fws.gov/ipac/), click on the text "My Projects" on the left of the black bar at the top of the screen (you will need to be logged into your account to do this). Click on the project name in the list of projects; then, click on the "Project Home" button that appears. Next, click on the "See Resources" button under the "Resources" heading. A list of species will appear on the screen. Directly above this list, on the right side, is a link that will take you to pdfs of the "Species Guidelines" available for species in your list. Alternatively, these documents and a link to the "ECOS species profile" can be accessed by clicking on an individual species in the online resource list.

Next Steps:

Requests for additional technical assistance or consultation from the Kentucky Field Office should be submitted following guidance on the following page <u>http://www.fws.gov/frankfort/</u> <u>PreDevelopment.html</u> and the document retrieved by clicking the "outline" link at that page. When submitting correspondence about your project to our office, please include the Consultation Tracking Number in the header of this letter. (There is no need to provide us with a copy of the IPaC-generated letter and species list.)

Attachment(s):

Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Kentucky Ecological Services Field Office

J C Watts Federal Building, Room 265 330 West Broadway Frankfort, KY 40601-8670 (502) 695-0468

Project Summary

Consultation Code:	04EK1000-2018-SLI-1961
Event Code:	04EK1000-2018-E-05129
Project Name:	KY18-005_US_60_Ballard_QK4
Project Type:	TRANSPORTATION
Project Description:	The Kentucky Transportation Cabinet (KYTC) Department of Highways District 1 has selected QK4 to develop an Environmental Assessment (EA) in support of proposed improvements of US 60 beginning where the existing US 60 four-lane cross-section into Paducah ends, east of the community of La Center. Designs have been developed under three separate KYTC Item numbers, including a southern "preferred alternative" on new alignment. All activities completed to date used state funding; however, the project is converting to federal funding, triggering additional alternatives evaluation due to impacts associated with the previously identified preferred. QK4 will evaluate a No Build alternative and two build alternatives: (1) the alignment shown in the RFP, with potential tweaks to minimize effects to historic resources; and, (2) a performance-based flexible solution generally following the existing alignment.

Project Location:

Approximate location of the project can be viewed in Google Maps: <u>https://www.google.com/maps/place/37.07656950346461N88.8841870551216W</u>



Counties: Ballard, KY | McCracken, KY

Endangered Species Act Species

There is a total of 4 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 3 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

1. <u>NOAA Fisheries</u>, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Gray Bat <i>Myotis grisescens</i> No critical habitat has been designated for this species. Species profile: <u>https://ecos.fws.gov/ecp/species/6329</u>	Endangered
 Indiana Bat Myotis sodalis There is final critical habitat for this species. Your location is outside the critical habitat. This species only needs to be considered under the following conditions: All activities in this location should consider possible effects to this species. The project area includes "potential" habitat. Species profile: https://ecos.fws.gov/ecp/species/5949 Species survey guidelines: https://ecos.fws.gov/ipac/guideline/survey/population/1/office/42431.pdf 	Endangered
 Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. This species only needs to be considered under the following conditions: The specified area includes areas in which incidental take would not be prohibited under the 4(d) rule. For reporting purposes, please use the "streamlined consultation form," linked to in the "general project design guidelines" for the species. Species profile: <u>https://ecos.fws.gov/ecp/species/9045</u> 	Threatened

Birds

NAME	STATUS
Least Tern Sterna antillarum	Endangered

Population: interior pop.

No critical habitat has been designated for this species.

This species only needs to be considered under the following conditions:

• This species should be addressed if the action area includes bare open areas with sparse to no vegetation (e.g., sand and gravel pits, agricultural fields) and the action would occur during the nesting season (April - August).

Species profile: https://ecos.fws.gov/ecp/species/8505

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.



TOURISM, ARTS AND HERITAGE CABINET KENTUCKY DEPARTMENT OF FISH & WILDLIFE RESOURCES

Matthew G. Bevin Governor

Don Parkinson Secretary #1 Sportsman's Lane Frankfort, Kentucky 40601 Phone (502) 564-3400 1-800-858-1549 Fax (502) 564-0506 *fw.ky.gov*

Regina Stivers Deputy Secretary

Frank Jemley, III Acting Commissioner

17 August 2018

Third Rock Consultants, LLC Attn: Chelsey Olson 2526 Regency Road, Suite 180 Lexington, KY 40503

RE: KY 18-005 U.S. 60 – Ballard County, Kentucky

Dear Mr. Scott:

The Kentucky Department of Fish and Wildlife Resources (KDFWR) has received your request for information pertaining to the subject project. The Kentucky Fish and Wildlife Information System indicates that no federally or state-listed species are known to occur within close proximity of the project site. Please be aware our database system is a dynamic one that only represents our current knowledge of various species distributions.

No caves, critical habitats, wildlife management areas, or other unique natural areas are known to occur within the project corridor. Please consult with the U.S. Fish and Wildlife Service Kentucky Field Office regarding federally-listed species and tree-clearing related to bats. Further, KDFWR recommends that you contact the appropriate US Army Corps of Engineers office and the Kentucky Division of Water prior to any work within the waterways or wetland habitats of Kentucky. KDFWR recommends the following for the portions of the project that impact streams:

- Channel changes located within the project area should incorporate natural stream channel design.
- If culverts are used, the culvert should be designed to allow the passage of aquatic organisms.
- Culverts should be designed so that degradation upstream and downstream of the culvert does not occur.
- Development/excavation during low flow period to minimize disturbances.
- Proper placement of erosion control structures below highly disturbed areas to minimize entry of silt into area streams.
- Replanting of disturbed areas after construction, including stream banks, with native vegetation for soil stabilization and enhancement of fish and wildlife populations. We recommend a 100 foot forested buffer along each stream bank.
- Return all disturbed instream habitat to a stable condition upon completion of construction in the area.
- Preservation of any tree canopy overhanging any streams within the project area.



To minimize indirect impacts to the aquatic environment, the KDFWR recommends that erosion control measures be developed and implemented prior to construction to reduce siltation into waterways located within the project area. Such erosion control measures may include, but are not limited to silt fences, staked straw bales, brush barriers, sediment basins, and diversion ditches. Erosion control measures will need to be installed prior to construction and should be inspected and repaired regularly as needed.

I hope this information is helpful to you, and if you have questions or require additional information, please call me at (502) 564-7109 extension 4453.

Sincerely,

Daniel Steel

Dan Stoelb Environmental Scientist

Cc: Environmental Section File



KENTUCKY STATE NATURE PRESERVES COMMISSION

Matthew G. Bevin Governor 300 Sower Blvd Frankfort, Kentucky 40601-1132 Phone 502-573-2886 Fax 502-573-2355 http://naturepreserves.ky.gov Charles G. Snavely Secretary

Zeb Weese Executive Director

June 7, 2018

William Olson Third Rock Consultants 2526 Regency Road Lexington, KY 40503

Project:	US 60 Improvements; KY18-005
Project ID:	18-0030
Project Type:	Transportation
Site Acreage:	50,257.31
Site Lat/Lon:	37.077499 / -88.900954
County:	Ballard; McCracken
USGS Quad:	Bandana; Heath; Joppa; La Center
Watershed HUC12:	Bayou Creek-Ohio River; Clanton Creek; Lower
	Humphrey Creek; Middle Humphrey Creek; Shawnee
	Creek +
Physiographic Region:	Purchase

Dear William Olson,

This letter is in response to your data request for the project referenced above. We have reviewed our Natural Heritage Program Database to determine if any of the endangered, threatened, or special concern plants and animals or exemplary natural communities monitored by the Kentucky State Nature Preserves Commission occur within your general project area. Your project does pose a concern at this time, therefore please see the attached reports for more detailed information.

I would like to take this opportunity to remind you of the terms of the data request license, which you agreed upon in order to submit your request. The license agreement states "Data and data products received from the Kentucky State Nature Preserves Commission, including any portion thereof, may not be reproduced in any form or by any means without the express written authorization of the Kentucky State Nature Preserves Commission." The exact location of plants, animals, and natural communities, if released by the Kentucky State Nature Preserves Commission, may not be released in any document or correspondence. These products are provided on a temporary basis for the express project (described above) of the requester, and may not be redistributed, resold or copied without the written permission of the Kentucky State Nature Preserves Heritage Branch (300 Sower Blvd - 4th Floor, Frankfort, KY, 40601. Phone: (502) 782-7828).

Please note that the quantity and quality of data collected by the Kentucky Natural Heritage Program are dependent on the research and observations of many individuals and organizations. In most cases, this information is not the result of comprehensive or site-specific field surveys; many natural areas in Kentucky have never been thoroughly surveyed and new plants and animals are still being discovered. For these reasons, the Kentucky Natural Heritage Program cannot provide a definitive statement on the presence, absence, or condition of biological elements in any part of Kentucky. Heritage reports summarize the existing information known to the Kentucky Natural Heritage



Project ID: 18-0030 June 7, 2018 Page 2

Program at the time of the request regarding the biological elements or locations in question. They should never be regarded as final statements on the elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments. We would greatly appreciate receiving any pertinent information obtained as a result of on-site surveys.

If you have any questions, or if I can be of further assistance, please do not hesitate to contact me.

Sincerely,

lan Horn Geoprocessing Specialist



currence Report	1 Miles of Project
Standard Occurrence	KSNPC monitored species within

		uddy , cypress II sloughs,	p	dry or ndhills.	et s, pond ies.	uch as wet js.	s; also s; also ns	vales and 970).	, sloughs.	edium to noderate to sometime ker 1983, ith 1979, nd Burr	edium to noderate to sometime ter 1983, thr 1979, nd Burr
	Habitat	Quiet shores or muddy waters of sloughs, cypress swamps, seasonal sloughs, or slow water.	Fields, barrens and roadsides.	Prairies and open dry or upland woods; sandhills.	Open swamps, wet meadows, prairies, pond margins, wet ditches.	Open wet areas such as wet meadows and bogs.	Bottomland forests and floodplain swamps; also cypress depressions (Weakley 2011).	Rich meadows, swales and shores (Fernald 1970).	Wooded swamps, sloughs.	 Reservoirs and medium to large rivers with moderate to low gradient and sometime swift current (Becker 1983, Pflieger 1975, Smith 1979, Trautman 1981, and Burr and Warren 1986). 	Reservoirs and medium to large rivers with moderate to low gradient and sometime swift current (Becker 1983, Pflieger 1975, Smith 1979, Trautman 1981, and Burr and Warren 1986).
	Directions	BALLARD COUNTY WILDLIFE MANAGEMENT AREA.	West KY. WMA.	WEST KY WMA, RD AROUND NUCLEAR PLANT (DYKE RD).	BALLARD COUNTY WILDLIFE MANAGEMENT AREA.	BALLARD COUNTY WILDLIFE MANAGEMENT AREA.	BALLARD COUNTY WILDLIFE MANAGEMENT AREA.	BALLARD COUNTY WILDLIFE MANAGEMENT AREA.	W of Kevil on US 60, Ballard Co [plotted on US 60 at Humphrey Creek, between Kevil and La Center].	CLANTON CREEK AT KY 358 (SITE 27).	BIG BAYOU CREEK (CA. 0.4 STREAM KM S OF WEST BOONE RD CROSSING).
	Lat / Lon	37.1639 / -89.0458	37.1059 / -88.8353	37.1008 / -88.8044	37.1639 / -89.0458	37.1611 / -89.0317	37.1639 / -89.0458	37.1797 / -89.0269	37.0778/ -88.9549	37.1525/ -88.9375	37.1267 / -88.8244
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Miles of P	Last Obs Date	1974-06-24	1974-06-25	1997-05-11	1974-06-03	1970-05-18	1976-07-10	1976-05-09	1986-pre	1996-07	1997-03
KSNPC monitored species within 1 Miles of Project Area	SPROT USESA	F	F	S	т	ш	ш	т	S	S	S
specie		S2	8	e	т	~	S2	т	e	<i>с</i> у	0
ored spec	k SRank	S1S2	S2	FT S3	R	S1	S1S2	R	S3	S S	S S
monit	GRank	G4?	G5	G4G5T4T 5	G5T5?	G5	G4	G5	G5T5	G5	G5
KSNPC					SS				Ŷ		
	Common Name	Lakecress	Prairie milkweed	Cream Wild Indigo	Blue-joint Reedgrass	Brown Bog Sedge	Large Sedge	Woolly Sedge	Western Mud Snake	Black Buffalo	Black Buffalo
	Scientific Name	Armoracia lacustris	Asclepias hirtella	Baptisia bracteata var. glabrescens	Calamagrostis canadensis var. macouniana	Carex buxbaumii	Carex gigantea	Carex pellita	Farancia abacura reinwardtii	Ictiobus niger	Ictiobus niger
	EO ID	2105	14297	9354	7611	7926	6739	7508	5379	6069	7041

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Standard Occurrence Report	Miles of Project
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	Habitat	Margins of ponds and lakes, depressions in savannas and flatwoods, wet, disturbed clearings, roadside ditches (Weakley 1998); damp or wet, sandy or peaty soil, particularly in pine barrens.	Occurs in well-vegetated swamps, sloughs, bottomland lakes, and low gradient streams (Burr and Mayden 1979, Pflieger 1975, Smith 1979, Burr and Warren 1986, Etnier adn Starnes 1993).	Moist woods.	Primarily uses caves for hibernacula and uses caves, bridges, and hollow trees as summer maternity and roosting sites.			The evening bat is a colonial species that roosts in trees and houses. It apparently migrates southward in winter.	Breeds in ponds in farmland and edge. Remains underground throughout most of the year, using crayfish burrows in moist grasslands and meadows.
	Directions	BALLARD COUNTY WILDLIFE MANAGEMENT AREA.	Bayou Creek, McCracken County: at KY 725 crossing	BALLARD COUNTY WILDLIFE MANAGEMENT AREA.	West Kentucky WMA, Bayou Creek just upstream of South Acid Road.	West Kentucky WMA, Bayou Creek just upstream of South Acid Road (124A). Along Bayou Creek, N of South Acid Rd (125B)	Along Bayou Creek, approx 1305 m NW of industrial waste ponds	West Ky WMA, along Bayou Creek ca 0.8 air mi WSW of headquarters.	10 mi W of Paducah, E side of Magruder Rd, 1.2 mi S of Woodville Rd, ca 0.5 mi N of US 60.
	Lat / Lon	37.1639 / -89.0458	37, 089 / -88, 8324	37.1639 / -89.0458	37.0989 / -88.8247	37.0989 / -88.8247	37.1289 / -88.8259	37.13 / -88.8261	37.0699 / -88.8211
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roject Are	Precision	U	S	Ċ	S	ω	S	S	S
KSNPC monitored species within 1 Miles of Project Area	Last Obs Date	1970-05-28	2004-08-04	1971-09-08	1999-07-14	1999-07-28	1999-08-02	1999-08-02	2003-03-21
hin 1 N	ISESA				SOMC				
jes wit	SPROT USESA	т	F	ш	ш	z	z	S	S
ored species within 1 Miles o	SRank	R	S2	S1S2	S1S2	SS	S5	S3	S3
monitor	GRank	G4G5	G5	G5	G4	63	G3	G5	G4T4
KSNPC	Common Name	Bog Rush	Redspotted Sunfish	Bush's Muhly	Southeastern Myotis	Little Brown Bat	Little Brown Bat	Evening Bat	Northern Crawfish Frog
	Scientific Name	Juncus elliottii	Lepomis miniatus	Muhlenbergia bushii	Myotis austroriparius	Myotis lucifugus	Myotis lucifugus	Nycticeius humeralis	Rana areolata circulosa
	EO ID	10536	12049	931	1398	15462	15465	97.06	502

June 7, 2018

Standard Occurrence Report	A INOTITOTED SPECIES WITHIN A MILES OF LIGIES
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	Habitat	Breeds in ponds in farmland and edge. Remains underground throughout most of the year, using crayfish burrows in moist grasslands and meadows.	Breeds in ponds in farmland and edge. Remains underground throughout most of the year, using crayfish burrows in moist grasslands and meadows.	Breeds in ponds in farmland and edge. Remains underground throughout most of the year, using crayfish burrows in moist grasslands and meadows.	Breeds in ponds in farmland and edge. Remains underground throughout most of the year, using crayfish burrows in moist grasslands and meadows.	Breeds in ponds in farmland and edge. Remains underground throughout most of the year, using crayfish burrows in moist grasslands and meadows.	Breeds in ponds in farmland and edge. Remains underground throughout most of the year, using crayfish burrows in moist grasslands and meadows.
	Directions	South side KY 358, 0.6 rd mi W jot KY 725 and KY 358 (012A), S side KY 358, ca 0.2 rd mi E jot KY 358 and Joppa Landing Road (012B), and S side KY 358 ca 0.05 air mi SSW of jot KY 358 and Joppa Landing Road (012C).	Just NE of jot KY 286 and 1 KY 1367 (005A) and N a side of KY 286, ca 0.1 rd mi W of jct KY 1367 (005B).	Circa 0.2 air mi E of KY 1154, ca 1.2 rd mi N of its jct w/ US 60 (007A), 10.0 mi W of Paducah, nr US 60 at jct Magruder and Woodvile [KY 725] roads (007B), N side KY 725, NE of jct MacGruder Rd (007C), and SW of Magruder Rd, just S of RR tracks (007D).	La Center, at city limits.	Circa 0.2 rd mi E of Bethel Church Road, ca 1.0 rd mi a S jct KY 358 (013A) and ca 1.0 air mi SSE jct KY 358 and Bethel Church Road (013B).	West Kentucky WMA, N I side Water Works Rd, just a W of filtration plant.
	Lat / Lon	37.1517/ -88.8674	37.0059 / -88.8538	37.0833 / -88.8133	37.0777 / -88.9729	37.1301/ -88.8281	37.1133/ -88.8289
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ו הופרו אוו	Precision	Ś	S	S	Σ	S	S
u species within 1 miles of Floject Alea	Last Obs Date	1991-03-21	1991-03-22	1991-03-20	1963-04-26	1991-03-18	1991-03-18
	USESA						
	SPROT USESA	S	S	S	S	S	S
	SRank	S S	S3	ő	S	S	S3
	GRank	G4T4	G4T4	G4T4	G4T4	G4T4	G4T4
	Common Name	Northern Crawfish Frog	Northern Crawfish Frog	Northern Crawfish Frog	Northern Crawfish Frog	Northern Crawfish Frog	Northern Crawfish Frog
	Scientific Name	Rana areolata circulosa	Rana areolata circulosa	Rana areolata circulosa	Rana areolata circulosa	Rana areolata circulosa	Rana areolata circulosa
	EO ID	2013	3169	34.88	3751	4065	5676

Project ID: 18-0030

Page 5 of 8

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	Habitat	Breeds in ponds in farmland and edge. Remains underground throughout most of the year, using crayfish burrows in moist grasslands and meadows.	Breeds in ponds in farmland and edge. Remains underground throughout most of the year, using crayfish burrows in moist grasslands and meadows.	Breeds in ponds in farmland and edge. Remains underground throughout most of the year, using crayfish burrows in moist grasslands and meadows.	Breeds in ponds in farmland and edge. Remains underground throughout most of the year, using crayfish burrows in moist grasslands and meadows.	Breeds in ponds in farmland and edge. Remains underground throughout most of the year, using crayfish burrows in moist grasslands and meadows.	Breeds in ponds in farmland and edge. Remains underground throughout most of the year, using crayfish burrows in moist grasslands and meadows.	Breeds in ponds in farmland and edge. Remains underground throughout most of the year, using crayfish burrows in moist grasslands and meadows.
	Directions	West side of Reed Rd, 0.15 rd mi S of jct Vaughn Rd.	West Kentucky WMA, ca 0.6 rd mi SW of jct KY 995 and KY 358, ca 0.15 air mi W of KY 995, ca 0.5 rd mi SW of WMA office (lodge).	Circa 0.4 air mi NW of Spring Bayou Church on KY 725 (008A) and ca 0.7 rd mi W of Spring Bayou Church on KY 725 on N side of rd (008B).	Ragland, S side KY 358, ca 0.4 rd mi W jct KY 1563 and KY 358 (016A) and ca 0.1 air mi SE of jct KY 358 and KY 1563 (016B).	Northwest side of KY 286, ca 0.3 rd mi E of Bethel Cumberland Church.	0.9 mi E of Gage [plotted 0.9 rd mi E on KY 286].	US 60, 0.6 mi E of Future City, 10 mi W of Paducah.
	Lat / Lon	37.15 / -88.9047	37.1307 / -88.8215	37.0897 / -88.8419	37.1599/ -88.8827	37.0031 / -88.8739	36.9983 / -88.8758	37.0631 / -88.7914
ea	EO Rank	Ο	Ο	Ο	0	O	т	т
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occur cies wit	SPROT USESA	S	S	S	S	S	S	S
ored species within 1 Miles o	SRank	S3	S3	S3	S3	S3	S3	°3 N
KSNPC monitored species within 1 Miles of Project Area	GRank	G4T4						
KSNP	Common Name	Northern Crawfish Frog						
	Scientific Name	Rana areolata circulosa						
	EO ID	6767	7330	8345	8576	8695	9267	8859 8850

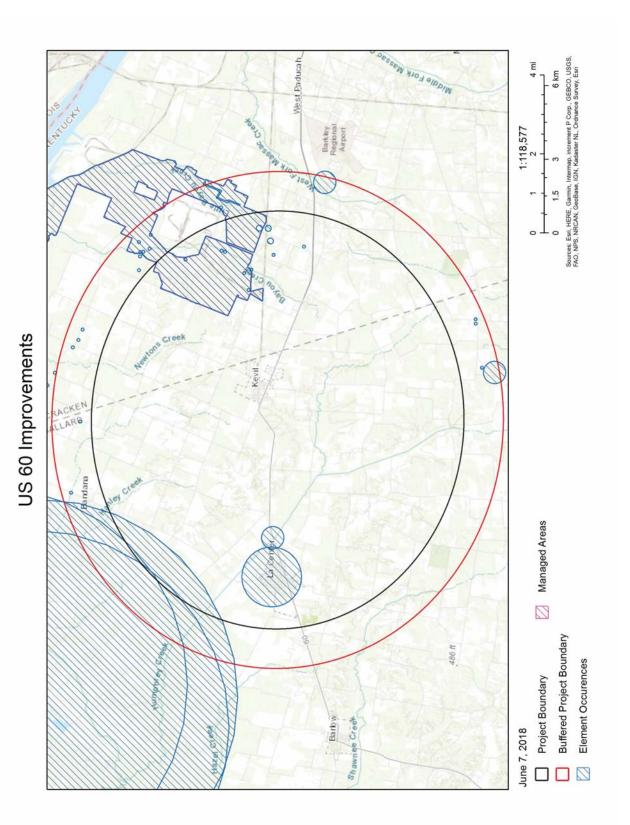
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	Miles of Project
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Report	Miles
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Standard Occurrence Repor	KSNPC monitored species within 1
	KSN

	Habitat	West KY WMA, W side of Breeds in ponds in farmland Little Bayou Creek, at SE and edge. Remains corner of Gaseous underground throughout Diffusion Plant, 1.0 air mi NW of Heath. grasslands and meadows.	West Kentucky WMA, W Open grassland habitat with side of main gravel rd, ca scattered small trees or 1.0 mi S of entrance on shrubs including reclaimed KY 358. surface mines, powerline rights-of-way, etc.
	Directions	West KY WMA, W side of Little Bayou Creek, at SE corner of Gaseous Diffusion Plant, 1.0 air mi NW of Heath.	West Kentucky WMA, W side of main gravel rd, ca 1.0 mi S of entrance on KY 358.
	Lat / Lon	37.1008 / -88.8009	37.1264 / -88.8181
ea	E0 Rank	O	0
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Ailes of P	Last Obs Date	2007-03-14	SOMC 1994-05-05
KSNPC monitored species within 1 Miles of Project Area	SRank SPROT USESA Last Obs Date		
oecies	k SPR	S	ω Ω
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C monito	GRank	G4T4	G5
KSNP	Common Name	Northern Crawfish Frog	Bell's Vireo
	Scientific Name	Rana areolata circulosa	Vireo belliñ
	EO ID	12576	7044

Managed Areas within 1 Miles of Project Area

Ilnit Type Managing Institution	nent Area TVA & US Dept. of Energy & KY Department of Fish and Wildlife Resources	Department of Fish and Wildlife Resources	
	ent State Wildlife Manager		
Manaded Area Name	West Kentucky Wildlife Management	Area	
	140		

THESE DATA ARE VALID ONLY ON THE DATE ON WHICH THE REPORT WAS GENERATED. THESE DATA MAY ONLY BE USED FOR THE PROJECT NAMED ABOVE.



Project ID: 18-0030

Molly C. Foree

From:	Vogeler, Samantha N (EEC) <samantha.vogeler@ky.gov></samantha.vogeler@ky.gov>
Sent:	Friday, August 10, 2018 1:18 PM
То:	William C. Olson
Cc:	KY18-005_US_60_Ballard_QK4
Subject:	RE: Information Request

There are currently no significant aquatic resources in the vicinity.

Samantha Vogeler

Environmental Biologist Consultant Kentucky Energy and Environment Cabinet Water Quality Certification Section 300 Sower Blvd, Frankfort, KY 40601 Office: 502-782-6995 Samantha.Vogeler@ky.gov

From: William C. Olson [mailto:colson@thirdrockconsultants.com]
Sent: Thursday, August 09, 2018 4:47 PM
To: Vogeler, Samantha N (EEC) <samantha.vogeler@ky.gov>
Cc: KY18-005_US_60_Ballard_QK4 <KY18-005_KY_90_Ecosystems_QK4@thirdrockconsultants.com>
Subject: Information Request

Samantha, can you please provide us with any known significant aquatic resources in the vicinity of the attached project?

Thank you, Chelsey

Chelsey Olson, Ecologist Third Rock Consultants, LLC |2526 Regency Road | Suite 180 | Lexington, KY 40503 Office: (859) 977-2000 | Cell: (859) 619-8011 | www.thirdrockconsultants.com

Disclaimer

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This email has been scanned for viruses and malware by Mimecast Ltd.

Molly C. Foree

From:Porter, Chuck (EEC) <Chuck.Porter@ky.gov>Sent:Monday, March 25, 2019 2:59 PMTo:William C. OlsonSubject:RE: Information Request

Mr. Olsen,

I am very sorry for not getting back with you regarding your request. The project area as shown on the attached map does not have any State Big Trees contained within the red boundary. All champion trees in Ballard County are on the WMA (Wildlife Management Area) properties. I hope this satisfies your request and again.....I am sorry for any delay.

Chuck

From: William C. Olson [mailto:colson@thirdrockconsultants.com]
Sent: Monday, March 25, 2019 1:14 PM
To: Porter, Chuck (EEC) <Chuck.Porter@ky.gov>
Cc: Rain A. Storm <rstorm@thirdrockconsultants.com>; KY18-005_US_60_Ballard_QK4 <KY18005_KY_90_Ecosystems_QK4@thirdrockconsultants.com>
Subject: FW: Information Request

CAUTION PDF attachments may contain links to malicious sites. To verify the destination of the hyperlink in an attachment, hover your mouse over the link and verify the link address. If you are unfamiliar with the address or the address looks suspicious, do not click on the link and delete the email immediately. Please contact the COT Service Desk <u>ServiceCorrespondence@ky.gov</u> for any assistance.

Hi Chuck, I sent you an information request on 8/20/18 but have not received a response. Could you please provide a response as soon as possible? We are hoping to submit a report be the end of the week.

Thank you, Chelsey

From: William C. Olson Sent: Monday, August 20, 2018 1:28 PM To: 'Chuck.Porter@ky.gov' <<u>Chuck.Porter@ky.gov</u>> Cc: KY18-005_US_60_Ballard_QK4 <<u>KY18-005_KY_90_Ecosystems_QK4@thirdrockconsultants.com</u>> Subject: Information Request

Chuck can you please provide me with any information on state/national champion trees and/or state forests that may impacted by the attached project?

Thank you, Chelsey

Disclaimer

The information contained in this communication from the sender is confidential. It is intended solely for use by the recipient and others authorized to receive it. If you are not the recipient, you are hereby notified that any disclosure, copying, distribution or taking action in relation of the contents of this information is strictly prohibited and may be unlawful.

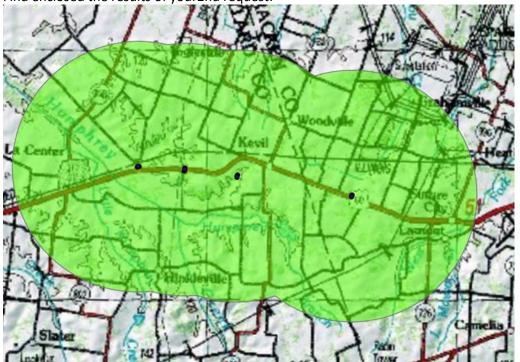
This email has been scanned for viruses and malware by Mimecast Ltd.

Molly C. Foree

From: Sent:	Howard <hkalnitz@fuse.net> Wednesday, June 20, 2018 8:54 PM</hkalnitz@fuse.net>
To:	William C. Olson
Cc:	caverjoshbrewer23@gmail.com;
Subject:	RE: KSS Data Request by William Chelsey Olson () (2nd request)

William

Find enclosed the results of your2nd request:



We find no caves in your requested 5km buffer around your project area.

Ownership, distribution, and replication rights are specifically not granted to any requesters. Requesters may be asked to sign a confidentiality agreement stating that the information shall not be disseminated without written permission of the Data Access Committee, or other agreements as requested by the committee. Wherever applicable, the requester may be asked to make a report stating the scope of their use of the data and any findings to the KSS in a timely manner.

Data reported by the KSS is as has been reported to us, but not guaranteed to be complete or correct. Use Caution when operating in karst terrains.

Commercial requests for data are assessed a fee for the search, and for the data returned. There is a \$50 search fee, and a fee of \$10 for each location returned.

Charge for this search is 50\$= 50\$, you will be invoiced by our treasurer..

Howard Kalnitz KSS Database Committee From: Kentucky Speleological Survey <christopherdmorris@gmail.com>
Sent: Thursday, June 7, 2018 11:11 AM
To: christopherdmorris@gmail.com
Cc: caverjoshbrewer23@gmail.com; currens@email.uky.edu; vanders33@yahoo.com; sarahmariecaver@gmail.com; hkalnitz@fuse.net
Subject: KSS Data Request by William Chelsey Olson

Name:	William Chelsey Olson
Address:	2526 Regency Road, Suite 180, Lexington
City:	Kentucky
State:	КҮ
Phone:	8599772000
Email:	<u>colson@thirdrockconsultants.com</u>
Organization:	Third Rock Consultants
Data/Information Requested:	We are interested in information concerning caves/karst features that may exist within 5 kilometers of the project area.
Intended Use of Data/Information:	Third Rock Consultants is conducting an Environmental Assessment for proposed improvements to US 60.
Qualifications:	Biologist
Attachment(s):	

IP: <u>64.191.149.26</u>

APPENDIX D PHOTO LOG





Corn Field and Forested Fencerow.jpg



Forest with Multiple Snags.jpg



Forested Riparian.jpg



Old Rail Bed Cooridor with Large Berms on North and South Sides (Alternative 3).jpg



Old Rail Bed on Top of Large Berm, Steep Slopes to the North and South (Alternative 3).jpg



Pond I, No Wetland Fringe.jpg





Pond 2 on North Side of Old Rail Bed Berm (Alternative 3).jpg



Roadside Ornamentals - No Bat Habitat.jpg



Rolling Field with Grass Swale.jpg



Rolling Field with Scattered Trees.jpg



Snags and Shagbark Near Pond.jpg

Snags of Maternity Size.jpg





Utility Right-of-Way Corridor.jpg



Utility Right-of-Way with Scrub Shrub Habitat.jpg



White Oak Snag.jpg





Station I UT Humphries Creek downstream view from upstream end.jpg



Station 2 Bayou creek downstream end.jpg



Station 3 UT Humphries creek mid point .jpg



Station 4 UT Humphries creek upstream view - dry during fish survey.jpg



Stream I, Downstream View.jpg



Stream 10, Downstream View.jpg





Stream II, Upstream View.jpg



Stream 12, Downstream View.jpg



Stream 13, Downstream View.jpg



Stream 13, Upstream View From Confluence With Wetland F.jpg



Stream 15, Upstream View From Confluence With Stream 13.jpg



Stream 16, Upstream View.jpg





Stream 17, Upstream View From Confluence With Stream 16.jpg



Stream 18, Downstream View.jpg



Stream 19, Downstream View Toward Confluence With



Stream 2, Upstream View.jpg



Stream 20, Downstream View From Top of Berm.jpg



Stream 21, Downstream View From Head of Stream.jpg





Stream 22, Downstream View.jpg



Stream 23, Downstream View.jpg



Stream 24, Upstream View.jpg



Stream 25, Downstream Veiw.jpg



Stream 26, Upstream View From Confluence With Stream 25.jpg



Stream 27, Downstream View From Head of Stream.jpg





Stream 28, Upstream View.jpg



Stream 29, Downstream View.jpg



Stream 3, Upstream View.jpg



Stream 30, Upstream View.jpg



Stream 31, Downstream View.jpg

Stream 32, Upstream View.jpg





Stream 33, Upstream View.jpg



Stream 34, Upstream View.jpg



Stream 35, Humphries Creek Upstream View.jpg



Stream 36, Bayou Creek.jpg



Stream 37, Humphries Creek.jpg



Stream 38, Humphries Creek Upstream View.jpg





Stream 4, Downstream Veiw.jpg



Stream 5, Downstream View.jpg



Stream 6, Upstream View.jpg



Stream 7, Downstream View From South Side of Road Crossing.jpg



Stream 8, Downstream View.jpg

Stream 9, Upstream View.jpg







Wetland A.jpg





Wetland C.jpg

Wetland D.jpg



Wetland E, Facing East from Western End.jpg

Wetland F.jpg





Wetland G.jpg



Wetland H.jpg



Wetland I.jpg

Wetland J.jpg



Wetland K.jpg

Wetland L.jpg





Wetland M.jpg



Wetland N, Facing East from Confluence with Stream 25.jpg



Wetland O.jpg





Blackstripe Topminnow



Blackstripe topminnow



Bluegill



Creek Chub



Gambusia

Green Sunfish





Pirate Perch



Slough darter



Spotted Bass



Stoneroller



Western creek chubsucker

Yellow Bullhead





Yellow Bullhead

APPENDIX E FIELD DATA

Macroinvertebrate Collection Check Sheet for Low-Gradient Streams

Date: 5-29-16 Time: 3-4 pm Project No: Ky18-005 Project Name: 4560 Balled Co. Collector(s) Initials: BR/RM Station ID: Station Lat: 37,079710 Long: -88.943030
Collector(s) Initials: BR/RM Station ID: Station Lat: 37,079710 Long: -88,943030
Collected during the headwater sampling period (March 1 – May 31) (Headwaters = $<5 \text{ mi}^2$).
Collected during the wadeable sampling period (May 1 – September 30) (Wadeable = >5 mi^2 and <200 mi^2).
<u>Stream Conditions</u> (Check precipitation before going. If a rainfall of at least 1 inch within a 24 hour period has occurred within 2 weeks of planned sampling event, then sampling <u>shall be delayed</u> until the 2 week requirement can be met.)
Clear with Normal flow Turbid or High flow. (If so, do not sample!) No flow in riffles. (If so, do not sample!)
Stream Reach
100 meters - 300 meters. How long? 100 meters Number of runs in stream reach: 3 (at least 3) Number of pools in stream reach: 3 (at least 3)
20 Jab Multi-Habitat Method
Vegetated Banks/Root Mats
Vegetative Bank/Root Mat Jabs (How many? (At least 1 in run and 2 from 2 separate pools
Submerged Vegetation
Submerged Vegetation Jabs (How many?) (At least 1 in run and 2 from 2 separate pools
Snags/Woody Debris
Snag/Woody Debris Jabs (How many?) (At least 1 in run and 2 from 2 separate pools)
Cobble/Gravel
Cobble/Gravel Kicks (How many?)
Silt/Sand/Fine Gravel
Sand/Silt/Fine Gravel Jabs (How many?) (At least 1 in run and 2 from 2 separate pools
beaf Packs
Leaf Pack Picks (How many? (At least 1 in run and 2 from 2 separate pools)
Total Number of Jabs/Kicks/Picks 20 (Should be 20 for the 20 jab method)
Field Measurements: <u>5.5</u> DO <u>23.5</u> Temperature <u>7.1</u> pH <u>23.4</u> Conductivity
Comments: 66.17 . 7n-b = 27.3

Low Gradient Bioassessment Stream Visit Sheet

			Low Gradien	n Diou				3	J
STREAM NAM	E: 1/T	Ave	mphrey G	Cik	LOCATION:	QU	1560	Balla	of the
STATION #:	Stat				COUNTY:	COUNTY: Ballard		PROGRAM: PROJECT: Ky 18-005	
INVESTIGATO	INVESTIGATORS: BRIAN			DATE: 29	110	TIME S	tart: 3	ocpu CST	
Verify Site LAT/	LONG vs GPS	s 🛛			·	-16	(24hr) F	inish: 4	100/01/07/
	Station		Downstrea		ach Upstreai	n	CANOPY	' COVER:: sed (0-25%)	
LAT 37	.07971	21	37.0795	71	37.079844		Partially Ex	posed (25-5	0%) Perennial
and the second se				404	-88.942	-704	Fully Shade	ed (75-100%	b) Intermittent
WEATHER Has there been a scouring rain in the last 14 days? Yes No			y rain y rain nittent showers /sunny	Deep	Disposal		truction mercial strial	Forest	e/Grazing
Stream Width Maximum Depth Reach Length Riffle/Run/P	200 Pool Sequence ed in Reach)	ft ft m	HYDRAULI STRUCTUR Dams Bridge Abutn Island Waterfalls Other:	ES	STREAM FLOW Dry Pooled Low High Normal	Dom	PARIAN VEGET inate Type rees[] Herbaceou rasses[] Shrubs ber of strata Shrub Taxa Box 2]	us Dom. /c-	CHANNEL ALTERATIONS Drcdging Channelization (EFull Partial)
P-CHEM		Instru	nent Used	ce o	heck list		Date	Calibrated:	5-29-18
Temp(°C)	D 0 (mg/l)	%Satu	iration	pH(S.L	.)(Cond		ſurb
					Collection Verific	_			
Algae	Sample: 🔲	QualM	l·IC 🗌 Other	4	Visual Assessn	ient	Lead Col	lector	
Fish	BPEF	PEF Seine Other Time: BPEF Seine Lead Collector:							
Habitat	RBP 🗌	RBP Substrate Other: Lead Collector							
Invertebrates	\square 1m ² \square 0 \square 20 Jab (#	Qual 🗖 Jabs: C] Other: obble 24 Snags	4 vo	eg Banks 🔏 Sa	nd <u>2</u> M	Lead Col Aacrophytes	lector Other	Lappade
Tissue:			lected S				Lead Col		
Water Chem			ilk 🗌 Nutrients 🗌		Low Hg		Lead Col	lector	
	Herbicid	es 🔲 P	Pesticides 🗌 Ortho	o P 🗖 Otl	ner:				
Duplicate Sam	ples Taken:	:							
			5	Substra	te Characteriz				
Substrate 🗆 Est	🗆 P.C. 🛛 F	Riffle_	0_%	F	lun <u>40</u> %		Pool_ <u>6_</u> %	0	Reach Total
Silt/Clay (<0.06	5 mm)								
Sand (0.06 – 2 1	mm)				30		70		
Gravel (2-64 m	m)				40		30		
Cobble (64 – 25	56 mm)				30	_			
Boulders (>256	mm)				12				
Bedrock									
NOTES/CO	OMMENTS	S:							

SITE NOT SAMPLED:

Land owner denial Dry Too deep/Impounded

Site not found/Secluded Unsafe

Other (indicate under comments)

RBP Low Gradient Habitat

Optimal	Suboptimal	Marginal	Poor		
0 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0		
er than 50% of substrate table for epifaunal ization and fish cover; mix igs, submerged logs, cut banks, cobble or other habitat and at stage to full colonization potential ogs/snags that are <u>not</u> new ansient).	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 newfall, 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		
re of substrate materials, gravel and firm sand lent; root mats and erged vegetation common.	Mixture of soft sand, mud, or elay: 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		
mix of large-shallow deep, small-shallow, small- 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		
or no enlargement of s or point bars and less 0% of the bottom affected liment deposition	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development: 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.		
reaches base of both lower , and minimal amount of el 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 rifile substrates are mostly exposed.	Very little water in channel and mostly present as standing pool		
elization or dredging or minimal; stream with 1 pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (>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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted In stream habitat greatly altered or removed entirely.		
ends in the stream increase eam length 3 to 4 times than if it was in a straight Note - channel braiding is ered normal in coastal and other low-lying areas, arameter is not easily rated e areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line	Channel straight: waterway has been channelized for a long distance.		
10 9	8 7 6	5 4 3	2 1 0		
stable; evidence of n or bank failure absent or al; little potential for problems. <5% of bank d	Moderately stable; infrequent, small areas of erosion mostly heated 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 croded areas; "raw" areas frequent along straight sections and bends, obvious bank sloughing; 60- 100% of bank has erosional scars.		
han 90% of the stream urlaces and immediate n zone covered by native tion, including trees, tory shrubs, or nonwoody ohytes; vegetative ion through grazing or g minimal or not evident; all plants allowed to grow ly.	70-90% of the stream bank 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 stream bank 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 stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height		
of riparian zone >18 ; human activities (i.e., g lots, roadbeds, clear- wns, or crops) have not ed 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.		
; hi g le avr	uman activities (i.e., ots. roadbeds, clear- is, or crops) have not	uman activities (i.e., Width of riparian zone 12-18 bts, roadbeds, clear- is, or crops) have not impacted zone only minimally.	uman activities (i.e., Width of riparian zone 12-18 meters; human activities have impacted zone only minimally. zone. Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.		

105

Stal

Macroinvertebrate Collection Check Sheet for Low-Gradient Streams

D	Date: 5-29-18 Time: 4-5 Project No: Ky 18-005 Project Name: US60 Ballard Co
С	Date: $5 - 29 - 18$ Time: $4 - 5$ Project No: $\frac{1}{18 - 205}$ Project Name: $\frac{1560}{100}$ Ballard Co. Collector(s) Initials: $\frac{3}{10}$ M Station ID: $\frac{5}{10}$ Lat: $\frac{3}{10}$, 070671 Long: $-\frac{88}{846452}$
-	Collected during the headwater sampling period (March 1 – May 31) (Headwaters = $<5 \text{ mi}^2$).
	Collected during the wadeable sampling period (May 1 – September 30) (Wadeable = $>5 \text{ mi}^2$ and $<200 \text{mi}^2$).
St. wi	<u>ream Conditions</u> (Check precipitation before going. If a rainfall of at least 1 inch within a 24 hour period has occurred ithin 2 weeks of planned sampling event, then sampling <u>shall be delayed</u> until the 2 week requirement can be met.)
V	Clear with Normal flow Turbid or High flow. (If so, do not sample!) No flow in riffles. (If so, do not sample!)
-	ream Reach 100 meters – 300 meters. How long? 15 0 meters umber of runs in stream reach: 4 (at least 3) umber of pools in stream reach: 4 (at least 3)
<u>20</u>	Jab Multi-Habitat Method
Ve	egetated Banks/Root Mats
	Vegetative Bank/Root Mat Jabs (How many?) (At least 1 in run and 2 from 2 separate pools
Su 	Submerged Vegetation Jabs (How many?) (At least 1 in run and 2 from 2 separate pools
Sn V	Snag/Woody Debris Jabs (How many?) (At least 1 in run and 2 from 2 separate pools)
Co	Cobble/Gravel Kicks (How many?)
Sil	lt/Sand/Fine Gravel
/	Sand/Silt/Fine Gravel Jabs (How many?) (At least 1 in run and 2 from 2 separate pools
Le	af Packs
	Leaf Pack Picks (How many?) (At least 1 in run and 2 from 2 separate pools)
To	tal Number of Jabs/Kicks/Picks (Should be 20 for the 20 jab method)
	Id Measurements: 6.6 DO 27.7 Temperature 7.3 pH 230 Conductivity mments: 79.2% $+ 1.5$ 29.3
	tarb 29.3
	incised stream, unstable substrutes

Low Gradient Bioassessment St	stream Visit	Sheet
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	LOW UTauten				
STREAM NAME: 3	gyon Creek	LOCA	TION:	@ 456	C GRAM: Ky 18-005 : 4:00 h: 4:00 CST
STATION #: Stat.		COUN	TY: Mc	Krater PRO	GRAM: KY 18-005
INVESTIGATORS:	BRIRM	DATE	· A .	TIME Start	: 11:00 Cat
Verify Site LAT/LONG vs	GPS TYES DNO DN/A		5 29-6	6 (24hr) Finis	h: 75.00 CSI
Station	Downstrea	Reach	Upstream	CANOPY CC	
LAT 370	7067 37.15708	26 37.	070784	Partially Expose	ed (25-50%)
	+6452 - 88,84				
WEATHER Now Has there been Image: Constraint of the last lage of the last last last lage of the last last last last last last last last	Past 24 hours Heavy rain Steady rain Intermittent showers Cloudy RES ft ft Dams nce h) Waterfalls	LOCAL WATER USURFACE Mining Deep Mining Oil Wells Land Disposal Residential C S S Dry ents Dry ents Norma S C C C C C C C C C C C C C C C C C C	SHED FEATU COLUMN IN I FLOW	REES (Predominant Su onstruction ommercial dustrial ow Crops RIPARIAN VEGETAT operfinate Type: Trees Herbaceous Grasses Shrubs imber of strata Dor ee/Shrub Taxa Bax Elder M Date Cali	Forest Pasture/Grazing Silviculture Urban Runoff/Storm Sewers ION CHANNEL ALTERATIONS Dredging Channelization (]Full [Partial] brated: 5 29-18
		Sample Collection			
Algae Sample:	QualMHC Other			Lead Collecto	ir:
Fish BPEF	🗋 Seine 🗌 Other 👘 Time	: BPEF	Seine	Lead Collecto)ľ
Habitat RBP	🗍 Substrate 📋 Other:				IT B. Rewled
	Qual Other:	Van Deelee	Cand		r. B. Renley
	mples collected Spage		Sang	Lead Collecto	
	Alk 🗋 Bulk 🗋 Nutrients 🗍			Lead Collecto	
	cides 🗌 Pesticides 🗌 Ortho	P 🔲 Other:			
Duplicate Samples Take	en:				
		ubstrate Chara			
Substrate Est. P.C.	Riffle_ <u>N/1</u> +%	Run 40	_%	Pool_60%	Reach Total
Silt/Clay (<0.06 mm)				30	
Sand (0.06 – 2 mm)		30		50	
Gravel (2-64 mm)		60		20	
Cobble (64 – 256 mm)		10			
Boulders (>256 mm)					
Bedrock					
NOTES/COMMEN	TS:	l			1
	v pernission Gide USO	v~ •0	Land ow	OT SAMPLED	Too deep/Impounded

No landorrer pernission ON Sonth Side 11560

SITE	NOT	SAMPLE	D:
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RBP Low Gradient Habitat

Habitat		Condition	1 Category			
Parameter	Optimal	Suboptimal	Marginal	Poor		
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0		
1. Epifaunal Substrate/ Available Cover Score	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 and 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 newfall, 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.		
2. Pool Substrate Characterization Score 9	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.		
3. Pool Variability 9	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,		
4. Sediment Deposition Score	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.		
5. Channel Flow Status Score 2-	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		
6. Channel Alteration Score	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, (>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 to 80% of stream reach channelized and disrupted	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. In stream habitat greatly altered or removed entirely.		
7. Channel Sinuosity Score	The bends in the stream increase the stream length 3 to 4 times longer than if it was in 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 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight: waterway has been channelized for a long distance.		
Left/Right Bank	10 9	8 7 6	5 4 3	2 1 0		
B. Bank Stability LB 2 RB 3	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 frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars;		
P. Vegetative Protection B.B. A.	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, mcluding 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 stream bank 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 stream bank 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 stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.		
0. Riparian /egetative Zone Vidth	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters: human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.		
	Score	NOTES/COMMENTS.				

Total Score

NOTES/COMMENTS:

Sec.

