BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.

Wetland Delineation and Stream Assessment
(Triple Rail Site) – (McCracken County, KY)

Submitted To:

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TABLE OF CONTENTS

ABSTRACT 4
1. INTRODUCTION 5
1.1 PURPOSE 5
1.2 SITE DESCRIPTION 5
2. TECHNICAL DEFINITIONS 6
2.1 WETLANDS 6
2.1.1 Hydrophytic Vegetation 6
2.1.2 Hydric Soils 6
2.1.3 Hydrology 7
3. METHODS & MATERIALS 8
3.1 WETLAND DELINEATION 8
3.1.1 Soils 8
3.1.2 Vegetation 9
3.1.3 Hydrology 9
3.2 STREAM ASSESSMENT 10
4. JURISDICTIONAL WATERS SUMMARY & DESCRIPTIONS 11
4.1 WETLANDS 11
4.2 STREAMS 15
4.2.1 Intermittent Streams 15
4.2.2 Ephemeral Streams 18
4.3 OPEN WATERS 19
5. REFERENCES 20

APPENDICES

Appendix A – Maps (Aerial, Soil Survey, Topographic)
Appendix B – Wetland Delineation Forms and Stream Assessment Forms
Appendix C – Photographs

LIST OF ACRONYMS AND ABBREVIATIONS

BFW	Bacon Farmer Workman Engineering & Testing, Inc.
CWA	Clean Water Act
FAC	Facultative
FACW	Facultative Wetland
FACU	Facultative Upland
NWI	National Wetland Inventory
OBL	Obligate Wetland
OW	Open Water
PEM	Palustrine Emergent Wetland
PFO	Palustrine Forested Wetland
RBP	Rapid Bioassessment Protocol
UPL	Obligate Upland
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service

ABSTRACT

Bacon Farmer Workman Engineering & Testing, Inc. (BFW) performed a stream habitat and wetland delineation for part of the “Triple Rail Site” property that is located in McCracken County, Kentucky south of Noble Road. The delineation was performed between May – June 2019 based on fluctuating weather conditions and site access. The project area includes approximately 430 - 450 acres and is located in McCracken County. The delineation was performed to determine if wetlands and/or streams were located on the property. Eleven (11) emergent wetlands, eight (8) forested wetlands, five (5) open waters, seven (7) ephemeral streams, and six (6) intermittent streams were located within the project area.

1. INTRODUCTION

1.1 PURPOSE

Bacon Farmer Workman Engineering & Testing, Inc. (BFW) performed a wetland delineation on the property located south of Noble Road in Paducah, Kentucky. The field work was completed between May and June 2019 based on fluctuating weather conditions and site access. The property is approximately 430 - 450 acres in size. It is located in the Lower Ohio watershed. The property is being reviewed for environmental compliance for proposed industrial development. A map which depicts the project area and associated wetlands/streams can be found in Appendix A.

The wetland delineation was conducted according the guidelines set forth by the 1987 Corps of Engineers Manual and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic Gulf Coastal Plain Region (Version 2.0). The United States Army Corps of Engineers (USACE) is the regulating authority of Section 404 of the Clean Water Act (CWA). This regulating entity must make the final decision with regards to the jurisdictional status of this site.

The purpose of this study was to investigate the project area, identify areas meeting the technical criteria for wetlands, delineate the jurisdictional extent of the wetland basins, map other aquatic resources, and classify the wetland habitat. This field investigation also documented other natural aquatic resources in the project area that may also require regulatory consideration for the project. This field delineation of wetlands and aquatic resources will be the basis on which regulated impacts to these resources will be determined for a future interchange reconstruction and improvement project.

1.2 SITE DESCRIPTION

The project area is located in McCracken county. From Interstate 24, proceed to Exit 3 and proceed west for approximately 1.33 miles to Meredith Road. Turn right and proceed north for approximately 1.36 miles to Noble Road. Turn left and proceed west for approximately 2.44 miles. The entrance to the property will be located on the left (south). The project area begins here at Latitude N37°07’31.66” and Longitude W88°44’26.87”.

The wetland delineation investigation area consisted of agricultural fields interspersed with occasional wooded areas and streams. These habitats are described in more detail in the following sections.