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Station 2

Macroinvertebrate Collection Check Sheet for Low-Gradient Streams

Date: 5-29-18 Time: Project No: Ky 16-005 Project Name: 4560 Ballard 20. Collector(s) Initials: BM/M Station ID: 9 tation 3 Lat: 37,077016 Long: -68.898236
Collector(s) Initials: BN/pm Station ID: 97471013 Lat: 37,077016 Long: -68.898236
Collected during the headwater sampling period (March 1 – May 31) (Headwaters = $<5 \text{ mi}^2$).
Collected during the wadeable sampling period (May 1 – September 30) (Wadeable = $>5 \text{ mi}^2$ and $<200 \text{mi}^2$).
Stream Conditions (Check precipitation before going. If a rainfall of at least 1 inch within a 24 hour period has occurred within 2 weeks of planned sampling event, then sampling shall be delayed until the 2 week requirement can be met.)
Clear with Normal flow Turbid or High flow. (If so, do not sample!) No flow in riffles. (If so, do not sample!)
Stream Reach
100 meters - 300 meters. How long? 200 meters Number of runs in stream reach: 6 (at least 3) Number of pools in stream reach: 6 (at least 3)
20 Jab Multi-Habitat Method
Vegetated Banks/Root Mats
Vegetative Bank/Root Mat Jabs (How many?24) (At least 1 in run and 2 from 2 separate pools
Submerged Vegetation
Submerged Vegetation Jabs (How many?) (At least 1 in run and 2 from 2 separate pools
Snags/Woody Debris
Snag/Woody Debris Jabs (How many?) (At least 1 in run and 2 from 2 separate pools)
Cobble/Gravel
Cobble/Gravel Kicks (How many?)
Silt/Sand/Fine Gravel
Sand/Silt/Fine Gravel Jabs (How many?) (At least 1 in run and 2 from 2 separate pools
Leaf Packs
Leaf Pack Picks (How many? (At least 1 in run and 2 from 2 separate pools) Total Number of Jabs/Kicks/Picks 20 (Should be 20 for the 20 jab method)
Total Number of Jabs/Kicks/Picks (Should be 20 for the 20 jab method)
Field Measurements: <u>6.20</u> DO <u>23.64</u> _{Temperature} <u>7.27</u> _{pH} <u>0.200</u> _{Conductivity} Comments: <u>75.3</u> ^e 10 TUB 36.4

Providence	Low Gradie	nt Bioas	ssessment S	tream \	isit Sheet		
STREAM NAME:			LOCATION:	6	Future	use	10
STATION #: 570	Tion 3		COUNTY:	Ball	god PI	ROGRAM: ROJECT: 人)	116-005 10 (ST
INVESTIGATORS: BILLEM			DATE: 5/2	alio	TIME St (24hr)	art: 5:00	1 ct
Verify Site LAT/LONG vs	ch						
Statio		am	Upstrea	m	CANOP Y Expose البرج	ed (0-25%)	STREAM
	70 16 37.0766				Partially Exposed (25-50%) Partially Shaded (50-75%)		Perennial
	98736 -88.8981		the second se	and the second se	🔲 Fully Shadeo		Intermittent
WEATHER Now Has there been	Past 24 hours Heavy rain	LOCAL Surfac		EATURE	ES (Predominant ruction	Surrounding La	and Use):
Has there been a scouring rain in the last 14	Steady rain	Deep I		lining 🗌 🗌 Comn		Pasture/Gra	zing
days?	Clear/sunny Cloudy	Land I	Disposal	Row		Urban Rund	off/Storm Sewers
INSTREAM FEATU	RES	1		and the state of t	ARIAN VEGET	ATION	
Maximum Depth	Image: Construction of the structure Hydrauli 51 ft STRUCTUR	es le	TREAM FLOW	1 In	nate Type: ces 🗌 Herbaceous		CHANNEL
Reach Length 2 Riffle/Run/Pool Seque	m Dams ence D Bridge Abutir		Pooled Low	Gr Numb	asses Shrubs er of strata <u>3</u> 1 hrub Taxa		LTERATIONS Dredging
(No. Sampled in Rea	ch) Island	ĺČ] High				Channelization Full Partial)
<u> </u>	Pool Other:	E	Normal	EL.	m/mil!	reruy -	
Р-СНЕМ	Instrument Used	see a	picht 1: 31	r l	Date C	Calibrated:	5.29.18
Temp("C) D_(O (mg/l) %Satu	iration	pH(S U	.)	Cond	Turb,	
		Sample Co	ollection Verific	ation			
Carrow and the second s	QualMHC Other] Visual Assessm		Lead Colle	ector:	,
and the state of the second state of the secon	Seine Other Time	E: BPEF	Seine		the second s	ector:	dec
	Qual 🗋 Other:	11				ector: B. R.	and the second se
· · · · · · · · · · · · · · · · · · ·	b (#Jabs: Cobble Snags	Veg	Banks San	dM			
Tissue: No of Sa	amples collected Sp):			Lead Colle		<u>.</u>
	Alk 🗌 Bulk 🗌 Nutrients 🗍 cides 🗌 Pesticides 🗍 Ortho	0	Ũ		Lead Colle	ctor:	
Duplicate Samples Tak							
							5 Sc
	S	ubstrate	Characteriza	ntion		2.	
Substrate 🗌 Est. 🗍 P.C.	Riffle%	Ru	n <u>40</u> %	Р	001 60 %	Re	ach Total
Silt/Clay (<0.06 mm)							
Sand (0.06 – 2 mm)			30	_	70		141
Gravel (2-64 mm)			70		70		
Cobble (64 – 256 mm)							
Boulders (>256 mm)							
Bedrock							_
NOTES/COMMEN	TS:		1				
			SIT	E NOI	SAMPLE	D:	

 d^{2}

18

- Land owner denial Dry Too deep/Impounded
- Site not found/Secluded Unsafe

÷.

Other (indicate under comments)

RBP Low Gradient Habitat

Habitat			Category	Poor		
Parameter	Optimal	Suboptimal	Marginal			
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0		
1. Epifaunal Substrate/ Available Cover Score	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 and 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 newfall, but not yet prepared for colonization (may rate at high end of scale).	r full colonization quate habitat for of populations; dditional substrate rewsfall, but not for colonization			
2. Pool Substrate Characterization Score	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 elay or bedrock; no root mat or vegetation.		
3. Pool Variability 10	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		
4. Sediment Deposition Score	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.		
5. Channel Flow Status Score 13	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 rifile substrates are mostly exposed.	Very little water in channel ar mostly present as standing po		
6. Channel Alteration $\rightarrow 20^{1/05^{(e_1)}}$ Score	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, (>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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted In stream habitat greatly altered or removed entirely.		
7. Channel Sinuosity Score	The bends in the stream increase the stream length 3 to 4 times longer than if it was in 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 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight: waterway has been channelized for a long distance.		
Left/Right Bank	10 9	8 7 6	5 4 3	2 1 0		
8. Bank Stability LB 4 RB 5	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 crosion 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 frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.		
D. Vegetative Protection	More than 90% of the stream bank 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 stream bank 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 stream bank 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 stream bank surfaces covered by vegetation; disruption of strean bank vegetation is very high: vegetation has been removed to 5 centimeters or less in average stubble height.		
10. Riparian Vegetative Zone Width .B	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.		

100 Station 3

Macroinvertebrate Collection Check Sheet for Low-Gradient Streams

Date: 5-29-18 Time: 6-7 Project No: Ky 18-005 Project Name: US60 Byllard Co Collector(s) Initials: BB/CM Station ID: 51-17-00 14 Lat: 37,078927 Long: 88,921960
Collector(s) Initials: BBIEM Station ID: 51-17-10 4 Lat: 37,078927 Long: 88.921960
\bigcirc collected during the headwater sampling period (March 1 – May 31) (Headwaters = <5 mi ²).
Collected during the wadeable sampling period (May 1 – September 30) (Wadeable = >5 mi ² and <200 mi ²).
Stream Conditions (Check precipitation before going. If a rainfall of at least 1 inch within a 24 hour period has occurred within 2 weeks of planned sampling event, then sampling shall be delayed until the 2 week requirement can be met.)
Turbid or High flow. (If so, do not sample!) No flow in riffles. (If so, do not sample!)
Stream Reach
100 meters - 300 meters. How long? 100 meters Number of runs in stream reach: (at least 3) Number of pools in stream reach: (at least 3)
20 Jab Multi-Habitat Method
Vegetated Banks/Root Mats
Vegetative Bank/Root Mat Jabs (How many?) (At least 1 in run and 2 from 2 separate pools
Submerged Vegetation
Submerged Vegetation Jabs (How many?) (At least 1 in run and 2 from 2 separate pools
Snags/Woody Debris
Snag/Woody Debris Jabs (How many?) (At least 1 in run and 2 from 2 separate pools)
Cobble/Gravel
Cobble/Gravel Kicks (How many?
Silt/Sand/Fine Gravel
Sand/Silt/Fine Gravel Jabs (How many?) (At least 1 in run and 2 from 2 separate pools
Leaf Packs
Leaf Pack Picks (How many? (At least 1 in run and 2 from 2 separate pools)
Total Number of Jabs/Kicks/Picks (Should be 20 for the 20 jab method)
Field Measurements: 10.64 DO 33.87 Temperature 6.74 pH 0.32^3 ConductivityComments: $124.19/0$ Turb 35.6
Comments: 124,190 Turh 35,6

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STREAM NAME: UT Image: Start to yee PROGRAM: PROGRAM: <th></th> <th>Low Gradie</th> <th>nt Bioas</th> <th>sessment S</th> <th>tream V</th> <th>Isit Sheet</th> <th></th> <th></th>		Low Gradie	nt Bioas	sessment S	tream V	Isit Sheet		
STATION # 61 4 0.0 4 POOREAT: Kylle-025 INVESTIGATORS: 61 / 1 0.0 km DATE: 5-24-12 TIME Status: St	STREAM NAME:	IT TONT Hamp	hveycak	LOCATION:	Ø			
INVESTIGATORS: UMS DATE: S 247-18 TIME Statism STREAM DATE: S 247-18 TIME Statism STREAM CANDAY COVER: STREAM STREAM CanDay Covers: STREAM						d P	ROGRAM: ROJECT:	15418-005
CANOPY COVER: LAT 37.078427 37.079425 57.078478 End (5) (5) (5) (5) (5) (5) (5) (5) (5) (5)	INVESTIGATORS:	ORIAN				TIME S	tart: G	oopn of
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	Riffle/Run/Pool Sequ	Jence 🔲 Bridge Abutn	nents	Low	Numb	er of strata 3	Dom,	Dredging
		Waterfalls] High Normal		-		(DFull Partial)
Temp("C)								>ZUY+ors
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Image: Instruct of the second seco								0
Substrate Characterization Substrate Characterization Substrate Est. P.C. Riffle% Run_30% Pool 70% Reach Total Sill/Clay (<0.06 mm)	Water Chem 🗌 Acid	/Alk 🗌 Bulk 🗋 Nutrients 🗋	Metals 🔲 L	low Hg		Lead Colle	ector:	
Substrate Characterization Substrate Est. P.C. Riffle% Run?O_% Pool _?O_% Reach Total Silt/Clay (<0.06 mm)			P 🗋 Other:					
Substrate Desc. Riffle% Run_30% Pool_70% Reach Total Silt/Clay (<0.06 mm)	Supreate Samples Tak	ten:			2			
Substrate Description Run 20 % Pool 70 % Reach Total Silt/Clay (<0.06 mm)								· ·
Sill/Clay (<0.06 mm)		1						
Sand (0.06 - 2 mm) 3.0 5.0 Gravel (2-64 mm) -7.0 5.0 Cobble (64 - 256 mm) -7.0 5.0 Boulders (>256 mm) -7.0 -7.0 Bedrock -7.0 -7.0		Riffle%	Run	30%	Po	ool <u>70</u> %		Reach Total
Gravel (2-64 mm) 70 50 Cobble (64 – 256 mm) 50 Boulders (>256 mm) 60 Bedrock 60 NOTES/COMMENTS: 60	ilt/Clay (<0.06 mm)							
Gravel (2-64 mm) 70 50 Cobble (64 – 256 mm) 50 Boulders (>256 mm) 60 Bedrock 60 NOTES/COMMENTS: 60	and (0.06 – 2 mm)		1	30		50		
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	5 Tak			SITI	E NOT	SAMPLE	D:	
NOF-17 Dry Droo deep/Impounded	Norigh							oo deep/Impounded

Site not found/Secluded Unsafe

Other (indicate under comments)

RBP Low Gradient Habitat

Habitat		Conditio	n Category	
Parameter	Optimal	Suboptimal	Marginal	Poor
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
1. Epifaunal Substrate/ Available Cover Score	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 and 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 newfall, 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.
2. Pool Substrate Characterization Score 15	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.
3. Pool Variability <i>d</i>	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
4. Sediment Deposition Score	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
5. Channel Flow Status Score H	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.
6. Channel Alteration The New Score	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, (>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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted In stream habitat greatly altered or removed entirely
7. Channel Sinuosity Score	The bends in the stream increase the stream length 3 to 4 times longer than if it was in 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 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line	Channel straight; waterway has been channelized for a long distance.
Left/Right Bank	10 9	8 7 6	5 4 3	2 1 0
Bank Stability B 2 RB 2	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 croded areas. "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars
Protection B B B	More than 90% of the stream bank 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 stream bank 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 stream bank 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 stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
	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.
Total S		NOTES/COMMENTS:		

Total Score

NOTES/COMMENTS:

Station 4

8

Macroinvertebrate Sample Chain of Custody Project Information Sheet

Client Name: <u>XK4</u>		Project Ad	ministrator:	M. Fore	2 Project Num	ber:Ky/{	8-005 Due Date: 7/30/18
Sampling Site Location: 450	0			County:	Ballard/1	1 Crachen	State:/ry
System Type: Handwater	Ec	oRegion:	VIR	_Total Numi	ber of Samples:	4 Total	Number of Containers: 4
Reporting Requirements:				/			
Samples Relinquished By:							
Samples Relinquished By:		Date/Time:	S	ample Rece	ived By:		Date/Time:
Comments/Special Instructions:							
						5	
Sample Reference ID	Qualitative or Quantitative	Collected By	Collection Date	Sample Type	Preservative	# of Containers Per Sample	Analysis Required (KDOW Protocol, ID Level; etc.)
Station 1	Quart	BRIAM	5-29-18	20- Jab	Ethonel	Ì	Kpow - Low Gradient
Station 2							
Station 3							
STATION 4	V	V	V	V			
		6	Deverse				

- Continue on Reverse for More Samples -

System Type: Headwater Stream; Wadeable Stream; Large River; Lotic; Other

EcoRegion: Bluegrass; Mountain; Pennyroyal; Mississippi Valley-Interior River Lowlands; Other

Sample Type: KN KickNet; TK Traveling Kick; MH Multihabitat; S Surber; HD Hester-Dendy Multiplate; HDD HD Deep; HDS HD Shallow; OT Other_____; NA Not Available

MacLIMS: Client Setup/Login By ______ Date _____; Reported By ______ Date ____; Invoiced By ______ Date _____ 5/20/10

Project No: <u>_Ky18-005</u>	Name: <u> </u>	Date(s):7-12-18
Stream Name: UT Hump	hry Creek	Station ID: Stat
	State: River Basin:	
Stream Class:	Latitude: <u>37.0797/0</u>	Longitude:88 , 9 4 30 3
Investigator(s): <u>B. Fenley</u>	J. Storm	Method: Backpack + seine
Sampling Duration	Start: 0 GCC	Finish: 1220 Sec
Stream Width (in meters)	Max: &	Mean:5 M

Species	Released	Voucher	Total	Notes
Stoneraller	168	0	168	
	74	0	74	
\bigcirc	18	0	18	
Vellow Bullhpad	8	0	8	
Green SunFish	8	0	8	
		0	1	
A 1	l	0	1	
2.	4	0	4	
···· 7··· 1			÷	
	Stoneroller Creek chub Black Stripe Vellow Bullhoad Green Sun Figh Spotted bass Pirate Perch	Stoneroller Greek chub 74 Black Stripe 18 Vellow Bullhead 8 Green Sun Figh 8 Spotted bass 1 Pirate Perch 1	Storerolli168Creek chub74Black Stripe18Vellow Bullhead8Vellow Bullhead8Green Sun Fish8Spotted bass1Pirate Perch1	Stoneroller1680168Creek chub74074Black stripe18018Vellow Bullhead808Green Sun Fish808Spotted bass101Pirate Purch101

Continue on additional sheet if necessary. TCMP 20.9 PH 6.9 Flow 0.01 DO/1. 4.1/46.8 COND 252

Project No: 14 8-005	Name: US 60	Date(s): <u>9-/2-/8</u>
Stream Name: Bayou C	recht	Station ID: <u>Sta 2</u>
County: Mc Craken	State: River Basin:	
Stream Class:	Latitude: <u>37.070671</u>	Longitude: <u>-88,846452</u>
Investigator(s): B. Roma	oy J. Starm	Method: Bach Pach + seine
Sampling Duration	Start: OSCC	Finish: 1012 500
Stream Width (in meters)	Max:7	Mean:

	Species	Released	Voucher	Total	Notes
	Bluegill	6		6	
2	Green SunFish	55		55	
3	Gambusia	44		44	
4	Creek chub	19		19	
5	Stancroller	18		18	
6	Blackstige Topminnow	16		16	
7	Jur Centrarchidae	68		68	
8	Vellow bullhead			1	
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23		-			
24					
25					

Continue on additional sheet if necessary. temp 22.3 PH 7.1 type 0.1 DO/.1. 4.8/56.4 COND 279 Flow 0.01

Project No: <u>Ky 18-005</u>	Name: US60	Date(s): <u>9-13-18</u>
Stream Name: UT Hum ph	y Creek	Station ID: Str 3
County: Ballard	State: Ky River Basin:	
Stream Class:	Latitude: 37.077016	Longitude: <u>88,898236</u>
Investigator(s): Kenley/	5, Storm	Method: Back pack + Siere
Sampling Duration	Start:	Finish:
Stream Width (in meters)	Max: 6 M	Mean:5 M

	Species	Released	Voucher	Total	Notes
- T_	Blackstipe topainnow	52	C	52	
2	Gambusia	43	0	43	
3	Creek chab	137	0	137	
4	Green Surfish	1	0		
5	Spotted bass	1	0		
6	B) he sill	2	0	7	
7	Stonereller	40	0	80	
8	Western Creek Chubsucker	26	0	26	
9	Slanch darter)	0	1	
10					
Ш					
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Continue on additional sheet if necessary.

ТСМР 20.4 РН 7.1 Dol.1. 7.3 82.0%

Cond 350 + 4.6 0.6 Flov 0.06

Project No: <u>KY18-005</u>	Name: <u> </u>	60	*	Date(s):
Stream Name: <u>UT</u> Hump	shrey Creek			Station ID: <u>Sta 4</u>
County: Ballord	State:	River Basin:	Ohio	Rive-
Stream Class:	Latitude: 37.07	8927	Longitude:	- 88,921960
Investigator(s): Rember	JJ. Storm		Method:	NA
Sampling Duration	Start:/		Finish:	N/A
Stream Width (in meters)	Max:5		Mean:	3

	Species	Released	Voucher	Total	Notes
	N/A - dat		Lait		
2	NA NO	War	1 EV		
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Continue on additional sheet if necessary.

THIRD ROCK CONSULTANTS, LLC	FOUSER ENVIRONMENTAL SERVICES ARORATORY CHAIN OF CINETO
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		FOUSER ENVIRONMENTAL	ENVIRO	NMEN		SERVICES		LABORATORY CHAIN-OF-CUSTODY	CHAI	V-OF-CU	STODY			
Project Name ¹ :	US60						Containe	Container Size / Preservation	ervation		2 ul	In Situ Measurements	Tents	
Project No.':	KY18-005						l litre	8 ounce	8 ounce	TÍ				
Prime Consultant:	QK4							H ₂ SO ₄	ŐNH					
Turnaround:	10 Days						Red	Requested Analysis ²	'sis ²			()	(1	
EDDs Required ¹ :	Yes									8		⊃°) ∍.	นว/รท	
EDDs to:	Bert Remley at bremley @thirdrockconsultants.com	bremley@thii	rdrockcons	ultants.cc	Ę		ieydso Id 'OC '		1			INJEYS	່) ອວນາ	(cfs)
Invoice to:	Accounts Payable at <u>bweatherford@thirdrockconsultants.com</u>	vie at <u>bweathe</u>	rford@thir	drockcor	isultants.	COM		litroge	ssə		(UTI	dməT	nducta	ุมราชอ
Questions to:	Bert Remley at bremley@thirdrockconsultants.com	bremley@thir	rdrockcons	ultants.cc	Ę		, Sbi		nbhah		1) YJit	ater -	roD p	osiQ I
CI qe I	Site ID	Date	Time	Matrix ³	Type	Filtered	Chlor		ron, F	JoloC	oidnu ⁻	W/niv	oficia	ແເອນ
	Station 2	g+21-b	1500	S	Grab	× 10	17		7	tauri		74 612	565	
	Station 1 9-12-18 1700	81-21-6	1700	SW	Grab	X / N	7	7	7	and of 1 to	00		252	0.01
	5tatiur3 9-13-18 0830	91-13-16	0830	SW	Grab	CN / X	7	2	7	Tannic	<i>j</i> , 0		350	000
				SW	Grab	N / Х		- -			5			2
				SW	Grab	Z \ 							-	
				SW	Grab	N / X								
$^{\sf I}$ Project name, No. and weather event must appear on EDD and invoice; 2 40CFR Pa	ind weather event n	nust appear on	EDD and inv	roice; ² 4()CFR Pari	: 136 Methor	lology Requir	urt 136 Methodology Required; ³ Surface Water;	Water;					

Field Notes:

nie Relinquished by:

Hymr Ellis FOR LAB

Received by:

202

Temp upon Relinquishment:

Upon relinquishment, samples properly preserved, bottles intact, seals intact, etc? Y / N If no, explain

Additional documentation attached? Y / (N) If yes, describe:

Date: 9-14-18 Date: 0,-//-

1-18 Time: 10,03A

Time: 10:03

REACH Stream I	PROJECT KY18-005	DATE 2/13/2019	LAT 37.078616	LONG -88.952552
INVESTIGATOR(S)	J. Storm, R. McGregor		WATERSHED Middle Hump	ohrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	AGE DESCRIPTION:	
Width (Ft) 3.0	Perennial			
- (·)	Ephemeral X			
-F - (-)				
Reach (Ft)	Intermittent			
		CONDITION	CATEGORY	
HABITAT	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
PARAMETER	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
1. Epifaunal Substrate /	Greater than 50% of substrate		· · · · · · · · · · · · · · · · · · ·	Less than 10% stable habitat; lack
Available Cover	favorable for epifaunal colonization and fish cover; mix of snags,	potential; adequate habitat for	· · ·	of habitat is obvious; substrate unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	unstable of lacking.
		presence of additional substrate in	distarbed of Terrioved.	
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 7	not new fall and not transient.)	at high end of scale).		
Score 7 2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock: no
Characterization	with gravel and firm sand	· · · · · · · · · · · · · · · · · · ·	·	root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	
	submerged vegetation common.	present.		
Score 12				
3. Pool Variability	Even mix of large-shallow, large-	Majority of pools large-deep; very	Shallow pools much more	Majority of pools small-shallow or
	deep, small-shallow, small-deep	few shallow.	prevalent than deep pools.	pools absent.
	pools present.			
Score 5				
4. Sediment Deposition	Little or no enlargement of islands			Heavy deposits of fine material,
		formation, mostly from gravel, sand		
	the bottom affected by sediment	or fine sediment; 20-50% of the		than 80% of the bottom changing
	deposition.	bottom affected; slight deposition in pools.		frequently; pools almost absent due to substantial sediment
			deposits at obstructions, constrictions, and bends;	deposition.
			moderate deposition of pools	
	•		prevalent.	
Score 7 5. Channel Flow Status	Water reaches base of both lower	Water fills > 75% of the available		Very little water in channel and
5. Chaimer now Status	banks, and minimal amount of	channel; or <25% of channel	available channel, and/or riffle	mostly present as standing pools.
	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	
Score 13		·····		
6. Channel Alteration	Channelization or dredging absent	Some channelization present,	Channelization may be	Banks shored with gabion or
	or minimal; stream with normal	usually in areas of bridge	· · · · · · · · · · · · · · · · · · ·	cement; over 80% of the stream
	pattern.	abutments; evidence of past		reach channelized and disrupted.
		channelization, i.e., dredging,		Instream habitat greatly altered or
		(greater than past 20 yr) may be present, but recent channelization	stream reach channelized and disrupted.	removed entirely.
Score 13		is not present.	disi upted.	
7. Channel Sinuosity	The bends in the stream increase	The bends in the stream increase	The bends in the stream	Channel straight; waterway has
,	the stream length 3 to 4 times	the stream length 2 to 3 times	increase the stream length I to	
	longer than if it was in a straight	longer than if it was in a straight	2 times longer than if it was in a	
	line. (Note – channel braiding is	line.	straight line.	
	considered normal in coastal plains			
	and other low-lying areas. This			
	parameter is not easily rated in			
Score 8	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 8	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
RB Score 8				of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 5 RB Score 5	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score I	lawns, or crops) have not			
	impacted zone.			
Total Score 97				

REACH Stream 2	PROJECT KY 18-005	DATE 2/13/2014	LAT <u>37.078137</u>	LONG -88.953406
INVESTIGATOR(S)	J. Storm, R. McGregor		WATERSHED Middle Hump	bhrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	AGE DESCRIPTION:	
Width (Ft) 3.0) Perennial			
Depth (Ft) 0.5	Ephemeral X			
Reach (Ft)	Intermittent			
		CONDITION	CATEGORY	
HABITAT	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
PARAMETER	20 19 18 17 16 Greater than 50% of substrate	15 14 13 12 11	10 9 8 7 6 10-30% mix of stable habitat;	5 4 3 2 1 0 Less than 10% stable habitat; lack
 Epifaunal Substrate / Available Cover 	favorable for epifaunal colonization		habitat availability less than	of habitat is obvious; substrate
Available Cover	and fish cover; mix of snags,	potential; adequate habitat for	· · · · · · · · · · · · · · · · · · ·	unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	unstable of lacking.
	cobble or other stable habitat and	presence of additional substrate in		
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 5	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock; no
Characterization	with gravel and firm sand		little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	-
	submerged vegetation common.	present.		
Score 6				
3. Pool Variability	Even mix of large-shallow, large- deep, small-shallow, small-deep	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	pools present.	iew shallow.	prevalent than deep pools.	pools absent.
Score 2				
4. Sediment Deposition	Little or no enlargement of islands		Moderate deposition of new	Heavy deposits of fine material,
	the bottom affected by sediment	formation, mostly from gravel, sand or fine sediment; 20-50% of the	old and new bars; 50-80% of	than 80% of the bottom changing
	deposition.	bottom affected; slight deposition		frequently; pools almost absent
		in pools.	deposits at obstructions,	due to substantial sediment
			constrictions, and bends;	deposition.
			moderate deposition of pools	
Score 3			prevalent.	
5. Channel Flow Status	Water reaches base of both lower	Water fills > 75% of the available	Water fills 25-75% of the	Very little water in channel and
	banks, and minimal amount of	channel; or <25% of channel	available channel, and/or riffle	mostly present as standing pools.
	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	
Score 10 6. Channel Alteration	Channelization or dredging absent	Some channelization present	Channelization may be	Banks shored with gabion or
6. Channel Alteration	or minimal; stream with normal	usually in areas of bridge	extensive; embankments or	cement; over 80% of the stream
	pattern.	abutments; evidence of past	shoring structures present on	reach channelized and disrupted.
	F	channelization, i.e., dredging,	both banks; and 40 to 80% of	Instream habitat greatly altered or
		(greater than past 20 yr) may be	stream reach channelized and	removed entirely.
		present, but recent channelization	disrupted.	
Score 8		is not present.		
7. Channel Sinuosity	The bends in the stream increase	The bends in the stream increase	The bends in the stream	Channel straight; waterway has
	the stream length 3 to 4 times	the stream length 2 to 3 times	increase the stream length I to	
	longer than if it was in a straight		2 times longer than if it was in a	distance.
	line. (Note – channel braiding is considered normal in coastal plains	line.	straight line.	
	and other low-lying areas. This			
	parameter is not easily rated in			
Score 2	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 8	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
LB Score 8 RB Score 8			-	of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 5 RB Score 5	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 6	lawns, or crops) have not			
	impacted zone.			
Total Score 70				

REACH Stream 3		PROJECT	KY18-005	DATE 2/13/2019	LAT <u>37.079110</u>	LONG -88.944367
INVESTIGATOR(S)	J. Storm, R. McGr	egor	COWARDIN CLASS R3	WATERSHED Middle Hump	ohrey Creek
STREAM SIZE:		STREAM TYPI	E:	IMAGE ID #: IM	IAGE DESCRIPTION:	
Width (Ft)	10.0	Perennial	Х			
Depth (Ft)	2.0	Ephemeral				
Reach (Ft)		Intermittent				
		Intermittent				
	-			CONDITION		
HABITAT PARAMETER	-			SUBOPTIMAL	MARGINAL	POOR
I. Epifaunal Substrate	a /	20 19 18 Greater than 50% o	17 16	15 14 13 12 11 30-50% mix of stable habitat; well	10 9 8 7 6 10-30% mix of stable habitat;	5 4 3 2 1 0 Less than 10% stable habitat; lack
Available Cover				suited for full colonization	habitat availability less than	of habitat is obvious; substrate
		and fish cover; mix		potential; adequate habitat for	desirable; substrate frequently	unstable or lacking.
		submerged logs, un	•	maintenance of populations;	disturbed or removed.	, v
		cobble or other sta		presence of additional substrate in		
		at stage to allow ful	ll colonization	the form of new fall, but not yet		
		potential (i.e., logs/s	snags that are	prepared for colonization (may rate	2	
Score	9	not new fall and no	t transient.)	at high end of scale).		
2. Pool Substrate		Mixture of substrat	e materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock; no
Characterization		with gravel and firm	n sand	mud may be dominant; some root	little or no root mat; no	root mat or vegetation.
		prevalent; root mat	ts and	mats and submerged vegetation	submerged vegetation.	
		submerged vegetati	ion common.	present.		
	8	F		Maintin of a sele laware describer		Maiania, af a ala anall aballana an
3. Pool Variability		Even mix of large-sl deep, small-shallow	-	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
		pools present.	, sman-deep	iew shallow.	prevalent than deep pools.	pools absent.
		pools present.				
00010	10					
4. Sediment Depositi		-		Some new increase in bar	Moderate deposition of new	Heavy deposits of fine material,
		-		formation, mostly from gravel, sand or fine sediment; 20-50% of the	-	
		the bottom affected deposition.	by sediment	bottom affected; slight deposition	old and new bars; 50-80% of the bottom affected; sediment	than 80% of the bottom changing frequently; pools almost absent
		deposition.		in pools.	deposits at obstructions,	due to substantial sediment
					constrictions, and bends;	deposition.
					moderate deposition of pools	'
	1				prevalent.	
Score 5. Channel Flow Stat	6 us	Water reaches base	e of both lower	Water fills > 75% of the available	Water fills 25-75% of the	Very little water in channel and
		banks, and minimal		channel; or <25% of channel	available channel, and/or riffle	mostly present as standing pools.
		channel substrate is		substrate is exposed.	substrates are mostly exposed.	······/ F 0 F
	12				, ,	
6. Channel Alteration				Some channelization present,	Channelization may be	Banks shored with gabion or
		or minimal; stream	with normal	usually in areas of bridge	extensive; embankments or	cement; over 80% of the stream
		pattern.		abutments; evidence of past	shoring structures present on	reach channelized and disrupted.
				channelization, i.e., dredging,	both banks; and 40 to 80% of	Instream habitat greatly altered or
				(greater than past 20 yr) may be present, but recent channelization	stream reach channelized and	removed entirely.
Score	13			is not present.	disrupted.	
7. Channel Sinuosity		The bends in the st	ream increase	The bends in the stream increase	The bends in the stream	Channel straight; waterway has
		the stream length 3		the stream length 2 to 3 times	increase the stream length I to	
		longer than if it was		longer than if it was in a straight	2 times longer than if it was in a	
		line. (Note – chanr	nel braiding is	line.	straight line.	
		considered normal	in coastal plains			
		and other low-lying	areas. This			
		parameter is not ea	asily rated in			
Score	7	these areas.)				

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 9	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
RB Score 7				of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 8 RB Score 8	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 9	lawns, or crops) have not			
RB Score 10	impacted zone.			
Total Score 116				

REACH Stream 4	PROJECT KY18-005	DATE 2/13/2019	LAT <u>37.079500</u>	LONG -88.905302
INVESTIGATOR(S)	J. Storm, R. McGregor		WATERSHED Upper Hump	hrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	AGE DESCRIPTION:	
Width (Ft) 8.0	Perennial			
	Ephemeral			
-1- (-)	· · <u> </u>			
Reach (Ft)	Intermittent X			
		CONDITION	CATEGORY	
HABITAT	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
PARAMETER I. Epifaunal Substrate /	20 19 18 17 16 Greater than 50% of substrate	15 14 13 12 11 30-50% mix of stable habitat; well	10 9 8 7 6 10-30% mix of stable habitat;	5 4 3 2 1 0 Less than 10% stable habitat; lack
Available Cover	favorable for epifaunal colonization		habitat availability less than	of habitat is obvious; substrate
/ Wallable Cover	and fish cover; mix of snags,	potential; adequate habitat for	: · · · · · · · · · · · · · · · · · · ·	unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	
	cobble or other stable habitat and	presence of additional substrate in		
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 13	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock; no
Characterization	with gravel and firm sand	mud may be dominant; some root	little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	
Score 16	submerged vegetation common.	present.		
Score 16 3. Pool Variability	Even mix of large-shallow, large-	Majority of pools large-deep; very	Shallow pools much more	Majority of pools small-shallow or
	deep, small-shallow, small-deep	few shallow.	prevalent than deep pools.	pools absent.
	pools present.		r	
Score 9 4. Sediment Deposition	Little or no enlargement of islands	Some new increase in bar	Moderate deposition of new	Heavy deposits of fine material,
4. Sediment Deposition	=	formation, mostly from gravel, sand		
			old and new bars; 50-80% of	than 80% of the bottom changing
	deposition.		the bottom affected; sediment	frequently; pools almost absent
		in pools.	deposits at obstructions,	due to substantial sediment
			constrictions, and bends;	deposition.
			moderate deposition of pools	
Score 8			prevalent.	
5. Channel Flow Status	Water reaches base of both lower		Water fills 25-75% of the	Very little water in channel and
	banks, and minimal amount of	channel; or <25% of channel	available channel, and/or riffle	mostly present as standing pools.
Score 6	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	
6. Channel Alteration	Channelization or dredging absent	Some channelization present,	Channelization may be	Banks shored with gabion or
	or minimal; stream with normal	usually in areas of bridge	extensive; embankments or	cement; over 80% of the stream
	pattern.	abutments; evidence of past	shoring structures present on	reach channelized and disrupted.
		channelization, i.e., dredging,	both banks; and 40 to 80% of	Instream habitat greatly altered or
		(greater than past 20 yr) may be	stream reach channelized and	removed entirely.
c [disrupted.	
Score 5 7. Channel Sinuosity	The bends in the stream increase	is not present. The bends in the stream increase	The bends in the stream	Channel straight; waterway has
7. Channel Sindosity	the stream length 3 to 4 times		increase the stream length 1 to	• ,
			2 times longer than if it was in a	
		line.	straight line.	
	considered normal in coastal plains			
	and other low-lying areas. This			
	parameter is not easily rated in			
Score 6	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 2	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
RB Score 3				of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score I RB Score 3	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score	lawns, or crops) have not			
	impacted zone.			
Total Score 74				

REACH Stream 5	PROJECT KY18-005	DATE 2/13/2019	LAT <u>37.079297</u>	LONG -88.905196
INVESTIGATOR(S)	J. Storm, R. McGregor		WATERSHED Upper Hump	hrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	AGE DESCRIPTION:	
Width (Ft) 10.0	Perennial			
Depth (Ft) I.0	Ephemeral			
-F- (-)				
Reach (Ft)	Intermittent X			
		CONDITION	CATEGORY	
HABITAT PARAMETER	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
I. Epifaunal Substrate /	20 19 18 17 16 Greater than 50% of substrate	15 14 13 12 11 30-50% mix of stable habitat; well	10 9 8 7 6 10-30% mix of stable habitat;	5 4 3 2 1 0 Less than 10% stable habitat; lack
Available Cover	favorable for epifaunal colonization		,	of habitat is obvious; substrate
Available Cover	and fish cover; mix of snags,	potential; adequate habitat for	· · · · · · · · · · · · · · · · · · ·	unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	
	cobble or other stable habitat and	presence of additional substrate in		
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 10	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock; no
Characterization	with gravel and firm sand	mud may be dominant; some root	little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	
Score 15	submerged vegetation common.	present.		
3. Pool Variability	Even mix of large-shallow, large-	Majority of pools large-deep; very	Shallow pools much more	Majority of pools small-shallow or
	deep, small-shallow, small-deep	few shallow.	prevalent than deep pools.	pools absent.
	pools present.			
Score 12				
Score 12 4. Sediment Deposition	Little or no enlargement of islands	Some new increase in bar	Moderate deposition of new	Heavy deposits of fine material,
	=	formation, mostly from gravel, sand		
		or fine sediment; 20-50% of the		than 80% of the bottom changing
	deposition.	bottom affected; slight deposition	the bottom affected; sediment	frequently; pools almost absent
		in pools.	deposits at obstructions,	due to substantial sediment
			•	deposition.
			moderate deposition of pools	
Score 10			prevalent.	
5. Channel Flow Status	Water reaches base of both lower			Very little water in channel and
	banks, and minimal amount of	channel; or <25% of channel	available channel, and/or riffle	mostly present as standing pools.
Score 12	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	
6. Channel Alteration	Channelization or dredging absent	Some channelization present,	Channelization may be	Banks shored with gabion or
	or minimal; stream with normal	usually in areas of bridge	extensive; embankments or	cement; over 80% of the stream
	pattern.	abutments; evidence of past	U	reach channelized and disrupted.
				Instream habitat greatly altered or
		(greater than past 20 yr) may be		removed entirely.
Score 8		present, but recent channelization is not present.	disrupted.	
7. Channel Sinuosity	The bends in the stream increase		The bends in the stream	Channel straight; waterway has
,	the stream length 3 to 4 times	the stream length 2 to 3 times	increase the stream length I to	• ,
	longer than if it was in a straight		2 times longer than if it was in a	
	line. (Note – channel braiding is	line.	straight line.	
	considered normal in coastal plains			
	and other low-lying areas. This			
	parameter is not easily rated in			
Score 9	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 2	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
RB Score 3				of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score I RB Score 2	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score I	lawns, or crops) have not			
RB Score I	impacted zone.			
Total Score 86				

REACH Stream 6	PROJECT KY18-005	DATE 2/13/2019	LAT <u>37.086033</u>	LONG -88.899979
INVESTIGATOR(S)	J. Storm, R. McGregor	COWARDIN CLASS R4	WATERSHED Upper Hump	hrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	IAGE DESCRIPTION:	
Width (Ft) 6.0	Perennial			
Depth (Ft) I.0	Ephemeral			
	· · <u> </u>			
Reach (Ft)	Intermittent X			
		CONDITION		
HABITAT	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
PARAMETER	20 19 18 17 16 Greater than 50% of substrate	15 14 13 12 11 30-50% mix of stable habitat; well	10 9 8 7 6 10-30% mix of stable habitat;	5 4 3 2 1 0 Less than 10% stable habitat; lack
I. Epifaunal Substrate / Available Cover	Greater than 50% of substrate favorable for epifaunal colonization		habitat availability less than	of habitat is obvious; substrate
	and fish cover; mix of snags,	potential; adequate habitat for		unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	discusic of menting.
		presence of additional substrate in		
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 7	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock; no
Characterization	with gravel and firm sand	mud may be dominant; some root	little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	
	submerged vegetation common.	present.		
Score 14 3. Pool Variability	Even mix of large shallow, large	Majority of pools large-deep; very	Shallow pools much more	Majority of pools small-shallow or
5. FOOI Variability	Even mix of large-shallow, large- deep, small-shallow, small-deep	few shallow.	prevalent than deep pools.	pools absent.
	pools present.			
	r · · · r · · · ·			
Score 5	1 : • • !	C i	Madaméa das saidiam of mous	llana da cita af far matanial
4. Sediment Deposition	Little or no enlargement of islands	formation, mostly from gravel, sand		Heavy deposits of fine material,
	the bottom affected by sediment	or fine sediment; 20-50% of the	old and new bars; 50-80% of	than 80% of the bottom changing
	deposition.	bottom affected; slight deposition	· · · · · · · · · · · · · · · · · · ·	frequently; pools almost absent
		in pools.	deposits at obstructions,	due to substantial sediment
			constrictions, and bends;	deposition.
			moderate deposition of pools	
Score 8			prevalent.	
5. Channel Flow Status	Water reaches base of both lower	Water fills > 75% of the available	Water fills 25-75% of the	Very little water in channel and
	banks, and minimal amount of	channel; or <25% of channel	available channel, and/or riffle	mostly present as standing pools.
	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	
Score 8 6. Channel Alteration	Channelization or dredging absent	Some channelization present	Channelization may be	Banks shored with gabion or
	or minimal; stream with normal	usually in areas of bridge	extensive; embankments or	cement; over 80% of the stream
	pattern.	abutments; evidence of past		reach channelized and disrupted.
		channelization, i.e., dredging,	:	Instream habitat greatly altered or
		(greater than past 20 yr) may be	stream reach channelized and	removed entirely.
		present, but recent channelization	disrupted.	
Score 12		is not present.		
7. Channel Sinuosity		The bends in the stream increase		Channel straight; waterway has
	the stream length 3 to 4 times longer than if it was in a straight	the stream length 2 to 3 times longer than if it was in a straight	increase the stream length 1 to 2 times longer than if it was in a	
	line. (Note – channel braiding is	line.	straight line.	ustance.
	considered normal in coastal plains	1		
	and other low-lying areas. This			
	parameter is not easily rated in			
Score 7	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 6	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
RB Score 6				of bank has erosional scars.
	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 2 RB Score 2	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 5	lawns, or crops) have not			
	impacted zone.			
Total Score 87				

REACH Strea	m 7	PROJECT KY18-005	DATE 2/13/2019	LAT <u>37.084839</u>	LONG88.895111
INVESTIGAT	OR(S)	J. Storm, R. McGregor		WATERSHED Upper Hump	hrey Creek
STREAM SIZE	:	STREAM TYPE:	IMAGE ID #: IM	AGE DESCRIPTION:	
Width (Ft)	15.0	Perennial X			
	2.0	Ephemeral			
Depth (Ft)	2.0				<u> </u>
Reach (Ft)		Intermittent			
			CONDITION	CATEGORY	
HABITA		OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
PARAMET		20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
I. Epifaunal Subs	trate /	Greater than 50% of substrate	· · · · · · · · · · · · · · · · · · ·	10-30% mix of stable habitat;	Less than 10% stable habitat; lack
Available Cover		favorable for epifaunal colonization and fish cover; mix of snags,	potential; adequate habitat for	habitat availability less than desirable; substrate frequently	of habitat is obvious; substrate unstable or lacking.
		submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	unstable of lacking.
		cobble or other stable habitat and	presence of additional substrate in	disturbed of removed.	
		at stage to allow full colonization	the form of new fall, but not yet		
		potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score	15	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate	-	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock: no
Characterization		with gravel and firm sand		little or no root mat; no	root mat or vegetation.
		prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	Ŭ
		submerged vegetation common.	present.		
Score					
3. Pool Variability	у	Even mix of large-shallow, large-		Shallow pools much more	Majority of pools small-shallow or
		deep, small-shallow, small-deep pools present.	few shallow.	prevalent than deep pools.	pools absent.
		pools present.			
Score					
4. Sediment Dep	osition	Little or no enlargement of islands		Moderate deposition of new	Heavy deposits of fine material,
			formation, mostly from gravel, sand	-	
		the bottom affected by sediment deposition.	or fine sediment; 20-50% of the	old and new bars; 50-80% of the bottom affected; sediment	than 80% of the bottom changing frequently; pools almost absent
			bottom affected; slight deposition in pools.	deposits at obstructions,	due to substantial sediment
				constrictions, and bends;	deposition.
				moderate deposition of pools	
c.				prevalent.	
Score 5. Channel Flow		Water reaches base of both lower	Water fills > 75% of the available	Water fills 25-75% of the	Very little water in channel and
		banks, and minimal amount of	channel; or <25% of channel	available channel, and/or riffle	mostly present as standing pools.
		channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
Score					
6. Channel Alter	ation	Channelization or dredging absent		Channelization may be	Banks shored with gabion or
		or minimal; stream with normal	usually in areas of bridge	extensive; embankments or	cement; over 80% of the stream
		pattern.	abutments; evidence of past channelization, i.e., dredging,	shoring structures present on both banks; and 40 to 80% of	reach channelized and disrupted. Instream habitat greatly altered or
			(greater than past 20 yr) may be	stream reach channelized and	removed entirely.
			present, but recent channelization	disrupted.	
Score	12	•	is not present.	- · F · · ·	
7. Channel Sinuo	sity	The bends in the stream increase		The bends in the stream	Channel straight; waterway has
		the stream length 3 to 4 times	the stream length 2 to 3 times	increase the stream length I to	been channelized for a long
		longer than if it was in a straight	longer than if it was in a straight	2 times longer than if it was in a	distance.
		line. (Note – channel braiding is	line.	straight line.	
		considered normal in coastal plains			
		and other low-lying areas. This			
Score	8	parameter is not easily rated in these areas.)			
Score	0	cicae ai casij	•	•	· · · · · · · · · · · · · · · · · · ·

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
IB Score 4	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
LB Score 4 RB Score 4				of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 4 RB Score 4	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 4	lawns, or crops) have not			
RB Score 6	impacted zone.			
Total Score 105				

REACH Stream 8	PROJECT KY18-005	DATE 2/13/2019	LAT <u>37.082832</u>	LONG -88.889358
INVESTIGATOR(S)	J. Storm, R. McGregor	COWARDIN CLASS R4	WATERSHED Upper Hump	hrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	IAGE DESCRIPTION:	
Width (Ft) 15.0	Perennial			
Depth (Ft) I.0	Ephemeral			
Reach (Ft)	Intermittent X			
LIADITAT		CONDITION		
HABITAT PARAMETER	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
I. Epifaunal Substrate /	20 19 18 17 16 Greater than 50% of substrate	15 14 13 12 11 30-50% mix of stable habitat; well	10 9 8 7 6 10-30% mix of stable habitat;	5 4 3 2 1 0 Less than 10% stable habitat; lack
Available Cover	favorable for epifaunal colonization	· · · · · · · · · · · · · · · · · · ·	habitat availability less than	of habitat is obvious; substrate
	and fish cover; mix of snags,	potential; adequate habitat for	1	unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	discusic of fucidity.
	cobble or other stable habitat and	presence of additional substrate in		
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
	not new fall and not transient.)	at high end of scale).		
Score 16 2. Pool Substrate	Mixture of substrate materials,	<u> </u>	All mud or clay or sand bottom;	Hard pap day or bodrock, po
Characterization	with gravel and firm sand		little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	root mat or vegetation.
	submerged vegetation common.	present.	submerged vegetation.	
Score 13		P. 000.00		
3. Pool Variability	Even mix of large-shallow, large-	Majority of pools large-deep; very	Shallow pools much more	Majority of pools small-shallow or
	deep, small-shallow, small-deep	few shallow.	prevalent than deep pools.	pools absent.
	pools present.			
Score 8				
4. Sediment Deposition	Little or no enlargement of islands	Some new increase in bar	Moderate deposition of new	Heavy deposits of fine material,
	=	formation, mostly from gravel, sand		<i>i</i> .
	the bottom affected by sediment	or fine sediment; 20-50% of the		than 80% of the bottom changing
	deposition.	bottom affected; slight deposition	the bottom affected; sediment	frequently; pools almost absent
		in pools.	deposits at obstructions,	due to substantial sediment
			constrictions, and bends;	deposition.
			moderate deposition of pools	
Score 9			prevalent.	
5. Channel Flow Status	Water reaches base of both lower	Water fills > 75% of the available	Water fills 25-75% of the	Very little water in channel and
	banks, and minimal amount of	channel; or <25% of channel	available channel, and/or riffle	, mostly present as standing pools.
	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	
Score 8		.		
6. Channel Alteration	Channelization or dredging absent	:	· ·	Banks shored with gabion or
	or minimal; stream with normal	usually in areas of bridge	extensive; embankments or	cement; over 80% of the stream
	pattern.	abutments; evidence of past	shoring structures present on	reach channelized and disrupted.
		channelization, i.e., dredging,	both banks; and 40 to 80% of stream reach channelized and	Instream habitat greatly altered or
		(greater than past 20 yr) may be present, but recent channelization	disrupted.	removed entirely.
Score 12		is not present.	disi upted.	
7. Channel Sinuosity	The bends in the stream increase	The bends in the stream increase	The bends in the stream	Channel straight; waterway has
	the stream length 3 to 4 times	the stream length 2 to 3 times	increase the stream length 1 to	
	longer than if it was in a straight	:	2 times longer than if it was in a	
	line. (Note – channel braiding is	line.	straight line.	
	considered normal in coastal plains			
	and other low-lying areas. This			
	parameter is not easily rated in			
Score 7	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 7	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
RB Score 7				of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 6 RB Score 6	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score I	lawns, or crops) have not			
RB Score 6	impacted zone.			
Total Score 106				

REACH Stream 9	PROJECT KY18-005	DATE 2/13/2019	LAT <u>37.081937</u>	LONG -88.886762
INVESTIGATOR(S)	J. Storm, R. McGregor	COWARDIN CLASS R3	WATERSHED Upper Hump	hrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	AGE DESCRIPTION:	
Width (Ft) 10.0	Perennial X			
Depth (Ft) I.5	Ephemeral			
	· · · <u></u>			
Reach (Ft)	Intermittent			
CONDITION CATEGORY				
HABITAT	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
PARAMETER	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
 Epifaunal Substrate / Available Cover 	Greater than 50% of substrate favorable for epifaunal colonization	· · · · · ·	10-30% mix of stable habitat; habitat availability less than	Less than 10% stable habitat; lack of habitat is obvious; substrate
Available Cover	and fish cover; mix of snags,	potential; adequate habitat for		unstable or lacking.
	submerged logs, undercut banks,		disturbed or removed.	distable of lacking.
		presence of additional substrate in		
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 13	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock; no
Characterization	with gravel and firm sand	mud may be dominant; some root	little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	
	submerged vegetation common.	present.		
Score 13	Even mix of lange shellow, lange	Majanity of a colo lange decay your	Shallow a colo much more	Majarity of a cale small shallow on
3. Pool Variability	Even mix of large-shallow, large- deep, small-shallow, small-deep	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	pools present.		prevalent than deep pools.	
	· · · · · · · · · · · · · · · · · · ·			
Score 9	1 : • • !	C in L	Madamata dagariti an af marri	llana da cita effica matanial
4. Sediment Deposition	Little or no enlargement of islands	some new increase in bar formation, mostly from gravel, sand		Heavy deposits of fine material,
	the bottom affected by sediment	or fine sediment; 20-50% of the	old and new bars; 50-80% of	than 80% of the bottom changing
	deposition.			frequently; pools almost absent
		in pools.	deposits at obstructions,	due to substantial sediment
			constrictions, and bends;	deposition.
			moderate deposition of pools	
Score 12			prevalent.	
5. Channel Flow Status	Water reaches base of both lower	Water fills > 75% of the available	Water fills 25-75% of the	Very little water in channel and
	banks, and minimal amount of	channel; or <25% of channel	available channel, and/or riffle	mostly present as standing pools.
c 12	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	
Score 13 6. Channel Alteration	Channelization or dredging absent	Some channelization present.	Channelization may be	Banks shored with gabion or
	or minimal; stream with normal	usually in areas of bridge	extensive; embankments or	cement; over 80% of the stream
	pattern.		shoring structures present on	reach channelized and disrupted.
		channelization, i.e., dredging,	both banks; and 40 to 80% of	Instream habitat greatly altered or
		(greater than past 20 yr) may be	stream reach channelized and	removed entirely.
		present, but recent channelization	disrupted.	
Score 12	T I I I I I I I I I I I I I I I I I I I	is not present.	T I I I I I I I	
7. Channel Sinuosity			The bends in the stream	Channel straight; waterway has
	the stream length 3 to 4 times longer than if it was in a straight		increase the stream length 1 to 2 times longer than if it was in a	
	line. (Note – channel braiding is		straight line.	ustance.
	considered normal in coastal plains			
	and other low-lying areas. This			
	parameter is not easily rated in			
Score 9	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 7	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
RB Score 7				of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 8 RB Score 8	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score I	lawns, or crops) have not			
	impacted zone.			
Total Score 3				

REACH Stream 10	PROJECT KY18-005	DATE 2/13/2019	LAT 37.079120	LONG88.877137
INVESTIGATOR(S)	J. Storm, R. McGregor		WATERSHED Upper Hump	hrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	AGE DESCRIPTION:	
Width (Ft) 3.0	Perennial			
Depth (Ft) 0.5	Ephemeral X			
Reach (Ft)	Intermittent			
		CONDITION	CATEGORY	
HABITAT	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
PARAMETER 1. Epifaunal Substrate /	20 19 18 17 16 Greater than 50% of substrate	15 14 13 12 11 30-50% mix of stable habitat; well	10 9 8 7 6 10-30% mix of stable habitat:	5 4 3 2 1 0 Less than 10% stable habitat; lack
Available Cover	favorable for epifaunal colonization		,	of habitat is obvious; substrate
	and fish cover; mix of snags,	potential; adequate habitat for	· · · · · · · · · · · · · · · · · · ·	unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	distable of lacking.
		presence of additional substrate in		
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 4	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock; no
Characterization	with gravel and firm sand		little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	Ŭ
	submerged vegetation common.	present.		
Score 6				
3. Pool Variability	Even mix of large-shallow, large-			Majority of pools small-shallow or
	deep, small-shallow, small-deep	few shallow.	prevalent than deep pools.	pools absent.
	pools present.			
Score 6				
4. Sediment Deposition	Little or no enlargement of islands			Heavy deposits of fine material,
		formation, mostly from gravel, sand	-	
	the bottom affected by sediment	or fine sediment; 20-50% of the	old and new bars; 50-80% of	than 80% of the bottom changing
	deposition.	bottom affected; slight deposition		frequently; pools almost absent
		in pools.	deposits at obstructions, constrictions, and bends;	due to substantial sediment deposition.
			moderate deposition of pools	deposition.
			prevalent.	
Score 16	Materia and the state	\A/£ _ > 7F9/{_1}		Mana lissia constanti di di di
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of	Water fills > 75% of the available channel; or <25% of channel		Very little water in channel and mostly present as standing pools.
	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	mostly present as standing pools.
Score 10				
6. Channel Alteration	Channelization or dredging absent	Some channelization present,	Channelization may be	Banks shored with gabion or
	or minimal; stream with normal	usually in areas of bridge	extensive; embankments or	cement; over 80% of the stream
	pattern.	abutments; evidence of past	•	reach channelized and disrupted.
		channelization, i.e., dredging,		Instream habitat greatly altered or
		(greater than past 20 yr) may be		removed entirely.
Score 11		present, but recent channelization	disrupted.	
7. Channel Sinuosity	The bends in the stream increase	is not present. The bends in the stream increase	The bends in the stream	Channel straight; waterway has
	the stream length 3 to 4 times	the stream length 2 to 3 times	increase the stream length 1 to	
	longer than if it was in a straight	longer than if it was in a straight	2 times longer than if it was in a	
	line. (Note – channel braiding is	line.	straight line.	
	considered normal in coastal plains		-	
	and other low-lying areas. This			
	parameter is not easily rated in			
Score 6	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 9	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
RB Score 10				of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 3 RB Score 2	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score I	lawns, or crops) have not			
	impacted zone.			
Total Score 84				

REACH Stream	PROJECT KY18-005	DATE 2/14/2019	LAT <u>37.074802</u>	LONG -88.861661
INVESTIGATOR(S)	J. Storm, R. McGregor		WATERSHED Bayou Creek	- Ohio River
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	AGE DESCRIPTION:	
Width (Ft) 5.0	Perennial			
Depth (Ft) 0.5	Ephemeral			
Reach (Ft)	Intermittent X			
HADITAT				2002
HABITAT PARAMETER	OPTIMAL 20 19 18 17 16	SUBOPTIMAL 15 14 13 12 11	MARGINAL 10 9 8 7 6	POOR 5 4 3 2 1 0
I. Epifaunal Substrate /	Greater than 50% of substrate			Less than 10% stable habitat; lack
Available Cover	favorable for epifaunal colonization		habitat availability less than	of habitat is obvious; substrate
	and fish cover; mix of snags,	potential; adequate habitat for	· · · · · · · · · · · · · · · · · · ·	unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	-
	cobble or other stable habitat and	presence of additional substrate in		
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 15	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock; no
Characterization	with gravel and firm sand	mud may be dominant; some root	little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	
c 12	submerged vegetation common.	present.		
Score 12 3. Pool Variability	Even mix of large-shallow, large-	Majority of pools large-deep; very	Shallow pools much more	Majority of pools small-shallow or
	deep, small-shallow, small-deep	few shallow.	prevalent than deep pools.	pools absent.
	pools present.		r	
Score 4	1 : • • !	C in h	Madamata dan asiti nu af manu	llana da aita af fina matanial
4. Sediment Deposition	Little or no enlargement of islands	formation, mostly from gravel, sand		Heavy deposits of fine material,
		or fine sediment; 20-50% of the	old and new bars; 50-80% of	than 80% of the bottom changing
	•		<i>'</i>	frequently; pools almost absent
	•	in pools.		due to substantial sediment
			constrictions, and bends;	deposition.
			moderate deposition of pools	
Score 8			prevalent.	
5. Channel Flow Status	Water reaches base of both lower	Water fills > 75% of the available	Water fills 25-75% of the	Very little water in channel and
	banks, and minimal amount of	channel; or <25% of channel	available channel, and/or riffle	mostly present as standing pools.
	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	
Score 8	Channelization on duad-in-state	Some channelization average	Channelization may be	Paply shared with retire
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal	some channelization present, usually in areas of bridge	Channelization may be extensive; embankments or	Banks shored with gabion or cement; over 80% of the stream
		abutments; evidence of past		reach channelized and disrupted.
	puttern	channelization, i.e., dredging,		Instream habitat greatly altered or
		(greater than past 20 yr) may be		removed entirely.
		present, but recent channelization	disrupted.	,
Score 12		is not present.		
7. Channel Sinuosity				Channel straight; waterway has
		the stream length 2 to 3 times	increase the stream length I to	
	•		2 times longer than if it was in a	distance.
	(line.	straight line.	
	considered normal in coastal plains			
	and other low-lying areas. This parameter is not easily rated in			
Score 13	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 2	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
LB Score 2 RB Score 3			-	of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 5 RB Score 5	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 6	lawns, or crops) have not			
	impacted zone.			
Total Score 99				

REACH Stream 12	PROJECT KY18-005	DATE 2/13/2019	LAT 37.071460	LONG -88.850619
INVESTIGATOR(S)	J. Storm, R. McGregor	COWARDIN CLASS R3	WATERSHED Bayou Creek	- Ohio River
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	AGE DESCRIPTION:	
Width (Ft) 12.0	Perennial X			
Depth (Ft) I.5	Ephemeral			
	· · · <u></u>			
Reach (Ft)	Intermittent			
CONDITION CATEGORY				
HABITAT	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
PARAMETER	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
1. Epifaunal Substrate /	Greater than 50% of substrate	· · · · · · · · · · · · · · · · · · ·	· · · · ·	Less than 10% stable habitat; lack
Available Cover	favorable for epifaunal colonization		habitat availability less than	of habitat is obvious; substrate
	and fish cover; mix of snags, submerged logs, undercut banks,	potential; adequate habitat for maintenance of populations;	desirable; substrate frequently disturbed or removed.	unstable or lacking.
	cobble or other stable habitat and	presence of additional substrate in	disturbed of removed.	
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
	not new fall and not transient.)	at high end of scale).		
Score II 2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pap clay or bedrock: no
Characterization	with gravel and firm sand			root mat or vegetation.
	prevalent; root mats and		submerged vegetation.	root mat of vegetation.
	submerged vegetation common.	present.		
Score II				
3. Pool Variability	Even mix of large-shallow, large-	Majority of pools large-deep; very	Shallow pools much more	Majority of pools small-shallow or
	deep, small-shallow, small-deep	few shallow.	prevalent than deep pools.	pools absent.
	pools present.			
Score 5				
4. Sediment Deposition	Little or no enlargement of islands	Some new increase in bar	Moderate deposition of new	Heavy deposits of fine material,
	or point bars and less than 20% of	formation, mostly from gravel, sand	gravel, sand or fine sediment on	increased bar development; more
	the bottom affected by sediment	or fine sediment; 20-50% of the		than 80% of the bottom changing
	deposition.			frequently; pools almost absent
		in pools.	deposits at obstructions,	due to substantial sediment
			:	deposition.
			moderate deposition of pools	
Score 13			prevalent.	
5. Channel Flow Status	Water reaches base of both lower			Very little water in channel and
	banks, and minimal amount of	channel; or <25% of channel		mostly present as standing pools.
Score 14	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	
6. Channel Alteration	Channelization or dredging absent	Some channelization present,	Channelization may be	Banks shored with gabion or
	or minimal; stream with normal	usually in areas of bridge		cement; over 80% of the stream
	pattern.	abutments; evidence of past	shoring structures present on	reach channelized and disrupted.
		channelization, i.e., dredging,	both banks; and 40 to 80% of	Instream habitat greatly altered or
		(greater than past 20 yr) may be	stream reach channelized and	removed entirely.
		present, but recent channelization	disrupted.	
Score 12		is not present.		
7. Channel Sinuosity				Channel straight; waterway has
	the stream length 3 to 4 times	the stream length 2 to 3 times	increase the stream length 1 to	
	longer than if it was in a straight line. (Note – channel braiding is	longer than if it was in a straight line.	2 times longer than if it was in a straight line.	usulle.
	considered normal in coastal plains		รุง สุราช แก่อ.	
	and other low-lying areas. This			
	parameter is not easily rated in			
Score 8	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 8	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
RB Score 9	-			of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 6 RB Score 6	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 2	lawns, or crops) have not			
	impacted zone.			
Total Score				

REACH Stream 13	PROJECT KY18-005	DATE 2/14/2019	LAT <u>37.084899</u>	LONG -88.928561
INVESTIGATOR(S)	J. Storm, R. McGregor		WATERSHED Middle Hump	ohrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	AGE DESCRIPTION:	
Width (Ft) I.0	Perennial			
· (· /				
-1- (-)	Ephemeral			
Reach (Ft)	Intermittent X			
		CONDITION	CATEGORY	
HABITAT	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
PARAMETER	20 19 18 17 16 Greater than 50% of substrate	15 14 13 12 11 30-50% mix of stable habitat; well	10 9 8 7 6 10-30% mix of stable habitat;	5 4 3 2 1 0 Less than 10% stable habitat; lack
 Epifaunal Substrate / Available Cover 	favorable for epifaunal colonization	· · · · · · · · · · · · · · · · · · ·	habitat availability less than	of habitat is obvious; substrate
Available Cover	and fish cover; mix of snags,	potential; adequate habitat for		unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	distable of lacking.
	cobble or other stable habitat and	presence of additional substrate in		
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 4	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock; no
Characterization	with gravel and firm sand	mud may be dominant; some root	little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	
Score 0	submerged vegetation common.	present.		
Score 0 3. Pool Variability	Even mix of large-shallow, large-	Majority of pools large-deep; very	Shallow pools much more	Majority of pools small-shallow or
	deep, small-shallow, small-deep	few shallow.	prevalent than deep pools.	pools absent.
	pools present.			
Score 3 4. Sediment Deposition	Little or no enlargement of islands	Some new increase in har	Moderate deposition of new	Heavy deposits of fine material,
1. Sediment Deposition	=	formation, mostly from gravel, sand		
			old and new bars; 50-80% of	than 80% of the bottom changing
	deposition.	bottom affected; slight deposition	the bottom affected; sediment	frequently; pools almost absent
		in pools.	deposits at obstructions,	due to substantial sediment
			constrictions, and bends;	deposition.
			moderate deposition of pools	
Score 14			prevalent.	
5. Channel Flow Status	Water reaches base of both lower			Very little water in channel and
	banks, and minimal amount of	channel; or <25% of channel	available channel, and/or riffle	mostly present as standing pools.
Score 14	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	
6. Channel Alteration	Channelization or dredging absent	Some channelization present,	Channelization may be	Banks shored with gabion or
	or minimal; stream with normal	usually in areas of bridge	extensive; embankments or	cement; over 80% of the stream
	pattern.	abutments; evidence of past	shoring structures present on	reach channelized and disrupted.
		channelization, i.e., dredging,		Instream habitat greatly altered or
		(greater than past 20 yr) may be		removed entirely.
Score 15			disrupted.	
7. Channel Sinuosity	The bends in the stream increase	is not present. The bends in the stream increase	The bends in the stream	Channel straight; waterway has
	the stream length 3 to 4 times		increase the stream length I to	· ,
		:	2 times longer than if it was in a	
	line. (Note – channel braiding is	line.	straight line.	
	considered normal in coastal plains			
	and other low-lying areas. This			
	parameter is not easily rated in			
Score 7	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
IB Score 8	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
LB Score 8 RB Score 8			-	of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 7 RB Score 7	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 8	lawns, or crops) have not			
	impacted zone.			
Total Score 103				

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REACH Stream 14	PROJECT KY18-005	DATE 2/14/2019	LAT 37.085189	LONG88.927794
INVESTIGATOR(S)	J. Storm, R. McGregor		WATERSHED Middle Hump	bhrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	AGE DESCRIPTION:	
Width (Ft) I.0	Perennial			
Depth (Ft) 0.3	Ephemeral X			
Reach (Ft)	Intermittent X			
		CONDITION	CATEGORY	
HABITAT	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
PARAMETER 1. Epifaunal Substrate /	20 19 18 17 16 Greater than 50% of substrate	15 14 13 12 11 30-50% mix of stable habitat; well	10 9 8 7 6 10-30% mix of stable habitat:	5 4 3 2 1 0 Less than 10% stable habitat; lack
Available Cover	favorable for epifaunal colonization		,	of habitat is obvious; substrate
	and fish cover; mix of snags,	potential; adequate habitat for	· · · · · · · · · · · · · · · · · · ·	unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	distable of lacking.
		presence of additional substrate in		
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 3	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock; no
Characterization	with gravel and firm sand		little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	
	submerged vegetation common.	present.		
Score 0	Even mix of lange shellow, lange	Majority of social lange deeps your	Shallow a a la much mana	Majarity of a cale small shallow on
3. Pool Variability	Even mix of large-shallow, large- deep, small-shallow, small-deep	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	pools present.	iew shallow.	prevalent than deep pools.	pools absent.
Score 2		· · · ·		
4. Sediment Deposition	Little or no enlargement of islands			Heavy deposits of fine material,
	the bottom affected by sediment	formation, mostly from gravel, sand or fine sediment; 20-50% of the	old and new bars; 50-80% of	than 80% of the bottom changing
	deposition.	bottom affected; slight deposition	· · · · · · · · · · · · · · · · · · ·	frequently; pools almost absent
		in pools.	deposits at obstructions,	due to substantial sediment
			constrictions, and bends;	deposition.
			moderate deposition of pools	
Score 13			prevalent.	
5. Channel Flow Status	Water reaches base of both lower	Water fills > 75% of the available	Water fills 25-75% of the	Very little water in channel and
	banks, and minimal amount of	channel; or <25% of channel	available channel, and/or riffle	mostly present as standing pools.
	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	
Score 15 6. Channel Alteration	Channelization or dredging absent	Some channelization present,	Channelization may be	Banks shored with gabion or
	or minimal; stream with normal	usually in areas of bridge	<i>'</i>	cement; over 80% of the stream
	pattern.	abutments; evidence of past	<i>'</i>	reach channelized and disrupted.
	•	channelization, i.e., dredging,	•	Instream habitat greatly altered or
		(greater than past 20 yr) may be	stream reach channelized and	removed entirely.
		present, but recent channelization	disrupted.	
Score 19		is not present.		
7. Channel Sinuosity	The bends in the stream increase	The bends in the stream increase		Channel straight; waterway has
	the stream length 3 to 4 times	the stream length 2 to 3 times	increase the stream length 1 to	
	longer than if it was in a straight	longer than if it was in a straight	2 times longer than if it was in a	distance.
	line. (Note – channel braiding is considered normal in coastal plains	line.	straight line.	
	and other low-lying areas. This			
	parameter is not easily rated in			
Score 6	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 10	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
RB Score 10				of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 7 RB Score 7	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 6	lawns, or crops) have not			
	impacted zone.			
Total Score 107				

REACH Stream 15	PROJECT KY18-005	DATE 2/14/2019	LAT <u>37.085198</u>	LONG -88.927761
INVESTIGATOR(S)	J. Storm, R. McGregor	COWARDIN CLASS R4	WATERSHED Middle Hump	bhrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	IAGE DESCRIPTION:	
Width (Ft) I.0	Perennial			
Depth (Ft) 0.3	Ephemeral			
Reach (Ft)	Intermittent X			
		CONDITION		
HABITAT PARAMETER	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
I. Epifaunal Substrate /	20 19 18 17 16 Greater than 50% of substrate	15 14 13 12 11 30-50% mix of stable habitat; well	10 9 8 7 6 10-30% mix of stable habitat:	5 4 3 2 1 0 Less than 10% stable habitat; lack
Available Cover	favorable for epifaunal colonization		,	of habitat is obvious; substrate
	and fish cover; mix of snags,	potential; adequate habitat for	1	unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	
		presence of additional substrate in		
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 4	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock; no
Characterization	with gravel and firm sand	mud may be dominant; some root	little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	
	submerged vegetation common.	present.		
Score 4	Even mix of lange shellow, lange		Shallow a a la much mana	Majaniny of a color small shallow on
3. Pool Variability	Even mix of large-shallow, large- deep, small-shallow, small-deep	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	pools present.		prevalent than deep pools.	pools absent.
	F F			
Score 0		· · · ·		
4. Sediment Deposition	Little or no enlargement of islands	some new increase in bar formation, mostly from gravel, sand		Heavy deposits of fine material,
	the bottom affected by sediment	or fine sediment; 20-50% of the	old and new bars; 50-80% of	than 80% of the bottom changing
	deposition.	bottom affected; slight deposition	· · · · · · · · · · · · · · · · · · ·	frequently; pools almost absent
	-F	in pools.	deposits at obstructions,	due to substantial sediment
			constrictions, and bends;	deposition.
			moderate deposition of pools	
Score 14			prevalent.	
5. Channel Flow Status	Water reaches base of both lower	Water fills > 75% of the available	Water fills 25-75% of the	Very little water in channel and
	banks, and minimal amount of	channel; or <25% of channel		mostly present as standing pools.
	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	
Score 12 6. Channel Alteration	Channelization or dredging absent	Some channelization present,	Channelization may be	Banks shored with gabion or
o. Channel Alteration	or minimal; stream with normal	some channelization present, usually in areas of bridge		cement; over 80% of the stream
	pattern.	abutments; evidence of past	· · · · · · · · · · · · · · · · · · ·	reach channelized and disrupted.
	P	channelization, i.e., dredging,	•	Instream habitat greatly altered or
		(greater than past 20 yr) may be		removed entirely.
		present, but recent channelization	disrupted.	
Score 15		is not present.		
7. Channel Sinuosity	The bends in the stream increase	The bends in the stream increase	1	Channel straight; waterway has
	the stream length 3 to 4 times	the stream length 2 to 3 times	increase the stream length I to	
	longer than if it was in a straight	longer than if it was in a straight	2 times longer than if it was in a	distance.
	line. (Note – channel braiding is	line.	straight line.	
	considered normal in coastal plains			
	and other low-lying areas. This parameter is not easily rated in			
Score 8	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
LB Score I RB Score I	-			of bank has erosional scars.
	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 7 RB Score 7	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 7	lawns, or crops) have not			
RB Score 6	impacted zone.			
Total Score 86				

Starts at seep in hillside.

REACH Stream 16	PROJECT KY18-005	DATE 2/14/2019	LAT <u>37.085587</u>	LONG -88.925740
INVESTIGATOR(S)	J. Storm, R. McGregor	COWARDIN CLASS R3	WATERSHED Middle Hump	bhrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	AGE DESCRIPTION:	
Width (Ft) 20.0	Perennial X			
Depth (Ft) 2.0	Ephemeral			
Reach (Ft)	Intermittent			
		CONDITION	CATEGORY	
HABITAT	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
PARAMETER	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6 10-30% mix of stable habitat;	5 4 3 2 1 0 Less than 10% stable habitat; lack
 Epifaunal Substrate / Available Cover 	Greater than 50% of substrate favorable for epifaunal colonization		habitat availability less than	of habitat is obvious; substrate
Available Cover	and fish cover; mix of snags,	potential; adequate habitat for	· · · · · · · · · · · · · · · · · · ·	unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	unstable of lacking.
	cobble or other stable habitat and	presence of additional substrate in		
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 16	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock; no
Characterization	with gravel and firm sand		little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	-
	submerged vegetation common.	present.		
Score 9				
3. Pool Variability	Even mix of large-shallow, large-	Majority of pools large-deep; very few shallow.	Shallow pools much more	Majority of pools small-shallow or
	deep, small-shallow, small-deep pools present.	iew sitaliow.	prevalent than deep pools.	pools absent.
Score 12				
4. Sediment Deposition	Little or no enlargement of islands		Moderate deposition of new	Heavy deposits of fine material,
		formation, mostly from gravel, sand or fine sediment; 20-50% of the	-	
	the bottom affected by sediment deposition.	bottom affected; slight deposition	old and new bars; 50-80% of the bottom affected; sediment	than 80% of the bottom changing frequently; pools almost absent
		in pools.	deposits at obstructions,	due to substantial sediment
			constrictions, and bends;	deposition.
			moderate deposition of pools	'
Score 7	+		prevalent.	
5. Channel Flow Status	Water reaches base of both lower	Water fills > 75% of the available	Water fills 25-75% of the	Very little water in channel and
	banks, and minimal amount of	channel; or <25% of channel	available channel, and/or riffle	, mostly present as standing pools.
	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	
Score 10	Channeline ti di di di	Companyation of the second	Channelinet	Dealer shared to be a lit
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal	Some channelization present, usually in areas of bridge	Channelization may be extensive; embankments or	Banks shored with gabion or cement; over 80% of the stream
	pattern.	abutments; evidence of past	shoring structures present on	reach channelized and disrupted.
		channelization, i.e., dredging,	both banks; and 40 to 80% of	Instream habitat greatly altered or
		(greater than past 20 yr) may be	stream reach channelized and	removed entirely.
		present, but recent channelization	disrupted.	,
Score 15		is not present.		
7. Channel Sinuosity	The bends in the stream increase	The bends in the stream increase	The bends in the stream	Channel straight; waterway has
	the stream length 3 to 4 times	the stream length 2 to 3 times	increase the stream length I to	
	longer than if it was in a straight		2 times longer than if it was in a	distance.
	line. (Note – channel braiding is	line.	straight line.	
	considered normal in coastal plains			
	and other low-lying areas. This parameter is not easily rated in			
Score 14	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 8	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
LB Score 8 RB Score 5				of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 8 RB Score 5	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 9	lawns, or crops) have not			
RB Score 7	impacted zone.			
Total Score 125				

REACH Stream 17	PROJECT KY18-005	DATE 2/14/2019	LAT <u>37.085217</u>	LONG -88.925217
INVESTIGATOR(S)	J. Storm, R. McGregor		WATERSHED Middle Hump	hrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	AGE DESCRIPTION:	
Width (Ft) 2.0	Perennial			
Depth (Ft) I.0	Ephemeral			
-F- (-)				
Reach (Ft)	Intermittent X			
		CONDITION	CATEGORY	
HABITAT	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
PARAMETER I. Epifaunal Substrate /	20 19 18 17 16 Greater than 50% of substrate	15 14 13 12 11 30-50% mix of stable habitat; well	10 9 8 7 6 10-30% mix of stable habitat;	5 4 3 2 1 0 Less than 10% stable habitat; lack
Available Cover	favorable for epifaunal colonization	· · · · · · · · · · · · · · · · · · ·	,	of habitat is obvious; substrate
Available Cover	and fish cover; mix of snags,	potential; adequate habitat for	· · · · · · · · · · · · · · · · · · ·	unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	
	cobble or other stable habitat and	presence of additional substrate in		
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 12	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock; no
Characterization	with gravel and firm sand	mud may be dominant; some root	little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	
Score 5	submerged vegetation common.	present.		
3. Pool Variability	Even mix of large-shallow, large-	Majority of pools large-deep; very	Shallow pools much more	Majority of pools small-shallow or
	deep, small-shallow, small-deep	few shallow.	prevalent than deep pools.	pools absent.
	pools present.			
Score 3				
4. Sediment Deposition	Little or no enlargement of islands	Some new increase in bar	Moderate deposition of new	Heavy deposits of fine material,
	=	formation, mostly from gravel, sand		
	-	or fine sediment; 20-50% of the		than 80% of the bottom changing
	deposition.	bottom affected; slight deposition	the bottom affected; sediment	frequently; pools almost absent
		in pools.	deposits at obstructions,	due to substantial sediment
			•	deposition.
			moderate deposition of pools	
Score 18			prevalent.	
5. Channel Flow Status	Water reaches base of both lower			Very little water in channel and
	banks, and minimal amount of	channel; or <25% of channel	available channel, and/or riffle	mostly present as standing pools.
Score 18	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	
6. Channel Alteration	Channelization or dredging absent	Some channelization present,	Channelization may be	Banks shored with gabion or
	or minimal; stream with normal	usually in areas of bridge	extensive; embankments or	cement; over 80% of the stream
	pattern.	abutments; evidence of past	U	reach channelized and disrupted.
		channelization, i.e., dredging,		Instream habitat greatly altered or
		(greater than past 20 yr) may be		removed entirely.
Score 20		present, but recent channelization is not present.	disrupted.	
7. Channel Sinuosity	The bends in the stream increase	The bends in the stream increase	The bends in the stream	Channel straight; waterway has
,	the stream length 3 to 4 times	the stream length 2 to 3 times	increase the stream length 1 to	• ,
	longer than if it was in a straight	longer than if it was in a straight	2 times longer than if it was in a	
	line. (Note – channel braiding is	line.	straight line.	
	considered normal in coastal plains			
	and other low-lying areas. This			
	parameter is not easily rated in			
Score 3	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 7	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
RB Score 7				of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 8 RB Score 8	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 5	lawns, or crops) have not			
	impacted zone.			
Total Score 9				

REACH Stream 18	PROJECT KY18-005	DATE 2/14/2019	LAT 37.085570	LONG -88.924058
INVESTIGATOR(S)	J. Storm, R. McGregor		WATERSHED Middle Hump	hrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	AGE DESCRIPTION:	
Width (Ft) I.0	Perennial			
Depth (Ft) 0.5	Ephemeral			
-F- (-)	· · <u></u>			
Reach (Ft)	Intermittent X			
		CONDITION		
HABITAT PARAMETER	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
I. Epifaunal Substrate /	20 19 18 17 16 Greater than 50% of substrate	15 14 13 12 11 30-50% mix of stable habitat; well	10 9 8 7 6 10-30% mix of stable habitat;	5 4 3 2 1 0 Less than 10% stable habitat; lack
Available Cover	favorable for epifaunal colonization	· · · · · · · · · · · · · · · · · · ·	· · · · · ·	of habitat is obvious; substrate
Available Cover	and fish cover; mix of snags,	potential; adequate habitat for	· · · ·	unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	
	cobble or other stable habitat and	presence of additional substrate in		
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 8	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock; no
Characterization	with gravel and firm sand	mud may be dominant; some root	little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	
Score 2	submerged vegetation common.	present.		
3. Pool Variability	Even mix of large-shallow, large-	Majority of pools large-deep; very	Shallow pools much more	Majority of pools small-shallow or
	deep, small-shallow, small-deep	few shallow.	prevalent than deep pools.	pools absent.
	pools present.			
Score 2				
Score 2 4. Sediment Deposition	Little or no enlargement of islands	Some new increase in bar	Moderate deposition of new	Heavy deposits of fine material,
	=	formation, mostly from gravel, sand		
	-	or fine sediment; 20-50% of the	-	than 80% of the bottom changing
	deposition.	bottom affected; slight deposition	the bottom affected; sediment	frequently; pools almost absent
		in pools.	deposits at obstructions,	due to substantial sediment
				deposition.
			moderate deposition of pools	
Score 11			prevalent.	
5. Channel Flow Status	Water reaches base of both lower			Very little water in channel and
	banks, and minimal amount of	channel; or <25% of channel	available channel, and/or riffle	mostly present as standing pools.
Score 15	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	
6. Channel Alteration	Channelization or dredging absent	Some channelization present,	Channelization may be	Banks shored with gabion or
	or minimal; stream with normal	usually in areas of bridge	extensive; embankments or	cement; over 80% of the stream
	pattern.	abutments; evidence of past		reach channelized and disrupted.
				Instream habitat greatly altered or
		(greater than past 20 yr) may be		removed entirely.
Score 18		present, but recent channelization is not present.	disrupted.	
7. Channel Sinuosity	The bends in the stream increase		The bends in the stream	Channel straight; waterway has
,	the stream length 3 to 4 times	the stream length 2 to 3 times	increase the stream length I to	• ,
	longer than if it was in a straight	:	2 times longer than if it was in a	
	line. (Note – channel braiding is	line.	straight line.	
	considered normal in coastal plains			
	and other low-lying areas. This			
Search L	parameter is not easily rated in			
Score I	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 10	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
RB Score 10				of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 8 RB Score 8	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score I	lawns, or crops) have not			
	impacted zone.			
Total Score 100				

REACH Stream 19	PROJECT KY18-005	DATE 2/14/2019	LAT <u>37.085533</u>	LONG -88.920623
INVESTIGATOR(S)	J. Storm, R. McGregor		WATERSHED Middle Hump	ohrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	IAGE DESCRIPTION:	
Width (Ft) I.0	Perennial			
Depth (Ft) 0.3	Ephemeral X			
_ · · · · · · · ·				
Reach (Ft)	Intermittent	<u> </u>		
		CONDITION	CATEGORY	-
HABITAT	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
PARAMETER	20 19 18 17 16	<u>15 14 13 12 11</u>	10 9 8 7 6	5 4 3 2 1 0
 Epifaunal Substrate / Available Cover 	Greater than 50% of substrate		,	Less than 10% stable habitat; lack
Available Cover	favorable for epifaunal colonization and fish cover; mix of snags,	potential; adequate habitat for	,	of habitat is obvious; substrate unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	unstable of lacking.
		presence of additional substrate in		
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 7	not new fall and not transient.)	at high end of scale).		
Score 7 2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock: no
Characterization	with gravel and firm sand	· · · · · · · · · · · · · · · · · · ·		root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	
	submerged vegetation common.	present.		
Score I				
3. Pool Variability	Even mix of large-shallow, large-	Majority of pools large-deep; very	Shallow pools much more	Majority of pools small-shallow or
	deep, small-shallow, small-deep	few shallow.	prevalent than deep pools.	pools absent.
	pools present.			
Score I				
4. Sediment Deposition	Little or no enlargement of islands	Some new increase in bar	Moderate deposition of new	Heavy deposits of fine material,
	-	formation, mostly from gravel, sand	1-	
	the bottom affected by sediment	or fine sediment; 20-50% of the		than 80% of the bottom changing
	deposition.	bottom affected; slight deposition		frequently; pools almost absent
		in pools.	1	due to substantial sediment
			constrictions, and bends; moderate deposition of pools	deposition.
			prevalent.	
Score 12			·	
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of	Water fills > 75% of the available channel; or <25% of channel	Water fills 25-75% of the available channel, and/or riffle	Very little water in channel and mostly present as standing pools.
	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	mostly present as standing pools.
Score 7	chainer substrate is exposed.	substrate is exposed.	contracto al c mostly exposed.	
6. Channel Alteration	Channelization or dredging absent	Some channelization present,	Channelization may be	Banks shored with gabion or
	or minimal; stream with normal	usually in areas of bridge	extensive; embankments or	cement; over 80% of the stream
	pattern.	abutments; evidence of past	•	reach channelized and disrupted.
		channelization, i.e., dredging,		Instream habitat greatly altered or
		(greater than past 20 yr) may be	stream reach channelized and	removed entirely.
Score 20		present, but recent channelization	disrupted.	
7. Channel Sinuosity	The bends in the stream increase	is not present. The bends in the stream increase	The bends in the stream	Channel straight; waterway has
	the stream length 3 to 4 times	the stream length 2 to 3 times	increase the stream length 1 to	
	longer than if it was in a straight	longer than if it was in a straight	2 times longer than if it was in a	
	line. (Note – channel braiding is	line.	straight line.	
	considered normal in coastal plains	i	Ŭ	
	and other low-lying areas. This			
	parameter is not easily rated in			
Score 13	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 4	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
LB Score 4 RB Score 4				of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 5 RB Score 5	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 5	lawns, or crops) have not			
	impacted zone.			
Total Score 89				

REACH Stream 20	PROJECT KY18-005	DATE 2/14/2019	LAT <u>37.085423</u>	LONG -88.915003
INVESTIGATOR(S)	J. Storm, R. McGregor		WATERSHED Middle Hump	hrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	AGE DESCRIPTION:	
Width (Ft) I.0	Perennial			
Depth (Ft) 0.5	Ephemeral X			
Reach (Ft)	Intermittent			
		CONDITION		
HABITAT	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
PARAMETER I. Epifaunal Substrate /	20 19 18 17 16 Greater than 50% of substrate	15 14 13 12 11 30-50% mix of stable habitat; well	10 9 8 7 6 10-30% mix of stable habitat;	5 4 3 2 1 0 Less than 10% stable habitat; lack
Available Cover	favorable for epifaunal colonization		habitat availability less than	of habitat is obvious; substrate
Available Cover	and fish cover; mix of snags,	potential; adequate habitat for	: · · · · · · · · · · · · · · · · · · ·	unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	distable of lacking.
		presence of additional substrate in		
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 9	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock; no
Characterization	with gravel and firm sand		little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	· ·	submerged vegetation.	Ŭ
	submerged vegetation common.	present.		
Score 10				
3. Pool Variability	Even mix of large-shallow, large-		Shallow pools much more	Majority of pools small-shallow or
	deep, small-shallow, small-deep	few shallow.	prevalent than deep pools.	pools absent.
	pools present.			
Score 7				
4. Sediment Deposition	Little or no enlargement of islands	Some new increase in bar	Moderate deposition of new	Heavy deposits of fine material,
		formation, mostly from gravel, sand	-	-
	the bottom affected by sediment	or fine sediment; 20-50% of the	old and new bars; 50-80% of	than 80% of the bottom changing
	deposition.			frequently; pools almost absent
		in pools.	deposits at obstructions, constrictions, and bends;	due to substantial sediment
			moderate deposition of pools	deposition.
	_		prevalent.	
Score 15			·	
5. Channel Flow Status	Water reaches base of both lower	channel; or <25% of channel	Water fills 25-75% of the	Very little water in channel and
	banks, and minimal amount of channel substrate is exposed.	substrate is exposed.	available channel, and/or riffle substrates are mostly exposed.	mostly present as standing pools.
Score 10	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	
6. Channel Alteration	Channelization or dredging absent	Some channelization present,	Channelization may be	Banks shored with gabion or
	or minimal; stream with normal	usually in areas of bridge	extensive; embankments or	cement; over 80% of the stream
	pattern.		shoring structures present on	reach channelized and disrupted.
				Instream habitat greatly altered or
		(greater than past 20 yr) may be	stream reach channelized and	removed entirely.
C	ł	present, but recent channelization	disrupted.	
Score 11 7. Channel Sinuosity	The bends in the stream increase	is not present. The bends in the stream increase	The bends in the stream	Channel straight; waterway has
	the stream length 3 to 4 times		increase the stream length 1 to	
	longer than if it was in a straight		2 times longer than if it was in a	
	line. (Note – channel braiding is		straight line.	
	considered normal in coastal plains		-	
	and other low-lying areas. This			
	parameter is not easily rated in			
Score 10	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 10	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
RB Score 10				of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 9 RB Score 9	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 6	lawns, or crops) have not			
	impacted zone.			
Total Score 122				

REACH Stream 21	PROJECT KY18-005	DATE 2/14/2019	LAT 37.085397	LONG -88.918820
INVESTIGATOR(S)	J. Storm, R. McGregor		WATERSHED Middle Hump	bhrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	AGE DESCRIPTION:	
Width (Ft) 0.5	Perennial			
· · ·	Ephemeral X			
Reach (Ft)	Intermittent			
		CONDITION	CATEGORY	
HABITAT	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
PARAMETER	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
 Epifaunal Substrate / Available Cover 	Greater than 50% of substrate favorable for epifaunal colonization		10-30% mix of stable habitat; habitat availability less than	Less than 10% stable habitat; lack of habitat is obvious; substrate
Available Cover	and fish cover; mix of snags,	potential; adequate habitat for	: · · · · · · · · · · · · · · · · · · ·	unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	unstable of lacking.
		presence of additional substrate in	disturbed of removed.	
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 5	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock: no
Characterization	with gravel and firm sand	· · · · · · · · · · · · · · · · · · ·	little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	, ,	submerged vegetation.	
	submerged vegetation common.	present.		
Score 2				
3. Pool Variability	Even mix of large-shallow, large-			Majority of pools small-shallow or
	deep, small-shallow, small-deep	few shallow.	prevalent than deep pools.	pools absent.
	pools present.			
Score I				
4. Sediment Deposition	Little or no enlargement of islands			Heavy deposits of fine material,
	-	formation, mostly from gravel, sand	-	
	the bottom affected by sediment	or fine sediment; 20-50% of the	old and new bars; 50-80% of	than 80% of the bottom changing
	deposition.	, 0 1		frequently; pools almost absent
		in pools.	deposits at obstructions, constrictions, and bends;	due to substantial sediment deposition.
			moderate deposition of pools	deposition.
	-		prevalent.	
Score 15 5. Channel Flow Status	Water reaches have of both lower	Water fills > 75% of the available	·	Vanu little water in shornel and
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of	channel; or <25% of channel	Water fills 25-75% of the available channel, and/or riffle	Very little water in channel and mostly present as standing pools.
	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	mostly present as standing pools.
Score 11		······		
6. Channel Alteration	Channelization or dredging absent	Some channelization present,	Channelization may be	Banks shored with gabion or
	or minimal; stream with normal	usually in areas of bridge	extensive; embankments or	cement; over 80% of the stream
	pattern.	abutments; evidence of past		reach channelized and disrupted.
				Instream habitat greatly altered or
		(greater than past 20 yr) may be present, but recent channelization	stream reach channelized and	removed entirely.
Score 20		is not present.	disrupted.	
7. Channel Sinuosity	The bends in the stream increase		The bends in the stream	Channel straight; waterway has
	the stream length 3 to 4 times		increase the stream length I to	
	longer than if it was in a straight	:	2 times longer than if it was in a	
	line. (Note – channel braiding is	line.	straight line.	
	considered normal in coastal plains			
	and other low-lying areas. This			
	parameter is not easily rated in			
Score 8	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 10	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
RB Score 10				of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 8 RB Score 8	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 10	lawns, or crops) have not			
	impacted zone.			
Total Score 6				

Stream is isolated

REACH Stream 22	PROJECT KY18-005	DATE 2/15/2019	LAT <u>37.083776</u>	LONG -88.934333
INVESTIGATOR(S)	J. Storm, R. McGregor	COWARDIN CLASS R4	WATERSHED Middle Hump	ohrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	IAGE DESCRIPTION:	
Width (Ft) 15.0	Perennial			
Depth (Ft) I.0	Ephemeral			
-F- (-)				
Reach (Ft)	Intermittent X	<u> </u>		
		CONDITION		
HABITAT PARAMETER	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
I. Epifaunal Substrate /	20 19 18 17 16 Greater than 50% of substrate	15 14 13 12 11 30-50% mix of stable habitat; well	10 9 8 7 6 10-30% mix of stable habitat;	5 4 3 2 1 0 Less than 10% stable habitat; lack
Available Cover	favorable for epifaunal colonization	· · · · · · · · · · · · · · · · · · ·	habitat availability less than	of habitat is obvious; substrate
	and fish cover; mix of snags,	potential; adequate habitat for		unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	
	• •	presence of additional substrate in		
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 9	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock; no
Characterization	with gravel and firm sand	mud may be dominant; some root	little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	
	submerged vegetation common.	present.		
Score 6 3. Pool Variability	Even mix of large shallow, large	Majority of pools large-deep; very	Shallow pools much more	Majority of pools small-shallow or
5. TOOL Valiability	Even mix of large-shallow, large- deep, small-shallow, small-deep	few shallow.	prevalent than deep pools.	pools absent.
	pools present.			
	r · · · r · · · ·			
Score 6		с. · · · .	M L & L M A	
4. Sediment Deposition	Little or no enlargement of islands	some new increase in bar formation, mostly from gravel, sand		Heavy deposits of fine material,
	the bottom affected by sediment	or fine sediment; 20-50% of the	old and new bars; 50-80% of	than 80% of the bottom changing
	deposition.	bottom affected; slight deposition	· · · · · · · · · · · · · · · · · · ·	frequently; pools almost absent
		in pools.	deposits at obstructions,	due to substantial sediment
			constrictions, and bends;	deposition.
			moderate deposition of pools	
Score 10			prevalent.	
5. Channel Flow Status	Water reaches base of both lower	Water fills > 75% of the available	Water fills 25-75% of the	Very little water in channel and
	banks, and minimal amount of	channel; or <25% of channel	available channel, and/or riffle	mostly present as standing pools.
	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	
Score 15 6. Channel Alteration	Channelization or dredging absent	Some channelization procent	Channelization may be	Banks shored with gabion or
	or minimal; stream with normal	usually in areas of bridge	extensive; embankments or	cement; over 80% of the stream
	pattern.	abutments; evidence of past		reach channelized and disrupted.
	F	channelization, i.e., dredging,	:	Instream habitat greatly altered or
		(greater than past 20 yr) may be		removed entirely.
		present, but recent channelization	disrupted.	
Score 10		is not present.		
7. Channel Sinuosity		The bends in the stream increase		Channel straight; waterway has
	the stream length 3 to 4 times	the stream length 2 to 3 times	increase the stream length 1 to	
	longer than if it was in a straight	longer than if it was in a straight	2 times longer than if it was in a	distance.
	line. (Note – channel braiding is considered normal in coastal plains	line.	straight line.	
	and other low-lying areas. This			
	parameter is not easily rated in			
Score 12	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
IB Score 4	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
LB Score 4 RB Score 5				of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 7 RB Score 7	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 10	lawns, or crops) have not			
	impacted zone.			
Total Score 106				

REACH Stream 23	PROJECT KY18-005	DATE 2/15/2019	LAT 37.083147	LONG -88.936285
INVESTIGATOR(S)	J. Storm, R. McGregor	COWARDIN CLASS R4	WATERSHED Middle Hump	hrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	AGE DESCRIPTION:	
Width (Ft) I.5	Perennial			
Depth (Ft) 0.5	Ephemeral			
-F- (-)	· ·			
Reach (Ft)	Intermittent X			
		CONDITION	CATEGORY	
HABITAT	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
PARAMETER	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
1. Epifaunal Substrate /	Greater than 50% of substrate		10-30% mix of stable habitat;	Less than 10% stable habitat; lack
Available Cover	favorable for epifaunal colonization and fish cover; mix of snags,	potential; adequate habitat for	<i>'</i>	of habitat is obvious; substrate unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	unstable of lacking.
		presence of additional substrate in	disturbed of removed.	
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 8	not new fall and not transient.)	at high end of scale).		
Score 8 2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock: no
Characterization	with gravel and firm sand		little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	
	submerged vegetation common.	present.		
Score II				
3. Pool Variability	Even mix of large-shallow, large-			Majority of pools small-shallow or
	deep, small-shallow, small-deep	few shallow.	prevalent than deep pools.	pools absent.
	pools present.			
Score 3				
4. Sediment Deposition	Little or no enlargement of islands			Heavy deposits of fine material,
		formation, mostly from gravel, sand	-	
	the bottom affected by sediment	or fine sediment; 20-50% of the		than 80% of the bottom changing
	deposition.	bottom affected; slight deposition in pools.		frequently; pools almost absent due to substantial sediment
		in pools.		deposition.
			moderate deposition of pools	deposition.
			prevalent.	
Score 13 5. Channel Flow Status	Water reaches base of both lower	Water fills > 75% of the available		Very little water in channel and
5. Channel Flow Status	banks, and minimal amount of	channel; or <25% of channel		mostly present as standing pools.
	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	mostly present as standing pools.
Score 10			, .	
6. Channel Alteration	Channelization or dredging absent			Banks shored with gabion or
	or minimal; stream with normal	usually in areas of bridge	, , , , , , , , , , , , , , , , , , ,	cement; over 80% of the stream
	pattern.	abutments; evidence of past	• ·	reach channelized and disrupted.
		channelization, i.e., dredging,		Instream habitat greatly altered or
		(greater than past 20 yr) may be present, but recent channelization	stream reach channelized and disrupted.	removed entirely.
Score 9	•	is not present.	disi upted.	
7. Channel Sinuosity	The bends in the stream increase		The bends in the stream	Channel straight; waterway has
,	the stream length 3 to 4 times	the stream length 2 to 3 times	increase the stream length I to	• ,
	longer than if it was in a straight	longer than if it was in a straight	2 times longer than if it was in a	
	line. (Note – channel braiding is	line.	straight line.	
	considered normal in coastal plains			
	and other low-lying areas. This			
	parameter is not easily rated in			
Score 7	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 8	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
LB Score 8 RB Score 8			-	of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 5 RB Score 5	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 5	lawns, or crops) have not			
	impacted zone.			
Total Score 97				