2. TECHNICAL DEFINITIONS

2.1 WETLANDS

Section 404 of the Clean Water Act defines Wetlands as:

> *"areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."*

The EPA and the Corps use the 1987 Corps of Engineers Wetlands Delineation Manual and Regional Supplements to define wetlands for the Clean Water Act Section 404 permit program. Section 404 requires a permit from the Corps or authorized state for the discharge of dredged or fill material into the waters of the United States, including wetlands.

The 1987 Corps of Engineers Wetlands Delineation Manual and Regional Supplements organizes characteristics of a potential wetland into three (3) categories: soils, vegetation and hydrology. The manual and supplements contain criteria for each category. With this approach, an area that meets all three (3) criteria is considered a wetland. These criteria are detailed below:

2.1.1 Hydrophytic Vegetation

Hydrophytic vegetation, due to morphological, physiological, and/or reproductive adaptation(s), has the ability to grow, effectively compete, reproduce, and/or persist in anaerobic soil conditions. Individual species have been assigned a wetland indicator status by the National Wetland Plant List designated by USACE.

A plant community is considered hydrophytic when more than 50% of the dominant species from all strata are Obligate Wetland (OBL), Facultative Wetland (FACW), or Facultative (FAC). If all dominants are FAC, the vegetation criteria can be disregarded, and the determination is based on soil and hydrology criteria.

Indicator Status	Probability of Occurrence in Wetlands
Obligate Wetland - OBL	> 99%
Facultative Wetland - FACW	67-99%
Facultative - FAC	34-66%
Facultative Upland - FACU	1-33%
Obligate Upland - UPL	< 1%

Secondary vegetation rules include observed physiological adaptations, plants growing in saturated soils, and the FAC neutral test.

2.1.2 Hydric Soils

Hydric soils are present if they have been classified as hydric or when they possess characteristics associated with anaerobic soil conditions. Hydric soils are those that are gleyed or have a low chroma matrix (2 or less) with redoximorphic features, or a matrix chroma 1 with or without redoximorphic feature in the upper 10-inches. These designations are made utilizing a Munsell

Soil Color Chart.

2.1.3 Hydrology

Hydrology in wetlands occurs in areas inundated permanently or periodically at mean water depths < 6.6 feet, or if the soil is saturated to the surface for five percent (5%) of the prevalent vegetation's growing season. Indicators of wetland hydrology could be present above or below the surface.

Primary indicators of hydrology include, but are not limited to:

- inundation
- saturation in the upper 12 inches
- oxidized rhizospheres
- watermarks on standing structures
- water stained leaves
- sediment deposits

Secondary indicators of wetland hydrology [two (2) or more required] include, but are not limited to:

- FAC neutral test
- wetland drainage patterns
- soil survey data

3. METHODS & MATERIALS

3.1 WETLAND DELINEATION

The wetland delineation was conducted according the guidelines set forth by the 1987 Corps of Engineers Manual and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0).

3.1.1 Soils

Soils were observed for hydric soil characteristics. Soils were examined in cores taken with a sharpshooter shovel or soil probe. Soil profiles were observed at a depth necessary to confirm hydric soil characteristics. Typical soil profile depths are typically within 12-18 inches below ground surface to allow for: (1) observation of an adequate portion of the soil profile to determine presence/absence of hydric soil characteristics; (2) observation of hydrology including depth to the water table and saturated soils; and, (3) identification of disturbances (e.g., buried horizon, plow line, etc.). Where site conditions preclude observing soil profile depths at the typical 12-18 inches below ground surface or where observed hydric soil indicators are documented above or below 12-18 inches below ground surface, justification is provided. Soil color determinations were made using MUNSELL Soil Color Charts (Gretag-Macbeth 1994). Site soil characteristics were compared to those mapped and described in the Soil Survey for McCracken County (USDA 2016). Hydric soil characteristics were compared to those identified in the Atlantic and Gulf Coastal Plain Region Supplement (USACE 2012) and the most recent version of the Natural Resources Conservation Service (NRCS) publication Field Indicators of Hydric Soils in the United States, Version 7.0 (USDA 2010). Hydric Soil Category ratings (USDA 2016) were also reviewed for soils in the project area. Results were recorded on the attached data forms (Appendix B).