REACH Stream 24	PROJECT KY18-005	DATE 2/15/2019	LAT <u>37.082875</u>	LONG -88.938038
INVESTIGATOR(S)	J. Storm, R. McGregor	COWARDIN CLASS R4	WATERSHED Middle Hump	ohrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	IAGE DESCRIPTION:	
Width (Ft) 5.0	Perennial			
Depth (Ft) I.0	· <u> </u>			
-F- (-)		<u> </u>		
Reach (Ft)	Intermittent X	<u> </u>		
		CONDITION	CATEGORY	
HABITAT	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
PARAMETER	20 19 18 17 16	<u>15 14 13 12 11</u>	10 9 8 7 6	5 4 3 2 1 0
 Epifaunal Substrate / Available Cover 	Greater than 50% of substrate favorable for epifaunal colonization	30-50% mix of stable habitat; well	10-30% mix of stable habitat; habitat availability less than	Less than 10% stable habitat; lack of habitat is obvious; substrate
	and fish cover; mix of snags,	potential; adequate habitat for	1	unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	chocasis of morning.
	cobble or other stable habitat and	presence of additional substrate in		
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 14	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock; no
Characterization	with gravel and firm sand	mud may be dominant; some root	little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	
Cara 12	submerged vegetation common.	present.		
Score 12 3. Pool Variability	Even mix of large-shallow, large-	Majority of pools large-deep; very	Shallow pools much more	Majority of pools small-shallow or
	deep, small-shallow, small-deep	few shallow.	prevalent than deep pools.	pools absent.
	pools present.			
Score 8 4. Sediment Deposition	Little or no enlargement of islands	Some new increase in bar	Moderate deposition of new	Heavy deposits of fine material,
4. Sediment Deposition	=	formation, mostly from gravel, sand		
	the bottom affected by sediment	or fine sediment; 20-50% of the	17	than 80% of the bottom changing
	deposition.	bottom affected; slight deposition	1	frequently; pools almost absent
		in pools.	deposits at obstructions,	due to substantial sediment
			constrictions, and bends;	deposition.
			moderate deposition of pools	
Score 13			prevalent.	
5. Channel Flow Status	Water reaches base of both lower		Water fills 25-75% of the	Very little water in channel and
	banks, and minimal amount of	channel; or <25% of channel	available channel, and/or riffle	mostly present as standing pools.
Score 15	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	
6. Channel Alteration	Channelization or dredging absent	Some channelization present,	Channelization may be	Banks shored with gabion or
	or minimal; stream with normal	usually in areas of bridge	extensive; embankments or	cement; over 80% of the stream
	pattern.	abutments; evidence of past	shoring structures present on	reach channelized and disrupted.
		channelization, i.e., dredging,	both banks; and 40 to 80% of	Instream habitat greatly altered or
		(greater than past 20 yr) may be		removed entirely.
		present, but recent channelization	disrupted.	
Score 16 7. Channel Sinuosity	The bends in the stream increase	is not present. The bends in the stream increase	The bends in the stream	Channel straight; waterway has
7. Channel Sindosity	the stream length 3 to 4 times	the stream length 2 to 3 times	increase the stream length 1 to	
	longer than if it was in a straight	longer than if it was in a straight	2 times longer than if it was in a	
	line. (Note – channel braiding is	line.	straight line.	
	considered normal in coastal plains			
	and other low-lying areas. This			
	parameter is not easily rated in			
Score 10	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
IB Score 9	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
LB Score 9 RB Score 8			-	of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 8 RB Score 9	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 10	lawns, or crops) have not			
	impacted zone.			
Total Score 142				

REACH Stream 25	PROJECT KY18-005	DATE 2/15/2019	LAT 37.081765	LONG -88.942284
INVESTIGATOR(S)	J. Storm, R. McGregor	COWARDIN CLASS R4	WATERSHED Middle Hump	ohrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	AGE DESCRIPTION:	
Width (Ft) 25.0	Perennial			
Depth (Ft) I.0	Ephemeral			
-F- (-)	· · <u> </u>			
Reach (Ft)	Intermittent X	<u> </u>		
		CONDITION	CATEGORY	
HABITAT	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
PARAMETER I. Epifaunal Substrate /	20 19 18 17 16 Greater than 50% of substrate	15 14 13 12 11 30-50% mix of stable habitat; well	10 9 8 7 6 10-30% mix of stable habitat:	5 4 3 2 1 0 Less than 10% stable habitat; lack
Available Cover	favorable for epifaunal colonization		,	of habitat is obvious; substrate
	and fish cover; mix of snags,	potential; adequate habitat for	1	unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	distable of lacking.
		presence of additional substrate in		
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 12	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock; no
Characterization	with gravel and firm sand		little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	
	submerged vegetation common.	present.		
Score 12	Even mix of lange shellow, lange	Majority of apple large deeps your	Shallow a a la much mana	Majority of social amolt shallow on
3. Pool Variability	Even mix of large-shallow, large- deep, small-shallow, small-deep	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	pools present.	iew shallow.	prevalent than deep pools.	pools absent.
Score 7				
4. Sediment Deposition	Little or no enlargement of islands			Heavy deposits of fine material,
	the bottom affected by sediment	formation, mostly from gravel, sand or fine sediment; 20-50% of the	old and new bars; 50-80% of	than 80% of the bottom changing
	deposition.	bottom affected; slight deposition	· · · · · · · · · · · · · · · · · · ·	frequently; pools almost absent
		in pools.	deposits at obstructions,	due to substantial sediment
			constrictions, and bends;	deposition.
			moderate deposition of pools	
Score 13			prevalent.	
5. Channel Flow Status	Water reaches base of both lower	Water fills > 75% of the available	Water fills 25-75% of the	Very little water in channel and
	banks, and minimal amount of	channel; or <25% of channel	available channel, and/or riffle	mostly present as standing pools.
	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	
Score 10 6. Channel Alteration	Channelization or dredging absent	Some channelization present,	Channelization may be	Banks shored with gabion or
	or minimal; stream with normal	usually in areas of bridge		cement; over 80% of the stream
	pattern.	abutments; evidence of past	· · · · · · · · · · · · · · · · · · ·	reach channelized and disrupted.
		channelization, i.e., dredging,	•	Instream habitat greatly altered or
		(greater than past 20 yr) may be	stream reach channelized and	removed entirely.
		present, but recent channelization	disrupted.	
Score 13		is not present.		
7. Channel Sinuosity	The bends in the stream increase	The bends in the stream increase	1	Channel straight; waterway has
	the stream length 3 to 4 times	the stream length 2 to 3 times	increase the stream length I to	
	longer than if it was in a straight	longer than if it was in a straight	2 times longer than if it was in a	distance.
	line. (Note – channel braiding is considered normal in coastal plains	line.	straight line.	
	and other low-lying areas. This			
	parameter is not easily rated in			
Score 5	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
IB Score 9	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
LB Score 9 RB Score 9				of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 8 RB Score 8	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 10	lawns, or crops) have not			
	impacted zone.			
Total Score 125				

125

REACH Stream 26	PROJECT KY18-005	DATE 2/15/2019	LAT <u>37.081716</u>	LONG88.942544
INVESTIGATOR(S)	J. Storm, R. McGregor	COWARDIN CLASS R4	WATERSHED Middle Hump	ohrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	IAGE DESCRIPTION:	
Width (Ft) I.5	Perennial			
Depth (Ft) I.0	Ephemeral			
	· · <u> </u>			<u> </u>
Reach (Ft)	Intermittent X			
		CONDITION		
HABITAT PARAMETER	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
I. Epifaunal Substrate /	20 19 18 17 16 Greater than 50% of substrate	15 14 13 12 11 30-50% mix of stable habitat; well	10 9 8 7 6 10-30% mix of stable habitat;	5 4 3 2 1 0 Less than 10% stable habitat; lack
Available Cover	favorable for epifaunal colonization		habitat availability less than	of habitat is obvious; substrate
	and fish cover; mix of snags,	potential; adequate habitat for		unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	
		presence of additional substrate in		
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 12	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock; no
Characterization	with gravel and firm sand	mud may be dominant; some root	little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	
	submerged vegetation common.	present.		
Score 10 3. Pool Variability	Even mix of large shallow, large	Majority of pools large-deep; very	Shallow pools much more	Majority of pools small-shallow or
5. TOOL Valiability	Even mix of large-shallow, large- deep, small-shallow, small-deep	few shallow.	prevalent than deep pools.	pools absent.
	pools present.			
	r · · · r · · · ·			
Score 5		с. · · · .	M L & L M A	
4. Sediment Deposition	Little or no enlargement of islands	some new increase in bar formation, mostly from gravel, sand		Heavy deposits of fine material,
	the bottom affected by sediment	or fine sediment; 20-50% of the	old and new bars; 50-80% of	than 80% of the bottom changing
	deposition.	bottom affected; slight deposition	· · · · · · · · · · · · · · · · · · ·	frequently; pools almost absent
	-F	in pools.	deposits at obstructions,	due to substantial sediment
			constrictions, and bends;	deposition.
			moderate deposition of pools	
Score 14			prevalent.	
5. Channel Flow Status	Water reaches base of both lower	Water fills > 75% of the available	Water fills 25-75% of the	Very little water in channel and
	banks, and minimal amount of	channel; or <25% of channel	available channel, and/or riffle	mostly present as standing pools.
_	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	
Score 10 6. Channel Alteration	Channelization or dredging absent	Some channelization procent	Channelization may be	Banks shored with gabion or
	or minimal; stream with normal	usually in areas of bridge	extensive; embankments or	cement; over 80% of the stream
	pattern.	abutments; evidence of past	· · · · · · · · · · · · · · · · · · ·	reach channelized and disrupted.
	r	channelization, i.e., dredging,	:	Instream habitat greatly altered or
		(greater than past 20 yr) may be	stream reach channelized and	removed entirely.
		present, but recent channelization	disrupted.	
Score 10		is not present.		
7. Channel Sinuosity		The bends in the stream increase		Channel straight; waterway has
	the stream length 3 to 4 times	the stream length 2 to 3 times	increase the stream length 1 to	
	longer than if it was in a straight	longer than if it was in a straight	2 times longer than if it was in a	distance.
	line. (Note – channel braiding is considered normal in coastal plains	line.	straight line.	
	and other low-lying areas. This			
	parameter is not easily rated in			
Score 8	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 9	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
RB Score 10				of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 3 RB Score 3	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 2	lawns, or crops) have not			
	impacted zone.			
Total Score 100				

REACH Stream 27	PROJECT KY18-005	DATE 2/15/2019	LAT 37.081040	LONG -88.942825
INVESTIGATOR(S)	J. Storm, R. McGregor		WATERSHED Middle Hump	bhrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	AGE DESCRIPTION:	
Width (Ft) I.0	Perennial			
Depth (Ft) 0.3	Ephemeral X			
Reach (Ft)	Intermittent			
		CONDITION	CATEGORY	
HABITAT	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
PARAMETER 1. Epifaunal Substrate /	20 19 18 17 16 Greater than 50% of substrate	15 14 13 12 11 30-50% mix of stable habitat: well	10 9 8 7 6 10-30% mix of stable habitat:	5 4 3 2 1 0 Less than 10% stable habitat; lack
Available Cover	favorable for epifaunal colonization		habitat availability less than	of habitat is obvious; substrate
	and fish cover; mix of snags,	potential; adequate habitat for	: · · · · · · · · · · · · · · · · · · ·	unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	distable of lacking.
		presence of additional substrate in		
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 5	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock; no
Characterization	with gravel and firm sand	· · · · · · · · · · · · · · · · · · ·	little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	
	submerged vegetation common.	present.		
Score 5	Even mix of lange shellow, lange	Majority of apple large deeps your	Shallow a cala much more	Majarity of a cale small shallow on
3. Pool Variability	Even mix of large-shallow, large- deep, small-shallow, small-deep	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	pools present.		prevalent than deep pools.	
	r r			
Score 5	1 : • • !	C in h	Madamén darasitian af navy	llana da cita effica matanial
4. Sediment Deposition	Little or no enlargement of islands	formation, mostly from gravel, sand		Heavy deposits of fine material,
	the bottom affected by sediment	or fine sediment; 20-50% of the	old and new bars; 50-80% of	than 80% of the bottom changing
	deposition.	í l	· · · · · · · · · · · · · · · · · · ·	frequently; pools almost absent
			deposits at obstructions,	due to substantial sediment
			constrictions, and bends;	deposition.
			moderate deposition of pools	
Score 15			prevalent.	
5. Channel Flow Status	Water reaches base of both lower	Water fills > 75% of the available	Water fills 25-75% of the	Very little water in channel and
	banks, and minimal amount of	channel; or <25% of channel	available channel, and/or riffle	mostly present as standing pools.
	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	
6. Channel Alteration	Channelization or dredging absent	Some channelization present,	Channelization may be	Banks shored with gabion or
o. Channel / Aleration	or minimal: stream with normal	usually in areas of bridge	extensive; embankments or	cement; over 80% of the stream
	pattern.	abutments; evidence of past		reach channelized and disrupted.
			both banks; and 40 to 80% of	Instream habitat greatly altered or
		(greater than past 20 yr) may be	stream reach channelized and	removed entirely.
		present, but recent channelization	disrupted.	
Score 18		is not present.		
7. Channel Sinuosity			The bends in the stream	Channel straight; waterway has
	the stream length 3 to 4 times	:	increase the stream length 1 to	
	longer than if it was in a straight line. (Note – channel braiding is	longer than if it was in a straight line.	2 times longer than if it was in a straight line.	uistance.
	considered normal in coastal plains	1	su aigne inic.	
	and other low-lying areas. This			
	parameter is not easily rated in			
Score 7	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 10	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
RB Score 10				of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 2 RB Score 2	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 2	lawns, or crops) have not			
	impacted zone.			
Total Score 91				

REACH Stream 28	PROJECT KY18-005	DATE 2/15/2019	LAT <u>37.081570</u>	LONG -88.943086
INVESTIGATOR(S)	J. Storm, R. McGregor		WATERSHED Middle Hump	bhrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	AGE DESCRIPTION:	
Width (Ft) 3.5	Perennial			
Depth (Ft) I.0	Ephemeral			
	· · <u> </u>			
Reach (Ft)	Intermittent X			
		CONDITION		
HABITAT	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
PARAMETER	20 19 18 17 16 Greater than 50% of substrate	15 14 13 12 11 30-50% mix of stable habitat: well	10 9 8 7 6 10-30% mix of stable habitat:	5 4 3 2 1 0 Less than 10% stable habitat; lack
 Epifaunal Substrate / Available Cover 	favorable for epifaunal colonization		habitat availability less than	of habitat is obvious; substrate
Available Cover	and fish cover; mix of snags,	potential; adequate habitat for	· ·	unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	distable of facially.
		presence of additional substrate in		
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 12	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock; no
Characterization	with gravel and firm sand	mud may be dominant; some root	little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	
	submerged vegetation common.	present.		
Score II 3. Pool Variability	Even mix of large-shallow, large-	Majority of pools large-deep; very	Shallow pools much more	Majority of pools small-shallow or
5. TOOL Valiability	deep, small-shallow, small-deep	few shallow.	prevalent than deep pools.	pools absent.
	pools present.		r	
Score 8	Little on no onlangement of islands	Sama nauringgaga in han	Madameta das asitian of nour	Hanny day agite of fine motorial
4. Sediment Deposition	Little or no enlargement of islands	formation, mostly from gravel, sand	Moderate deposition of new	Heavy deposits of fine material,
	the bottom affected by sediment	or fine sediment; 20-50% of the	old and new bars; 50-80% of	than 80% of the bottom changing
	deposition.	bottom affected; slight deposition		frequently; pools almost absent
		in pools.	deposits at obstructions,	due to substantial sediment
			constrictions, and bends;	deposition.
			moderate deposition of pools	
Score 13			prevalent.	
5. Channel Flow Status	Water reaches base of both lower	Water fills > 75% of the available	Water fills 25-75% of the	Very little water in channel and
	banks, and minimal amount of	channel; or <25% of channel	available channel, and/or riffle	mostly present as standing pools.
	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	
Score 8 6. Channel Alteration	Channelization or dredging absent	Some channelization present.	Channelization may be	Banks shored with gabion or
	or minimal; stream with normal	usually in areas of bridge	extensive; embankments or	cement; over 80% of the stream
	pattern.	abutments; evidence of past	shoring structures present on	reach channelized and disrupted.
		channelization, i.e., dredging,	both banks; and 40 to 80% of	Instream habitat greatly altered or
		(greater than past 20 yr) may be	stream reach channelized and	removed entirely.
		present, but recent channelization	disrupted.	
Score 13		is not present.	The bands to do a	Channel atmaticles and a
7. Channel Sinuosity		The bends in the stream increase		Channel straight; waterway has
	the stream length 3 to 4 times longer than if it was in a straight	the stream length 2 to 3 times longer than if it was in a straight	increase the stream length 1 to 2 times longer than if it was in a	
	line. (Note – channel braiding is	line.	straight line.	Giodifico.
	considered normal in coastal plains	i	0	
	and other low-lying areas. This			
	parameter is not easily rated in			
Score 5	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
IB Score 9	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
LB Score 9 RB Score 9			-	of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 5 RB Score 5	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 5	lawns, or crops) have not			
	impacted zone.			
Total Score				

REACH Stream 29	PROJECT KY18-005	DATE 2/15/2019	LAT <u>37.077006</u>	LONG -88.931299
INVESTIGATOR(S)	J. Storm, R. McGregor	COWARDIN CLASS R4	WATERSHED Middle Hump	ohrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	AGE DESCRIPTION:	
Width (Ft) 5.0) Perennial			
Depth (Ft)	Ephemeral			
Reach (Ft)	Intermittent X			
		CONDITION		
HABITAT PARAMETER	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
I. Epifaunal Substrate /	20 19 18 17 16 Greater than 50% of substrate	15 14 13 12 11 30-50% mix of stable habitat; well	10 9 8 7 6 10-30% mix of stable habitat;	5 4 3 2 1 0 Less than 10% stable habitat; lack
Available Cover	favorable for epifaunal colonization	· · · · · · · · · · · · · · · · · · ·	habitat availability less than	of habitat is obvious; substrate
	and fish cover; mix of snags,	potential; adequate habitat for	· ·	unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	
	• •	presence of additional substrate in		
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 15	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock; no
Characterization	with gravel and firm sand	mud may be dominant; some root	little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	
	submerged vegetation common.	present.		
Score 15				
3. Pool Variability	Even mix of large-shallow, large- deep, small-shallow, small-deep	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	pools present.	iew shallow.	prevalent than deep pools.	pools absent.
Score 10				
4. Sediment Deposition	Little or no enlargement of islands		Moderate deposition of new	Heavy deposits of fine material,
		formation, mostly from gravel, sand	-	
	the bottom affected by sediment deposition.	or fine sediment; 20-50% of the bottom affected; slight deposition	old and new bars; 50-80% of the bottom affected; sediment	than 80% of the bottom changing frequently; pools almost absent
		in pools.	deposits at obstructions,	due to substantial sediment
			constrictions, and bends;	deposition.
			moderate deposition of pools	'
c [12	-		prevalent.	
Score 12 5. Channel Flow Status	Water reaches base of both lower	Water fills > 75% of the available	Water fills 25-75% of the	Very little water in channel and
	banks, and minimal amount of	channel; or <25% of channel	available channel, and/or riffle	mostly present as standing pools.
	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	CI OF State
Score 16				
6. Channel Alteration	Channelization or dredging absent		Channelization may be	Banks shored with gabion or
	or minimal; stream with normal	usually in areas of bridge	extensive; embankments or	cement; over 80% of the stream
	pattern.	abutments; evidence of past channelization, i.e., dredging,	shoring structures present on	reach channelized and disrupted.
		(greater than past 20 yr) may be	both banks; and 40 to 80% of stream reach channelized and	Instream habitat greatly altered or removed entirely.
		present, but recent channelization	disrupted.	removed entirely.
Score 13	1	is not present.	·	
7. Channel Sinuosity	The bends in the stream increase	The bends in the stream increase	The bends in the stream	Channel straight; waterway has
	the stream length 3 to 4 times	the stream length 2 to 3 times	increase the stream length I to	
	longer than if it was in a straight	longer than if it was in a straight	2 times longer than if it was in a	distance.
	line. (Note – channel braiding is	line.	straight line.	
	considered normal in coastal plains			
	and other low-lying areas. This			
	parameter is not easily rated in			
Score 10	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 9	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
RB Score 9				of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 8 RB Score 8	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 5	lawns, or crops) have not			
	impacted zone.			
Total Score 35				

REACH Stream 30	PROJECT KY18-005	DATE 2/15/2019	LAT <u>37.077423</u>	LONG -88.921771
INVESTIGATOR(S)	J. Storm, R. McGregor		WATERSHED Middle Hump	hrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	AGE DESCRIPTION:	
Width (Ft) I.0	Perennial			
Depth (Ft) 0.5	Ephemeral X			
Reach (Ft)	Intermittent			
LIADITAT				2002
HABITAT PARAMETER	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
I. Epifaunal Substrate /	20 19 18 17 16 Greater than 50% of substrate	15 14 13 12 11 30-50% mix of stable habitat; well	10 9 8 7 6 10-30% mix of stable habitat;	5 4 3 2 1 0 Less than 10% stable habitat; lack
Available Cover	favorable for epifaunal colonization		habitat availability less than	of habitat is obvious; substrate
	and fish cover; mix of snags,	potential; adequate habitat for	: · · · · · · · · · · · · · · · · · · ·	unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	-
	cobble or other stable habitat and	presence of additional substrate in		
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 8	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock; no
Characterization	with gravel and firm sand	mud may be dominant; some root	little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	
	submerged vegetation common.	present.		
Score 8	Even mix of lange shellow lange	Majaniny of a colo lange decay years	Shallow a colo much more	Majarity of a cale small shallow on
3. Pool Variability	Even mix of large-shallow, large- deep, small-shallow, small-deep	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	pools present.	iew shanow.	prevalent than deep pools.	
	F F			
Score 3				
4. Sediment Deposition	Little or no enlargement of islands			Heavy deposits of fine material,
	the bottom affected by sediment	formation, mostly from gravel, sand or fine sediment; 20-50% of the	old and new bars; 50-80% of	than 80% of the bottom changing
	deposition.			frequently; pools almost absent
			deposits at obstructions,	due to substantial sediment
				deposition.
			moderate deposition of pools	
Score 15			prevalent.	
5. Channel Flow Status	Water reaches base of both lower	Water fills > 75% of the available	Water fills 25-75% of the	Very little water in channel and
	banks, and minimal amount of	channel; or <25% of channel	available channel, and/or riffle	mostly present as standing pools.
	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	
Score 5				
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal	Some channelization present, usually in areas of bridge	Channelization may be extensive; embankments or	Banks shored with gabion or cement; over 80% of the stream
	pattern.		shoring structures present on	reach channelized and disrupted.
				Instream habitat greatly altered or
			stream reach channelized and	removed entirely.
			disrupted.	,
Score 16		is not present.		
7. Channel Sinuosity	The bends in the stream increase	The bends in the stream increase	The bends in the stream	Channel straight; waterway has
	the stream length 3 to 4 times		increase the stream length I to	
	longer than if it was in a straight		2 times longer than if it was in a	distance.
	line. (Note – channel braiding is		straight line.	
	considered normal in coastal plains			
	and other low-lying areas. This parameter is not easily rated in			
Score 12	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 10	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
LB Score 10 RB Score 10				of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 8 RB Score 8	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 7	lawns, or crops) have not			
	impacted zone.			
Total Score 7				

REACH Stream	31	PROJECT	KY18-005	DATE 2/15/2019	LAT 37.076370	LONG -88.881294
INVESTIGATO	R(S)	J. Storm, R. McGre	egor	COWARDIN CLASS R4	WATERSHED Upper Hump	hrey Creek
STREAM SIZE:		STREAM TYPE	:	IMAGE ID #: IM	AGE DESCRIPTION:	
Width (Ft)	2.0	Perennial				
– Depth (Ft)	1.0	Ephemeral				_
			x	<u> </u>		
Reach (Ft)		Intermittent	<u>~</u>			
				CONDITION		
HABITAT PARAMETE		OPTIM		SUBOPTIMAL	MARGINAL	POOR
I. Epifaunal Substra		20 19 18 Greater than 50% o	17 16	15 14 13 12 11 30-50% mix of stable habitat; well	10 9 8 7 6 10-30% mix of stable habitat;	5 4 3 2 1 0 Less than 10% stable habitat; lack
Available Cover	ale /			suited for full colonization	habitat availability less than	of habitat is obvious; substrate
, wanable Cover		and fish cover; mix		potential; adequate habitat for	desirable; substrate frequently	unstable or lacking.
		submerged logs, une	-	maintenance of populations;	disturbed or removed.	
		cobble or other sta		presence of additional substrate in		
		at stage to allow ful	l colonization	the form of new fall, but not yet		
		potential (i.e., logs/s	snags that are	prepared for colonization (may rate		
Score	12	not new fall and not	t transient.)	at high end of scale).		
2. Pool Substrate		Mixture of substrate	e materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock; no
Characterization		with gravel and firm	n sand	mud may be dominant; some root	little or no root mat; no	root mat or vegetation.
		prevalent; root mat	is and	mats and submerged vegetation	submerged vegetation.	
	12	submerged vegetation	on common.	present.		
Score 3. Pool Variability	12	Even mix of large-sh	hallow largo	Majority of pools large-deep; very	Shallow pools much more	Majority of pools small-shallow or
5. TOOL Variability		deep, small-shallow,		few shallow.	prevalent than deep pools.	pools absent.
		pools present.	,			
-		· · · · · · · ·				
Score	5	Lind Line		· · · · ·	M L / L M C	
4. Sediment Depos	sition	-		Some new increase in bar formation, mostly from gravel, sand	Moderate deposition of new	Heavy deposits of fine material,
		the bottom affected		or fine sediment; 20-50% of the	old and new bars; 50-80% of	than 80% of the bottom changing
		deposition.	by sediment	bottom affected; slight deposition	the bottom affected; sediment	frequently; pools almost absent
		-F		in pools.	deposits at obstructions,	due to substantial sediment
					constrictions, and bends;	deposition.
					moderate deposition of pools	
Score	11				prevalent.	
5. Channel Flow St	tatus	Water reaches base	e of both lower	Water fills > 75% of the available	Water fills 25-75% of the	Very little water in channel and
		banks, and minimal	amount of	channel; or <25% of channel	available channel, and/or riffle	mostly present as standing pools.
_		channel substrate is	exposed.	substrate is exposed.	substrates are mostly exposed.	
Score 6. Channel Alterati	14 ion	Channelization or d	Irodaina abcort	Some channelization present,	Channelization may be	Banks shored with gabion or
o. Channer Alterati	1011	or minimal; stream		usually in areas of bridge	extensive; embankments or	cement; over 80% of the stream
		pattern.	With Horman	abutments; evidence of past	shoring structures present on	reach channelized and disrupted.
		F		channelization, i.e., dredging,	both banks; and 40 to 80% of	Instream habitat greatly altered or
				(greater than past 20 yr) may be	stream reach channelized and	removed entirely.
_				present, but recent channelization	disrupted.	
Score	15			is not present.		
7. Channel Sinuosi	ty	The bends in the st		The bends in the stream increase	The bends in the stream	Channel straight; waterway has
		the stream length 3		the stream length 2 to 3 times	increase the stream length 1 to	:
		longer than if it was	•	longer than if it was in a straight	2 times longer than if it was in a	distance.
		line. (Note – chann considered normal i		line.	straight line.	
		and other low-lying				
		parameter is not ea				
Score	9	these areas.)				

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 8	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
RB Score 9	-			of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 5 RB Score 5	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 8	lawns, or crops) have not			
	impacted zone.			
Total Score 121				

REACH Stream 32	PROJECT KY18-005	DATE 2/15/2019	LAT <u>37.076023</u>	LONG88.871294
INVESTIGATOR(S)	J. Storm, R. McGregor		WATERSHED Upper Hump	hrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	IAGE DESCRIPTION:	
Width (Ft) I.5	Perennial			
· (·)	·			
-F - (-)	Ephemeral X			
Reach (Ft)	Intermittent			
CONDITION CATEGORY				
HABITAT	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
PARAMETER	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
1. Epifaunal Substrate /	Greater than 50% of substrate	30-50% mix of stable habitat; well	10-30% mix of stable habitat;	Less than 10% stable habitat; lack
Available Cover	favorable for epifaunal colonization and fish cover; mix of snags,	potential; adequate habitat for	habitat availability less than desirable; substrate frequently	of habitat is obvious; substrate unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	unstable of lacking.
	0 0 0	presence of additional substrate in	distuibed of removed.	
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 7	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock: no
Characterization	with gravel and firm sand	· · · · · · · · · · · · · · · · · · ·	little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	, j
	submerged vegetation common.	present.		
Score 10				
3. Pool Variability	Even mix of large-shallow, large-	Majority of pools large-deep; very	Shallow pools much more	Majority of pools small-shallow or
	deep, small-shallow, small-deep pools present.	few shallow.	prevalent than deep pools.	pools absent.
	pools present.			
Score 3				
4. Sediment Deposition	Little or no enlargement of islands		Moderate deposition of new	Heavy deposits of fine material,
		formation, mostly from gravel, sand or fine sediment; 20-50% of the	-	
	the bottom affected by sediment deposition.	bottom affected; slight deposition	old and new bars; 50-80% of the bottom affected; sediment	than 80% of the bottom changing frequently; pools almost absent
		in pools.	deposits at obstructions,	due to substantial sediment
			constrictions, and bends;	deposition.
			moderate deposition of pools	'
Score 8			prevalent.	
5. Channel Flow Status	Water reaches base of both lower	Water fills > 75% of the available	Water fills 25-75% of the	Very little water in channel and
	banks, and minimal amount of	channel; or <25% of channel	available channel, and/or riffle	mostly present as standing pools.
	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	
Score 10 6. Channel Alteration	Channelization or dredging absent	Some channelization present,	Channelization may be	Banks shored with gabion or
6. Channel Alteration	or minimal; stream with normal	usually in areas of bridge	Channelization may be extensive; embankments or	cement; over 80% of the stream
	pattern.	abutments; evidence of past	shoring structures present on	reach channelized and disrupted.
	Putterin	channelization, i.e., dredging,	both banks; and 40 to 80% of	Instream habitat greatly altered or
		(greater than past 20 yr) may be	stream reach channelized and	removed entirely.
		present, but recent channelization	disrupted.	
Score 13		is not present.		
7. Channel Sinuosity	The bends in the stream increase	The bends in the stream increase	The bends in the stream	Channel straight; waterway has
	the stream length 3 to 4 times	the stream length 2 to 3 times	increase the stream length 1 to	:
	longer than if it was in a straight	longer than if it was in a straight	2 times longer than if it was in a	distance.
	line. (Note – channel braiding is considered normal in coastal plains	line.	straight line.	
	and other low-lying areas. This			
	parameter is not easily rated in			
Score 5	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 9	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
LB Score 9 RB Score 9			-	of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 5 RB Score 5	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 2	lawns, or crops) have not			
	impacted zone.			
Total Score 89				

REACH Stream 33	PROJECT KY18-005	DATE 2/15/2019	LAT 37.076066	LONG -88.871497
INVESTIGATOR(S)	J. Storm, R. McGregor		WATERSHED Upper Hump	hrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	AGE DESCRIPTION:	
Width (Ft) I.5	Perennial			
Depth (Ft) 0.5	Ephemeral X			
Reach (Ft)	Intermittent	<u> </u>		
		CONDITION	CATEGORY	
HABITAT	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
PARAMETER 1. Epifaunal Substrate /	20 19 18 17 16 Greater than 50% of substrate	15 14 13 12 11 30-50% mix of stable habitat; well	10 9 8 7 6 10-30% mix of stable habitat:	5 4 3 2 1 0 Less than 10% stable habitat; lack
Available Cover	favorable for epifaunal colonization		· · · · · · · · · · · · · · · · · · ·	of habitat is obvious; substrate
	and fish cover; mix of snags,	potential; adequate habitat for	: · · · · · · · · · · · · · · · · · · ·	unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	discusic of menting.
		presence of additional substrate in		
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 7	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock; no
Characterization	with gravel and firm sand	mud may be dominant; some root	little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	
	submerged vegetation common.	present.		
Score 10	Even mix of lange shellow, lange	Majanity of a cale lange decay your	Shallow a cala much more	Majarity of a cale small shallow on
3. Pool Variability	Even mix of large-shallow, large- deep, small-shallow, small-deep	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	pools present.		prevalent than deep pools.	
Score 3	l :::::	C in h	Madamén darasitian af navy	llana da cita af far matanial
4. Sediment Deposition	Little or no enlargement of islands	some new increase in bar formation, mostly from gravel, sand		Heavy deposits of fine material,
	the bottom affected by sediment	or fine sediment; 20-50% of the	old and new bars; 50-80% of	than 80% of the bottom changing
	deposition.	bottom affected; slight deposition	<i>.</i>	frequently; pools almost absent
	-F	in pools.	deposits at obstructions,	due to substantial sediment
			constrictions, and bends;	deposition.
			moderate deposition of pools	
Score 8			prevalent.	
5. Channel Flow Status	Water reaches base of both lower	Water fills > 75% of the available	Water fills 25-75% of the	Very little water in channel and
	banks, and minimal amount of	channel; or <25% of channel	available channel, and/or riffle	mostly present as standing pools.
	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	
Score 10 6. Channel Alteration	Channelization or dredging absent	Some channelization present,	Channelization may be	Banks shored with gabion or
	or minimal; stream with normal	usually in areas of bridge	<i>'</i>	cement; over 80% of the stream
	pattern.	abutments; evidence of past	<i>·</i>	reach channelized and disrupted.
	•	channelization, i.e., dredging,		Instream habitat greatly altered or
		(greater than past 20 yr) may be	stream reach channelized and	removed entirely.
		present, but recent channelization	disrupted.	
Score 6		is not present.		
7. Channel Sinuosity	The bends in the stream increase			Channel straight; waterway has
	the stream length 3 to 4 times	the stream length 2 to 3 times	increase the stream length 1 to	
	longer than if it was in a straight		2 times longer than if it was in a	distance.
	line. (Note – channel braiding is considered normal in coastal plains	line.	straight line.	
	and other low-lying areas. This			
	parameter is not easily rated in			
Score 5	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 9	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
RB Score 9				of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 2 RB Score 2	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 0	lawns, or crops) have not			
	impacted zone.			
Total Score 73				

REACH Stream 34	PROJECT KY18-005	DATE 2/15/2019	LAT 37.071507	LONG -88.851372
INVESTIGATOR(S)	J. Storm, R. McGregor		WATERSHED Bayou Creek	- Ohio River
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	AGE DESCRIPTION:	
Width (Ft) I.0	Perennial			
Depth (Ft) 0.5	Ephemeral X			
Reach (Ft)	Intermittent			
		CONDITION		
HABITAT	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
PARAMETER 1. Epifaunal Substrate /	20 19 18 17 16 Greater than 50% of substrate	15 14 13 12 11 30-50% mix of stable habitat: well	10 9 8 7 6 10-30% mix of stable habitat:	5 4 3 2 1 0 Less than 10% stable habitat; lack
Available Cover	favorable for epifaunal colonization		habitat availability less than	of habitat is obvious; substrate
	and fish cover; mix of snags,	potential; adequate habitat for	: · · · · · · · · · · · · · · · · · · ·	unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	distable of lacking.
		presence of additional substrate in		
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 7	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock; no
Characterization	with gravel and firm sand	mud may be dominant; some root	little or no root mat; no	root mat or vegetation.
	prevalent; root mats and	mats and submerged vegetation	submerged vegetation.	
	submerged vegetation common.	present.		
Score 3	Even mix of lange shellow, lange	Majanity of a cale lange decay your	Shallow a colo much more	Majarity of a cale small shallow on
3. Pool Variability	Even mix of large-shallow, large- deep, small-shallow, small-deep	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	pools present.		prevalent than deep pools.	
	r r			
Score 3	1 : • • !	C in h	Madamén darasitian af navy	llana da cita effica matanial
4. Sediment Deposition	Little or no enlargement of islands	some new increase in bar formation, mostly from gravel, sand		Heavy deposits of fine material,
	the bottom affected by sediment	or fine sediment; 20-50% of the	old and new bars; 50-80% of	than 80% of the bottom changing
	deposition.		<i>.</i>	frequently; pools almost absent
	'		deposits at obstructions,	due to substantial sediment
			constrictions, and bends;	deposition.
			moderate deposition of pools	
Score 15			prevalent.	
5. Channel Flow Status	Water reaches base of both lower	Water fills > 75% of the available	Water fills 25-75% of the	Very little water in channel and
	banks, and minimal amount of	channel; or <25% of channel	available channel, and/or riffle	mostly present as standing pools.
	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	
Score 5 6. Channel Alteration	Channelization or dredging absent	Some channelization present,	Channelization may be	Banks shored with gabion or
	or minimal: stream with normal	usually in areas of bridge	extensive; embankments or	cement; over 80% of the stream
	pattern.	abutments; evidence of past		reach channelized and disrupted.
			both banks; and 40 to 80% of	Instream habitat greatly altered or
		(greater than past 20 yr) may be	stream reach channelized and	removed entirely.
		present, but recent channelization	disrupted.	
Score 5		is not present.		
7. Channel Sinuosity			The bends in the stream	Channel straight; waterway has
	the stream length 3 to 4 times	:	increase the stream length 1 to	
	longer than if it was in a straight line. (Note – channel braiding is	longer than if it was in a straight line.	2 times longer than if it was in a straight line.	uistance.
	considered normal in coastal plains		su aigne inic.	
	and other low-lying areas. This			
	parameter is not easily rated in			
Score 5	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 9	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
RB Score 9				of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 2 RB Score 2	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 0	lawns, or crops) have not			
	impacted zone.			
Total Score 65				

REACH Stream 35	PROJECT KY18-005	DATE 5/29/2018	LAT 37.079710	LONG -88.943030
INVESTIGATOR(S)	B. Remley, R. McGregor	COWARDIN CLASS R3	WATERSHED Middle Hump	bhrey Creek
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	AGE DESCRIPTION:	
Width (Ft) 25.0	Perennial X			
Depth (Ft) I.5	Ephemeral			
	· · ·			
Reach (Ft)	Intermittent	<u> </u>		
		CONDITION	CATEGORY	
HABITAT	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
PARAMETER	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
 Epifaunal Substrate / Available Cover 	Greater than 50% of substrate	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	Less than 10% stable habitat; lack
Available Cover	favorable for epifaunal colonization and fish cover; mix of snags,	potential; adequate habitat for	habitat availability less than desirable; substrate frequently	of habitat is obvious; substrate unstable or lacking.
	submerged logs, undercut banks,	maintenance of populations;	disturbed or removed.	unstable of lacking.
	cobble or other stable habitat and	presence of additional substrate in	disturbed of removed.	
	at stage to allow full colonization	the form of new fall, but not yet		
	potential (i.e., logs/snags that are	prepared for colonization (may rate		
Score 3	not new fall and not transient.)	at high end of scale).		
Score 13 2. Pool Substrate	Mixture of substrate materials,	Mixture of soft sand, mud, or clay;	All mud or clay or sand bottom;	Hard-pan clay or bedrock: no
Characterization	with gravel and firm sand			root mat or vegetation.
	prevalent; root mats and		submerged vegetation.	
	submerged vegetation common.	present.		
Score 16				
3. Pool Variability	Even mix of large-shallow, large-		Shallow pools much more	Majority of pools small-shallow or
	deep, small-shallow, small-deep	few shallow.	prevalent than deep pools.	pools absent.
	pools present.			
Score 10	•			
4. Sediment Deposition	Little or no enlargement of islands	Some new increase in bar	Moderate deposition of new	Heavy deposits of fine material,
	or point bars and less than 20% of	formation, mostly from gravel, sand	gravel, sand or fine sediment on	increased bar development; more
	the bottom affected by sediment	or fine sediment; 20-50% of the		than 80% of the bottom changing
	deposition.			frequently; pools almost absent
		in pools.	deposits at obstructions,	due to substantial sediment
			:	deposition.
			moderate deposition of pools	
Score 11			prevalent.	
5. Channel Flow Status	Water reaches base of both lower			Very little water in channel and
	banks, and minimal amount of	channel; or <25% of channel	•	mostly present as standing pools.
Score 10	channel substrate is exposed.	substrate is exposed.	substrates are mostly exposed.	
6. Channel Alteration	Channelization or dredging absent	Some channelization present,	Channelization may be	Banks shored with gabion or
	or minimal; stream with normal	usually in areas of bridge	extensive; embankments or	cement; over 80% of the stream
	pattern.	abutments; evidence of past	shoring structures present on	reach channelized and disrupted.
		channelization, i.e., dredging,	both banks; and 40 to 80% of	Instream habitat greatly altered or
		(greater than past 20 yr) may be	stream reach channelized and	removed entirely.
		present, but recent channelization	disrupted.	
Score 14	The hands in the start	is not present.	The hands in the star	Channel atmo
7. Channel Sinuosity				Channel straight; waterway has
	the stream length 3 to 4 times longer than if it was in a straight	the stream length 2 to 3 times longer than if it was in a straight	increase the stream length 1 to 2 times longer than if it was in a	
	line. (Note – channel braiding is	line.	straight line.	uistante.
	considered normal in coastal plains			
	and other low-lying areas. This			
	parameter is not easily rated in			
Score 8	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 5	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
RB Score 5				of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 3 RB Score 3	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score 5	lawns, or crops) have not			
	impacted zone.			
Total Score 105				

RBP completed during macro collection effort for Station 1. I have relabeled it as Stream 35.

REACH Stream 36	PROJECT KY18-005	DATE 5/29/2018	LAT <u>37.070671</u>	LONG88.846304
INVESTIGATOR(S)	B. Remley, R. McGregor	COWARDIN CLASS R4	WATERSHED Bayou Creek	- Ohio River
STREAM SIZE:	STREAM TYPE:	IMAGE ID #: IM	AGE DESCRIPTION:	
Width (Ft) 10.0	Perennial			
Reach (Ft) ~150	Intermittent X			
		CONDITION	CATEGORY	
HABITAT	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
PARAMETER	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
I. Epifaunal Substrate / Available Cover	at stage to allow full colonization potential (i.e., logs/snags that are	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	disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
Score 11	not new fall and not transient.)	at high end of scale).		
2. Pool Substrate			All mud or clay or sand bottom;	
Characterization	with gravel and firm sand			root mat or vegetation.
	prevalent; root mats and submerged vegetation common.	mats and submerged vegetation present.	submerged vegetation.	
Score 9				
3. Pool Variability	Even mix of large-shallow, large- deep, small-shallow, small-deep pools present.		Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
Score 9				
4. Sediment Deposition	the bottom affected by sediment deposition.	formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition	gravel, sand or fine sediment on old and new bars; 50-80% of	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
Score 10	*		moderate deposition of pools prevalent.	
5. Channel Flow Status Score 12	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	channel; or <25% of channel	:	Very little water in channel and mostly present as standing pools.
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization	extensive; embankments or shoring structures present on	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score 12 7. Channel Sinuosity		is not present. The bends in the stream increase	The bends in the stream	Channel straight; waterway has
	the stream length 3 to 4 times longer than if it was in a straight	the stream length 2 to 3 times longer than if it was in a straight line.		been channelized for a long
Score 3	these areas.)			

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, sma	I Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 2	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
LB Score 2 RB Score 3				of bank has erosional scars.
	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident bu	t bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 2 RB Score 3	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score I	lawns, or crops) have not			
	impacted zone.			
Total Score 79				
		<u>;</u>	<u>.i</u>	<u>.</u>

RBP completed during macro collection at Station 2. I've renamed it Stream 36.

THIRD ROCK CONSULTANTS, LLC STREAM HABITAT ASSESSMENT (LOW GRADIENT)

REACH	Stream	37	PROJECT	KY18-005		DATE 5/29	9/2018	LA	T 37.07701	6	LONG	-88.8982	236
INVESTI	GATO	R(S)	B. Remley, R. McC	Gregor	COWARD	OIN CLASS	R3	WATERSH	ED Upper	Hump	ohrey Cre	ek	
STREAM SIZE:			STREAM TYPE	:	IMAGE ID #: IM		IAGE DESCRIPTION:						
Width (Ft))	١.0	Perennial	х									
Depth (Ft)	-	١.5	Ephemeral										
• • • /	-												
Reach (Ft)	-	~200	Intermittent										
					-	CON		CATEGORY					
	BITAT	_	ΟΡΤΙΜ	1AL	SUBOPTIMAL			MARGINAL			POOR		
			20 19 18	17 16	15 14	13 12	11	10 9	8 7	6	5 4		2 1 0
I. Epifauna Available C		ate /	Greater than 50% of favorable for epifau			of stable hab	,		of stable hab	,			le habitat; lack
Available C	_over		and fish cover; mix			lii colonizatio dequate habita		:	ability less tha Jbstrate frequ		unstable o		ıs; substrate
			submerged logs, une	•		e of populatic		disturbed o		lenuy	unstable o	i lacking.	
			cobble or other sta		1	additional su		distui bed o	r removed.				
			at stage to allow ful		: ·	new fall, but							
			potential (i.e., logs/s			r colonization							
	Score	11	not new fall and not	t transient.)	at high end	of scale).							
2. Pool Sut			Mixture of substrate	e materials.	Mixture of s	soft sand, mu	d. or clav:	All mud or	clay or sand b	ottom:	Hard-pan	clay or b	edrock: no
Characteri			with gravel and firm	1			-	root mat; no	,	root mat (-		
			prevalent; root mat		· · ·			submerged					
	F		submerged vegetation	on common.	present.			_	-				
	Score	16											
3. Pool Vai	riability		Even mix of large-sh			pools large-d	eep; very	-	ols much more			-	mall-shallow or
			deep, small-shallow,	, small-deep	few shallow	•		prevalent th	ian deep pool	s.	pools abse	ent.	
			pools present.										
	Score	10											
4. Sedimen	nt Depos	sition	Little or no enlarge					-	eposition of n				fine material,
			or point bars and le		1			-					-
			the bottom affected	l by sediment		ment; 20-50%			/ bars; 50-80%		1		ottom changing
			deposition.		in pools.	cted; slight de	eposition	1	affected; sedi obstructions,	ment	due to sub	•	lmost absent
					in pools.			1	is, and bends;		depositior		sediment
									eposition of p		coposition		
	. Г	10						prevalent.					
5. Channel	Score	12	Water reaches base	of both lower	Water fills 2	> 75% of the	availahle	Water fills 2	25-75% of the		Verv little	water in	channel and
J. Chaine	11000 5	atus	banks, and minimal			<25% of char			annel, and/or		: ·		standing pools.
			channel substrate is		substrate is				re mostly exp		ineed, pr		
	Score	13		•		•							
6. Channel	Alterat	ion	Channelization or d		:			Channelizat	-		Banks sho		-
			or minimal; stream	with normal	· ·	eas of bridge		, i i i i i i i i i i i i i i i i i i i	mbankments				of the stream
			pattern.			evidence of p		-	ictures preser		1		and disrupted.
					1	on, i.e., dredg In past 20 yr)			and 40 to 80 [°] h channelized		removed (-	eatly altered or
						t recent chan		disrupted.			removed	sinch eig.	
	Score	11			is not prese		200	allor up to al					
7. Channel	l Sinuosi	ty	The bends in the st	ream increase		n the stream	increase	The bends i	n the stream		Channel s	traight; w	vaterway has
		-	the stream length 3	to 4 times	the stream l	length 2 to 3	times	increase the	e stream lengt	h I to	been chan	nelized fo	or a long
			longer than if it was	in a straight	longer than	if it was in a	straight	2 times long	ger than if it w	vas in a	distance.		
			line. (Note – chann		line.			straight line					
			considered normal										
			and other low-lying										
	с Г	1	parameter is not ea	sily rated in									
1	Score	6	these areas.)		1			1			:		ł

8. Bank Stability	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
,	10 9	8 7 6	5 4 3	2 1 0
	Banks stable; evidence of erosion	Moderately stable; infrequent, small	Moderately unstable; 30-60% of	Unstable; many eroded areas;
	or bank failure absent or minimal;	areas of erosion mostly healed	bank in reach has areas of	"raw" areas frequent along
	little potential for future problems.	over. 5-30% of bank in reach has	erosion; high erosion potential	straight sections and bends;
LB Score 4	< 5% of bank affected.	areas of erosion.	during floods.	obvious bank sloughing; 60-100%
RB Score 5				of bank has erosional scars.
9. Vegetative Protection	More than 90% of the streambank	70-90% of the streambank surfaces	50-70% of the streambank	Less than 50% of the streambank
	surfaces and immediate riparian	covered by native vegetation, but	surfaces covered by vegetation;	surfaces covered by vegetation;
	zone covered by native vegetation,	one class of plants is not well-	disruption obvious; patches of	disruption of streambank
	including trees, understory shrubs,	represented; disruption evident but	bare soil or closely cropped	vegetation is very high; vegetation
	or non-woody macrophytes;	not affecting full plant growth	vegetation common; less than	has been removed to 5
	vegetative disruption through	potential to any great extent; more	one-half of the potential plant	centimeters or less in average
	grazing or mowing minimal or not	than one-half of the potential plant	stubble height remaining.	stubble height.
	evident; almost all plants allowed	stubble height remaining.		
LB Score 5 RB Score 5	to grow naturally.			
10. Riparian Vegetative	Width of riparian zone >18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6 meters:
Zone Width	meters; human activities (i.e.,	meters; human activities have	meters; human activities have	little or no riparian vegetation due
	parking lots, roadbeds, clear-cuts,	impacted zone only minimally.	impacted zone a great deal.	to human activities.
LB Score I	lawns, or crops) have not			
RB Score I	impacted zone.			
Total Score 100				

REMARKS / NOTES:

RBP completed during macro collection at Station 3. I've renamed it Stream 37.

THIRD ROCK CONSULTANTS, LLC STREAM HABITAT ASSESSMENT (LOW GRADIENT)

REACH	Stream	n 38	PROJECT	KY18-005		DATE 5/29	9/2018	LA	т 37.078927	LONG	-88.921960	
INVESTIGATOR(S)		B. Remley, R. McC	Gregor	COWARD	IN CLASS	R4	WATERSH	ED Middle Hum	phrey Cre	ek		
STREAM SIZE:		STREAM TYPE	E:	IMAGE ID #: IM		IAGE DESCRIPTION:						
Width (Ft)		10.0	Perennial									
Depth (Ft)	-	0.5	Ephemeral									
	-			<u> </u>								
Reach (Ft)	-	~150	Intermittent	X								
						CON		CATEGORY				
HAB	BITAT	-	ΟΡΤΙΜ	1AL	รเ	JBOPTIMA	\L	MARGINAL			POOR	
PARA			20 19 18	17 16	15 14			10 9	8 7 6	5 4	3 2 1 0	
I. Epifaunal Substrate / Available Cover		rate /	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		:			habitat avail desirable; su disturbed o	of stable habitat; ability less than ıbstrate frequently r removed.		10% stable habitat; lack is obvious; substrate or lacking.	
	Г		potential (i.e., logs/s not new fall and no	•	at high end	r colonization of scale).	ii (iiiay i ace					
2. Pool Sub	Score	9	Mixture of substrat		-		d an alau	م المعنام الم	alay, an aand battan	. Hand son	alay, an hadnaaly, na	
Characteriz			with gravel and firm prevalent; root mat	mud may be dominant; some root			little or no i submerged	root mat; no	Hard-pan clay or bedrock; no root mat or vegetation.			
			submerged vegetati		present.		ctation	Submerged	regetation.			
	Score	15			r							
3. Pool Variability			Even mix of large-sl deep, small-shallow pools present.				Shallow pools much more prevalent than deep pools.		Majority of pools small-shallow or pools absent.			
	Score	8										
4. Sediment	t Depo	sition	Little or no enlarge	ment of islands	Some new i	ncrease in ba	ır	Moderate d	eposition of new	Heavy dep	posits of fine material,	
		10	or point bars and less than 20% of the bottom affected by sediment deposition.		or fine sediment; 20-50% of the bottom affected; slight deposition in pools.		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.		increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.			
5. Channel	Flow S	tatus	Water reaches base	e of both lower		> 75% of the		Water fills 2	25-75% of the		water in channel and	
			banks, and minimal		channel; or <25% of channel				available channel, and/or riffle mostly present as			
	Score	8	channel substrate is	s exposed.	substrate is	exposed.		substrates a	re mostly exposed.			
6. Channel Alteration		Channelization or dredging absent or minimal; stream with normal pattern.		usually in ar abutments; channelizati (greater tha	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		Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.		Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.			
	Score	12			is not prese	nt.						
7. Channel :			The bends in the st the stream length 3 longer than if it was line. (Note – chanr considered normal and other low-lying parameter is not ea	to 4 times s in a straight nel braiding is in coastal plains g areas. This	the stream longer than line.	n the stream length 2 to 3 if it was in a	times	increase the	n the stream e stream length I to ger than if it was in a	been chan	traight; waterway has inelized for a long	
	Score	6	these areas.)							1		

8. Bank Stability OPTIMAL SUBOPTIMAL MARGINAL POOR 10 9 8 7 6 5 4 3 2 1 Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. Moderately stable; infrequent, small over. 5-30% of bank in reach has areas of erosion; high erosion potential Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential Unstable; many eroded a "raw" areas frequent alo straight sections and ber obvious bank sloughing; of bank has erosional scr obvious bank sloughing; of bank has erosional scr 9. Vegetative Protection More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, vegetative disruption through grazing or mowing minimal or not RB Score 70-90% of the streambank surfaces and immediate riparian zone covered by native vegetation, but surfaces or less than for ann-woody macrophytes; vegetative disruption through grazing or mowing minimal or not RB Score Vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Note the potential plant stubble height remaining. Subble height remaining. Subble height remaining. Subble height remaining. Subble height remaining.	
LB Score2 2or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.bank in reach has areas of erosion; high erosion potential during floods."raw" areas frequent alo straight sections and ber obvious bank sloughing; of bank has erosional sci9. Vegetative ProtectionMore than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody 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- not affecting full plant growth potential to any great extent; more grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.Less than 100% or bank affected.Store21"raw" areas frequent alo straight sections and ber over. 5-30% of bank in reach has areas of erosion.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.1"raw" areas frequent alo straight sections and ber obvious bank sloughing; of bank has erosional sci disruption obvious; patches of one-half of the potential plant stubble height remaining.50-70% of the streambank surfaces covered by veget disruption obvious; patches of one-half of the potential plant stubble height remaining.1	0
LB Score2 25% of bank affected.over. 5-30% of bank in reach has areas of erosion.erosion; high erosion potential during floods.straight sections and ber obvious bank sloughing; of bank has erosional sci9. Vegetative ProtectionMore than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; yegetative disruption through grazing or mowing minimal or not LB Score70-90% of the streambank surfaces to grow naturally.50-70% of the streambank surfaces covered by native vegetation, but one class of plants is not well- not affecting full plant growth potential to any great extent; more 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; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	eas;
LB Score 2 < 5% of bank affected. areas of erosion. during floods. obvious bank sloughing; of bank has erosional science 9. Vegetative Protection More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; vegetative disruption through grazing or mowing minimal or not 70-90% of the streambank surfaces of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; vegetative disruption through grazing or mowing minimal or not than one-half of the potential plant stubble height remaining. 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of disruption of streambank surfaces covered by vegetation common; less than one-half of the potential plant stubble height remaining. LB Score 2 corrent and the obvious bank sloughing; of bank has erosional science LB Score 2 corrent and the obvious bank affected. areas of erosion. during floods. Device and the streambank surfaces covered by vegetation; but one class of plants is not well- stubble height remaining. tess than 50% of the streambank vegetation; bare soil or closely cropped vegetation is very high; vegetation common; less than one-half of the potential plant has been removed to 5 test has one-half of the potential plant stubble height.	3
LB Score 2 of bank has erosional science 9. Vegetative Protection More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, vegetative disruption through grazing or mowing minimal or not 70-90% of the streambank surfaces 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of or non-woody macrophytes; Less than 50% of the streambank vegetative disruption evident but grazing or mowing minimal or not Image: Source	s;
RB Score 2 of bank has erosional score 9. Vegetative Protection More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; vegetative disruption through grazing or mowing minimal or not 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well- including trees, understory shrubs, or non-woody macrophytes; vegetative disruption through grazing or mowing minimal or not 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 stubble height remaining. Less than 50% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than stubble height remaining.	0-100%
surfaces and immediate riparian zone covered by native vegetation, but including trees, understory shrubs, or non-woody macrophytes; vegetative disruption through grazing or mowing minimal or not LB Score 2 to grow naturally.	s.
zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; vegetative disruption through grazing or mowing minimal or not <i>LB Score</i> 2 to grow naturally. one class of plants is not well- including trees, understory shrubs, one class of plants is not well- including trees, understory shrubs, one class of plants is not well- including trees, understory shrubs, one class of plants is not well- including trees, understory shrubs, or non-woody macrophytes; vegetative disruption through grazing or mowing minimal or not than one-half of the potential plant stubble height remaining. <i>LB Score</i> 2 to grow naturally.	ambank
including trees, understory shrubs, or non-woody macrophytes; vegetative disruption through grazing or mowing minimal or not LB Score 2 to grow naturally.	ation;
or non-woody macrophytes; vegetative disruption through grazing or mowing minimal or not <i>LB Score</i> 2 to grow naturally. not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. than one-half of the potential plant stubble height remaining.	
vegetative disruption through grazing or mowing minimal or not LB Score 2 to grow naturally.	getation
grazing or mowing minimal or not than one-half of the potential plant stubble height remaining. LB Score 2 to grow naturally.	
evident; almost all plants allowed stubble height remaining.	rage
LB Score 2 to grow naturally.	
to grow naturally.	
10. Riparian Vegetative Width of riparian zone >18 Width of riparian zone 12-18 Width of riparian zone 6-12 Width of riparian zone 4	meters:
Zone Width meters; human activities (i.e., meters; human activities have meters; human activities have little or no riparian vege	tion due
parking lots, roadbeds, clear-cuts, impacted zone only minimally. impacted zone a great deal. to human activities.	
LB Score 3 lawns, or crops) have not	
RB Score 2 impacted zone.	
Total Score 81	

REMARKS / NOTES:

RBP completed during macro collection at Station 4. I've renamed it Stream 38.

Project Name: US 60 Improvements	Project No: KY18-005 Date: 2	2/13/18
Applicant/Owner: QK4	State: KY Site ID: We	
Investigator(s): James Storm and Ryan McGregor City, C	County, Range: Kevil, Ballard	
	ncave, convex, none): Concave	Slope (%): <
Subregion (LRR or MLRA): P/134 Lat: 37.078285	Long: -88.953813	Datum: NAD83
Soil Map Unit Name: Falaya - Collins complex	NWI Classification: NA	
	es No ✓ (If no, explain in rei	marks.)
Are vegetation soil or hydrology significantly disturbe		
Are vegetation soil or hydrology naturally problemati	ic? (If needed, explain any answers in "Remar	'ks.'')
SUMMARY OF FINDINGS		
Hydrophytic Vegetation Present? Yes 🖌 No		
Hydric Soil Present? Yes <u>√</u> No		
Wetland Hydrology Present? Yes 🖌 No	Is the sampled area within a wetland? Ye	s <u>✓</u> No
Remarks:		
Heavy recent rains.		
WETLAND HYDROLOGY INDICATORS		
Wetland Hydrology Indicators:	Secondary Indicators (mini	mum of two required)
Primary Indicators (minimum of one is required; check all that apply)	Surface Soil Cracks	
✓ Surface Water (A1) ✓ Water-Stained Leaves (B9)	Sparsely Vegetated 0	Concave Surface (B8)
High Water Table (A2) Aquatic Fauna (B13)	✓ Drainage Patterns (E	310)
✓ Saturation (A3) Marl Deposits (BI5) (LRR		,
Water Marks (B1) Hydrogen Sulfide Odor (C1		. ,
✓ Sediment Deposits (B2) Oxidized Rhizospheres on I		,
Drift Deposits (B3) Presence of Reduced Iron (Aerial Imagery (C9)
Algal Mat or Crust (B4) Recent Iron Reduction in Ti		
Iron Deposits (B5) Thin Muck Surface (C7) Inundation Visible on Aerial Imagery (B7) Other (Explain in Remarks)	Shallow Aquitard (D FAC-Neutral Test (I	
Indidation visible on Aerian imagery (b7) Other (explain in Kenlarks)	Sphagnum Moss (D8	,
) (, _)
Field Observations:		
Surface Water Present? Yes ✓ No Depth (inches):	2	
Water Table Present? Yes No _✓ Depth (inches):		
Saturation Present: Yes <u>√</u> No Depth (inches): (includes capillary fringe)	0 Wetland Hydrology Present? Ye	es <mark>✓</mark> No
Describe Recorded Data (Stream gauge, monitoring well, aerial photos, previous inspe-	ctions), if available:	
Remarks:		
Forested. Connected to Stream I		
Torested. Connected to stream 1		

Site ID <u>Wetland A</u>

T 0 (7) (7) (7)	Absolute	Dominant	Indicator	Dominance Test Worksheet:					
Tree Stratum (Plot Size: 30) I. Liquidambar styraciflua	% Cover	Species?	Status FAC	No. of dominant species that	7	(•)			
	35	▼ ✓	FAC	are OBL, FACW, or FAC:	7	(A)			
2. Fraxinus pennsylvanica	5	V		Total No. of dominant species		(=)			
3. Salix nigra	5		OBL	– across all strata: –	8	(B)			
4.				% of dominant species that					
5.				- Are OBL, FACW, or FAC -	87.5	(A/B)			
6.				Describer of trades Manhaka at					
8.	İ			Prevalence Index Worksheet Total % Cover of:	Multip	NV BV			
	50	= Total Cov				<u>, ny by.</u>			
50 % of Total Cover: _	25 20%	of Total Cov	er: 10	OBL Species 5	X I =	5			
Sapling/Shrub Stratum (Plot size: 15)	1	1 .	1	FACW Species 65	X 2 =	130			
I.Acer rubrum	5	✓	FAC	FAC Species 17	X 3 =	51			
2. Fraxinus pennsylvanica	15	✓	FACW	FACU Species 2	X 4 =	8			
3.				UPL Species	X 5 =				
4.				Totals (A) 89	(B)	194			
5.					2.10				
6.				Prevalence Index = B/A or _	2.18				
7.				Hydrophytic Vegetation Indicat	tors:				
8.				I Rapid Test for Hydrophy	tic Vegetatio	'n			
	20	= Total Cov	/er	✓ 2 Dominance Test is > 50%	/				
50 % of Total Cover: _	10 20%	- 5 of Total Cov	er: 4	\checkmark 3 Prevalence Index is \leq 3.0)ı				
Herb Stratum (Plot size: 5)				Problematic Hydrophytic V		Explain)			
I.Juncus sp	10	✓	FACW			. ,			
2. Carex sp	5	✓	FACW	 Indicators of hydric soil and wetland l present, unless disturbed or problemation 		st be			
3.				Definition of Four Vegetation S					
4.				Tree – Woody plants, excluding vir	nes 3 in (76	(cm) or			
5.				More in diameter at breast height (I					
6.				Height.					
7.	1	<u> </u>		Sapling/Shrub – Woody plants, e>		s, less than			
8.				 3 in. DBH and greater than 3.28 ft. 	(1 m) tall.				
9.				Herb – All herbaceous (non-wood)		ardless of			
10.				- Size, and woody plants less than 3.2	8 ft. tall.				
11.				Woody Vine – All woody vines gr	eater than 3.	28 ft. in			
12.	1		1	– height.					
	15	= Total Cov	/er						
50 % of Total Cover:	-	-							
Woody Vine Stratum (Plot size: 5)									
L Smilax rotundifolia	2	1	FAC	1					
2. Lonicera japonica	2	· ✓	FACW	Hydrophytic Vegetation Present?	Yes 🗸 N	lo			
3.	-	*			· cs P				
4.				-					
7. 5.				-					
з.	4	- T	<u> </u>	-					
	4	= Total Cov							
50 % of Total Cover: _	<u> </u>	of Iotal Cov	er:0.0						
Remarks: (Include photo numbers here or on separate	e sheet. If obs	erved, list mo	rphological ada	aptations below.)					
•			-	·					

	Profile Description	n: (Describ	e to the depth need	ed to docu	ment the i	ndicator o	or confirm the	absence of indicators.)			
Depth	Matrix		Re	edox Feature	s						
(inches)	Color (moist)	%	Color (moist)	%	Туре	Loc ²	Texture	Remarks			
0-1					/1			Organic matter			
2-10	10 YR 6/2	50	10 YR 5/4	50			Clay loam	5			
							1				
		+					1				
<u> </u>											
		+					1				
	Concentration D-Debletier		ad Matrix MC=Markad	Cand Crains			21 a antiona DI -	-Dava Lining Ad-Adatain			
	Concentration, D=Depletion	n, KM=Reduc	ed Matrix, MIS=Masked	Sana Grains				Pore Lining, M=Matrix			
-	oil Indicators:			C ((C)				Problematic Hydric Soils ³ :			
	osol (AI)		Polyvalue Belo		, .			(A9) (LRR O)			
	c Epipedon (A2)		Thin Dark Surf			_		(A10) (LRR S)			
	Histic (A3)		Loamy Mucky		(LRR 0)		Reduced Ve				
	ogen Sulfide (A4)		Loamy Gleyed				-	MLRA I50A,B)			
	ified Layers (A5)		✓ Depleted Matr	. ,		_		oodplain Soils (F19) (LRR P,S,T)			
	nic Bodies (A6) (LRR P,		Redox Dark Su	. ,		_	Anomalous Bright Loamy Soils (F20)				
	Mucky Mineral (A7) (LR			Depleted Dark Surface (F7)				(MLRA 153B)			
Muck	(Presence (A8) (LRR U))	Redox Depres	Redox Depressions (F8)				Red Parent Material (TF2)			
l cm	Muck (A9) (LRR P, T)		Marl (F10) (LF	Marl (FI0) (LRR U)				Very Shallow Dark Surface (TF12)			
Deple	eted Below Dark Surface	(AII)	Depleted Och	ric (FII) (M I	_RA 151)		Other (Expl	ain in Remarks)			
Thick	k Dark Surface (A12)		Iron-Manganes	e Masses (FI	2) (LRR O	Р, Т)					
Coas	t Prairie Redox (A16) (M	LRA 150A)	Umbric Surface	Umbric Surface (FI3) (LRR P, T, U)				³ Indicators of hydrophytic vegetation and			
Sandy	y Mucky Mineral (SI) (LR	RR O, S)	Delta Ochric (Delta Ochric (F17) (MLRA 151) Reduced Vertic (F18) (MLRA 150A, 150B)				wetland hydrology must be present.			
Sandy	y Gleyed Matrix (S4)		Reduced Verti								
Sandy	y Redox (S5)		Piedmont Floo	Piedmont Floodplain Soils (F19) (MLRA 149A				4)			
Strip	ped Matrix (S6)		Anomalous Bri	ight Loamy S	oils (F20) (M	1LRA 149A	, 153C, 153D)				
Dark	Surface (S7) (LRR P, S,	T, U)									
	ve Layer (if observed):	-									
Гуре:	,						Hydric Soil	Present? Yes 🗸 No			
Depth (inc	ches):										
	·										
emarks:											

Project Name: US 60 Improvements Proje	ct No: KY18-005 Date: 2	/13/19
Applicant/Owner: QK4	State: KY Site ID: Wet	land B
	, Range: Kevil, Ballard	
	convex, none): Concave	Slope (%): <2
Subregion (LRR or MLRA): P/134 Lat: 37.079260 Lo		Datum: NAD83
Soil Map Unit Name: Falaya - Collins complex	NWI Classification: NA	
Are climatic / hydrologic conditions on the site typical for this time of year? Yes	No ✓ (If no, explain in rem	arks)
Are vegetation soil or hydrology significantly disturbed?	Are "Normal Circumstances" present?	Yes 🖌 No 🖌
Are vegetation soil or hydrology naturally problematic?	(If needed, explain any answers in "Remark	<s.")< td=""></s.")<>
SUMMARY OF FINDINGS		
Hydrophytic Vegetation Present? Yes 🖌 No		
Hydric Soil Present? Yes ✓ No		
Wetland Hydrology Present? Yes 🖌 No Is	the sampled area within a wetland? Yes	✓ No
Remarks:		
Recent heavy rains.		
WETLAND HYDROLOGY INDICATORS		
Wetland Hydrology Indicators:	Secondary Indicators (minim	• •
Primary Indicators (minimum of one is required; check all that apply)	Surface Soil Cracks (I	
✓ Surface Water (A1) ✓ Water-Stained Leaves (B9)	Sparsely Vegetated C	
High Water Table (A2) Aquatic Fauna (B13)	✓ Drainage Patterns (B	,
✓ Saturation (A3) Marl Deposits (B15) (LRR U) Water Marks (B1) Hydrogen Sulfide Odor (C1)	Moss Trim Lines (BI Dry-Season Water T	,
Sediment Deposits (B2) Oxidized Rhizospheres on Living F		· ,
Drift Deposits (B3) Drift Deposits (B3) Presence of Reduced Iron (C4)	Saturation Visible on	
Algal Mat or Crust (B4) Recent Iron Reduction in Tilled Sc		-
Iron Deposits (B5) Thin Muck Surface (C7)	Shallow Aquitard (D3	
Inundation Visible on Aerial Imagery (B7) Other (Explain in Remarks)	FAC-Neutral Test (D	
· · · · · · · · · · · · · · · · ·	Sphagnum Moss (D8)	,
Field Observations:		
Surface Water Present? Yes ✓ No Depth (inches):	_	
Water Table Present? Yes Depth (inches):		
Saturation Present: Yes ✓ No Depth (inches): 0 (includes capillary fringe) 0	Wetland Hydrology Present? Yes	s <u>✓</u> No
Describe Recorded Data (Stream gauge, monitoring well, aerial photos, previous inspections)	, if available:	
Remarks:		
Forested. Wetland ditch bound by road berm and berm of abandoned rail line.	Water held between two berms. We	tland is providing
hydrology to stream I, which flows off site to the north.		

	Absolute	Dominant	Indicator	Dominance Test Worksheet:	
Tree Stratum (Plot Size: 30)	% Cover	Species?	Status		
I. Liquidambar styraciflua	30	✓	FAC	No. of dominant species that are OBL, FACW, or FAC:	(A)
2. Acer rubrum	20	\checkmark	FAC		
3. Fraxinus pennsylvanica	25	✓	FACW	Total No. of dominant species	(B)
4.					
5.				% of dominant species that	(A/B)
6.				Are OBL, FACW, or FAC	
8.			1	Prevalence Index Worksheet	
	75	= Total Cov	/er	Total % Cover of: Multip	ly By:
50 % of Total Cover:		-		OBL Species 15 X I =	15
Sapling/Shrub Stratum (Plot size: 15)				FACW Species 30 X 2 =	60
L Celtis occidentalis	10	✓	FACU	FAC Species 95 X 3 =	285
2. Ulmus americana	10	▼ ✓	FAC		
3. Acer rubrum	20	▼ ✓	FAC		40
	20	✓	FAC	UPL Species X 5 =	(00
4.				Totals (A) <u>150</u> (B)	400
5.				Prevalence Index = B/A or 2.67	
6.					
7.				Hydrophytic Vegetation Indicators:	
8.				I Rapid Test for Hydrophytic Vegetatio	n
	40	= Total Cov	ver	2 Dominance Test is > 50%	
50 % of Total Cover: _	20 20%	of Total Cov	er:8	3 Prevalence Index is <u><</u> 3.0 ¹	
Herb Stratum (Plot size: 5)				Problematic Hydrophytic Vegetation ¹ (E	Explain)
I. Carex sp	5	✓	FACW		* * *
2. Rumex crispus	5	√	FAC	 Indicators of hydric soil and wetland hydrology mus present, unless disturbed or problematic. 	t De
3. Glyceria striata	15	✓	OBL	Definition of Four Vegetation Strata:	
4.				Tree – Woody plants, excluding vines, 3 in. (7.6	(m) or
5.				More in diameter at breast height (DBH), regard	
6.				Height.	
7.				Sapling/Shrub – Woody plants, excluding vines	s, less than
8.				3 in. DBH and greater than 3.28 ft. (1 m) tall.	
9.				Herb – All herbaceous (non-woody) plants, reg	ardless of
10.				Size, and woody plants less than 3.28 ft. tall.	
				Woody Vine – All woody vines greater than 3.	28 ft. in
	 			height.	
12.			<u> </u>		
	25	= Total Cov			
50 % of Total Cover:	12.5 20%	of Total Cov	er:5		
Woody Vine Stratum (Plot size: 5)	1	1	1	-	
1.				-	
2.				Hydrophytic Vegetation Present? Yes 🖌 N	lo
3.					
4.					
5.					
		= Total Cov	ver		
50 % of Total Cover: _	20%	of Total Cov	er:		
Remarks: (Include photo numbers here or on separate	e sneet. If obs	erved, list mo	rpnological ada	aptations below.)	

	Profile Descriptio	n: (Descrit	e to the depth neede	ed to docur	ment the i	ndicator o	or confirm the	absence of indicators.)			
Depth	Matrix		Re	dox Feature	s						
(inches)	Color (moist)	%	Color (moist)	%	Туре	Loc ²	Texture	Remarks			
0-1					71			Organic layer			
1-14	10 YR 6/1	60	10 YR 5/6	40	С	М	Clay loam				
	10 11(0/1		10 11(0/0								
		+ +									
		+		-							
		+									
		$\frac{1}{1}$		1		1					
		+									
		+ +									
	Concentration, D=Depletion	n, RM=Redu	ced Matrix, MS=Masked S	sand Grains				Pore Lining, M=Matrix			
-	oil Indicators:							Problematic Hydric Soils ³ :			
	osol (AI)		Polyvalue Belov		, .			(A9) (LRR O)			
	c Epipedon (A2)		Thin Dark Surf				_	(A10) (LRR S)			
	Histic (A3)		Loamy Mucky I		(LRR 0)		Reduced Ve	· ,			
	ogen Sulfide (A4)		Loamy Gleyed	. ,				MLRA I50A,B)			
	ified Layers (A5)		✓ Depleted Matri	. ,				oodplain Soils (F19) (LRR P,S,T)			
	nic Bodies (A6) (LRR P,		Redox Dark Su	. ,			Anomalous Bright Loamy Soils (F20)				
5 cm	Mucky Mineral (A7) (LR	R P, T, U)	Depleted Dark	Depleted Dark Surface (F7)				(MLRA 153B)			
Muck Presence (A8) (LRR U)			Redox Depress	Redox Depressions (F8)				Red Parent Material (TF2)			
l cm	Muck (A9) (LRR P, T)		Marl (FI0) (LR	Marl (FI0) (LRR U)				Very Shallow Dark Surface (TF12)			
Deple	eted Below Dark Surface	(AII)	Depleted Ochr	ic (FLL) (ML	RA 151)		Other (Expl	ain in Remarks)			
Thick	CDark Surface (A12)		Iron-Manganes	e Masses (FI	2) (LRR O	, P, T)					
Coas	t Prairie Redox (AI6) (M	LRA 150A) Umbric Surface	e (FI3) (LRR	R P, T, U)		³ Indico	ators of hydrophytic vegetation and			
Sandy	y Mucky Mineral (SI) (LF	RR O, S)	Delta Ochric (l	-17) (MLRA	151)		wetlan	d hydrology must be present.			
Sandy	y Gleyed Matrix (S4)		Reduced Vertic	: (FI8) (MLI	RA 150A,	I 50B)					
Sandy	y Redox (S5)		Piedmont Floo	dplain Soils (F19) (MLR	A 149A)					
Strip	oed Matrix (S6)		Anomalous Bri	ght Loamy S	oils (F20) (N	1LRA 149A	, 153C, 153D)				
Dark	Surface (S7) (LRR P, S,	T, U)									
Restrictiv	ve Layer (if observed)										
уре:							Hydric Soil	Present? Yes 🗸 No			
Depth (inc	ches):										
emarks:											

Project Name: US 60 Improvements	Project No: KYI	8-005 Date: 2	/13/19
Applicant/Owner: QK4	State		
	County, Range: Kevi		
	ncave, convex, none):		Slope (%): <
Subregion (LRR or MLRA): P/134 Lat: 37.071010	Long: -88.849		Datum: NAD83
Soil Map Unit Name: Grenada silt Ioam	NWI Classif		11/12/05
	es No	 ✓ (If no, explain in ren 	narks)
Are vegetation soil or hydrology significantly disturbe		Circumstances" present?	Yes 🖌 No
Are vegetation soil or hydrology naturally problemati	ic? (If needed, exp	plain any answers in "Remarl	ks.")
SUMMARY OF FINDINGS			
Hydrophytic Vegetation Present? Yes 🖌 No			
Hydric Soil Present? Yes <u>Ves</u> No			
Wetland Hydrology Present? Yes <u>√</u> No	ls the sampled a	rea within a wetland? Yes	s <u>√</u> No
Remarks:			
Recent heavy rains.			
WETLAND HYDROLOGY INDICATORS			
Wetland Hydrology Indicators:		Secondary Indicators (minin	num of two required)
Primary Indicators (minimum of one is required; check all that apply)	ļ	Surface Soil Cracks (
✓ Surface Water (A1) Water-Stained Leaves (B9)	-	Sparsely Vegetated C	. ,
High Water Table (A2) Aquatic Fauna (B13)		Drainage Patterns (B	,
Saturation (A3) Marl Deposits (BI5) (LRR		Moss Trim Lines (BI	,
Water Marks (BI) Hydrogen Sulfide Odor (CI	·	Dry-Season Water T	· ,
Sediment Deposits (B2) ✓ Oxidized Rhizospheres on I Drift Deposits (B3) Presence of Reduced Iron (1)	- · ·	Crayfish Burrows (C Saturation Visible on	,
Algal Mat or Crust (B4) Recent Iron Reduction in Ti	·	✓ Geomorphic Position	- , , ,
Iron Deposits (B5) Thin Muck Surface (C7)		Shallow Aquitard (D3	
Inundation Visible on Aerial Imagery (B7) Other (Explain in Remarks)	F	FAC-Neutral Test (D	
································	ŀ	Sphagnum Moss (D8)	,
Field Observations:			
Surface Water Present? Yes ✓ No Depth (inches):			
Water Table Present? Yes Depth (inches):			
Saturation Present: Yes <u>√</u> No Depth (inches): (includes capillary fringe)	0 Wet	land Hydrology Present? Ye	es <mark>✓</mark> No
Describe Recorded Data (Stream gauge, monitoring well, aerial photos, previous inspe-	ctions), if available:		
Remarks:			
Emergent. Isolated			

	Absolute	Dominant Se a si a 2	Indicator	Dominance Test Worksheet:
Tree Stratum (Plot Size: 30)	% Cover	Species?	Status	No. of dominant species that
2.				are OBL, FACW, or FAC:
3.				Total No. of dominant species I (B)
4.				across all strata:
5.				% of dominant species that IOO (A/B)
6.				Are OBL, FACW, or FAC
8.				Prevalence Index Worksheet
		= Total Cov	er	Total % Cover of: Multiply By:
50 % of Total Cover:	20%	-		OBL Species X I =
Sapling/Shrub Stratum (Plot size: 15)				FACW Species 75 X 2 = 150
I.				FAC Species 10 X 3 = 30
2.				FACU Species X 4 =
3.				UPL Species X 5 =
4.				Totals (A) 85 (B) 180
5.				
6.		<u>.</u>		Prevalence Index = B/A or2.12
7.				Hydrophytic Vegetation Indicators:
8.				I Rapid Test for Hydrophytic Vegetation
		= Total Cov	er	✓ 2 Dominance Test is > 50%
50 % of Total Cover:	20%	-		\checkmark 3 Prevalence Index is \leq 3.0 ¹
Herb Stratum (Plot size: 5)	10/0		····	Problematic Hydrophytic Vegetation ¹ (Explain)
I. Carex sp	75	✓	FACW	
2. Festuca arundinacea	10		FAC	 Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
3.				Definition of Four Vegetation Strata:
4.			1 	Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or
5.				More in diameter at breast height (DBH), regardless of
6.				Height.
7.				Sapling/Shrub – Woody plants, excluding vines, less than
8.		 		- 3 in. DBH and greater than 3.28 ft. (1 m) tall.
9.				Herb – All herbaceous (non-woody) plants, regardless of
10.				Size, and woody plants less than 3.28 ft. tall.
11.				Woody Vine – All woody vines greater than 3.28 ft. in
12.		<u>↓</u> 		- height.
	85	= Total Cov	er	
50 % of Total Cover:	•	-		
Woody Vine Stratum (Plot size: 5)				
· · · · · · · · · · · · · · · · · · ·				
2.				Hydrophytic Vegetation Present? Yes 🖌 No
3.				
4.				1
5.				-
		= Total Cov	er	1
50 % of Total Cover:	20%	-		
Remarks: (Include photo numbers here or on separate	sheet. If obs	erved, list mor	phological ada	aptations below.)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.) Depth Matrix Redox Features Type! Loc2 Texture Remarks 0-14 10 YR 6/2 50 10 YR 5/6 50 C M Clay loam 0-14 10 YR 6/2 50 10 YR 5/6 50 C M Clay loam 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Color (moist) % Color (moist) % Type! Loc2 Texture Remarks 0-14 10 YR 6/2 50 10 YR 5/6 50 C M Clay Ioan
0-14 10 YR 6/2 50 I0 YR 5/6 50 C M Clay loam
Image: Second
Iydric Soil Indicators: Indicators for Problematic Hydric Soils ³ :
Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O)
Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S)
Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18)
Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B)
Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T)
Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20)
5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B)
Muck Presence (A8) (LRR U)Redox Depressions (F8)Red Parent Material (TF2)
I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12)
Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks)
Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T)
Coast Prairie Redox (A16) (MLRA 150A) Umbric Surface (F13) (LRR P, T, U) ³ Indicators of hydrophytic vegetation and
Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present.
Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B)
Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A)
Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)
Dark Surface (S7) (LRR P, S, T, U)
Restrictive Layer (if observed):
ype: Hydric Soil Present? Yes ✓ No
Depth (inches):
emarks:

Project Name: US 60 Improvements	Project No: KY18-005 Date: 2/14/19
Applicant/Owner: QK4	State: KY Site ID: Wetland D
	ounty, Range: Kevil, Ballard
	cave, convex, none): Concave Slope (%): <1
Soil Map Unit Name: Grenada silt Ioam	NWI Classification: NA
Are climatic / hydrologic conditions on the site typical for this time of year? Ye	es _✓ No (If no, explain in remarks.)
Are vegetation soil or hydrology significantly disturbed	d? Are "Normal Circumstances" present? Yes 🧹 No 🔄
Are vegetation soil or hydrology naturally problematic	c? (If needed, explain any answers in "Remarks.")
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes 🗸 No	
Hydric Soil Present? Yes ✓ No	
Wetland Hydrology Present? Yes 🗸 No	ls the sampled area within a wetland? Yes ✔ No
Remarks:	
WETLAND HYDROLOGY INDICATORS	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)	Surface Soil Cracks (B6)
✓ Surface Water (AI) ✓ Water-Stained Leaves (B9)	Sparsely Vegetated Concave Surface (B8)
High Water Table (A2) Aquatic Fauna (B13)	Drainage Patterns (B10)
✓ Saturation (A3) Marl Deposits (B15) (LRR U	J) Moss Trim Lines (B16)
Water Marks (BI) Hydrogen Sulfide Odor (CI)	Dry-Season Water Table (C2)
Sediment Deposits (B2) 🗸 Oxidized Rhizospheres on L	
Drift Deposits (B3) Presence of Reduced Iron (C	
Algal Mat or Crust (B4) Recent Iron Reduction in Til	
Iron Deposits (B5) Thin Muck Surface (C7)	Shallow Aquitard (D3)
Inundation Visible on Aerial Imagery (B7) Other (Explain in Remarks)	FAC-Neutral Test (D5)
	Sphagnum Moss (D8) (LRR T, U)
Field Observations:	I
Surface Water Present? Yes ✓ No Depth (inches):	
Water Table Present? Yes No ✓ Depth (inches):	0
Saturation Present: Yes ✓ No Depth (inches):	0 Wetland Hydrology Present? Yes ✓ No
(includes capillary fringe)	
Describe Recorded Data (Stream gauge, monitoring well, aerial photos, previous inspec	tions), if available:
Remarks:	
Forested. Isolated	

T C (7) C 20	Absolute	Dominant	Indicator	Dominance Test Worksheet:		
Tree Stratum (Plot Size: 30)	% Cover 30	Species?	Status FAC	No. of dominant species that	4	
2. Ulmus americana	10	▼ ✓	FAC	are OBL, FACW, or FAC: –	4	(A)
	10	¥		Total No. of dominant species	4	
3.				– across all strata: –	4	(B)
4.				% of dominant species that	100	(4 (D)
5.				Are OBL, FACW, or FAC –	100	(A/B)
6.		 		Prevalence Index Worksheet		
8.	10			Total % Cover of:	Multip	ly By:
	40	= Total Cov				
50 % of Total Cover: _	20%	of Total Cov	er: <u> </u>	· ···	× I =	40
Sapling/Shrub Stratum (Plot size: 15)	10		EAC.	- ·	× 2 =	4
I. Acer rubrum	10	✓	FAC		× 3 =	150
2.				- '	X 4 =	
3.					× 5 =	
4.				Totals (A) 92	(B)	194
5.				Prevalence Index = B/A or	2.10	
6.						
7.			ļ	Hydrophytic Vegetation Indicat		
8.				I Rapid Test for Hydrophyt		n
	10	= Total Cov		2 Dominance Test is > 50%		
50 % of Total Cover:	520%	of Total Cov	er:2	\checkmark 3 Prevalence Index is \leq 3.0	I	
Herb Stratum (Plot size: 5)	<u>!</u>		<u>.</u>	Problematic Hydrophytic V	egetation ¹ (E	xplain)
I. Glyceria striata	40	✓	OBL	Indicators of hydric soil and wetland h	ydrology mus	t be
2. Carex sp	2		FACW	present, unless disturbed or problemation	с.	
3.				Definition of Four Vegetation S	trata:	
4.				Tree – Woody plants, excluding vin	es, 3 in. (7.6	cm) or
5.				More in diameter at breast height (D	OBH), regard	lless of
6.				Height.		
7.				Sapling/Shrub – Woody plants, ex 3 in. DBH and greater than 3.28 ft. (s, less than
8.					,	
9.				Herb – All herbaceous (non-woody Size, and woody plants less than 3.28		ardless of
10.						
11.				Woody Vine – All woody vines gre height.	eater than 3.	28 ft. in
12.				neight.		
	42	= Total Cov	ver			
50 % of Total Cover:	21 20%	of Total Cov	er: 8.4			
Woody Vine Stratum (Plot size: 5)						
1.						
2.				Hydrophytic Vegetation Present?	res 🖌 N	lo
3.						
4.]		
5.						
		= Total Cov	ver	1		
50 % of Total Cover:	20%	of Total Cov	er:			
Remarks: (Include photo numbers here or on separate	sneet. If obs	erved, list mo	rpnological ada	aptations below.)		

	Profile Description	n: (Descrit	e to the depth neede	d to docur	ment the i	ndicator o	or confirm the	e absence of indicators.)		
Depth	Matrix		-	dox Feature						
' (inches)	Color (moist)	%	Color (moist)	%	Туре	Loc ²	Texture	Remarks		
0-14	10 YR 6/2	60	10 YR 5/6	40	C	M	Clay loam			
-					-					
		++		+						
		+								
IT.t. C-		DA4=D- 4-					21 tions DI-			
	Concentration, D=Depletion	n, K/VI=Kedu	ced Matrix, MIS=Masked S	ana Grains				=Pore Lining, M=Matrix		
-	Soil Indicators:							Problematic Hydric Soils ³ :		
	osol (AI)		Polyvalue Belov					(A9) (LRR O)		
	ic Epipedon (A2)		Thin Dark Surfa					(A10) (LRR S)		
	k Histic (A3)		Loamy Mucky N		(LRR 0)	_	Reduced Ve	· · ·		
	rogen Sulfide (A4)		Loamy Gleyed				•	MLRA 150A,B)		
	tified Layers (A5)		✓ Depleted Matri	. ,		_		loodplain Soils (F19) (LRR P,S,T)		
	anic Bodies (A6) (LRR P,		Redox Dark Su	. ,		_		Bright Loamy Soils (F20)		
	n Mucky Mineral (A7) (LR			. ,			(MLRA 15	•		
	Muck Presence (A8) (LRR U) Redox Depressions (F8)						Red Parent Material (TF2)			
I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U)						Very Shallow Dark Surface (TF12)				
Depleted Below Dark Surface (AII) Depleted Ochric (FII) (M						Other (Exp	lain in Remarks)			
Thic	k Dark Surface (A12)		Iron-Manganese	e Masses (FI	2) (LRR O	P, T)				
Coa	st Prairie Redox (A16) (M	LRA 150A) Umbric Surface	(FI3) (LRF	R P, T, U)		³ Indico	ators of hydrophytic vegetation and		
Sand	ly Mucky Mineral (SI) (LR	RR O, S)	Delta Ochric (F	17) (MLRA	(151)		wetlan	nd hydrology must be present.		
Sand	ly Gleyed Matrix (S4)		Reduced Vertic	: (FI8) (MLI	RA 150A, I	50B)				
	ly Redox (S5)		Piedmont Floor	dplain Soils (F19) (MLR	A 149A)				
Strip	oped Matrix (S6)		Anomalous Brig	ght Loamy S	oils (F20) (M	1LRA 149A	, 153C, 153D)			
Darl	k Surface (S7) (LRR P, S,	T, U)								
Restricti	ive Layer (if observed):	:								
Туре:							Hydric Soil	Present? Yes ✓ No		
Depth (in	ches):									
Remarks:										

Project Name: US 60 Improv	vements	Project No: K	Y18-005 Date: 2	/14/19
Applicant/Owner: QK4			State: KY Site ID: Wet	
	n and Ryan McGregor	City, County, Range: k		
Landform (hillslope, terrace, etc.)		ocal Relief (concave, convex, no		Slope (%): <
	P/134 Lat: 37.084789		.930702	Datum: NAD83
Soil Map Unit Name: Loring F			assification: NA	
Are climatic / nydrologic conditio	ns on the site typical for this time of ye	ear? Yes <u>√</u> No	o (If no, explain in ren	narks.)
Are vegetation soil	or hydrology signifi	cantly disturbed? Are "Nor	mal Circumstances" present?	Yes 🖌 No 🔄
Are vegetation soil	or hydrology natur	ally problematic? (If needed	, explain any answers in "Remar	ks.")
SUMMARY OF FINDINGS				
Hydrophytic Vegetation Present?	Yes 🗸 No			
Hydric Soil Present?	Yes 🗸 No			
Wetland Hydrology Present?	Yes 🖌 No	ls the sample	ed area within a wetland? Yes	s ✔ No
Remarks:				
WETLAND HYDROLOGY	INDICATORS			
Wetland Hydrology Indicator	rs:		Secondary Indicators (minin	num of two required)
Primary Indicators (minimum of o	one is required; check all that apply)		Surface Soil Cracks (B6)
✓ Surface Water (AI)	Water-Staine	d Leaves (B9)	Sparsely Vegetated C	Concave Surface (B8)
High Water Table (A2)	Aquatic Faun	a (BI3)	Drainage Patterns (B	10)
✓ Saturation (A3)		s (BI5) (LRR U)	Moss Trim Lines (BI	
Water Marks (BI)	· · ·	lfide Odor (CI)	Dry-Season Water T	able (C2)
Sediment Deposits (B2)		zospheres on Living Roots (C3)		,
Drift Deposits (B3)		Reduced Iron (C4)	✓ Saturation Visible on	
Algal Mat or Crust (B4)		Reduction in Tilled Soils (C6)	✓ Geomorphic Position	
Iron Deposits (B5)	Thin Muck Su	, ,	Shallow Aquitard (D	
✓ Inundation Visible on Aerial	Imagery (B7) Other (Expla	in in Remarks)	FAC-Neutral Test (E	,
Field Observations:				
Surface Water Present?	Yes 🖌 No Depth (inches): >3 feet		
Water Table Present?	Yes No 🖌 Depth (inches):		
Saturation Present: (includes capillary fringe)	Yes _✔_ No Depth (·	Wetland Hydrology Present? Ye	es _ ✓ No
Describe Recorded Data (Stream	gauge, monitoring well, aerial photos,	previous inspections), if available	2:	
Remarks:				
Forested. Isolated. Large poo	ol of indeterminate depth.			

Site ID <u>Wetland E</u>

Tree Stratum (Plot Size: 30)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet:	
I. Fraxinus pennsylvanica	15	Species?	FACW	No. of dominant species that 2	(A)
	15	•	ТАСТ	are OBL, FACW, or FAC:Z	(A)
3.				Total No. of dominant species 2	(D)
				across all strata:	(B)
4.				% of dominant species that	(A / D)
			1	Are OBL, FACW, or FAC	(A/B)
6.				Prevalence Index Worksheet	
8.					ply By:
	15	= Total Cov			
	over: 7.5 20%	of Total Cov	er: <u> </u>	OBL Species X I =	
Sapling/Shrub Stratum (Plot size: 15)			1=+ 0	FACW Species X 2 =	30
I. Acer negundo	10	\checkmark	FAC	FAC Species 10 X 3 =	30
2.				FACU Species X 4 =	
3.				UPL Species X 5 =	
4.				Totals (A) <u>25</u> (B)	60
5.					
6.				Prevalence Index = B/A or2.4	
7.				Hydrophytic Vegetation Indicators:	
8.				I Rapid Test for Hydrophytic Vegetation	on
	10	= Total Cov	ver	2 Dominance Test is > 50%	
50 % of Total Co	over: 5 20%	of Total Cov	er: 2	\checkmark 3 Prevalence Index is \leq 3.0 ¹	
Herb Stratum (Plot size: 5)				Problematic Hydrophytic Vegetation ¹ (Explain)
1.					
2.				 Indicators of hydric soil and wetland hydrology mu present, unless disturbed or problematic. 	st be
3.				Definition of Four Vegetation Strata:	
4.					
5.				Tree – Woody plants, excluding vines, 3 in. (7.0 More in diameter at breast height (DBH), regard	
				Height.	
6.				Sapling/Shrub – Woody plants, excluding vine	es, less than
7.				3 in. DBH and greater than 3.28 ft. (1 m) tall.	
8.				Herb – All herbaceous (non-woody) plants, reg	ardless of
9.				Size, and woody plants less than 3.28 ft. tall.	541 21000 01
10.			1	Woody Vine – All woody vines greater than 3	28 ft in
11.				height.	.2010.111
12.					
		= Total Cov			
	over: 20%	of Total Cov	er:		
Woody Vine Stratum (Plot size: 5)			1	4	
1.				-	
2.				Hydrophytic Vegetation Present? Yes 🖌 N	No
3.			<u> </u>	1	
4.					
5.					
		= Total Cov	ver		
50 % of Total Co	over: 20%	of Total Cov	er:		
Pomarka (Include photo purchase have a	powers about If the	mind list man			
Remarks: (Include photo numbers here or on se	eparate sneet. If ODS	ervea, list mo	phological ada	aptations below.)	

Color (moist) % Color (moist) % Type! Loc? Texture Remarks Image: Color (moist) % Color (moist) % Type! Loc? Texture Remarks Image: Color (moist) % Type! Loc? Texture Remarks Image: Color (moist) % Type! Loc? Texture Remarks Image: Color (moist) % Color (moist) % Type! Loc? Texture Remarks Image: Color (moist) % Image: Color (moist) % Type! Loc? Texture Remarks Image: Color (moist) % Image: Color (moist) % Type! Loc? Texture Remarks Image: Color (moist) % Image: Color (moist) % Image: Color (moist) Mole Image: Color (moist) Mole (Mole		Matrix		to the depth neede	dox Features				,
ype: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ?Location: ?Location:<			0/				l oc²	Toxturo	Pomarka
ydric Soil Indicators: Indicators for Problematic Hydric Soils ² : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR O) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) Depleted Dark Surface (F6) Anomalous Bright Loamy Soils (F20) Organic Bodies (A6) (LRR P, T, U) Redox Depressions (F8) Red Parent Material (TF2) Muck Presence (A8) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) ✓ Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR P, T, U) ³ Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Deleta Ochric (F13) (MLRA 150A, 150B) ³ Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S4) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Jandicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) <t< td=""><td>inches)</td><td></td><td>/0</td><td></td><td>/0</td><td>туре</td><td>LUC-</td><td>TEXLUTE</td><td>i i i i i i i i i i i i i i i i i i i</td></t<>	inches)		/0		/0	туре	LUC-	TEXLUTE	i i i i i i i i i i i i i i i i i i i
ydric Soil Indicators: Indicators for Problematic Hydric Soils ² : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR O) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) Depleted Dark Surface (F6) Anomalous Bright Loamy Soils (F20) Organic Bodies (A6) (LRR P, T, U) Redox Depressions (F8) Red Parent Material (TF2) Muck Presence (A8) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) ✓ Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR P, T, U) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Sandy Mucky Mineral (S1) (LRR O, S) Piedmont Floodplain Soils (F19) (MLRA 150A) Vert of H30 Sandy Mucky Mineral (S4) Areduced Vertic (F18) (MLRA 150A, 150B) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Jandicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S6) Anomalous Bright Loamy Soils									
ydric Soil Indicators: Indicators for Problematic Hydric Soils ² : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR O) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) Depleted Dark Surface (F6) Anomalous Bright Loamy Soils (F20) Organic Bodies (A6) (LRR P, T, U) Redox Depressions (F8) Red Parent Material (TF2) Muck Presence (A8) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) ✓ Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR P, T, U) ³ Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Deleta Ochric (F13) (MLRA 150A, 150B) ³ Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S4) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Jandicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) <t< td=""><td></td><td></td><td>+</td><td></td><td></td><td></td><td></td><td></td><td></td></t<>			+						
ydric Soil Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histo: Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR O) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Depressions (F8) Anomalous Bright Loamy Soils (F20) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) Very Shallow Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) ✓ Coast Prairie Redox (A16)(MLRA 150A) Umbric Surface (F13) (LRR P, T, U) 3Indicators of hydrophytic vegetation and wetdan hydrology must be present. Sandy Mucky Mineral (S1) Deleta Ochric (F17) (MLRA 151) ✓ Other (Explain in Remarks) Sandy Mucky Mineral (S4) Reduced Vertic (F18) (MLRA 150A, 150B) Netdand hydrology must be present. Sandy Mucky Mineral (S4) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Jandicators of hydrophytic vegetation and wetdan hydrology must be present. <t< td=""><td></td><td></td><td>+</td><td></td><td>-</td><td></td><td></td><td></td><td></td></t<>			+		-				
ydric Soil Indicators: Indicators for Problematic Hydric Soils ² : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR O) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) Depleted Dark Surface (F6) Anomalous Bright Loamy Soils (F20) Organic Bodies (A6) (LRR P, T, U) Redox Depressions (F8) Red Parent Material (TF2) Muck Presence (A8) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) ✓ Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR P, T, U) ³ Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Deleta Ochric (F13) (MLRA 150A, 150B) ³ Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S4) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Jandicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) <t< td=""><td></td><td></td><td>+</td><td></td><td></td><td></td><td></td><td></td><td></td></t<>			+						
ydric Soil Indicators: Indicators for Problematic Hydric Soils ² : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR O) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) Depleted Dark Surface (F6) Anomalous Bright Loamy Soils (F20) Organic Bodies (A6) (LRR P, T, U) Redox Depressions (F8) Red Parent Material (TF2) Muck Presence (A8) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) ✓ Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR P, T, U) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Sandy Mucky Mineral (S1) (LRR O, S) Piedmont Floodplain Soils (F19) (MLRA 150A) Vert of H30 Sandy Mucky Mineral (S4) Areduced Vertic (F18) (MLRA 150A, 150B) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Jandicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S6) Anomalous Bright Loamy Soils			<u> </u>						
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Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) ✓ Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and Coast Prairie Redox (A16)(MLRA 150A) Umbric Surface (F13) (LRR P, T, U) 3Indicators of hydrophytic vegetation and Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) stripped Matrix (S6) Dark Surface (S7) (LRR P, S, T, U) Anomalous Bright Loarny Soils (F20) (MLRA 149A, 153C, 153D) estrictive Layer (if observed): Yes ✓ rpe: Hydric Soil Present? Yes ✓ epth (inches): marks: Hydric Soil Present? Yes ✓								-	. ,
Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) Coast Prairie Redox (A16)(MLRA 150A) Umbric Surface (F13) (LRR P, T, U) Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Hydric Soil Present? Yes ✓ weth (inches): No						RA 151)		_	
Coast Prairie Redox (A16)(MLRA 150A) Umbric Surface (F13) (LRR P, T, U) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Hydric Soil Present? Yes ✓ epth (inches): Hydric Soil Present? Yes ✓ No			()	·					·····
Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Hydric Soil Present? Yes ✓ No epth (inches): Hydric Soil Present? Yes ✓ No			RA 150A)				, . , . ,	3India	ators of hydrophytic vegetation and
Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Hydric Soil Present? Yes ✓ No epth (inches): Yes		· · · ·	-						
Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Hydric Soil Present? Yes ✓ No estrictive Layer (if observed): Yes ✓ No epth (inches): Hydric Soil Present? Yes ✓ No			K 0, 3)		, .	-	50B)	weddi	la hydrology must be present.
Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Hydric Soil Present? estrictive Layer (if observed): Hydric Soil Present? rpe: Hydric Soil Present? epth (inches): No									
Dark Surface (S7) (LRR P, S, T, U) estrictive Layer (if observed): /pe: epth (inches): emarks:					•	, 、			
estrictive Layer (if observed): <pre> /pe: /pe: /peth (inches): // No // No // Present? Yes ✓ No // No // Present? // Present? // No // Present? // P</pre>		• • • •	-	Anomaious Bri	gnt Loamy So	5115 (F20) (I	ILKA 149A,	153C, 153D)	
Ppe: Hydric Soil Present? Yes ✓ No epth (inches):					r				
epth (inches):		ve Layer (if observed):						L Ivaluia Cail	
emarks:								myaric soli	Present? Yes <u>√</u> No
	Pepth (ind	ches):							
	<u> </u>								
		oo deep to collect soi	i sample. H						
		oo deep to collect soi	r sample. H						
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Date: 2/14/19
Y Site ID: Wetland F
lard
ncave Slope (%): <
Datum:
n: N/A
(If no, explain in remarks.)
nstances" present? Yes _ ✓ No
ny answers in "Remarks.")
thin a wetland? Yes _✔ No
ndary Indicators (minimum of two required) Surface Soil Cracks (B6) Sparsely Vegetated Concave Surface (B8) Drainage Patterns (B10) Moss Trim Lines (B16) Dry-Season Water Table (C2) Crayfish Burrows (C8) Saturation Visible on Aerial Imagery (C9) Geomorphic Position (D2) Shallow Aquitard (D3) FAC-Neutral Test (D5) Sphagnum Moss (D8) (LRR T, U)
lydrology Present? Yes ✔ No

	Absolute	Dominant	Indicator	Dominance Test Worksheet:		
Tree Stratum (Plot Size: 30)	% Cover 30	Species?	Status FAC	No. of dominant species that	4	(A)
2. Celtis occidentalis	10	✓ ✓	FACU	are OBL, FACW, or FAC: —	7	_ (~)
3.		•	1/100	Total No. of dominant species	6	(B)
4.				across all strata: —	0	_ (0)
5.				% of dominant species that	66.6	(A/B)
6.				Are OBL, FACW, or FAC —	00.0	_ (, (, 2))
8.			1	Prevalence Index Worksheet		
	40	= Total Cov	/er	<u>Total % Cover of:</u>	<u>Multiply</u>	<u>/ By:</u>
50 % of Total Cover: _	20 20%	- of Total Cov	er: 8	OBL Species 3	X I =	3
Sapling/Shrub Stratum (Plot size: 15)					× 2 =	34
I. Celtis occidentalis	10	✓	FACU	FAC Species 35	× 3 =	105
2. Acer rubrum	5		FAC	FACU Species 20	× 4 =	80
3. Fraxinus pennsylvanica	15	✓	FACW	UPL Species	× 5 =	
4.				Totals (A) 75	(B)	222
5.						
6.				Prevalence Index = B/A or	2.96	
7.				Hydrophytic Vegetation Indicate	ors:	
8.				I Rapid Test for Hydrophyti	ic Vegetation	
	30	= Total Cov	/er	2 Dominance Test is > 50%		
50 % of Total Cover: _	15 20%	of Total Cov	er:6	\checkmark 3 Prevalence Index is \leq 3.0 ¹	l	
Herb Stratum (Plot size: 5)		·	<u>.</u>	Problematic Hydrophytic Ve	egetation ¹ (Ex	plain)
I. symphyotrichum lanceolatum	2	✓	FACW	Indicators of hydric soil and wetland hy	drology must	he
2. Rorippa palustris	3	√	OBL	present, unless disturbed or problematic.		20
3.				Definition of Four Vegetation St	rata:	
4.				Tree – Woody plants, excluding vine	es, 3 in. (7.6 d	cm) or
5.				More in diameter at breast height (D		
6.				Height.		
7.				Sapling/Shrub – Woody plants, exc 3 in. DBH and greater than 3.28 ft. (1		less than
8.					,	
9.				Herb – All herbaceous (non-woody) Size, and woody plants less than 3.28		dless of
10.						
11.				Woody Vine – All woody vines great height.	ater than 3.2	8 ft. in
12.						
	5	= Total Cov	/er			
50 % of Total Cover: _	2.5 20%	of Total Cov	er:I			
Woody Vine Stratum (Plot size:)		•	-	_		
1.	<u> </u>			_		
2.				Hydrophytic Vegetation Present? Y	′es 🖌 No)
3.				_		
4.				_		
5.				-		
		= Total Cov	ver			
50 % of Total Cover: _	20%	of Total Cov	er:			
Remarks: (Include photo numbers here or on separat	e sheet. If obs	erved, list mo	rphological ada	ptations below.)		
,				. ,		

SOI	1
301	∟.

Redox Features Type1 Loc2 Texture Remarks % Color (moist) % Type1 Loc2 Texture Remarks 60 10YR 5/6 40 M C Clay Loam 70 7.5YR 4/4 30 M C Clay Loam 70 1 C 1 1 1 70 7.5YR 4/4 30 1 1 1 70 7.5YR 4/4 1 1
Andrew Surface (S8) (LRR S, T, U) Clay Loam Organic Matter Organic Matter Organic Matter Organic Matter RM=Reduced Matrix, MS=Masked Sand Grains ² Location: PL=Pore Lining, M=Matrix Indicators for Problematic Hydric Soils ³ : I cm Muck (A9) (LRR O) Organic Matter Organic Matter Organic Matter
60 IOYR 5/6 40 M C Clay Loam 70 7.5YR 4/4 30 M C Indice Clay Loam 70 7.5YR 4/4 30 M G 1 Indice Clay Loam 70 7.0 2 cm Muck (A9) (LRR O) 2 cm Muck (A10) (LRR S) 2 cm Muck (A10) (LRR S)
70 7.5YR 4/4 30 M C Clay Loam
RM=Reduced Matrix, MS=Masked Sand Grains 2Location: PL=Pore Lining, M=Matrix Indicators for Problematic Hydric Soils3: Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S)
Indicators for Problematic Hydric Soils3: Polyvalue Below Surface (S8) (LRR S, T, U) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S)
Indicators for Problematic Hydric Soils ³ : Polyvalue Below Surface (S8) (LRR S, T, U) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S)
Indicators for Problematic Hydric Soils ³ : Polyvalue Below Surface (S8) (LRR S, T, U) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S)
Indicators for Problematic Hydric Soils ³ : Polyvalue Below Surface (S8) (LRR S, T, U) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S)
Indicators for Problematic Hydric Soils ³ : Polyvalue Below Surface (S8) (LRR S, T, U) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S)
Indicators for Problematic Hydric Soils ³ : Polyvalue Below Surface (S8) (LRR S, T, U) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S)
Indicators for Problematic Hydric Soils ³ : Polyvalue Below Surface (S8) (LRR S, T, U) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S)
Indicators for Problematic Hydric Soils ³ : Polyvalue Below Surface (S8) (LRR S, T, U) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S)
Polyvalue Below Surface (S8) (LRR S, T, U)I cm Muck (A9) (LRR O)Thin Dark Surface (S9) (LRR S, T, U)2 cm Muck (A10) (LRR S)
Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S)
Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B)
✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T)
r, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20)
R P, T, U) Depleted Dark Surface (F7) (MLRA 153B)
Redox Depressions (F8) Red Parent Material (TF2)
Marl (F10) (LRR U) Very Shallow Dark Surface (TF12)
A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks)
Iron-Manganese Masses (FI2) (LRR O, P, T)
RA ISOA) Umbric Surface (FI3) (LRR P, T, U) ³ Indicators of hydrophytic vegetation and
R O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present.
Reduced Vertic (F18) (MLRA 150A, 150B)
Piedmont Floodplain Soils (F19) (MLRA 149A)
Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)
 , U)
Hydric Soil Present? Yes ✔ No

Project Name: US 60 Improvements Project No: KY18-005 Date: 2/14/19	
Applicant/Owner: QK4 State: KY Site ID: Wetland G	
Investigator(s): James Storm and Ryan McGregor City, County, Range: Kevil, Ballard	
Landform (hillslope, terrace, etc.): Floodplain Local Relief (concave, convex, none): Concave Slope (%): < 1	
Subregion (LRR or MLRA): P/134 Lat: 37.085580 Long: -88.927186 Datum:	
Soil Map Unit Name: Falaya-Colling Complex NWI Classification: N/A	
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No (If no, explain in remarks.)	
Are vegetation soil or hydrology significantly disturbed? Are "Normal Circumstances" present? Yes 🗸 No	
Are vegetation soil or hydrology naturally problematic? (If needed, explain any answers in "Remarks.")	
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes 🗸 No	
Hydric Soil Present? Yes ✓ No	
Wetland Hydrology Present? Yes 🖌 No Is the sampled area within a wetland? Yes 🖌 No	
Remarks:	
WETLAND HYDROLOGY INDICATORS	
Wetland Hydrology Indicators: Secondary Indicators (minimum of two required; check all that apply) ✓ Surface Water (A1) Water-Stained Leaves (B9) Surface Soil Cracks (B6) ✓ Surface Water (A1) Water-Stained Leaves (B9) Sparsely Vegetated Concave Surface (B8) ✓ Saturation (A3) Aquatic Fauna (B13) ✓ Drainage Patterns (B10) ✓ Saturation (A3) Marl Deposits (B15) (LRR U) Moss Trim Lines (B16) Water Marks (B1) Hydrogen Sulfide Odor (C1) Dry-Season Water Table (C2) Sediment Deposits (B2) ✓ Oxidized Rhizospheres on Living Roots (C3) ✓ Crayfish Burrows (C8) Drift Deposits (B3) Presence of Reduced Iron (C4) Saturation Visible on Aerial Imagery (C9) Algal Mat or Crust (B4) Recent Iron Reduction in Tilled Soils (C6) ✓ Geomorphic Position (D2) Iron Deposits (B5) Thin Muck Surface (C7) Shallow Aquitard (D3) ✓ FAC-Neutral Test (D5) Inundation Visible on Aerial Imagery (B7) Other (Explain in Remarks) ✓ FAC-Neutral Test (D5) Sphagnum Moss (D8) (LRR T, U)	3)
Field Observations:	
Surface Water Present? Yes ✓ No Depth (inches): 2 Water Table Present? Yes No ✓ Depth (inches):	
Water Table Present? Yes No ✓ Depth (inches): Saturation Present: Yes ✓ No Depth (inches): 0 Wetland Hydrology Present? Yes ✓ No	
(includes capillary fringe)	
Describe Recorded Data (Stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	
Forested, located in floodplain of stream 16.	

	Absolute	Dominant	Indicator	Dominance Test Worksheet:		
Tree Stratum (Plot Size: 30)	% Cover	Species?	Status			
I. Platanus occidentalis	40	\checkmark	FACW	No. of dominant species that are OBL, FACW, or FAC: –	5	(A)
2. Acer negundo	20	✓	FAC			
3. Acer rubrum	20	√	FAC	Total No. of dominant species across all strata:	5	(B)
4.						
5.				% of dominant species that Are OBL, FACW, or FAC –	100	(A/B)
6.						
8.				Prevalence Index Worksheet		
	80	= Total Cov	ver	<u>Total % Cover of:</u>	<u>Multir</u>	<u>oly By:</u>
50 % of Total Cover:	40 20%	of Total Cov	er: 16	OBL Species	X I =	
 Sapling/Shrub Stratum (Plot size: 15)				· · · · · · · · · · · · · · · · · · ·	× 2 =	80
I. Acer negundo	25	1	FAC	- ·	× 3 =	225
2. Acer rubrum	10	, ,	FAC		× 4 =	225
3.		•			× 5 =	
4.						305
				Totals (A) 115	(B)	303
5.				Prevalence Index = B/A or	2.65	
6.						
7.				Hydrophytic Vegetation Indicat		
8.				I Rapid Test for Hydrophyt	-	n
	35	= Total Cov		2 Dominance Test is > 50%		
50 % of Total Cover: _	17.5 20%	of Total Cov	er:7	✓ 3 Prevalence Index is < 3.0		
Herb Stratum (Plot size: 5)	1	·	·	Problematic Hydrophytic V	egetation ¹ (I	Explain)
1.				Indicators of hydric soil and wetland h	ydrology mus	st be
2.				present, unless disturbed or problemation		
3.				Definition of Four Vegetation S	trata:	
4.				Tree – Woody plants, excluding vin	nes 3 in <i>(7 f</i>	cm) or
5.				More in diameter at breast height (D		
6.				Height.		
7.		1	1	Sapling/Shrub – Woody plants, ex		s, less than
8.				 3 in. DBH and greater than 3.28 ft. (I m) tall.	
9.				Herb – All herbaceous (non-woody		ardless of
10.				Size, and woody plants less than 3.28	3 ft. tall.	
11.				Woody Vine – All woody vines gre	eater than 3.	.28 ft. in
2.				– height.		
	<u> </u>	= Total Cov				
	200/	-				
50 % of Total Cover: _	20%	of Total Cov	er:			
Woody Vine Stratum (Plot size: 5)	1	l	1	_		
				_	1	
2.			1	Hydrophytic Vegetation Present?	Yes <u> </u>	10
3.				_		
4.				_		
5.				_		
		= Total Cov	ver			
50 % of Total Cover:	20%	of Total Cov	er:			
Remarks: (Include photo numbers here or on separate	sheet. If obs	erved. list mo	rphological ada	aptations below.)		
			r	······································		

	Darth			to the depth need								
0-6 IOYR 6/2 60 IOYR 6/6 40 C M Clay Loam 6-14 2.5Y 6/1 80 IOYR 6/6 20 C M Clay Loam 6-14 2.5Y 6/1 80 IOYR 6/6 20 C M Clay Loam 6-14 2.5Y 6/1 80 IOYR 6/6 20 C M Clay Loam 6-14 2.5Y 6/1 80 IOYR 6/6 20 C M Clay Loam 6 1 1 1 1 1 1 1 1 1 1										_		
6-14 2.5Y 6/1 80 IOYR 6/6 20 C M Clay Loam		, ,			-		1			Re	emarks	
Image: Solution of the second seco								,				
Hydric Soil Indicators: Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) 1 cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR O) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetand hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 150A) wetand hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) wetand hydrology must be present. Sandy Redox (S5)	6-14	2.5 1 6/1	80	10YR 6/6	20	C	M	Clay Loam				
Hydric Soil Indicators: Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) 1 cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR O) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetand hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 150A) wetand hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) wetand hydrology must be present. Sandy Redox (S5)												
Hydric Soil Indicators: Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) 1 cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR O) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetand hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 150A) wetand hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) wetand hydrology must be present. Sandy Redox (S5)												
Hydric Soil Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) 1 cm Muck (A9) (LRR O) Histosol (A1) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR O) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F13) (MLRA 150A, 150B) Wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Type: Hydric Soil Present? Yes <td></td>												
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Type: Hydric Soil Present? Yes ✓ N						[
		e Layer (if observed):					Hudnia Sail	Procent?	V		
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Depth (inches):	Depth (Inc											

Project Name: US 60 Improvements Project No: KY18-005 Date: 2/14/19	
Applicant/Owner: QK4 State: KY Site ID: Wetland H	
Investigator(s): James Storm and Ryan McGregor City, County, Range: Kevil, Ballard	
Landform (hillslope, terrace, etc.): Toe of berm Local Relief (concave, convex, none): Flat Slope (%): <	
Subregion (LRR or MLRA): P/134 Lat: 37.085565 Long: -88.924875 Datum:	
Soil Map Unit Name: Falaya-Collins Complex NWI Classification: N/A	
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No (If no, explain in remarks.)	
Are vegetation soil or hydrology significantly disturbed? Are "Normal Circumstances" present? Yes No	
Are vegetation soil or hydrology naturally problematic? (If needed, explain any answers in "Remarks.")	
summary of findings	
Hydrophytic Vegetation Present? Yes 🖌 No	
Hydric Soil Present? Yes No	
Wetland Hydrology Present? Yes 🖌 No Is the sampled area within a wetland? Yes 🖌 No	
Remarks:	
WETLAND HYDROLOGY INDICATORS	
Wetland Hydrology Indicators: Secondary Indicators (minimum of two required	d)
Primary Indicators (minimum of one is required; check all that apply) Surface Soil Cracks (B6)	
✓ Surface Water (A1) ✓ Water-Stained Leaves (B9) Sparsely Vegetated Concave Surface (B8))
High Water Table (A2) Aquatic Fauna (B13) ✓ Drainage Patterns (B10)	
✓ Saturation (A3) Marl Deposits (B15) (LRR U) Moss Trim Lines (B16)	
Water Marks (BI) Hydrogen Sulfide Odor (CI) Dry-Season Water Table (C2)	
Sediment Deposits (B2) ✓ Oxidized Rhizospheres on Living Roots (C3) Crayfish Burrows (C8)	
✓ Drift Deposits (B3) Presence of Reduced Iron (C4) Saturation Visible on Aerial Imagery (C9) Algal Mat or Crust (B4) Recent Iron Reduction in Tilled Soils (C6) ✓ Geomorphic Position (D2)	ł.
Again nation Crust (64) Recent non Reduction in Third Solis (C6) V Geomorphic Position (D2) Iron Deposits (B5) Thin Muck Surface (C7) Shallow Aquitard (D3)	
Inundation Visible on Aerial Imagery (B7) Other (Explain in Remarks) FAC-Neutral Test (D5)	
Sphagnum Moss (D8) (LRR T, U)	
Field Observations:	
Surface Water Present? Yes ✓ No Depth (inches):	
Water Table Present? Yes No ✓ Depth (inches): Saturation Present: Yes ✓ No Depth (inches): 0 Wetland Hydrology Present? Yes ✓ No	
Saturation Present: Yes <u>√</u> No <u>Depth (inches)</u> : <u>0</u> Wetland Hydrology Present? Yes <u>√</u> No <u>(includes capillary fringe)</u>	
Describe Recorded Data (Stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	
Forested, Connected to stream 16.	

Site ID <u>Wetland H</u>

	Absolute	Dominant	Indicator	Dominance Test Worksheet:		
Tree Stratum (Plot Size: 30)	% Cover	Species?	Status	No. of dominant species that	_	
I. Celtis occidentalis	20	✓	FACU	- are OBL, FACW, or FAC: —	3 (A)	
2. Ulmus americana	5		FAC	Total No. of dominant species		
3. Fraxinus pennsylvanica	20	\checkmark	FACW	- across all strata:	4 (B)	
4. Populus deltoides	5		FAC	% of dominant species that		
5. Acer rubrum	15	✓	FAC	- Are OBL, FACW, or FAC	75 (A/B)	5)
6.	 					
8.				Prevalence Index Worksheet <u>Total % Cover of:</u>	Multiply By:	
	65	= Total Cov			<u>Platiply By.</u>	
50 % of Total Cover: _	32.5 20%	of Total Cov	er: 13	· · · · · · · · · · · · · · · · · · ·	× I =	
Sapling/Shrub Stratum (Plot size: 15)	1	-	1	FACW Species 20	× 2 = 40	
I. Acer rubrum	10	\checkmark	FAC	FAC Species 35	× 3 = 105	
2.				FACU Species 20	× 4 = <u>80</u>	
3.				UPL Species	× 5 =	
4.				Totals (A) 75	(B) 225	
5.					2.0	
6.				Prevalence Index = B/A or	3.0	
7.				Hydrophytic Vegetation Indicato	ors:	
8.				I Rapid Test for Hydrophytic	c Vegetation	
	10	= Total Cov	ver	2 Dominance Test is > 50%		
50 % of Total Cover: _	5 20%	of Total Cov	er: 2	\checkmark 3 Prevalence Index is \leq 3.0 ¹		
Herb Stratum (Plot size: 5)				Problematic Hydrophytic Ve	getation ¹ (Explain)	
1.				- Indiantory of budging soil and unstand bu		
2.				 Indicators of hydric soil and wetland hy present, unless disturbed or problematic. 		
3.				Definition of Four Vegetation St		
4.				Tree – Woody plants, excluding vine		
5.				More in diameter at breast height (D		
6.				Height.		
7.				Sapling/Shrub – Woody plants, exc	luding vines, less that	an
8.				- 3 in. DBH and greater than 3.28 ft. (1	m) tall.	
9.				Herb – All herbaceous (non-woody)		of
10.				- Size, and woody plants less than 3.28	ft. tall.	
11.				Woody Vine – All woody vines grea	ater than 3.28 ft. in	
12.				– height.		
	i	= Total Cov	i ver			
50 % of Total Cover:	20%	•				
Woody Vine Stratum (Plot size: 5)						
1.						
2.				– Hydrophytic Vegetation Present? Y		
3.			1			
4.				-		
5.				-		
	I	= Total Cov	l	4		
EQ % of Total Course	200/	•				
50 % of Total Cover:						
Remarks: (Include photo numbers here or on separate	sheet. If obs	erved, list mo	rphological ada	aptations below.)		

Inches) Color (moist) % Type! Loc2 Texture Remarks 0-14 2.5Y 6/2 70 10YR 5/6 30 C M Clay Loam 0 1 1 1 1 1 1 1 1 1	0-14 2.5Y 6/2 70 10YR 5/6 30 C M Clay Loam 0 0 0 0 0 0 0 0 0 0	Clay Loam
0-14 2.5Y 6/2 70 10YR 5/6 30 C M Clay Loam 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0-14 2.5Y 6/2 70 10YR 5/6 30 C M Clay Loam 0 0 0 0 0 0 0 0 0 0	Clay Loam
Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains 2Location: PL=Pore Lining, M=Matrix Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains 2Location: PL=Pore Lining, M=Matrix Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains 2Location: PL=Pore Lining, M=Matrix Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains Indicators for Problematic Hydric Soils*: Histosol (A1) Polyvalue Below Surface (S9) (LRR S, T, U) 1 cm Muck (A9) (LRR O) Histo Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A9) (LRR O) Black Histic (A3) Loamy Gleyed Matrix (F2) C Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F2) (Outside MLRA 150A,B) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) Organic Bodies (A6) (LRR P, T) Redox Dark Surface (F7) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Delow Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) JIndicators of hydrophytic vegetation and wetand hydrology must be present. <t< td=""><td>Image: Section of the section of th</td><td>2Location: PL=Pore Lining, M=Matrix Indicators for Problematic Hydric Soils³: </td></t<>	Image: Section of the section of th	2Location: PL=Pore Lining, M=Matrix Indicators for Problematic Hydric Soils ³ :
Hydric Soil Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 133B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (Hydric Soil Indicators: Indicators: Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LI Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (L Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplair Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright L 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Other (Explain in Red Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Red Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of h Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F13) (MLRA 150A, 150B) Sandy Redox (S5) Sandy Redox (S5) Piedmont Floodplain Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Anomalous Bright Loa	Indicators for Problematic Hydric Soils ³ : I cm Muck (A9) (LRR O) 2 cm Muck (A10) (LRR S) Reduced Vertic (F18) (Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2)
Hydric Soil Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 133B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (Hydric Soil Indicators: Indicators: Indicators for Problem Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LI Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (L Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplair Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright L 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Other (Explain in Red Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Red Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of h Sandy Mucky Mineral (S1) (LRR O, S) Deleta Ochric (F13) (MLRA 150A, 150B) Sandy Redox (S5) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Is3C, 153D) Sandy Redox (S5) Anomalous Bright Loamy Soils (F2	Indicators for Problematic Hydric Soils ³ : I cm Muck (A9) (LRR O) 2 cm Muck (A10) (LRR S) Reduced Vertic (F18) (Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2)
Hydric Soil Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 150A, 150B) 3Indicators of hydrology must be present. Sandy Redox (S5) Piedmont Floo	Hydric Soil Indicators: Indicators: Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LI Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (L Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplair Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright L 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Other (Explain in Redox Depressions (F8) Other (Explain in Redox 10.10 (MLRA 151)) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Redox 6.10 (MLRA 150A) Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F13) (LRR P, T, U) 3Indicators of h Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D	Indicators for Problematic Hydric Soils ³ : I cm Muck (A9) (LRR O) 2 cm Muck (A10) (LRR S) Reduced Vertic (F18) (Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2)
Hydric Soil Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 133B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (Hydric Soil Indicators: Indicators: Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LI Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (L Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplair Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright L 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Other (Explain in Red Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Red Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of h Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F13) (MLRA 150A, 150B) Sandy Redox (S5) Sandy Redox (S5) Piedmont Floodplain Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Anomalous Bright Loa	Indicators for Problematic Hydric Soils ³ : I cm Muck (A9) (LRR O) 2 cm Muck (A10) (LRR S) Reduced Vertic (F18) (Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2)
Hydric Soil Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 133B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (Hydric Soil Indicators: Indicators: Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LI Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (L Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplair Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright L 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material 1 cm Muck (A9) (LRR P, T) Mari (F10) (LRR U) Other (Explain in Red Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Red Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of h Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F13) (MLRA 150A, 150B) Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restri	Indicators for Problematic Hydric Soils ³ : I cm Muck (A9) (LRR O) 2 cm Muck (A10) (LRR S) Reduced Vertic (F18) (Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2)
Hydric Soil Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 133B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (Hydric Soil Indicators: Indicators: Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LI Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (L Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplair Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright L 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material 1 cm Muck (A9) (LRR P, T) Mari (F10) (LRR U) Other (Explain in Red Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Red Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of h Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F13) (MLRA 150A, 150B) Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restri	Indicators for Problematic Hydric Soils ³ : I cm Muck (A9) (LRR O) 2 cm Muck (A10) (LRR S) Reduced Vertic (F18) (Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2)
Hydric Soil Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 133B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (Hydric Soil Indicators: Indicators: Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LI Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (L Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplair Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright L 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Other (Explain in Redox Depressions (F8) Other (Explain in Redox 10.10 (MLRA 151)) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Redox 6.10 (MLRA 150A) Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F13) (LRR P, T, U) 3Indicators of h Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D	Indicators for Problematic Hydric Soils ³ : I cm Muck (A9) (LRR O) 2 cm Muck (A10) (LRR S) Reduced Vertic (F18) (Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2)
Hydric Soil Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 133B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (Hydric Soil Indicators: Indicators: Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LI Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (L Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplair Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright L 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Other (Explain in Red Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Red Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of h Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F13) (MLRA 150A, 150B) Sandy Redox (S5) Sandy Redox (S5) Piedmont Floodplain Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Anomalous Bright Loa	Indicators for Problematic Hydric Soils ³ : I cm Muck (A9) (LRR O) 2 cm Muck (A10) (LRR S) Reduced Vertic (F18) (Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2)
Hydric Soil Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 133B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (Hydric Soil Indicators: Indicators: Indicators for Problem Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LI Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (L Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplair Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright L 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Other (Explain in Red Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Red Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of h Sandy Mucky Mineral (S1) (LRR O, S) Deleta Ochric (F13) (MLRA 150A, 150B) Sandy Redox (S5) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Is3C, 153D) Sandy Redox (S5) Anomalous Bright Loamy Soils (F2	Indicators for Problematic Hydric Soils ³ : I cm Muck (A9) (LRR O) 2 cm Muck (A10) (LRR S) Reduced Vertic (F18) (Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2)
Hydric Soil Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 133B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (Hydric Soil Indicators: Indicators: Indicators for Problem Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LI Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (L Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplair Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright L 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Other (Explain in Red Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Red Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of h Sandy Mucky Mineral (S1) (LRR O, S) Deleta Ochric (F13) (MLRA 150A, 150B) Sandy Redox (S5) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Is3C, 153D) Sandy Redox (S5) Anomalous Bright Loamy Soils (F2	Indicators for Problematic Hydric Soils ³ : I cm Muck (A9) (LRR O) 2 cm Muck (A10) (LRR S) Reduced Vertic (F18) (Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2)
Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histo Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F13) (MLRA 150A, IS0B) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A), IS3C, IS3D) Saripeed Matrix (S6) <td>Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LI Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (L Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18 Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplair Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright L 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark S Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Redox 16, 16, 16, 16, 16, 16, 16, 16, 16, 16,</td> <td> I cm Muck (A9) (LRR O) 2 cm Muck (A10) (LRR S) Reduced Vertic (F18) (Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2) </td>	Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LI Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (L Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18 Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplair Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright L 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark S Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Redox 16, 16, 16, 16, 16, 16, 16, 16, 16, 16,	 I cm Muck (A9) (LRR O) 2 cm Muck (A10) (LRR S) Reduced Vertic (F18) (Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2)
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Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F13) (MLRA 151) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F20) (MLRA 149A) stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A), 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Yes ✓	Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplair Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright L 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark S2 Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Redox 10 and parent Material Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of h Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrole Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed):	 Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2)
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Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Type: Hydric Soil Present? Yes ✓ No	Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed):	
Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Type: Hydric Soil Present? Yes ✓ No	Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed):)
Restrictive Layer (if observed): Type: Hydric Soil Present? Yes ✓	Restrictive Layer (if observed):	9A, 153C, 153D)
ype: Hydric Soil Present? Yes ✓ No		
	Ludria Sail Present	
Depth (inches):		Hydric Soil Present? Yes <u>√</u> No
	Depth (inches):	
	Remarks:	

Project Name: US 60 Improv	vements		Project No: KY	18-005 Date:	2/14/19
Applicant/Owner: QK4			· · · · · ·	ate: KY Site ID: V	
	n and Ryan McGrego	or City, C	ounty, Range: Ke		
Landform (hillslope, terrace, etc.)			cave, convex, none		Slope (%): <
		7.085320		16488	Datum:
Soil Map Unit Name: Grenad		.000020		sification: N/A	
Are climatic / hydrologic conditio		this time of year? Ye		(If no, explain in	romarke)
Are climatic / hydrologic conditio	is on the site typical for	this time of year:			remarks.)
Are vegetation soil	or hydrology	significantly disturbed	? Are "Norm	al Circumstances" present	?Yes ✓ No
Are vegetation soil	or hydrology	naturally problemation	? (If needed, e	explain any answers in "Rei	marks.")
SUMMARY OF FINDINGS					
Hydrophytic Vegetation Present?	Yes 🗸	No			
Hydric Soil Present?	Yes 🖌	No			
Wetland Hydrology Present?	Yes 🖌	No	Is the sampled	area within a wetland?	Yes 🖌 No
Remarks:					
WETLAND HYDROLOGY	INDICATORS				
Wetland Hydrology Indicator	rs:			Secondary Indicators (m	ninimum of two required)
Primary Indicators (minimum of o		that apply)		Surface Soil Crac	• •
✓ Surface Water (AI)		Water-Stained Leaves (B9)		Sparsely Vegetate	ed Concave Surface (B8)
High Water Table (A2)		Aquatic Fauna (BI3)		✓ Drainage Pattern	s (B10)
✓ Saturation (A3)		Marl Deposits (BI5) (LRR L	J)	Moss Trim Lines	(BI6)
Water Marks (BI)		Hydrogen Sulfide Odor (CI)		Dry-Season Wate	er Table (C2)
Sediment Deposits (B2)		Oxidized Rhizospheres on L		Crayfish Burrows	· ,
Drift Deposits (B3)		Presence of Reduced Iron (C	,		e on Aerial Imagery (C9)
Algal Mat or Crust (B4)		Recent Iron Reduction in Til	led Soils (C6)	✓ Geomorphic Pos	. ,
Iron Deposits (B5)		Thin Muck Surface (C7)		Shallow Aquitard	
Inundation Visible on Aerial	Imagery (B7)	Other (Explain in Remarks)		FAC-Neutral Tes	(D8) (LRR T, U)
Field Observations:				1	
Surface Water Present?	Yes 🖌 No _	Depth (inches):	6		
Water Table Present?	Yes No	✓ Depth (inches):			
Saturation Present: (includes capillary fringe)	Yes 🖌 No _	Depth (inches):	<u> </u>	etland Hydrology Present?	Yes 🖌 No
Describe Recorded Data (Stream	gauge, monitoring well,	aerial photos, previous inspec	tions), if available:		
Remarks:					
Forested, isolated.					

Site ID <u>Wetland I</u>

	Absolute	Dominant	Indicator	Dominance Test Worksheet:		
Tree Stratum (Plot Size: 30) I. Liquidambar styraciflua	% Cover 30	Species?	Status FAC	No. of dominant species that	4	(4)
2. Celtis occidentalis	5	•	FACU	are OBL, FACW, or FAC: –	4	(A)
3. Acer rubrum	20	✓	FAC	Total No. of dominant species	4	(B)
4.		•		across all strata: –	-1	_ (0)
5.				% of dominant species that	100	(A/B)
6.				Are OBL, FACW, or FAC –	100	_ (/ (/ 2))
8.				Prevalence Index Worksheet		
	55	= Total Cov	ver	Total % Cover of:	<u>Multip</u>	ly By:
50 % of Total Cover:		of Total Cov	er: II	OBL Species	X =	
Sapling/Shrub Stratum (Plot size: 15)					X 2 =	16
I. Acer rubrum	10	√	FAC	- · · · · · · · · · · · · · · · · · · ·	× 3 =	180
2.	Ì				X 4 =	20
3.					× 5 =	
4.				Totals (A) 73	(B)	216
5.						
6.				Prevalence Index = B/A or	2.96	
7.				Hydrophytic Vegetation Indicat	ors:	
8.				I Rapid Test for Hydrophyt	tic Vegetatio	n
	10	= Total Cov	ver	∠ 2 Dominance Test is > 50%		
50 % of Total Cover: _	5 20%	of Total Cov	er: 2	✓ 3 Prevalence Index is < 3.0	1	
Herb Stratum (Plot size: 5)				Problematic Hydrophytic Ve	egetation ¹ (I	xplain)
I. symphyotrichum lanceolatum	8	√	FACW	 Indicators of hydric soil and wetland h 	udrology mus	t bo
2.				present, unless disturbed or problematic		l De
3.				Definition of Four Vegetation St	trata:	
4.				Tree – Woody plants, excluding vin	es. 3 in. (7.6	cm) or
5.				More in diameter at breast height (D		
6.				Height.		
7.				Sapling/Shrub – Woody plants, ex 3 in. DBH and greater than 3.28 ft. (s, less than
8.					i iii) tali.	
9.				Herb – All herbaceous (non-woody Size, and woody plants less than 3.28		ardless of
10.						
11.				Woody Vine – All woody vines gre height.	eater than 3.	28 ft. in
12.				ncigne.		
	8	= Total Cov	ver			
50 % of Total Cover:	4 20%	of Total Cov	er: 1.6			
Woody Vine Stratum (Plot size:)	:		1			
1.						
2.				Hydrophytic Vegetation Present?	Yes 🗹 N	lo
3.						
4.				_		
5.						
		= Total Cov	ver			
50 % of Total Cover:	20%	of Total Cov	er:			
Remarks: (Include photo numbers here or on separate	sheet. If obs	erved. list mo	rphological ada	aptations below.)		
			1			

Color (moist) % Color (moist) % Type! Loc2 Texture Remarks 0-3 10YR 4/3 60 IOYR 5/6 20 C M Clay Loam 3-14 2.5Y 6/1 80 10YR 5/6 20 C M Clay Loam Image: Construction of the second s	I	Profile Descriptio		-					absence of in	incución 51)	
0-3 I0YR 4/3 60 I0YR 5/6 20 C M Clay Loam 3-14 2.SY 6/1 80 I0YR 5/6 20 C M Clay Loam 3-14 2.SY 6/1 80 I0YR 5/6 20 C M Clay Loam 3-14 2.SY 6/1 80 I0YR 5/6 20 C M Clay Loam 3-14 2.SY 6/1 80 I0YR 5/6 20 C M Clay Loam 4 1		Matrix									
3-14 2.5Y 6/1 80 10YR 5/6 20 C M Clay Loam	· /	· · · · ·		Color (moist)	<u>%</u>	Туре	Loc ²	Texture		Remarks	
Image: Stratified Layers (A5) Image: Stratified Layers (A5) Image: Stratified Layers (A5) Image: Stratified Layers (A6)											
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Coast Prairie Redox (A16) (MLRA 150A)Umbric Surface (F13) (LRR P, T, U)3Indicators of hydrophytic vegetatioSandy Mucky Mineral (S1) (LRR O, S)Delta Ochric (F17) (MLRA 151)wetland hydrology must be presentSandy Gleyed Matrix (S4)Reduced Vertic (F18) (MLRA 150A, 150B)Sandy Redox (S5)Piedmont Floodplain Soils (F19) (MLRA 149A)Stripped Matrix (S6)Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)			(AII)					Other (Expl	ain in Remarks)		
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Sandy Gleyed Matrix (S4)Reduced Vertic (F18) (MLRA 150A, 150B)Sandy Redox (S5)Piedmont Floodplain Soils (F19) (MLRA 149A)Stripped Matrix (S6)Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)										-	and
Sandy Redox (S5)Piedmont Floodplain Soils (F19) (MLRA 149A)Stripped Matrix (S6)Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)			lR O, S)					wetlan	d hydrology must	be present.	
Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)											
		. ,									
		. ,		Anomalous Brig	ht Loamy S	oils (F20) (N	1LRA 149A	, 153C, 153D)			
Dark Surface (S7) (LRR P, S, T, U)											
Restrictive Layer (if observed):		e Layer (if observed):	:					l Induia Cail	Duccent?	,	
	_	h) -						Hydric Soli	Present? Ye	es ✓	No
Depth (inches):	Jepth (inci	nes):									

Project Name: US 60 Improvements	Project No: KY18-005 Date: 2/14/19
Applicant/Owner: QK4	State: KY Site ID: Wetland
	County, Range: Kevil, Ballard
	ncave, convex, none): Concave Slope (%): <
Subregion (LRR or MLRA): P/134 Lat: 37.085367	Long: -88.917291 Datum:
Soil Map Unit Name: Grenada Silt Loam	
Are climatic / hydrologic conditions on the site typical for this time of year?	<pre>/es _ ✓ No (If no, explain in remarks.)</pre>
Are vegetation soil or hydrology significantly disturb	ed? Are "Normal Circumstances" present? Yes _✔_ No
Are vegetation soil or hydrology naturally problemat	tic? (If needed, explain any answers in "Remarks.")
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes 🖌 No	
Hydric Soil Present? Yes No	
Wetland Hydrology Present? Yes 🖌 No	Is the sampled area within a wetland? Yes 🖌 No
Remarks:	
WETLAND HYDROLOGY INDICATORS	
Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply) ✓ Surface Water (A1) High Water Table (A2) Aquatic Fauna (B13) ✓ Saturation (A3) Water Marks (B1) Hydrogen Sulfide Odor (C Sediment Deposits (B2) Oxidized Rhizospheres on Drift Deposits (B3) Presence of Reduced Iron (Algal Mat or Crust (B4)) Iron Deposits (B5) Thin Muck Surface (C7) Inundation Visible on Aerial Imagery (B7) Other (Explain in Remarks)	✓ Drainage Patterns (B10) U) Moss Trim Lines (B16) I) Dry-Season Water Table (C2) Living Roots (C3) Crayfish Burrows (C8) (C4) Saturation Visible on Aerial Imagery (C9) 'illed Soils (C6) ✓ Geomorphic Position (D2) Shallow Aquitard (D3)
Surface Water Present? Yes ✓ No Depth (inches):	3
Water Table Present? Yes No 🗸 Depth (inches):	
Saturation Present: Yes 🗸 No Depth (inches):	0 Wetland Hydrology Present? Yes ✓ No
(includes capillary fringe)	
Describe Recorded Data (Stream gauge, monitoring well, aerial photos, previous inspe	ections), if available:
Remarks: Forested, isolated. Wetland is connected to stream 21 but stream 21 doe therefore it is non-jurisdictional.	sn't have a downstream connection to another stream,

Site ID <u>Wetland J</u>

	Absolute	Dominant	Indicator	Dominance Test Worksheet:		
Tree Stratum (Plot Size: 30) I. Liquidambar styraciflua	% Cover 40	Species?	Status FAC	No. of dominant species that	2	(A)
2. Acer rubrum	40	▼ ✓	FACU	are OBL, FACW, or FAC: -	3	(A)
3.	10	•	17.00	Total No. of dominant species	3	(B)
4.				across all strata: -	J	(b)
5.				% of dominant species that	100	(A/B)
6.				Are OBL, FACW, or FAC -	100	(//////////////////////////////////
8.				Prevalence Index Worksheet		
	80	= Total Cov	ver	Total % Cover of:	<u>Multir</u>	oly By:
50 % of Total Cover:	40 20%	of Total Cov	er: 16	OBL Species	X I =	
Sapling/Shrub Stratum (Plot size: 15)					X 2 =	
I. Acer rubrum	35	✓	FAC	FAC Species 115	× 3 =	345
2.		Ì	Ì	- · · · · · · · · · · · · · · · · · · ·	X 4 =	
3.				UPL Species	× 5 =	
4.				Totals (A) 115	(B)	345
5.					· · · <u> </u>	
6.				Prevalence Index = B/A or _	3.0	
7.	Ì			Hydrophytic Vegetation Indicat	tors:	
8.				I Rapid Test for Hydrophy		n
	35	= Total Cov	ver	✓ 2 Dominance Test is > 50%	/ 0	
50 % of Total Cover:	17.5 20%	of Total Cov	er: 7	\checkmark 3 Prevalence Index is \leq 3.0)၊	
Herb Stratum (Plot size: 5)				Problematic Hydrophytic V		Explain)
1.						
2.				 Indicators of hydric soil and wetland h present, unless disturbed or problemati 		st be
3.				Definition of Four Vegetation S	trata:	
4.				Tree – Woody plants, excluding vir	nes. 3 in. (7.€	cm) or
5.				More in diameter at breast height (I	OBH), regard	lless of
6.				Height.		
7.				Sapling/Shrub – Woody plants, ex 3 in. DBH and greater than 3.28 ft. (s, less than
8.					. ,	
9.				Herb – All herbaceous (non-wood) Size, and woody plants less than 3.2		ardless of
10.						
11.				Woody Vine – All woody vines gra- height.	eater than 3.	.28 ft. in
12.						
		= Total Cov	ver			
50 % of Total Cover:	20%	of Total Cov	er:			
Woody Vine Stratum (Plot size: 5)			•			
1.						
2.				Hydrophytic Vegetation Present?	Yes 🖌 N	lo
3.						
4.						
5.						
		= Total Cov	ver			
50 % of Total Cover:	20%	of Total Cov	er:			
Remarks: (Include photo numbers here or on separa	e sheet If obs	erved list mo	rphological ada	potations below)		
			- Friend Sical add			

Depth (inches)	Matrix		e to the depth neede Rec	dox Feature				
Inchesi	Color (moist)	%	Color (moist)	%	Туре	Loc ²	Texture	Remarks
0-3	10YR 4/3	60			1700	200	I CALLI C	Remarks
3-14	2.5Y 6/1	80	10YR 5/6	20	С	М	Clay Loam	
		+		+				
		+						
Туре: С=С	Concentration, D=Depletio	n, RM=Reduc	ed Matrix, MS=Masked S	and Grains		1	² Location: PL=	Pore Lining, M=Matrix
lydric So	oil Indicators:					Ir	ndicators for F	Problematic Hydric Soils ³ :
Histo	sol (AI)		Polyvalue Below	v Surface (S8	B) (LRR S,	T, U)	I cm Muck	(A9) (LRR O)
Histic	Epipedon (A2)		Thin Dark Surfa	ace (S9) (LR	R S, T, U)	· · -	2 cm Muck	(A10) (LRR S)
Black	Histic (A3)		Loamy Mucky M			_	Reduced Ve	. , . ,
	ogen Sulfide (A4)		Loamy Gleyed N		-			MLRA I 50A,B)
	fied Layers (A5)		✓ Depleted Matrix				•	oodplain Soils (F19) (LRR P,S,T)
	nic Bodies (A6) (LRR P,	, T, U)	Redox Dark Su	. ,				Bright Loamy Soils (F20)
	Mucky Mineral (A7) (LF		Depleted Dark	Surface (F7))	_		
Muck	Presence (A8) (LRR U)	Redox Depress	ions (F8)			Red Parent	Material (TF2)
	Muck (A9) (LRR P, T)		 Marl (FI0) (LRI	. ,		_		w Dark Surface (TFI2)
	eted Below Dark Surface	e (ATT)	Depleted Ochri		RA 151)			ain in Remarks)
Thick	Dark Surface (A12)		Iron-Manganese	Masses (FI	2) (LRR O	, P, T)		
Coast	rairie Redox (AI6) (M	LRA 150A)	Umbric Surface	(FI3) (LRF	P, T, U)		³ Indico	ators of hydrophytic vegetation and
Sandy	Mucky Mineral (SI) (LF	₹R O, S)	Delta Ochric (F	17) (MLRA	151)		wetlan	nd hydrology must be present.
Sandy	Gleyed Matrix (S4)		Reduced Vertic	(FI8) (MLI	RA 150A,	I 50B)		
Sandy	r Redox (S5)		Piedmont Flood	Iplain Soils (F19) (MLR	A 149A)		
Stripp	oed Matrix (S6)		Anomalous Brig	ght Loamy S	oils (F20) (N	1LRA 149A	, 153C, 153D)	
Dark	Surface (S7) (LRR P, S,	, T , U)						
Restrictiv	ve Layer (if observed)	:						
Гуре:							Hydric Soil	Present? Yes ✓ No
Depth (incl	hes):							
Remarks:								

Project Name: US 60 Improv	vements	Project No:	KY18-005 Date: 2/14/19					
Applicant/Owner: QK4		,	State: KY Site ID: Wetland K					
Investigator(s): James Storm and Ryan McGregor City, County, Range: Kevil, Ballard								
Landform (hillslope, terrace, etc.)		Local Relief (concave, convex, r						
	P/134 Lat: 37.08531		8.913949 Datum:					
Soil Map Unit Name: Grenada			Classification: N/A					
Are climatic / hydrologic conditions on the site typical for this time of year? Yes _✓ No (If no, explain in remarks.)								
Are vegetation soil or hydrology significantly disturbed? Are "Normal Circumstances" present? Yes 🖌 No								
Are vegetation soil	or hydrology	naturally problematic? (If needed	ed, explain any answers in "Remarks.")					
SUMMARY OF FINDINGS								
Hydrophytic Vegetation Present?	Yes 🖌 No							
Hydric Soil Present?	Yes 🖌 No							
Wetland Hydrology Present?	Yes 🖌 No	Is the sam	pled area within a wetland? Yes 🧹 No					
Remarks:								
WETLAND HYDROLOGY	INDICATORS							
Wetland Hydrology Indicator	ſS:		Secondary Indicators (minimum of two required)					
Primary Indicators (minimum of o		ply)	Surface Soil Cracks (B6)					
✓ Surface Water (AI)	Water	r-Stained Leaves (B9)	Sparsely Vegetated Concave Surface (B8)					
High Water Table (A2)	Aquat	ic Fauna (BI3)	Drainage Patterns (BI0)					
✓ Saturation (A3)	Marl E	Deposits (BI5) (LRR U)	Moss Trim Lines (B16)					
Water Marks (BI)	Hydro	Dry-Season Water Table (C2)						
Sediment Deposits (B2)	Oxidiz							
Drift Deposits (B3)		nce of Reduced Iron (C4)	Saturation Visible on Aerial Imagery (C9)					
Algal Mat or Crust (B4)		t Iron Reduction in Tilled Soils (C6)	Geomorphic Position (D2)					
Iron Deposits (B5)		Muck Surface (C7)	Shallow Aquitard (D3)					
Inundation Visible on Aerial Imagery (B7) Other (Explain in Remarks) ✓ FAC-Neutral Test (D5) Sphagnum Moss (D8) (LRR T, U)								
Field Observations:								
Surface Water Present?	Yes 🖌 No 🔤	Depth (inches): 3						
Water Table Present?	Yes No _✔_ [Depth (inches):						
Saturation Present: (includes capillary fringe)	Yes 🖌 No _ [Depth (inches): 0	Wetland Hydrology Present? Yes 🖌 No					
Describe Recorded Data (Stream	gauge, monitoring well, aerial p	hotos, previous inspections), if availa	ble:					
Remarks:								
Forested, isolated.								

Site ID <u>Wetland K</u>

Tree Stratum (Plot Size: 30)	Absolute % Cover	Dominant	Indicator	Dominance Test Worksheet:
I. Acer rubrum	25	Species?	Status FAC	No. of dominant species that 2 (A)
2.		•		are OBL, FACW, or FAC: <u>2</u> (^)
3.				Total No. of dominant species 2 (B)
4.				across all strata:
5.				% of dominant species that IOO (A/B)
6.				Are OBL, FACW, or FAC
				Prevalence Index Worksheet
8.	25	- 7 . 1 6		Total % Cover of: Multiply By:
50 % of Total Cover	25	= Total Cov		
	<u> 12.5 </u> 20%	of Total Cov	er:	OBL Species X I =
Sapling/Shrub Stratum (Plot size: 15)	5		FAC	FACW Species X 2 =
I. Acer rubrum	5	✓	FAC	FAC Species 30 X 3 = 90
2.				FACU Species X 4 =
3.				UPL Species X 5 =
4.				Totals (A) <u>30</u> (B) <u>90</u>
5.				Prevalence Index = B/A or 3.0
6.				Prevalence Index = B/A or3.0
7.				Hydrophytic Vegetation Indicators:
8.				I Rapid Test for Hydrophytic Vegetation
5 = Total Cover				2 Dominance Test is > 50%
50 % of Total Cover	: <u>2.5</u> 20%	of Total Cov	er:I	\checkmark 3 Prevalence Index is \leq 3.0 ¹
Herb Stratum (Plot size: 5)		_		Problematic Hydrophytic Vegetation ¹ (Explain)
1.				Indicators of hydric soil and wetland hydrology must be
2.				present, unless disturbed or problematic.
3.				Definition of Four Vegetation Strata:
4.				Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or
5.				More in diameter at breast height (DBH), regardless of
6.				Height.
7.		<u> </u>		Sapling/Shrub – Woody plants, excluding vines, less than
8.				– 3 in. DBH and greater than 3.28 ft. (1 m) tall.
9.				Herb – All herbaceous (non-woody) plants, regardless of
10.				– Size, and woody plants less than 3.28 ft. tall.
11.				Woody Vine – All woody vines greater than 3.28 ft. in
2.		<u> </u>	1	– height.
	I	= Total Cov	/er	
50 % of Total Cover	. 20%	-		
Woody Vine Stratum (Plot size: 5)	20%		ei	
				-
2.			1	Hydrophytic Vegetation Present? Yes 🖌 No
3.				4
4.				4
5.			1	-
		= Total Cov		
50 % of Total Cover	: 20%	of Total Cov	er:	
Remarks: (Include photo numbers here or on separ	ate sheet. If obs	erved, list mo	rphological ada	aptations below.)

Depth Matrix Redox Features (inches) Color (moist) % Color (moist) % Type! Loc2 Texture Remarks 0-3 10YR 4/3 100 Image: Color (moist) % Type! Loc2 Texture Remarks 3-14 2.5Y 6/1 70 10YR 5/6 30 C M Clay Loam 3-14 2.5Y 6/1 70 10YR 5/6 30 C M Clay Loam 3-14 2.5Y 6/1 70 10YR 5/6 30 C M Clay Loam	Dopth	Matrix						r confirm the	
0-3 I0YR 4/3 I00 I0YR 5/6 30 C M Clay Loam 3-14 2.5Y 6/1 70 I0YR 5/6 30 C M Clay Loam 3-14 2.5Y 6/1 70 I0YR 5/6 30 C M Clay Loam 3-14 2.5Y 6/1 70 I0YR 5/6 30 C M Clay Loam 3-14 2.5Y 6/1 70 I0YR 5/6 30 C M Clay Loam 3-14 2.5Y 6/1 70 I0YR 5/6 30 C M Clay Loam 3-14 3-14 3 1 <td< th=""><th></th><th></th><th>9/</th><th></th><th></th><th></th><th>12</th><th>T</th><th>Damanlar</th></td<>			9/				12	T	Damanlar
3-14 2.5Y 6/1 70 10YR 5/6 30 C M Clay Loam 3-14 2.5Y 6/1 70 10YR 5/6 30 C M Clay Loam 4 2.5Y 6/1 70 10YR 5/6 30 C M Clay Loam 4 2.5Y 6/1 70 10YR 5/6 30 C M Clay Loam 4 2.2	· /	()		Color (moist)	%	Туре	LOC ²	Texture	Remarks
'Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains 'Location: PL=Pare Lining, M=Matrix 'Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains 'Location: PL=Pare Lining, M=Matrix Hydric Soil Indicators: Indicators for Problematic Hydric Soils': Indicators for Problematic Hydric Soils': Histosol (A1) Polyvalue Below Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR O) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T Stratified Layers (A5) ✓ Depleted Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Redox Depressions (F8) Red Parent Material (TF2) Muck Presence (A8) (LRR P, T) Mari (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Marganese Masses (F12) (LRR O, P, T) JIndicators of hydrophytic vegetation and wetdon hydrology must be present. Sandy Below Dark Surface (A12) De				10YR 5/6	30	C	м	Clay Loam	
Hydric Soil Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F13) (MLRA 150A, 150B) Yeldom thoodplain Soils (F20) (MLRA 149A) Sandy Gleyed Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) <t< td=""><td>5-11</td><td>2.51 0/1</td><td>/0</td><td>1011(5/0</td><td>50</td><td></td><td></td><td></td><td></td></t<>	5-11	2.51 0/1	/0	1011(5/0	50				
Hydric Soil Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F13) (MLRA 150A, 150B) Yeldom thoodplain Soils (F20) (MLRA 149A) Sandy Gleyed Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>									
Hydric Soil Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) V Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F13) (MLRA 150A, 150B) Yeldom thodplain Soils (F20) (MLRA 149A) Sandy Gleyed Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) <td< td=""><td></td><td></td><td></td><td></td><td></td><td>1</td><td></td><td></td><td></td></td<>						1			
Hydric Soil Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) V Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F13) (MLRA 150A, 150B) Yeldom thodplain Soils (F20) (MLRA 149A) Sandy Gleyed Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>									
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Dark Surface (S7) (LRR P, S, T, U)		. ,			•	· / •	,		
		. ,		Anomalous Brig	ght Loamy S	oils (F20) (1	1LRA 149A	, 153C, 153D)	
Restrictive Layer (if observed):			-						
		e Layer (if observed)):						
		h).						Hydric Soil	Present? Yes 🖌 No
Depth (inches):	Depth (inc	nes):							

THIRD ROCK CONSULTANTS, LLC WETLAND DETERMINATION - ATLANTIC AND GULF COAST PLAIN REGION

Project Name: US 60 Improvements Project N	No: KY18-005 Date: 2/14/19
Applicant/Owner: QK4	State: KY Site ID: Wetland L
	ange: Kevil, Ballard
Landform (hillslope, terrace, etc.): Toe of berm Local Relief (concave, con	
Subregion (LRR or MLRA): P/134 Lat: 37.085310 Long:	
Are climatic / hydrologic conditions on the site typical for this time of year? Yes \checkmark	No (If no, explain in remarks.)
Are vegetation soil or hydrology significantly disturbed? Ar	re "Normal Circumstances" present? Yes _✔_ No
Are vegetation soil or hydrology naturally problematic? (If	needed, explain any answers in "Remarks.")
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes 🗸 No	
Hydric Soil Present? Yes ✓ No	
	e sampled area within a wetland? Yes 🖌 No
Remarks:	
WETLAND HYDROLOGY INDICATORS	
Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply) ✓ Surface Water (A1) High Water Table (A2) Aquatic Fauna (B13) ✓ Saturation (A3) Water Marks (B1) Hydrogen Sulfide Odor (C1) Sediment Deposits (B2) ✓ Oxidized Rhizospheres on Living Roo Drift Deposits (B3) Presence of Reduced Iron (C4) Algal Mat or Crust (B4) Recent Iron Reduction in Tilled Soils of Iron Deposits (B5) Inundation Visible on Aerial Imagery (B7) Other (Explain in Remarks)	✓ Saturation Visible on Aerial Imagery (C9)
Field Observations:	
Surface Water Present? Yes ✓ No Depth (inches): 6	
Water Table Present? Yes No ✓ Depth (inches):	,
Saturation Present: Yes ✓ No Depth (inches): 0 (includes capillary fringe)	Wetland Hydrology Present? Yes <u>√</u> No
Describe Recorded Data (Stream gauge, monitoring well, aerial photos, previous inspections), if a	available:
Remarks:	
Forested, in 100 year floodplain of stream 16.	

Site ID <u>Wetland L</u>

VEGETATION (Four Strata) – Use scientific names of plants.

	Absolute	Dominant	Indicator	Dominance Test Worksheet:		
Tree Stratum (Plot Size: 30)	% Cover	Species?	Status	No. of dominant species that		
I. Quercus michauxii	30	\checkmark	FACW	- are OBL, FACW, or FAC:	4	(A)
2. Acer rubrum	40	 ✓ 	FAC	Total No. of dominant species		
3. Platanus occidentalis	25	✓	FACW	- across all strata:	4	(B)
4.				% of dominant species that		
5.			<u> </u>	- Are OBL, FACW, or FAC	100	(A/B)
6.						
8.				Prevalence Index Worksheet	Multi	Ly Dy
	95	= Total Cov		<u>Total % Cover of:</u>	Multi	<u>oly By:</u>
50 % of Total Cover: _	47.5 20%	of Total Cov	er: 19	OBL Species	X I =	
Sapling/Shrub Stratum (Plot size: 15)	.	ì	î	FACW Species 55	X 2 =	110
I. Acer rubrum	10	√	FAC	FAC Species 50	X 3 =	150
2.				FACU Species	X 4 =	
3.			<u> </u>	UPL Species	× 5 =	
4.				Totals (A) 105	(B)	260
5.					2.40	
6.				Prevalence Index = B/A or _	2.48	
7.				Hydrophytic Vegetation Indica	tors:	
8.				I Rapid Test for Hydrophy	ytic Vegetatic	n
	10	= Total Cov	ver	∠ 2 Dominance Test is > 509	%	
50 % of Total Cover: _	5 20%	of Total Cov	er: <u>2</u>	\checkmark 3 Prevalence Index is \leq 3.	01	
Herb Stratum (Plot size: 5)				Problematic Hydrophytic \	√egetation ¹ (Explain)
1.					hudrolo munou	
2.				 Indicators of hydric soil and wetland present, unless disturbed or problemat 		st de
3.				Definition of Four Vegetation S		
4.	1			Tree – Woody plants, excluding vi		(cm) or
5.				More in diameter at breast height (
6.				Height.		
7.				Sapling/Shrub – Woody plants, et		s, less than
8.		1 1 1		- 3 in. DBH and greater than 3.28 ft.	(1 m) tall.	
9.				Herb – All herbaceous (non-wood		ardless of
10.				 Size, and woody plants less than 3.2 	28 ft. tall.	
				Woody Vine – All woody vines gr	reater than 3	.28 ft. in
12.		 	1	– height.		
12.		= Total Cov	l lor			
50 % of Total Cover: _	20%	-				
Woody Vine Stratum (Plot size: 5)	20/6		cı			
				-		
1. 2.			1	Hydrophytic Vegetation Present?	Yos 🗸 🖡	
3.	<u> </u>		†	i iyu opiyuc vegetation Present?	1 es <u> </u>	
			<u> </u>	-		
4.			<u> </u>	-		
5.	!	- T	<u> </u>	-		
		= Total Cov				
50 % of Total Cover:	20%	of Lotal Cov	er:			
Remarks: (Include photo numbers here or on separate	e sheet. If obs	erved, list mo	rphological ada	aptations below.)		

Color (moist) % Color (moist) % Type! Loc2 Texture Remarks 0-4 10YR 6/2 70 10YR 6/6 30 C M Clay Loam 4-14 2.5Y 6/1 70 10YR 6/6 30 C M Clay Loam 4-14 2.5Y 6/1 70 10YR 6/6 30 C M Clay Loam 4-14 2.5Y 6/1 70 10YR 6/6 30 C M Clay Loam 4-14 2.5Y 6/1 70 10YR 6/6 30 C M Clay Loam 4-14 2.5Y 6/1 70 10YR 6/6 30 C M Clay Loam 4-14 2.5Y 6/1 70 10YR 6/6 30 C M Clay Loam 4-14 2.5Y 6/1 70 10YR 6/6 30 C M Clay Loam 4-14 2.5Y 6/1 70 10YR 6/6 30 C M Clay Loam 1/petintin <td< th=""><th></th><th></th><th>T</th><th>e to the depth neede</th><th></th><th></th><th></th><th></th><th></th></td<>			T	e to the depth neede					
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Image: Second Structure Solution: Second Structure Solutis Second Struc									
Hydric Soil Indicators: Indicators for Problematic Hydric Soils?: Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) 1 cm Muck (A9) (LRR O) Histosol (A1) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR O) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) Otypicate Matrix (F3) Organic Bodies (A6) (LRR P, T, U) Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Depleted Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) Red Parent Material (TF2) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) Indicators of hydrophytic vegetation and Sandy Mucky Mineral (S1) (LRR O, S) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, IS0B) Piedmont Floodplain Soils (F12) (LRR O, P, T) JIndicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Lo	4-14	2.5 1 6/1	/0	10YR 6/6	30	C	M	Clay Loam	
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Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 150A, 150B) Piedmont Floodplain Soils (F19) (MLRA 149A), 153C, 153D) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Type: Model Surface (S7) (LRR P, S, T, U)	-			Polyvalue Belov	w Surface (S	8) (LRR S.			•
Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Deleta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Gleyed Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A) Anomalous Bright Loamy Soils (F20) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Yes ✓ No		. ,					-		
Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 150A, 150B) Piedmont Floodplain Soils (F19) (MLRA 149A) Sandy Gleyed Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Type: Hydric Soil Present? Yes ✓ Depth (inches): Endoteric (F10 observed): Yes ✓ No		•••							
Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P, S, T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) Stratified Layers (A8) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR P, T) Depleted Dark Surface (F7) (MLRA 153B) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) other (Explain in Remarks) Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Type: Hydric Soil Present? Yes // No Depth (inches): Depth (inches): No		()			. ,				
5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) Other (Explain in Remarks) Coast Prairie Redox (A16)(MLRA 150A) Umbric Surface (F13) (LRR P, T, U) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Hydric Soil Present? Yes V No Type:								Piedmont Flo	oodplain Soils (F19)(LRR P,S,T)
Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) Other (Explain in Remarks) Coast Prairie Redox (A16)(MLRA 150A) Umbric Surface (F13) (LRR P, T, U) ³Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Hydric Soil Present? Yes v ✓ Type:			P, T, U)	Redox Dark Su	irface (F6)		_	Anomalous I	Bright Loamy Soils (F20)
I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) Other (Explain in Remarks) Coast Prairie Redox (A16)(MLRA 150A) Umbric Surface (F13) (LRR P, T, U) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Hydric Soil Present? Yes ✓ Type:	5 cm	Mucky Mineral (A7) (L	RR P, T, U)	Depleted Dark	Surface (F7)		(MLRA 153	BB)
Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) Other (Explain in Remarks) Coast Prairie Redox (A16)(MLRA 150A) Umbric Surface (F13) (LRR P, T, U) ³Indicators of hydrophytic vegetation and Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Hydric Soil Present? Yes ✓ No Depth (inches):	Muck	Presence (A8) (LRR U	J)	Redox Depress	sions (F8)			Red Parent I	Material (TF2)
Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) Coast Prairie Redox (A16)(MLRA 150A) Umbric Surface (F13) (LRR P, T, U) Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Hydric Soil Present? Yes ✓	l cm	Muck (A9) (LRR P, T))	Marl (F10) (LR	RU)			Very Shallow	v Dark Surface (TF12)
Coast Prairie Redox (A16)(MLRA 150A) Umbric Surface (F13) (LRR P, T, U) 3Indicators of hydrophytic vegetation and Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Type: Hydric Soil Present? Yes ✓ No	Deple	ted Below Dark Surfac	e (AII)	Depleted Ochr	ric (FLI) (M I	LRA 151)	_	Other (Expla	ain in Remarks)
Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Type: Hydric Soil Present? Yes ✓	Thick	Dark Surface (A12)		Iron-Manganes	e Masses (FI	2) (LRR O	, P, T)		
Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Type: Hydric Soil Present? Yes ✓ No Depth (inches):	Coast	Prairie Redox (AI6) (1LRA 50A)	Umbric Surface	e (FI3) (LRF	R P, T, U)		³ Indica	tors of hydrophytic vegetation and
Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Type: Hydric Soil Present? Yes ✓ No Depth (inches): No	Sandy	Mucky Mineral (SI) (L	RR O, S)	Delta Ochric (l	=17) (MLR 4	A 151)		wetland	d hydrology must be present.
Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Type: Depth (inches):									
Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Type: Depth (inches):									
Restrictive Layer (if observed): Type: Hydric Soil Present? Yes ✓ No Depth (inches):		. ,		Anomalous Bri	ght Loamy S	oils (F20) (I	1LRA 149A	A, 153C, 153D)	
Type: Hydric Soil Present? Yes ✓ No Depth (inches):									
Depth (inches):		e Layer (if observed):					l hadata Catil	
		h) -						Hydric Soil	Present? Yes <u>√</u> No
Neurolui -	Depth (incl	nes):							
	Remarks:								

THIRD ROCK CONSULTANTS, LLC WETLAND DETERMINATION - ATLANTIC AND GULF COAST PLAIN REGION

Project Name: US 60 Improvements	Project No: KY18-005 Date: 2/15/19
Applicant/Owner: QK4	State: KY Site ID: Wetland M
	County, Range: Kevil, Ballard
	ncave, convex, none): Concave Slope (%): <
Subregion (LRR or MLRA): P/134 Lat: 37.082629	Long: -88.938548 Datum:
Soil Map Unit Name: Falaya-Collins Complex	NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? Y	es _✓_ No (If no, explain in remarks.)
Are vegetation soil or hydrology significantly disturbed	ed? Are "Normal Circumstances" present? Yes _✔_ No
Are vegetation soil or hydrology naturally problemat	ic? (If needed, explain any answers in "Remarks.")
SUMMARY OF FINDINGS	
Hydrophytic Vegetation Present? Yes 🗸 No	
Hydric Soil Present? Yes ✓ No	
Wetland Hydrology Present? Yes ✓ No	Is the sampled area within a wetland? Yes 🖌 No
Remarks:	
WETLAND HYDROLOGY INDICATORS	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)	Surface Soil Cracks (B6)
✓ Surface Water (A1) ✓ Water-Stained Leaves (B9)	Sparsely Vegetated Concave Surface (B8)
High Water Table (A2) Aquatic Fauna (B13)	Drainage Patterns (B10)
✓ Saturation (A3) Marl Deposits (B15) (LRR	U) Moss Trim Lines (B16)
Water Marks (B1) Hydrogen Sulfide Odor (C1	
Sediment Deposits (B2) Oxidized Rhizospheres on	
Drift Deposits (B3) Presence of Reduced Iron (
Algal Mat or Crust (B4) Recent Iron Reduction in T	
Iron Deposits (B5) Thin Muck Surface (C7)	Shallow Aquitard (D3)
Inundation Visible on Aerial Imagery (B7) Other (Explain in Remarks)	
	Sphagnum Moss (D8) (LRR T, U)
Field Observations:	
Surface Water Present? Yes ✓ No Depth (inches):	4
Water Table Present? Yes No ✓ Depth (inches):	<u> </u>
Saturation Present: Yes ✓ No Depth (inches):	0 Wetland Hydrology Present? Yes ✓ No
(includes capillary fringe)	, , ,
Describe Recorded Data (Stream gauge, monitoring well, aerial photos, previous inspe	ctions), if available:
Remarks:	
Scrub/Shrub, vernal pool, isolated.	

VEGETATION (Four Strata) – Use scientific names of plants.

Tree Stratum (Plot Size: 5)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet:
I.	% Cover	species:	Status	No. of dominant species that 2 (A)
2.				are OBL, FACW, or FAC: <u>2</u> (A)
3.				Total No. of dominant species 2 (B)
4.				across all strata:
5.				% of dominant species that
				Are OBL, FACW, or FAC
6. 8.			1	Prevalence Index Worksheet
8.		- Tatal Ca		<u>Total % Cover of:</u> <u>Multiply By:</u>
	20%	= Total Cov		
50 % of Total Cover: _	20%	of Total Cov	er:	OBL Species X I =
Sapling/Shrub Stratum (Plot size: 5)	5	✓	FAC	FACW Species X 2 = FAC 5 X 2 =
2. Ulmus americana	5	✓ ✓	FAC	FAC Species 10 X 3 = 30
	5	v	FAC	FACU Species X 4 =
3.				UPL Species X 5 =
4.				Totals (A) <u>10</u> (B) <u>30</u>
5.				Prevalence Index = B/A or 3.0
6.			<u> </u>	
7.				Hydrophytic Vegetation Indicators:
8.				I Rapid Test for Hydrophytic Vegetation
	10	= Total Cov		2 Dominance Test is > 50%
50 % of Total Cover:	<u> </u>	of Total Cov	er: <u>2</u>	\checkmark 3 Prevalence Index is $\leq 3.0^{11}$
Herb Stratum (Plot size: 5)	1		1	Problematic Hydrophytic Vegetation ¹ (Explain)
1.				Indicators of hydric soil and wetland hydrology must be
2.				present, unless disturbed or problematic.
3.				Definition of Four Vegetation Strata:
4.				Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or
5.				More in diameter at breast height (DBH), regardless of Height.
6.				
7.				Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft. (1 m) tall.
8.				
9.				Herb – All herbaceous (non-woody) plants, regardless of Size, and woody plants less than 3.28 ft. tall.
10.				Mandu Ving All ward wing a matter than 2.29 ft in
11.				Woody Vine – All woody vines greater than 3.28 ft. in height.
12.				-
		= Total Cov	ver	
50 % of Total Cover:	20%	of Total Cov	er:	
Woody Vine Stratum (Plot size: 5)	1	1	1	-
1.				
2.	ļ	 		Hydrophytic Vegetation Present? Yes 🖌 No
3.				_
4.				
5.				_
		= Total Cov	/er	
50 % of Total Cover:	20%	of Total Cov	er:	
Remarks: (Include photo numbers here or on separate	e sheet. If obs	erved. list mo	rphological ad:	aptations below.)
,				· /

Inches) Color (moist) % Type! Loc2 Texture Remarks 0-14 2.5Y 6/2 70 10YR 5/6 30 C M Clay Loam 0 1 1 1 1 1 1 1 1 1	0-14 2.5Y 6/2 70 10YR 5/6 30 C M Clay Loam 0 0 0 0 0 0 0 0 0 0	Clay Loam
0-14 2.5Y 6/2 70 10YR 5/6 30 C M Clay Loam 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0-14 2.5Y 6/2 70 10YR 5/6 30 C M Clay Loam 0 <	Clay Loam
Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains 2Location: PL=Pore Lining, M=Matrix Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains 2Location: PL=Pore Lining, M=Matrix Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains 2Location: PL=Pore Lining, M=Matrix Histosol (A1) Polyvalue Below Surface (S9) (LRR S, T, U) Indicators for Problematic Hydric Soils*: Histosol (A1) Polyvalue Below Surface (S9) (LRR S, T, U) 2 cm Muck (A9) (LRR O) Histosol (A1) Loamy Gleyed Matrix (F2) C Outside MLRA 150A,B) Black Histic (A3) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F19) (LRR P,S,T) Organic Bodies (A6) (LRR P, T) Redox Dark Surface (F7) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Red Parent Material (TF2) I cm Muck (A9) (LRR A ISDA) Depleted Ochric (F11) (MLRA ISI) Other (Explain in Remarks) I cm Muck (A9) (LRR A ISDA) Depleted Ochric (F11) (MLRA ISDA) Very Shallow Dark Surface (TF12) Depleted Matrix (S6) Depleted Vertic (F18) (MLRA ISDA) Very Shallow Dark Surface (F19) (MLRA ISDA) Sandy Mucky Mineral (S1) (LRR O, S)	Image: Section of the section of th	2Location: PL=Pore Lining, M=Matrix Indicators for Problematic Hydric Soils ³ :
Hydric Soil Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 133B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (Hydric Soil Indicators: Indicators: Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LI Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (L Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplair Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright L 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Other (Explain in Red Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Red Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of h Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F13) (MLRA 150A, 150B) Sandy Redox (S5) Sandy Redox (S5) Piedmont Floodplain Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Anomalous Bright Loa	Indicators for Problematic Hydric Soils ³ : I cm Muck (A9) (LRR O) 2 cm Muck (A10) (LRR S) Reduced Vertic (F18) (Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2)
Hydric Soil Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 133B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (Hydric Soil Indicators: Indicators: Indicators for Problem Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LI Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (L Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplair Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright L 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Other (Explain in Red Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Red Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of h Sandy Mucky Mineral (S1) (LRR O, S) Deleta Ochric (F13) (MLRA 150A, 150B) Sandy Redox (S5) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Is3C, 153D) Sandy Redox (S5) Anomalous Bright Loamy Soils (F2	Indicators for Problematic Hydric Soils ³ : I cm Muck (A9) (LRR O) 2 cm Muck (A10) (LRR S) Reduced Vertic (F18) (Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2)
Hydric Soil Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 150A, 150B) 3Indicators of hydrology must be present. Sandy Redox (S5) Piedmont Floo	Hydric Soil Indicators: Indicators: Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LI Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (L Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplair Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright L 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Other (Explain in Redox Depressions (F8) Other (Explain in Redox 10 (LRR O, P, T)) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Redox 6) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of h Sandy Mucky Mineral (S1) (LRR O, S) Deleta Ochric (F13) (MLRA 150A, 150B) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Sandy Redox (S5) Piedmont Floodplain Soils (F20) (MLRA 149A, 153C, 153D)	Indicators for Problematic Hydric Soils ³ : I cm Muck (A9) (LRR O) 2 cm Muck (A10) (LRR S) Reduced Vertic (F18) (Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2)
Hydric Soil Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 133B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (Hydric Soil Indicators: Indicators: Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LI Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (L Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplair Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright L 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Other (Explain in Red Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Red Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of h Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F13) (MLRA 150A, 150B) Sandy Redox (S5) Sandy Redox (S5) Piedmont Floodplain Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Anomalous Bright Loa	Indicators for Problematic Hydric Soils ³ : I cm Muck (A9) (LRR O) 2 cm Muck (A10) (LRR S) Reduced Vertic (F18) (Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2)
Hydric Soil Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 133B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (Hydric Soil Indicators: Indicators: Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LI Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (L Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplair Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright L 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material 1 cm Muck (A9) (LRR P, T) Mari (F10) (LRR U) Other (Explain in Red Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Red Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of h Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F13) (MLRA 150A, 150B) Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restri	Indicators for Problematic Hydric Soils ³ : I cm Muck (A9) (LRR O) 2 cm Muck (A10) (LRR S) Reduced Vertic (F18) (Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2)
Hydric Soil Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 133B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (Hydric Soil Indicators: Indicators: Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LI Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (L Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplair Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright L 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material 1 cm Muck (A9) (LRR P, T) Mari (F10) (LRR U) Other (Explain in Red Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Red Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of h Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F13) (MLRA 150A, 150B) Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restri	Indicators for Problematic Hydric Soils ³ : I cm Muck (A9) (LRR O) 2 cm Muck (A10) (LRR S) Reduced Vertic (F18) (Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2)
Hydric Soil Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 133B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (Hydric Soil Indicators: Indicators: Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LI Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (L Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplair Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright L 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Other (Explain in Redox Depressions (F8) Other (Explain in Redox 10 (LRR O, P, T)) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Redox 6) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of h Sandy Mucky Mineral (S1) (LRR O, S) Deleta Ochric (F13) (MLRA 150A, 150B) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Sandy Redox (S5) Piedmont Floodplain Soils (F20) (MLRA 149A, 153C, 153D)	Indicators for Problematic Hydric Soils ³ : I cm Muck (A9) (LRR O) 2 cm Muck (A10) (LRR S) Reduced Vertic (F18) (Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2)
Hydric Soil Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 133B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (Hydric Soil Indicators: Indicators: Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LI Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (L Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplair Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright L 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Other (Explain in Red Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Red Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of h Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F13) (MLRA 150A, 150B) Sandy Redox (S5) Sandy Redox (S5) Piedmont Floodplain Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Anomalous Bright Loa	Indicators for Problematic Hydric Soils ³ : I cm Muck (A9) (LRR O) 2 cm Muck (A10) (LRR S) Reduced Vertic (F18) (Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2)
Hydric Soil Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 133B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (Hydric Soil Indicators: Indicators: Indicators for Problem Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LI Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (L Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplair Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright L 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Other (Explain in Red Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Red Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of h Sandy Mucky Mineral (S1) (LRR O, S) Deleta Ochric (F13) (MLRA 150A, 150B) Sandy Redox (S5) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Is3C, 153D) Sandy Redox (S5) Anomalous Bright Loamy Soils (F2	Indicators for Problematic Hydric Soils ³ : I cm Muck (A9) (LRR O) 2 cm Muck (A10) (LRR S) Reduced Vertic (F18) (Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2)
Hydric Soil Indicators: Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 133B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (Hydric Soil Indicators: Indicators: Indicators for Problem Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LI Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (L Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplair Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright L 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Other (Explain in Red Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Red Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of h Sandy Mucky Mineral (S1) (LRR O, S) Deleta Ochric (F13) (MLRA 150A, 150B) Sandy Redox (S5) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Is3C, 153D) Sandy Redox (S5) Anomalous Bright Loamy Soils (F2	Indicators for Problematic Hydric Soils ³ : I cm Muck (A9) (LRR O) 2 cm Muck (A10) (LRR S) Reduced Vertic (F18) (Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2)
Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LRR O) Histo Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F13) (MLRA 150A, IS0B) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A), IS3C, IS3D) Saripeed Matrix (S6) <td>Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LI Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (L Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18 Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplair Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright L 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark S Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Redox 16, 16, 16, 16, 16, 16, 16, 16, 16, 16,</td> <td> I cm Muck (A9) (LRR O) 2 cm Muck (A10) (LRR S) Reduced Vertic (F18) (Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2) </td>	Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) I cm Muck (A9) (LI Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (L Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18 Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplair Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright L 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark S Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Redox 16, 16, 16, 16, 16, 16, 16, 16, 16, 16,	 I cm Muck (A9) (LRR O) 2 cm Muck (A10) (LRR S) Reduced Vertic (F18) (Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2)
Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Yes ✓ No </td <td>Histic Epipedon (A2)Thin Dark Surface (S9) (LRR S, T, U)2 cm Muck (A10) (LBlack Histic (A3)Loamy Mucky Mineral (F1) (LRR 0)Reduced Vertic (F18Hydrogen Sulfide (A4)Loamy Gleyed Matrix (F2)(Outside MLRA)Stratified Layers (A5)✓Depleted Matrix (F3)Piedmont FloodplairOrganic Bodies (A6) (LRR P, T, U)Redox Dark Surface (F6)Anomalous Bright L5 cm Mucky Mineral (A7) (LRR P, T, U)Depleted Dark Surface (F7)(MLRA 153B)Muck Presence (A8) (LRR U)Redox Depressions (F8)Red Parent Material1 cm Muck (A9) (LRR P, T)Marl (F10) (LRR U)Very Shallow Dark SDepleted Below Dark Surface (A11)Depleted Ochric (F11) (MLRA 151)Other (Explain in RedThick Dark Surface (A12)Iron-Manganese Masses (F12) (LRR O, P, T)3Indicators of hSandy Mucky Mineral (S1) (LRR O, S)Delta Ochric (F17) (MLRA 151)wetland hydroloSandy Redox (S5)Piedmont Floodplain Soils (F19) (MLRA 149A)Stripped Matrix (S6)Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)Dark Surface (S7) (LRR P, S, T, U)Restrictive Layer (if observed):Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)</td> <td> 2 cm Muck (A10) (LRR S) Reduced Vertic (F18) (Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2) </td>	Histic Epipedon (A2)Thin Dark Surface (S9) (LRR S, T, U)2 cm Muck (A10) (LBlack Histic (A3)Loamy Mucky Mineral (F1) (LRR 0)Reduced Vertic (F18Hydrogen Sulfide (A4)Loamy Gleyed Matrix (F2)(Outside MLRA)Stratified Layers (A5)✓Depleted Matrix (F3)Piedmont FloodplairOrganic Bodies (A6) (LRR P, T, U)Redox Dark Surface (F6)Anomalous Bright L5 cm Mucky Mineral (A7) (LRR P, T, U)Depleted Dark Surface (F7)(MLRA 153B)Muck Presence (A8) (LRR U)Redox Depressions (F8)Red Parent Material1 cm Muck (A9) (LRR P, T)Marl (F10) (LRR U)Very Shallow Dark SDepleted Below Dark Surface (A11)Depleted Ochric (F11) (MLRA 151)Other (Explain in RedThick Dark Surface (A12)Iron-Manganese Masses (F12) (LRR O, P, T)3Indicators of hSandy Mucky Mineral (S1) (LRR O, S)Delta Ochric (F17) (MLRA 151)wetland hydroloSandy Redox (S5)Piedmont Floodplain Soils (F19) (MLRA 149A)Stripped Matrix (S6)Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)Dark Surface (S7) (LRR P, S, T, U)Restrictive Layer (if observed):Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)	 2 cm Muck (A10) (LRR S) Reduced Vertic (F18) (Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2)
Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Deleta Ochric (F13) (MLRA 150A, 150B) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F20) (MLRA 149A), 153C, 153D) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Reduced Vertic (F18) (MLRA 149A, 153C, 153D) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7	Black Histic (A3) Loamy Mucky Mineral (F1) (LRR 0) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplair Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright L 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark S Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Redox 10 and the composition of the composition composition of the composition of the composi	Reduced Vertic (F18) (Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2)
Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 150A, 150B) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Yes ✓	Hydrogen Sulfide (A4)Loamy Gleyed Matrix (F2)(Outside MLRA)Stratified Layers (A5)✓Depleted Matrix (F3)Piedmont FloodplairOrganic Bodies (A6) (LRR P, T, U)Redox Dark Surface (F6)Anomalous Bright L5 cm Mucky Mineral (A7) (LRR P, T, U)Depleted Dark Surface (F7)(MLRA 153B)Muck Presence (A8) (LRR U)Redox Depressions (F8)Red Parent MaterialI cm Muck (A9) (LRR P, T)Marl (F10) (LRR U)Very Shallow Dark SDepleted Below Dark Surface (A11)Depleted Ochric (F11) (MLRA 151)Other (Explain in Redox 151)Thick Dark Surface (A12)Iron-Manganese Masses (F12) (LRR O, P, T)3Indicators of hCoast Prairie Redox (A16) (MLRA 150A)Umbric Surface (F13) (LRR P, T, U)3Indicators of hSandy Mucky Mineral (S1) (LRR O, S)Delta Ochric (F17) (MLRA 151)wetland hydroleSandy Redox (S5)Piedmont Floodplain Soils (F19) (MLRA 149A)Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)Dark Surface (S7) (LRR P, S, T, U)Restrictive Layer (if observed):Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)	(Outside MLRA 150A,B) Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2)
Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F13) (MLRA 151) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F20) (MLRA 149A) stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A), 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Yes ✓	Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplair Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright L 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark S2 Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Redox 10 and parent Material Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of h Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrole Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed):	 Piedmont Floodplain Soils (F19)(LRR P,S,T) Anomalous Bright Loamy Soils (F20) (MLRA 153B) Red Parent Material (TF2)
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5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) Other (Explain in Remarks) Coast Prairie Redox (A16)(MLRA 150A) Umbric Surface (F13) (LRR P, T, U) 3Indicators of hydrophytic vegetation and Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Yes ✓ No	5 cm Mucky Mineral (A7) (LRR P, T, U)Depleted Dark Surface (F7)(MLRA 153B)Muck Presence (A8) (LRR U)Redox Depressions (F8)Red Parent MaterialI cm Muck (A9) (LRR P, T)Marl (F10) (LRR U)Very Shallow Dark SurfaceDepleted Below Dark Surface (A11)Depleted Ochric (F11) (MLRA 151)Other (Explain in RedThick Dark Surface (A12)Iron-Manganese Masses (F12) (LRR O, P, T)3Indicators of hCoast Prairie Redox (A16) (MLRA 150A)Umbric Surface (F13) (LRR P, T, U)3Indicators of hSandy Mucky Mineral (S1) (LRR O, S)Delta Ochric (F17) (MLRA 151)wetland hydroldSandy Redox (S5)Piedmont Floodplain Soils (F19) (MLRA 149A)Stripped Matrix (S6)Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)Dark Surface (S7) (LRR P, S, T, U)Restrictive Layer (if observed):Ket Carl State S	(MLRA 153B) Red Parent Material (TF2)
Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) Other (Explain in Remarks) Coast Prairie Redox (A16)(MLRA 150A) Umbric Surface (F13) (LRR P, T, U) 3Indicators of hydrophytic vegetation and Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Cast Free (if observed): Type: Hydric Soil Present? Yes ✓ No	Muck Presence (A8) (LRR U)Redox Depressions (F8)Red Parent MaterialI cm Muck (A9) (LRR P, T)Marl (F10) (LRR U)Very Shallow Dark SDepleted Below Dark Surface (A11)Depleted Ochric (F11) (MLRA 151)Other (Explain in RedThick Dark Surface (A12)Iron-Manganese Masses (F12) (LRR O, P, T)Other (Explain of hCoast Prairie Redox (A16) (MLRA 150A)Umbric Surface (F13) (LRR P, T, U)3Indicators of hSandy Mucky Mineral (S1) (LRR O, S)Delta Ochric (F17) (MLRA 151)wetland hydroleSandy Redox (S5)Piedmont Floodplain Soils (F19) (MLRA 149A)Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)Dark Surface (S7) (LRR P, S, T, U)Restrictive Layer (if observed):Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)	Red Parent Material (TF2)
I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) Other (Explain in Remarks) Coast Prairie Redox (A16) (MLRA 150A) Umbric Surface (F13) (LRR P, T, U) 3Indicators of hydrophytic vegetation and Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) 132, 133, 133, 133, 133, 133, 133, 133,	I cm Muck (A9) (LRR P, T)Marl (F10) (LRR U)Very Shallow Dark SDepleted Below Dark Surface (A11)Depleted Ochric (F11) (MLRA 151)Other (Explain in ReThick Dark Surface (A12)Iron-Manganese Masses (F12) (LRR O, P, T)Other (Explain of her constraints)Coast Prairie Redox (A16) (MLRA 150A)Umbric Surface (F13) (LRR P, T, U)3Indicators of her constraints)Sandy Mucky Mineral (S1) (LRR O, S)Delta Ochric (F17) (MLRA 151)wetland hydroleSandy Redox (S5)Piedmont Floodplain Soils (F19) (MLRA 149A)Stripped Matrix (S6)Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)Dark Surface (S7) (LRR P, S, T, U)Restrictive Layer (if observed):	
Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) Coast Prairie Redox (A16)(MLRA 150A) Umbric Surface (F13) (LRR P, T, U) 3Indicators of hydrophytic vegetation and Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Ype: Hydric Soil Present? Yes ✓	Depleted Below Dark Surface (A11)Depleted Ochric (F11) (MLRA 151)Other (Explain in ReThick Dark Surface (A12)Iron-Manganese Masses (F12) (LRR O, P, T)Iron-Manganese Masses (F12) (LRR O, P, T)Coast Prairie Redox (A16) (MLRA 150A)Umbric Surface (F13) (LRR P, T, U)3Indicators of hSandy Mucky Mineral (S1) (LRR O, S)Delta Ochric (F17) (MLRA 151)wetland hydroldSandy Gleyed Matrix (S4)Reduced Vertic (F18) (MLRA 150A, 150B)Piedmont Floodplain Soils (F19) (MLRA 149A)Stripped Matrix (S6)Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)Dark Surface (S7) (LRR P, S, T, U)Restrictive Layer (if observed):	Very Shallow Dark Surface (TFI2)
Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) Coast Prairie Redox (A16)(MLRA 150A) Umbric Surface (F13) (LRR P, T, U) Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Ype: Hydric Soil Present? Yes ✓ No	Thick Dark Surface (A12)Iron-Manganese Masses (F12) (LRR O, P, T)Coast Prairie Redox (A16) (MLRA 150A)Umbric Surface (F13) (LRR P, T, U)Sandy Mucky Mineral (S1) (LRR O, S)Delta Ochric (F17) (MLRA 151)Sandy Gleyed Matrix (S4)Reduced Vertic (F18) (MLRA 150A, 150B)Sandy Redox (S5)Piedmont Floodplain Soils (F19) (MLRA 149A)Stripped Matrix (S6)Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)Dark Surface (S7) (LRR P, S, T, U)Restrictive Layer (if observed):	
Coast Prairie Redox (A16)(MLRA I50A) Umbric Surface (F13) (LRR P, T, U) 3Indicators of hydrophytic vegetation and Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA I51) wetland hydrology must be present. Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA I50A, I50B) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA I49A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA I49A, I53C, I53D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Hydric Soil Present? Yes ✓ No	Coast Prairie Redox (A16) (MLRA 150A) Umbric Surface (F13) (LRR P, T, U) 3Indicators of h Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrold Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) wetland hydrold Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed):	Other (Explain in Remarks)
Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Ype: Hydric Soil Present? Yes ✓	Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrold Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) Piedmont Floodplain Soils (F19) (MLRA 149A) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed):	
Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Ype: Hydric Soil Present? Yes ✓ No	Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed):	³ Indicators of hydrophytic vegetation and
Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Hydric Soil Present? Yes ✓ No	Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed):	wetland hydrology must be present.
Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Type: Hydric Soil Present? Yes ✓ No	Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed):	
Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed): Type: Hydric Soil Present? Yes ✓ No	Dark Surface (S7) (LRR P, S, T, U) Restrictive Layer (if observed):)
Restrictive Layer (if observed): Type: Hydric Soil Present? Yes ✓	Restrictive Layer (if observed):	9A, 153C, 153D)
ype: Hydric Soil Present? Yes ✓ No		
	Ludria Sail Present	
Depth (inches):		Hydric Soil Present? Yes <u>√</u> No
	Depth (inches):	
	Remarks:	

THIRD ROCK CONSULTANTS, LLC WETLAND DETERMINATION - ATLANTIC AND GULF COAST PLAIN REGION

Project Name: US 60 Improvements	Project No: KY18-005 Date: 2/15/19								
Applicant/Owner: QK4	State: KY Site ID: Wetland N								
	County, Range: Kevil, Ballard								
	ncave, convex, none): Concave Slope (%): <								
Subregion (LRR or MLRA): P/134 Lat: 37.081821									
Soil Map Unit Name: Waverly Silt Loam NWI Classification: N/A									
Are climatic / hydrologic conditions on the site typical for this time of year? Y	es _✓_ No (If no, explain in remarks.)								
Are vegetation soil or hydrology significantly disturbed	ed? Are "Normal Circumstances" present? Yes _✔_ No								
Are vegetation soil or hydrology naturally problemat	ic? (If needed, explain any answers in "Remarks.")								
SUMMARY OF FINDINGS									
Hydrophytic Vegetation Present? Yes 🗸 No									
Hydric Soil Present? Yes ✓ No									
Vetland Hydrology Present? Yes ✓ No	Is the sampled area within a wetland? Yes 🖌 No								
	·								
Remarks:									
WETLAND HYDROLOGY INDICATORS									
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)								
Primary Indicators (minimum of one is required; check all that apply)	Surface Soil Cracks (B6)								
✓ Surface Water (A1) ✓ Water-Stained Leaves (B9)	Sparsely Vegetated Concave Surface (B8)								
High Water Table (A2) Aquatic Fauna (B13)	✓ Drainage Patterns (B10)								
✓ Saturation (A3) Marl Deposits (B15) (LRR	U) Moss Trim Lines (B16)								
Water Marks (B1) Hydrogen Sulfide Odor (Cl) Dry-Season Water Table (C2)								
Sediment Deposits (B2) Oxidized Rhizospheres on	Living Roots (C3) Crayfish Burrows (C8)								
Drift Deposits (B3) Presence of Reduced Iron (C4) Saturation Visible on Aerial Imagery (C9)								
Algal Mat or Crust (B4) Recent Iron Reduction in T	illed Soils (C6)								
Iron Deposits (B5) Thin Muck Surface (C7)	Shallow Aquitard (D3)								
Inundation Visible on Aerial Imagery (B7) Other (Explain in Remarks)									
	Sphagnum Moss (D8) (LRR T, U)								
Field Observations:Surface Water Present?Yes✓NoDepth (inches):	4								
Surface Water Present? Yes ✓ No Depth (inches): Water Table Present? Yes No ✓ Depth (inches):	<u>+</u>								
Saturation Present: Yes ✓ No Depth (inches):	0 Wetland Hydrology Present? Yes ✓ No								
(includes capillary fringe)									
Describe Recorded Data (Stream gauge, monitoring well, aerial photos, previous inspe	ctions), if available:								
Remarks:									
Forested, Connected to jurisdictional stream S25 .									
Torested, Connected to jurisdictional stream 525.									

VEGETATION (Four Strata) – Use scientific names of plants.

Tree Stratum (Plot Size: 15)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet:
1. Liquidambar styraciflua	20	Species?	FAC	No. of dominant species that 4 (A)
2.	20	•		are OBL, FACW, or FAC:
3.				Total No. of dominant species 4 (B)
4.				across all strata:
5.				% of dominant species that IOO (A/B)
6.				Are OBL, FACW, or FAC
8.				Prevalence Index Worksheet
o.	20	= Total Cov		Total % Cover of: Multiply By:
50 % of Total Cover: _				
	20%	of Total Cov	er:	OBL Species X I = FACW Species X 2 =
Sapling/Shrub Stratum (Plot size: 15)	15		FAC	
	5	\checkmark	FAC	FAC Species 45 X 3 = 135
2. Acer negundo	5	√	FAC	FACU Species X 4 =
3. Ulmus americana	2	✓	FAC	UPL Species X 5 =
4.				Totals (A) 45 (B) 135
5.				Prevalence Index = B/A or3.0
6.				
7.				Hydrophytic Vegetation Indicators:
8.				I Rapid Test for Hydrophytic Vegetation
	25	= Total Cov		2 Dominance Test is ≥ 50%
50 % of Total Cover: _	12.5 20%	of Total Cov	er:5	\checkmark 3 Prevalence Index is $\leq 3.0^{11}$
Herb Stratum (Plot size:)		!	·	Problematic Hydrophytic Vegetation ¹ (Explain)
1.				Indicators of hydric soil and wetland hydrology must be
2.				present, unless disturbed or problematic.
3.				Definition of Four Vegetation Strata:
4.				Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or
5.				More in diameter at breast height (DBH), regardless of
6.				Height.
7.				Sapling/Shrub – Woody plants, excluding vines, less than – 3 in. DBH and greater than 3.28 ft. (1 m) tall.
8.				
9.				Herb – All herbaceous (non-woody) plants, regardless of Size, and woody plants less than 3.28 ft. tall.
10.				- Size, and woody plants less than 5.20 ft. tail.
11.				Woody Vine – All woody vines greater than 3.28 ft. in
12.				– height.
	•	= Total Cov	/er	
50 % of Total Cover:	20%	of Total Cov	er:	
Woody Vine Stratum (Plot size:)				
2.				Hydrophytic Vegetation Present? Yes 🖌 No
3.	1		1	, , , , , , , , , , ,
4.				1
5.				1
	!	= Total Cov	! /er	1
50 % of Total Cover: _	20%	-		
Remarks: (Include photo numbers here or on separate	e sheet. If obs	erved, list mo	rphological ada	aptations below.)

	Profile Descriptio	n: (Describ	e to the depth neede	ed to docur	ment the i	ndicator o	or confirm the	e absence of indicators.)
Depth	Matrix		-	dox Feature				
' (inches)	Color (moist)	%	Color (moist)	%	Туре	Loc ²	Texture	Remarks
0-14	2.5Y 6/2	70	10YR 6/6	30	C	M	Clay Loam	
-								
		+		+			1	
				-				
	1	+						
					1			
	Concentration, D=Depletion	n, RM=Reduc	ed Matrix, MS=Masked S	Sand Grains				=Pore Lining, M=Matrix
-	oil Indicators:							Problematic Hydric Soils ³ :
	osol (AI)		Polyvalue Belov					(A9) (LRR O)
	ic Epipedon (A2)		Thin Dark Surf			_		(A10) (LRR S)
Black	k Histic (A3)		Loamy Mucky I	Mineral (FI)	(LRR 0)	_	Reduced Ve	ertic (FI8)
Hydr	rogen Sulfide (A4)		Loamy Gleyed	Matrix (F2)			(Outside	MLRA 150A,B)
Strat	tified Layers (A5)		✓ Depleted Matri	ix (F3)		_	Piedmont F	loodplain Soils (F19) (LRR P,S,T)
Orga	anic Bodies (A6) (LRR P,	T, U)	Redox Dark Su	irface (F6)		_	Anomalous	Bright Loamy Soils (F20)
5 cm	n Mucky Mineral (A7) (LR	R P, T, U)	Depleted Dark	Surface (F7))		(MLRA 15	3B)
Muck	k Presence (A8) (LRR U))	Redox Depress	sions (F8)			Red Parent	Material (TF2)
l cm	n Muck (A9) (LRR P, T)		Marl (FI0) (LR	RU)			Very Shallov	w Dark Surface (TF12)
Depl	leted Below Dark Surface	(AII)	Depleted Ochr	ric (FLI) (MI	LRA 151)		Other (Exp	lain in Remarks)
Thick	k Dark Surface (A12)		Iron-Manganes	e Masses (FI	2) (LRR O	, P, T)		
Coas	st Prairie Redox (A16) (M	LRA 150A	Umbric Surface	e (FI3) (LRF	R P, T, U)		³ Indice	ators of hydrophytic vegetation and
Sand	ly Mucky Mineral (SI) (LF	RR O, S)	Delta Ochric (I	-17) (MLRA	A 151)		wetlar	nd hydrology must be present.
	ly Gleyed Matrix (S4)		Reduced Vertic	: (FI8) (MLI	RA 150A, I	50B)		
Sand	ly Redox (S5)		Piedmont Floo					
	ped Matrix (S6)		Anomalous Bri	•	, .		, 153C, 153D)	
	<pre> Surface (S7) (LRR P, S, </pre>	T. U)		,			,	
	ve Layer (if observed)	-						
Туре:							Hydric Soil	Present? Yes 🗸 No
Depth (ind	ches):							
I X	,							
Remarks:								

THIRD ROCK CONSULTANTS, LLC WETLAND DETERMINATION - ATLANTIC AND GULF COAST PLAIN REGION

Project Name: US 60 Improvements Project No: KY18-005 Date: 2/15/19
Applicant/Owner: QK4 State: KY Site ID: Wetland O
Investigator(s): James Storm and Ryan McGregor City, County, Range: Kevil, Ballard
Landform (hillslope, terrace, etc.): Floodplain Local Relief (concave, convex, none): Flat Slope (%): < 1
Subregion (LRR or MLRA): P/134 Lat: 37.081863 Long: -88.942623 Datum:
Soil Map Unit Name: Grenada Silt Loam NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? Yes \checkmark No (If no, explain in remarks.)
Are vegetation soil or hydrology significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No
Are vegetation soil or hydrology naturally problematic? (If needed, explain any answers in "Remarks.")
SUMMARY OF FINDINGS
Hydrophytic Vegetation Present? Yes 🖌 No
Hydric Soil Present? Yes ✓ No
Wetland Hydrology Present? Yes 🖌 No Is the sampled area within a wetland? Yes 🖌 No
Remarks:
WETLAND HYDROLOGY INDICATORS
Wetland Hydrology Indicators: Secondary Indicators (minimum of two required) Primary Indicators (minimum of one is required; check all that apply) Surface Water (A1) Surface Soil Cracks (B6) Migh Water Table (A2) Aquatic Fauna (B13) Drainage Patterns (B10) ✓ Saturation (A3) Marl Deposits (B15) (LRR U) Moss Trim Lines (B16) Water Marks (B1) Hydrogen Sulfide Odor (C1) Dry-Season Water Table (C2) Sediment Deposits (B2) ✓ Oxidized Rhizospheres on Living Roots (C3) ✓ Crayfish Burrows (C8) Drift Deposits (B3) Presence of Reduced Iron (C4) Saturation Visible on Aerial Imagery (C9) Algal Mat or Crust (B4) Recent Iron Reduction in Tilled Soils (C6) ✓ Geomorphic Position (D2) Iron Deposits (B5) Thin Muck Surface (C7) Shallow Aquitard (D3) Shallow Aquitard (D3) Inundation Visible on Aerial Imagery (B7) Other (Explain in Remarks) ✓ FAC-Neutral Test (D5) Sphagnum Moss (D8) (LRR T, U) Sphagnum Moss (D8) (LRR T, U) Sphagnum Moss (D8) (LRR T, U)
Field Observations:
Surface Water Present? Yes Depth (inches):
Water Table Present? Yes No ✓ Depth (inches):
Saturation Present: Yes ✓ No Depth (inches): Wetland Hydrology Present? Yes ✓ No (includes capillary fringe)
Describe Recorded Data (Stream gauge, monitoring well, aerial photos, previous inspections), if available:
Remarks:
Forested, located within the 100 year floodplain of S26.

VEGETATION (Four Strata) – Use scientific names of plants.

	Absolute	Dominant	Indicator	Dominance Test Worksheet:	
Tree Stratum (Plot Size: 30)	% Cover	Species?	Status		
I. Fraxinus pennsylvanica	45	✓	FACW	No. of dominant species that are OBL, FACW, or FAC:	3 (A)
2 Acer negundo	5		FAC		
3.				Total No. of dominant species	3 (B)
4.					
5.				% of dominant species that Are OBL, FACW, or FAC —	100 (A/B)
6.				Are OBL, FACTY, OF FAC	
8.				Prevalence Index Worksheet	
	50	= Total Cov	ver	<u>Total % Cover of:</u>	Multiply By:
50 % of Total Cover: _	25 20%	of Total Cov	er: 10	OBL Species X	=
Sapling/Shrub Stratum (Plot size: 15)				· · · · · · · · · · · · · · · · · · ·	2 = 100
I. Acer negundo	10	✓	FAC		3 = 45
2.				1	4 =
3.					5 =
4.					
				Totals (A) <u>65</u>	(B) <u>145</u>
5.				Prevalence Index = B/A or	2.23
6.	1		1		
7.				Hydrophytic Vegetation Indicator	
8.				I Rapid Test for Hydrophytic	Vegetation
		= Total Cov		2 Dominance Test is > 50%	
50 % of Total Cover: _	<u> </u>	of Total Cov	er:2	\checkmark 3 Prevalence Index is \leq 3.0 ¹	
Herb Stratum (Plot size: 5)			1	Problematic Hydrophytic Vege	etation ¹ (Explain)
I.symphyotrichum lanceolatum	5	✓	FACW	Indicators of hydric soil and wetland hydr	rology must be
2.				present, unless disturbed or problematic.	
3.				Definition of Four Vegetation Stra	ita:
4.				Tree – Woody plants, excluding vines,	, 3 in. (7.6 cm) or
5.				More in diameter at breast height (DBI	H), regardless of
6.				Height.	
7.				Sapling/Shrub – Woody plants, exclu 3 in. DBH and greater than 3.28 ft. (1 n	
8.				S IN. DBH and greater than 3.28 ft. (1 h	n) tall.
9.				Herb – All herbaceous (non-woody) p	
10.				Size, and woody plants less than 3.28 ft	. tall.
11.				Woody Vine – All woody vines greate	er than 3.28 ft. in
12.	<u> </u>	<u> </u>		– height.	
	5	= Total Cov	l /er		
50 % of Total Cover:		-			
Woody Vine Stratum (Plot size: 5)	20%		er		
		1		-	
1.			<u> </u>		
2.			1	Hydrophytic Vegetation Present? Yes	; <u>*</u> No
3.				4	
4.			<u> </u> 	4	
5.		<u> </u>		4	
		= Total Cov			
50 % of Total Cover:	20%	of Total Cov	er:		
Remarks: (Include photo numbers here or on separate	sheet. If obs	erved, list mo	rphological ada	l aptations below.)	
			-		

Ches) Color (moist) % Color (moist) % Type! Loc ² Texture Remarks 0-3 0	Depth		n: (Describ	e to the depth need	ed to docur	ment the i	ndicator o	or confirm the	absence of indicators.)
0-3 3-14 10YR5/2 70 10YR 5/4 30 C M Clay Loam Alter Al	-	Matrix		Re	dox Feature	s			
0-3 3-14 10YR5/2 70 10YR 5/4 30 C M Clay Loam Alter Al	nches)	Color (moist)	%	Color (moist)	%	Туре	Loc ²	Texture	Remarks
3-14 10YR5/2 70 10YR 5/4 30 C M Clay Loam 2 2 10YR 5/4 30 C M Clay Loam 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 4 2 2 2 2 2 2 2 4 2 2 2 2 2 2 2 4 2 2 2 2 2 2 2 4 30 2 2 2 2 2 2 4 30 2 2 2 2 2 2 4 30 2 2 2 2 2 2 2 2 2 3 2 2 2 2 2 3 2 2 2 2 2 2 2 2	0-3								Organic Matter
Image: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ?Location: PL=Pore Lining, M=Matrix ydric Soil Indicators: Indicators for Problematic Hydric Soils ³ : Histic Epipedon (A2) Polyvalue Below Surface (S9) (LRR S, T, U) I cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) I cm Muck (A0) (LRR O) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR O) Reduced Vertic (F18) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) Goutside MLRA 150A,B) Organic Bodies (A6) (LRR P, T, U) Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Depressions (F8) Red Parent Material (TF2) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) Umbric Surface (F1) Umbric Surface (F1) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Sandy Mucky Mineral (S1) (LRR O, S) Deta Ochric (F13) (MLRA 150A, 150B) Jindicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Gleyed Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)	3-14	10YR5/2	70	10YR 5/4	30	С	М	Clay Loam	5
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Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) (Outside MLRA 150A,B) Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P,S,T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) setfictive Layer (if observed): Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Piedmont Floodplain Soils (F20) (MLRA 149A, 153C, 153D) No		•••					_		
Stratified Layers (A5) ✓ Depleted Matrix (F3) Piedmont Floodplain Soils (F19)(LRR P, S, T) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 150A, 150B) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F20) (MLRA 149A), 153C, 153D) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Estrictive Layer (if observed): Piedmont Floodplain Soils (F20) (MLRA 149A, 153C, 153D)		ι,				()			
Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) Anomalous Bright Loamy Soils (F20) 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) No Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) estrictive Layer (if observed): Hydric Soil Present? Yes No					. ,				,
5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) (MLRA 153B) Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) Other (Explain in Remarks) Coast Prairie Redox (A16)(MLRA 150A) Umbric Surface (F13) (LRR P, T, U) 3Indicators of hydrophytic vegetation and wetland hydrology must be present. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 150A, 150B) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Extrictive Layer (if observed): Hydric Soil Present? Yes ✓ No		• • •	τιN	`	. ,				
Muck Presence (A8) (LRR U) Redox Depressions (F8) Red Parent Material (TF2) I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) Other (Explain in Remarks) Coast Prairie Redox (A16)(MLRA 150A) Umbric Surface (F13) (LRR P, T, U) ³Indicators of hydrophytic vegetation and Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) estrictive Layer (if observed): Hydric Soil Present? Yes ✓ No	_				. ,		_		
I cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Very Shallow Dark Surface (TF12) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) Other (Explain in Remarks) Coast Prairie Redox (A16) (MLRA 150A) Umbric Surface (F13) (LRR P, T, U) ³Indicators of hydrophytic vegetation and Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Hydric Soil Present? Yes ✓ No	_								•
Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) Other (Explain in Remarks) Coast Prairie Redox (A16)(MLRA 150A) Umbric Surface (F13) (LRR P, T, U) 3Indicators of hydrophytic vegetation and Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Hydric Soil Present? Yes ✓ No					. ,		_		· ,
Thick Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) Coast Prairie Redox (A16)(MLRA 150A) Umbric Surface (F13) (LRR P, T, U) Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Hydric Soil Present? Yes ✓ No							_		
Coast Prairie Redox (A16)(MLRA 150A) Umbric Surface (F13) (LRR P, T, U) 3Indicators of hydrophytic vegetation and Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) wetland hydrology must be present. Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Strictive Layer (if observed): Hydric Soil Present? Yes ✓ No			(AII)					Other (Expl	ain in Remarks)
Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) wetland hydrology must be present. Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) wetland hydrology must be present? estrictive Layer (if observed): Hydric Soil Present? Yes ✓ No		, ,					, Р, Т)		
Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B) Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Hydric Soil Present? Yes ✓ No			-						
Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) Estrictive Layer (if observed): rpe: Hydric Soil Present? Yes ✓ No			R O, S)					wetlan	d hydrology must be present.
Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Dark Surface (S7) (LRR P, S, T, U) estrictive Layer (if observed): rpe: Hydric Soil Present? Yes ✓ No	-								
Dark Surface (S7) (LRR P, S, T, U) estrictive Layer (if observed): rpe: Hydric Soil Present? Yes ✓ No	Sandy	v Redox (S5)		Piedmont Floo	dplain Soils (F19) (MLR	A 149A)		
estrictive Layer (if observed): rpe: Hydric Soil Present? Yes ✓ No		ad Maturity (C()		Anomalous Bri	ght Loamy S	oils (F20) (N	1LRA 149A	, 153C, 153D)	
rpe: Hydric Soil Present? Yes ✓ No	_ `	bed Matrix (Sb)							
	Stripp	. ,	T, U)						
epth (inches):	Stripp Dark	Surface (S7) (LRR P, S,	-						
	Stripp Dark	Surface (S7) (LRR P, S,	-					Hydric Soil	Present? Yes √ No
	Stripp Dark estrictiv	Surface (S7) (LRR P, S, ve Layer (if observed):	-					Hydric Soil	Present? Yes _✔_ No _
	Stripp Dark estrictiv pe: epth (inc	Surface (S7) (LRR P, S, ve Layer (if observed):	-					Hydric Soil	Present? Yes <u>√</u> No _
	Stripp Dark estrictiv vpe: epth (inc	Surface (S7) (LRR P, S, ve Layer (if observed):	-					Hydric Soil	Present? Yes <mark>√</mark> No _
	Stripp Dark estrictiv vpe: epth (inc	Surface (S7) (LRR P, S, ve Layer (if observed):	-					Hydric Soil	Present? Yes <u>√</u> No _
	Stripp Dark estrictiv vpe: epth (inc	Surface (S7) (LRR P, S, ve Layer (if observed):	-					Hydric Soil	Present? Yes <u>√</u> No _
	Stripp Dark estrictiv vpe: epth (inc	Surface (S7) (LRR P, S, ve Layer (if observed):	-					Hydric Soil	Present? Yes <u>√</u> No _
	Stripp Dark estrictiv vpe: epth (inc	Surface (S7) (LRR P, S, ve Layer (if observed):	-					Hydric Soil	Present? Yes <u>√</u> No _
	Stripp Dark estrictiv pe: epth (inc	Surface (S7) (LRR P, S, ve Layer (if observed):	-					Hydric Soil	Present? Yes <u>√</u> No _
	Stripp Dark estrictiv vpe: epth (inc	Surface (S7) (LRR P, S, ve Layer (if observed):	-					Hydric Soil	Present? Yes ✓ No _
	Stripp Dark estrictiv vpe: epth (inc	Surface (S7) (LRR P, S, ve Layer (if observed):	-					Hydric Soil	Present? Yes ✓ No _
	Stripp Dark estrictiv	Surface (S7) (LRR P, S, ve Layer (if observed):	-					Hydric Soil	Present? Yes ✓ No _
	Stripp Dark estrictiv ype: epth (inc	Surface (S7) (LRR P, S, ve Layer (if observed):	-					Hydric Soil	Present? Yes <u>√</u> No _
	Stripp Dark estrictiv ype: epth (inc	Surface (S7) (LRR P, S, ve Layer (if observed):	-					Hydric Soil	Present? Yes <u>√</u> No _
	Stripp Dark estrictiv ype: epth (inc	Surface (S7) (LRR P, S, ve Layer (if observed):	-					Hydric Soil	Present? Yes <u>√</u> No _
	Stripp Dark estrictiv /pe: epth (inc	Surface (S7) (LRR P, S, ve Layer (if observed):	-					Hydric Soil	Present? Yes ✓ No _
	Stripp Dark estrictiv ype: epth (inc	Surface (S7) (LRR P, S, ve Layer (if observed):	-					Hydric Soil	Present? Yes ✓ No _

APPENDIX F RESULTS AND DATA SETS

Prepared for KYTC Division of Environmental Analyses Prepared by Third Rock Consultants, LLC, April I, 2019 KY18-005/Ecological Baseline Study 04-1-19

Third Rock ID:	KY18-005	Client Name: QK4
Water Body:	US60	State/County: KY / Ballard / McCrackin
Sample ID:	Station 1 QT	Collection Date: 5/29/2018
Collector:	RM	Sampling Method: MH (20 Jab DipNet)
Sorter:	Tammie Fister	Sample Sorting: Subsample
Taxonomist:	Bert Remley	No. Grids of 30 Picked: 9
		No. Organisms Picked: 300

	Nie		Nia		Ne
Family or Taxon / Genus	No. Orgs.	Family or Taxon / Genus	No. Orgs.	Family or Taxon / Genus	No. Orgs.
ANNELIDA	Orgs.	PLECOPTERA	orgs.	DIPTERA (CHIRONOMIDAE)	Orgs.
ANNELIDA				Ablabesmyia sp	4
				Chironomus decorus gr	28
				Dicrotendipes neomodestus	16
				Limnophyes sp	4
AMPHIPODA				Parachironomus carinatus	12
				Paratendipes albimanus	24
				Phaenopsectra flavipes	20
				Phaenopsectra obediens gp	12
ISOPODA				Polypedilum fallax gr	4
1001.021.				Polypedilum illinoense gr	64
				Procladius sp	44
				Tanypus sp	8
DECAPODA				Tanytarsus sp	12
		TRICHOPTERA		Thienemanniella xena	8
		Cheumatopsyche sp	5		
EPHEMEROPTERA					
Acerpenna sp	2				
				DIPTERA (OTHER)	
				Anopheles sp	2
				Pericoma sp	3
		MEGALOPTERA			
				MOLLUSCA	
ODONATA				Gyraulus sp	2
Argia sp (Damaged)	1			Physella sp	9
Coenagrionidae (Immature)	1			· ·	
		COLEOPTERA			
		Hydrophilidae (L) 2	2		
		Stenelmis (A) 1 (L) 2	3		
		· · · · ·		OTHER TAXA	
				Corixidae (Immature)	1
				· · · ·	
				Number of Individuals	291

Third Rock ID:	KY18-005	Client Name: QK4
Water Body:	US60	State/County: KY / Ballard / McCrackin
Sample ID:	Station 2 QT	Collection Date: 5/29/2018
Collector:	BR, RM	Sampling Method: MH (20 Jab DipNet)
Sorter:	Tammie Fister	Sample Sorting: Subsample
Taxonomist:	Bert Remley	No. Grids of 30 Picked: 4
		No. Organisms Picked: 311

/ _	No.		No.	/ _	No.
Family or Taxon / Genus	Orgs.	Family or Taxon / Genus	Orgs.	Family or Taxon / Genus	Orgs.
ANNELIDA		PLECOPTERA		DIPTERA (CHIRONOMIDAE)	
				Ablabesmyia mallochi	4
				Chironomus decorus gr	28
				Cricotopus bicinctus	24
				Dicrotendipes neomodestus	8
AMPHIPODA				Larsia sp	8
				Limnophyes sp	8
				Phaenopsectra flavipes	4
				Polypedilum illinoense gr	80
ISOPODA				Rheocricotopus robacki	28
				Thienemanniella xena	4
DECADODA					
DECAPODA		TRICHOPTERA			
EPHEMEROPTERA					
Caenis diminuta gr	1				
				DIPTERA (OTHER)	
				Culex sp	1
				Muscidae	1
				Pericoma sp	59
				Sciomyzidae	2
				Simulium sp	27
		MEGALOPTERA			
				MOLLUSCA	
ODONATA				Physella sp	7
		COLEOPTERA			
		Tropisternus (L) 1	1		
				OTHER TAXA	
				Corixidae	1
					1
				Number of Individuals	296
					290

Third Rock ID:	KY18-005	Client Name: QK4
Water Body:	US60	State/County: KY / Ballard / McCrackin
Sample ID:	Station 3 QT	Collection Date: 5/29/2018
Collector:	BR, RM	Sampling Method: MH (20 Jab DipNet)
Sorter:	Tammie Fister	Sample Sorting: Subsample
Taxonomist:	Bert Remley	No. Grids of 30 Picked: 4
		No. Organisms Picked: 298

	No.		No.		No.
Family or Taxon / Genus	Orgs.	Family or Taxon / Genus	Orgs.	Family or Taxon / Genus	Orgs.
ANNELIDA		PLECOPTERA		DIPTERA (CHIRONOMIDAE)	
				Chironomus decorus gr	15
				Cricotopus sylvestris gr	10
				Cricotopus bicinctus	55
				Dicrotendipes neomodestus	35
AMPHIPODA				Limnophyes sp	15
				Nanocladius distinctus	5
				Paratanytarsus sp	5
				Polypedilum illinoense gr	120
ISOPODA				Rheotanytarsus exiguus gr	10
Caecidotea sp	15			Tanytarsus sp	5
•				Thienemanniella xena	5
DECAPODA					
		TRICHOPTERA			
EPHEMEROPTERA					
Caenis sp (Damaged)	1				
				DIPTERA (OTHER)	
				Muscidae (Immature)	2
				Pericoma sp	4
				Sciomyzidae	1
		MEGALOPTERA			
				MOLLUSCA	
ODONATA				Physella sp	2
		COLEOPTERA			
		Hydrophilidae (L) 5	5		
		Peltodytes (L) 1	1		
		Tropisternus (L) 1	1	OTHER TAXA	
					1
				Number of Individuals	312
•					

Third Rock ID:	KY18-005	Client Name: QK4
Water Body:	US60	State/County: KY / Ballard / McCrackin
Sample ID:	Station 4 QT	Collection Date: 5/29/2018
Collector:	BR, RM	Sampling Method: MH (20 Jab DipNet)
Sorter:	Tammie Fister	Sample Sorting: Subsample
Taxonomist:	Bert Remley	No. Grids of 30 Picked: 15
		No. Organisms Picked: 299

	No.		No.		No.
Family or Taxon / Genus	Orgs.	Family or Taxon / Genus	Orgs.	Family or Taxon / Genus	Orgs.
ANNELIDA		PLECOPTERA		DIPTERA (CHIRONOMIDAE)	
Naididae (Immature)	1			Chironomus riparius gr	3
				Chironomus decorus gr	27
				Larsia sp	18
				Limnophyes sp	36
AMPHIPODA				Micropsectra sp	30
Crangonyx sp	4			Parametriocnemus sp	6
				Paraphaenocladius sp	4
				Paratendipes albimanus	6
ISOPODA				Phaenopsectra flavipes	3
Lirceus fontinalis	7			Polypedilum illinoense gr	15
DECADODA					
DECAPODA		TRICHOPTERA			
EPHEMEROPTERA					
				DIPTERA (OTHER)	
				Anopheles sp	1
				Culex sp	4
				Limonia sp	1
				Muscidae (Immature)	9
				Nemotelus sp	1
				Pericoma sp	15
				Sciomyzidae	4
				Tipula sp (Damaged)	1
		MEGALOPTERA		Tipulidae (Immature)	2
				MOLLUSCA	
ODONATA				Physella sp	100
<u> </u>		COLEOPTERA			
			1		
		Agabus (A) 1	1		
		Hydrochara (L) 1	1	OTHER TAXA	
				Pyralidae (Immature)	1
					1
					1
				Number of Individuals	301

2018 US 60 Macroinvertebrate Results KY18-005

Sample ID	Taxa Name	Class	Order	Family	FFG	Tolerence	Clinger	Count
	Chironomus decorus gr	Insecta	Diptera	Chironomidae	CG	9.6	FALSE	28
	-	Insecta	Diptera	Chironomidae	CG	8.1	FALSE	16
	Ablabesmyia sp	Insecta	Diptera	Chironomidae	PR	7.2	FALSE	4
	Acerpenna sp	Insecta	Ephemeroptera	Baetidae	CG	5	FALSE	2
	Procladius sp	Insecta	Diptera	Chironomidae	PR	9.1	FALSE	44
	Polypedilum fallax gr	Insecta	Diptera	Chironomidae	SH	6.39	FALSE	4
	Phaenopsectra flavipes	Insecta	Diptera	Chironomidae	SC	7.94	FALSE	20
	Phaenopsectra obediens gp	Insecta	Diptera	Chironomidae	SC	6.8	FALSE	12
	Paratendipes albimanus	Insecta	Diptera	Chironomidae	CG	9.2	TRUE	24
	Tanytarsus sp	Insecta	Diptera	Chironomidae	CF	6.7	FALSE	12
	Polypedilum illinoense gr	Insecta	Diptera	Chironomidae	SH	9	FALSE	64
	Thienemanniella xena	Insecta	Diptera	Chironomidae	CG	5.9	FALSE	8
	Parachironomus carinatus	Insecta	Diptera	Chironomidae	CG	9.42	FALSE	12
Station 1 QT		Mollusca	Lymnophila	Planorbidae	SC	7.5	FALSE	2
Station 1 QT		Insecta	Diptera	Chironomidae	PR	9.19	FALSE	8
	Limnophyes sp	Insecta	Diptera	Chironomidae	CG	7	FALSE	4
Station 1 QT		Mollusca	Basommatophora	Physidae	SC	8.84	FALSE	9
Station 1 QT	, ,	Insecta	Diptera	Psychodidae	CG	10	FALSE	3
	Anopheles sp	Insecta	Diptera	Culicidae	CF	8.58	FALSE	2
Station 1 QT		Insecta	Hemiptera	Corixidae	PH	9	FALSE	1
	Stenelmis sp	Insecta	Coleoptera	Elmidae	SC	5.1	TRUE	1
Station 1 QT		Insecta	Odonata	Coenagrionidae	PR	8.17	FALSE	1
	Coenagrionidae	Insecta	Odonata	Coenagrionidae	PR	9	FALSE	1
	Stenelmis sp	Insecta	Coleoptera	Elmidae	SC	5.1	TRUE	2
	Hydrophilidae	Insecta	Coleoptera	Hydrophilidae	PR	6.3	FALSE	2
	Cheumatopsyche sp	Insecta	Trichoptera		CF	6.22	TRUE	5
	Chironomus decorus gr	Insecta	Diptera	Chironomidae	CG	9.6	FALSE	28
		Insecta	Diptera	Chironomidae	CG	8.1	FALSE	8
	Phaenopsectra flavipes	Insecta	Diptera	Chironomidae	SC	7.94	FALSE	4
	Polypedilum illinoense gr	Insecta	Diptera	Chironomidae	SH	9	FALSE	80
	Limnophyes sp	Insecta	Diptera	Chironomidae	CG	7	FALSE	8
Station 2 QT		Insecta	Diptera	Chironomidae	PR	9.3	FALSE	8
Station 2 QT	•	Insecta	Diptera	Simuliidae	CF	4.4	TRUE	27
	Thienemanniella xena	Insecta	Diptera	Chironomidae	CG	5.9	FALSE	4
	Cricotopus bicinctus	Insecta	Diptera	Chironomidae	SH	8.54	FALSE	24
	Ablabesmyia mallochi	Insecta	Diptera	Chironomidae	PR	7.19		4
	Caenis diminuta gr	Insecta	Ephemeroptera	Caenidae	CG		FALSE	1
	Tropisternus sp	Insecta	Coleoptera	Hydrophilidae	CG	9.68	FALSE	1
Station 2 QT		Insecta	Diptera	Culicidae	CF	10	FALSE	1
Station 2 QT		Insecta	Diptera	Muscidae	PR	8	FALSE	1
Station 2 QT		Insecta	Hemiptera	Corixidae	PH	9	FALSE	1
Station 2 QT		Insecta	Diptera	Psychodidae	CG	10	FALSE	- 59
Station 2 QT		Mollusca	Basommatophora	Physidae	SC	8.84	FALSE	7
	Rheocricotopus robacki	Insecta	Diptera	Chironomidae	CG	7.28	FALSE	28
Station 2 QT		Insecta	Diptera	Sciomyzidae	PR	6	FALSE	2
	Chironomus decorus gr	Insecta	Diptera	Chironomidae	CG	9.6	FALSE	15
	Caecidotea sp	Malacostraca	Isopoda	Asellidae	CG	9.11	FALSE	15
Station 3 QT		Insecta	Ephemeroptera	Caenidae	CG	7.41	FALSE	1
		Insecta	Diptera	Chironomidae	CG	8.1	FALSE	35
	Limnophyes sp	Insecta	Diptera	Chironomidae	CG	7	FALSE	15
	Thienemanniella xena	Insecta	Diptera	Chironomidae	CG	5.9	FALSE	5
	Nanocladius distinctus	Insecta	Diptera	Chironomidae	CG	7.2	FALSE	5
	Cricotopus sylvestris gr	Insecta	Diptera	Chironomidae	SH	10		10
			- P					

2018 US 60 Macroinvertebrate Results KY18-005

Sample ID	Taxa Name	Class	Order	Family	FFG	Tolerence	Clinger	Count
Station 3 QT	Cricotopus bicinctus	Insecta	Diptera	Chironomidae	SH	8.54	FALSE	55
Station 3 QT	Paratanytarsus sp	Insecta	Diptera	Chironomidae	CG	8.45	TRUE	5
Station 3 QT	Sciomyzidae	Insecta	Diptera	Sciomyzidae	PR	6	FALSE	1
Station 3 QT	Polypedilum illinoense gr	Insecta	Diptera	Chironomidae	SH	9	FALSE	120
Station 3 QT	Tanytarsus sp	Insecta	Diptera	Chironomidae	CF	6.7	FALSE	5
Station 3 QT	Pericoma sp	Insecta	Diptera	Psychodidae	CG	10	FALSE	4
Station 3 QT	Physella sp	Mollusca	Basommatophora	Physidae	SC	8.84	FALSE	2
Station 3 QT	Muscidae	Insecta	Diptera	Muscidae	PR	8	FALSE	2
Station 3 QT	Peltodytes sp	Insecta	Coleoptera	Haliplidae	PH	8.73	FALSE	1
Station 3 QT	Tropisternus sp	Insecta	Coleoptera	Hydrophilidae	CG	9.68	FALSE	1
Station 3 QT	Hydrophilidae	Insecta	Coleoptera	Hydrophilidae	PR	6.3	FALSE	5
Station 3 QT	Rheotanytarsus exiguus gr	Insecta	Diptera	Chironomidae	CF	6.4	TRUE	10
Station 4 QT	Physella sp	Mollusca	Basommatophora	Physidae	SC	8.84	FALSE	100
Station 4 QT	Paratendipes albimanus	Insecta	Diptera	Chironomidae	CG	9.2	TRUE	6
Station 4 QT	Chironomus decorus gr	Insecta	Diptera	Chironomidae	CG	9.6	FALSE	27
Station 4 QT	Limnophyes sp	Insecta	Diptera	Chironomidae	CG	7	FALSE	36
Station 4 QT	Phaenopsectra flavipes	Insecta	Diptera	Chironomidae	SC	7.94	FALSE	3
Station 4 QT	Polypedilum illinoense gr	Insecta	Diptera	Chironomidae	SH	9	FALSE	15
Station 4 QT	Parametriocnemus sp	Insecta	Diptera	Chironomidae	CG	3.65	FALSE	6
Station 4 QT	Micropsectra sp	Insecta	Diptera	Chironomidae	CG	1.52	FALSE	30
Station 4 QT	Paraphaenocladius sp	Insecta	Diptera	Chironomidae	CG	7	FALSE	4
Station 4 QT	Naididae	Oligochaeta	Haplotaxida	Naididae	CG	9.1	FALSE	1
Station 4 QT	Pyralidae	Insecta	Lepidoptera	Pyralidae	SH	8	FALSE	1
Station 4 QT	Crangonyx sp	Malacostraca	Amphipoda	Crangonyctidae	SH	8	FALSE	4
Station 4 QT	Larsia sp	Insecta	Diptera	Chironomidae	PR	9.3	FALSE	18
Station 4 QT	Pericoma sp	Insecta	Diptera	Psychodidae	CG	10	FALSE	15
Station 4 QT	Tipulidae	Insecta	Diptera	Tipulidae		5	FALSE	2
Station 4 QT	Limonia sp	Insecta	Diptera	Tipulidae	SC	9.64	FALSE	1
Station 4 QT	Muscidae	Insecta	Diptera	Muscidae	PR	8	FALSE	9
Station 4 QT	Nemotelus sp	Insecta	Diptera	Stratiomyidae	CG	10	FALSE	1
Station 4 QT	Sciomyzidae	Insecta	Diptera	Sciomyzidae	PR	6	FALSE	4
Station 4 QT	Tipula sp	Insecta	Diptera	Tipulidae	SH	7.33	FALSE	1
Station 4 QT	Culex sp	Insecta	Diptera	Culicidae	CF	10	FALSE	4
Station 4 QT	Lirceus fontinalis	Malacostraca	Isopoda	Asellidae	CG	7.85	FALSE	7
Station 4 QT	Agabus sp	Insecta	Coleoptera	Dytiscidae	PR	8.9	FALSE	1
Station 4 QT	Hydrochara sp	Insecta	Coleoptera	Hydrophilidae	PR	8.3	FALSE	1
Station 4 QT	Chironomus riparius gr	Insecta	Diptera	Chironomidae	CG	9.6	FALSE	3
Station 4 QT	Anopheles sp	Insecta	Diptera	Culicidae	CF	8.58	FALSE	1

US 60 2018							STA	TION	
Species	FG	Т	FH	SS	BG	Station 1	Station 2	Station 3	Station 4
Campostoma anomalum, stoneroller			Х			168	18	80	NA
Semotilus atromaculatus, creek chub	0	Т		Р		74	19	137	NA
Erimyzon oblongus, western creek chubsucker	Ι		Χ	Р				26	NA
Ameiurus natalis, yellow bullhead	0	Т	Х			8	1		NA
Aphredoderus sayanus, Pirate Perch	Ι		Х			1			NA
Fundulus notatus, blackstripe topminnow	Ι		Х			18	16	52	NA
Gambusia affinis, mosquitofish		Т	Х				44	43	NA
Lepomis sp., Juvenille sunfish	Ι		Х	Р			68		NA
Lepomis cyanellus, green sunfish		Т	Х	Р		8	55	1	NA
L. macrochirus, bluegill		Т	Х			4	6	2	NA
Microtendipes punctulatus, spotted bass	С		Х			1		1	NA
Etherostoma gracile, slough darter	Ι							1	NA
US 60 2018							STAT	TION	
Metrics						Station 1	Station 2	Station 3	Station 4
Native Species Richness						8	8	9	NA
Darter, Madtom, Sculpin Richness						0	0	1	NA
Intolerant Species Richness						0	0	0	NA
Simple Lithophile Species Richness						0	0	0	NA
Proportion of Insectivore Individuals						7	37	23	NA
Proportion of Facultative Headwater Individuals						74	92	60	NA
Proportion of Tolerant Individuals						33	55	53	NA
Proportion of Omnivore Individuals						29	9	40	NA
Number of Individuals						282	227	343	NA
Drainage Area (mi ²)						3	0.95	1.72	0.18
Sampling Effort (seconds)						1,220	1,012	1,133	NA
Fish Capture/Sampling Effort						0.23	0.22	0.30	NA
IDI SCORE						20	56	48	NA
IBI SCORE						39 Esin	56		NA
IBI CLASS / RATING	<u></u> .		2.47	6	1.0	Fair	Good	Good	NA
IBI Classes: Very Poor (VP, 0-15), Poor (P, 16-31) Feeding Guild (FG): C = Carnivore, I = Insectivore Facultative headwater individuals; Stream Size (SS Lithophiles. STATIONS: Station 1 = Unamed Tributary to Hun to Humphry Creek, Station 4 = Unamed Tributary	, O = 0 5): H =	Omn Hea Cree	ivore dwat ek, St	; Tol er, P tatior	eranc = Pic	e (T): I = In oneer; Breed	tolerant, T = ling Guild (I	= Tolerant; F 3G):SL = Si	mple

Fouser Environmental Services

165 Camden Avenue Versailles, KY 40383 Phone: 859-873-6211 Fax: 859-873-3715 Email: lab@fouser.com

Laboratory / Consulting

Certificate of Analysis

Third Rock Consultants, LLC Cory Bloyd 2526 Regency Road Suite 180 Lexington, KY 40503			Ente Date Ro Date Ro	Project KY ered By Ly eported 10 ecceived 9/1 pproved 10	nn Ellis /1/2018 4/2018	JS 60)	
Test	Method	Result	Qualifiers	Units	PQL	Date	Initials
969974-01	Station 2		9/12/18 15:	00			
Iron	EPA 200.7	<0.2		mg/L	0.2	9/26/2018	KM
pH - Lab	SM 4500 H+B	7.25		S.U.		9/14/2018	AW
Hardness, Total	EPA 130.1	101		mg/L as Ca	C 25	9/17/2018	СТ
Nitrogen, Ammonia	Hach 10205	< 0.05		mg/L	0.05	9/14/2018	CT
Chloride	EPA 300.0	18		mg/L	1	9/28/2018	EW
Dissolved Oxygen	DOWSOP03014	6.2		mg/L		9/14/2018	AW
Acidity	SM 2310 B	<10		mg/L	10	9/25/2018	CT
Alkalinity	EPA 310.2	103		mg/L	10	9/17/2018	CT
Carbon Dioxide	SM 4500-CO2 D	88		mg/L		9/25/2018	CT
Orthophosphate	SM 4500 P-E	0.13		mg/L	0.125	9/14/2018	СТ
Sulfate	EPA 300.0	9.0		mg/L		9/28/2018	EW
969974-02	Station 1		9/12/18 17:	:00			
Iron	EPA 200.7	<0.2		mg/L	0.2	9/26/2018	KM
pH - Lab	SM 4500 H+B	7.50		S.U.		9/14/2018	AW
Hardness, Total	EPA 130.1	87		mg/L as Ca	C 25	9/17/2018	СТ
Nitrogen, Ammonia	Hach 10205	< 0.05		mg/L	0.05	9/27/2018	CT
Chloride	EPA 300.0	15		mg/L	1	9/28/2018	EW
Dissolved Oxygen	DOWSOP03014	6.5		mg/L		9/14/2018	AW
Acidity	SM 2310 B	<10		mg/L	10	9/25/2018	СТ
Alkalinity	EPA 310.2	91		mg/L	10	9/17/2018	СТ
Carbon Dioxide	SM 4500-CO2 D	86		mg/L		9/25/2018	СТ
Orthophosphate	SM 4500 P-E	0.17		mg/L	0.125	9/14/2018	CT
Sulfate	EPA 300.0	5.0		mg/L		9/28/2018	EW
969974-03	Station 3		9/13/18 08:	30			
Iron	EPA 200.7	< 0.2		mg/L	0.2	9/26/2018	KM
10/01/2018 Lab No:			EC:			Page	1 of 2

Fouser Environmental Services

165 Camden Avenue Versailles, KY 40383 Phone: 859-873-6211 Fax: 859-873-3715 Email: lab@fouser.com

Laboratory / Consulting

Certificate of Analysis

Third Rock Consultants, LLC Cory Bloyd 2526 Regency Road Suite 180 Lexington, KY 40503			5	d 9/14/2018	JS 60)	
Test	Method	Result	Qualifiers Units	PQL	Date	Initials
969974-03	Station 3		9/13/18 08:30			
pH - Lab	SM 4500 H+B	7.75	S.U.		9/14/2018	AW
Hardness, Total	EPA 130.1	68	mg/L	as CaC 25	9/17/2018	CT
Nitrogen, Ammonia	Hach 10205	< 0.05	mg/L	0.05	9/27/2018	СТ
Chloride	EPA 300.0	49	mg/L	1	9/28/2018	EW
Dissolved Oxygen	DOWSOP03014	6.1	mg/L		9/14/2018	AW
Acidity	SM 2310 B	<10	mg/L	10	9/25/2018	CT
Alkalinity	EPA 310.2	66	mg/L	10	9/17/2018	CT
Carbon Dioxide	SM 4500-CO2 D	60	mg/L		9/25/2018	CT
Orthophosphate	SM 4500 P-E	0.79	mg/L	0.125	9/14/2018	CT
Sulfate	EPA 300.0	24	mg/L		9/28/2018	EW

Approved By

my forser

Ray Fouser, P.E.





riviect name, not and weather event must appear on EDD and invoice; ² 40CFR Part 136 Methodology Required, 3	Project name No an			Q S	202	0	Lab ID	Questions to:	Invoice to:	EDDs to:	EDDs Required ¹ :	Turnaround:	Prime Consultant:	Project No. ¹ :	Project Name ¹ :	
iu weather event m				Station3	Station 1	Station 2	Site ID	Bert Remley at bremley@thirdrockconsultants.com	Accounts Payable at bweatherford@thirdrockconsultants.com	Bert Remley at bremley@thirdrockconsultants.com	Yes	10 Days	QK4	KY18-005	US60	-TOL
ust appear on EE				9-13-18 5830	9-12-18	8+21-b	Date	oremley@thirc	e at <u>bweather</u>	oremley@thirs						USER
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			0.06	0.01	0.01	Strea	m Di	scharg	ge (cfs	;)						

Field Notes:

Relinquished by Campie Apites Received by: Hym Ellis FOR LAB

Temp upon Relinquishment: 200

Additional documentation attached? Y / (N) If yes, describe :

Upon relinquishment, samples properly preserved, bottles intact, seals intact, etc? Y / N If no, explain :

Date: 9-14-18 Time: 10:03An Date: 9-14-18 Time: 10:03

Northest Hopkinsville Bypass KYTC Item 2-136 Fauna and Flora Data Set

Common Name	Species Name					
Flora						
Barnyard grass	Echinochloa crus-galli					
Black locust	Robinia pseudoacacia					
Black willow	Salix nigra					
Blackberry	Rubus sp.					
Box elder	Acer negundo					
Common ragweed	Ambrosia artemisiifolia					
Crown vetch	Securigera varia					
Curly dock	Rumex crispus					
Eastern cottonwood	Populus deltoides					
Eastern redcedar	Juniperus virginiana					
Elm	Ulmus sp.					
Fescue	Festuca arundinaceae					
Green ash	Fraxinus pennsylvanica					
Greenbrier	Smilax sp.					
Hackberry	Celtis occidentalis					
Henbit	Lamium amplexicaule					
Japanese honeysuckle	Lonicera japonica					
Johnson grass	Sorghum halepense					
Multflora rose	Rosa multiflora					
Paper birch	Betula papyrifera					
Privet	Ligustrum vulgare					
Raspberry	Rubus sp.					
Red maple	Acer rubrum					
River birch	Betula nigra					
Shagbark hickory	Carya ovata					
Sugar maple	Acer saccharum					
Sweetgum	Liquidambar styraciflua					
Sycamore	Platanus occidentalis					
White oak	Quercus alba					
Wild black cherry	Prunus serotina					
Wild garlic	Allium vineale					
Winter creeper	Euonymus fortunei					

Northest Hopkinsville Bypass KYTC Item 2-136 Fauna and Flora Data Set

Common Name	Species Name					
Fauna						
American crow	Corvus brachyrhynchos					
American toad	Anaxyrus americanus					
Black-capped chickadee	Poecile atricapillus					
Broad-winged hawk	Buteo platypterus					
Coyote	Canis latrans					
Eastern cottontail	Sylvilagus floridanus					
Eastern gray squirrel	Sciurus carolinensis					
Green frog	Rana clamitans					
Groundhog	Marmota monax					
Northern bobwhite	Colinus virginianus					
Northern cardinal	Cardinalis cardinalis					
Raccoon	Procyon lotor					
Red-winged blackbird	Agelaius phoeniceus					
Tufted titmouse	Baeolophus bicolor					
White-tailed deer	Odocoileus virginianus					