The proposed project area primarily consisted of the Ginat silt loam and Routon silt loam according to the USDA soil survey (Appendix A). There were other soil types, which included Calloway, Cascilla-Colp-Wheeling, Falaya-Collins, Grenada, Hurst, Kurk, Loring, Okaw, and Waverly. However, it should be noted that only the more prominent soil series were discussed below.

The Ginat soils series has slopes which range from 0 to 2 percent, poorly drained, and are rarely flooded. They are typically found on stream terraces and are prime farmland if they are drained.

The Routon soils series has slopes which range from 0 to 2 percent, poorly drained, and are rarely flooded. They are typically found on stream terraces and are prime farmland if they are drained.

The Calloway soils series has slopes which range from 0 to 2 and 2 to 4 percent, somewhat poorly drained, and are rarely flooded. They are typically found on flats and ridges and are prime farmland if they are drained.

The Cascilla-Colp-Wheeling complex soils series has slopes which range from 2 to 25 percent, are well drained, and occasionally flood. They are typically found on floodplains, stream terraces, and drainageways.

The Falaya-Collins complex soils series has slopes which range from 0 to 2 percent, are somewhat poorly drained, and permeability is slow. They are

typically found on floodplains and drainageways.

The Grenada soils series has slopes which range from 0 to 6 percent, moderately well-drained, and can be severely eroded. They are typically found on flats, floodplains, and drainageways, and are prime farmland if they are drained and not severely eroded.

The Hurst soils series has slopes which range from 0 to 2 percent, somewhat poorly drained, and are rarely flooded. They are typically found on stream terraces and are prime farmland if they are drained.

The Kurk soils series has slopes which range from 0 to 2 percent and are somewhat poorly drained. They are typically found on stream terraces and are prime farmland if they are drained.

The Loring soils series has slopes which range from 6 to 12 percent, are moderately well drained, and are severely eroded. They are typically found on ridges and are not prime farmland.

The Okaw soils series has slopes which range from 0 to 2 percent, poorly drained, and are rarely flooded. They are typically found on stream terraces and are prime farmland if they are drained.

The Waverly soils series has slopes which range from 0 to 2 percent, poorly drained, and are occasionally flooded. They are typically found on floodplains and drainageways and are prime farmland if they are drained.

3.1.2 Vegetation

Wetland plant species nomenclature follows the National Wetland Plant List (USACE 2018). Identification was aided when necessary with field guides for the region. Vegetation was sampled in nested circular plots:

- 5-ft radius for herbaceous species
- 15-ft radius for shrubs
- 30-ft radius for trees and vines.

Vegetation was classified using the USACE 2018 National Wetland Plant list. Unless otherwise stated, aerial coverage dominance was determined using the 50/20 rule. Under the 50/20 rule, any plant species that equals or exceeds 20% of the aerial coverage of the plot is a dominant plant. In addition, the cumulative total of all dominant plants (OBL, FACW, or FAC) must be equal to or greater than 50% of the aerial coverage of the plot. If no plant species equals or exceeds 20% of the cumulative total aerial coverage of the plot, then the dominant plants are the plants that when ranked in decreasing order of abundance and summed, immediately exceed 50% of the plots aerial coverage when added together.

The majority of the delineated area included previously farmed agricultural fields. There were some forested locations and several open water areas also located on the property.

3.1.3 Hydrology

Hydrology was determined by observing field indicators. Local soil survey data was reviewed but not automatically implied without field verification. Hydrologic indicators were recorded on the data forms and are also noted in photographs

of the site (Appendix C). The majority of the hydrology was documented as saturation, standing water, and crayfish burrows.

3.2 STREAM ASSESSMENT

A Rapid Bioassessment Protocol (RBP) low gradient field data sheet was completed for each stream located within the project area. Documentation for the streams includes photographs, location, typical cross-section, and total length. The protocol matrix used to assess habitat quality is based on key physical characteristics of the waterbody and surrounding land. Habitat is defined as the quality of in-stream and riparian habitat that influences the structure and function of the aquatic community in a stream. This matrix provides an effective means of evaluating and documenting habitat quality at each site. Habitat parameters evaluated are related to overall aquatic life and are a potential source of limitation to aquatic biota. Site selection for assessment was based upon a probabilistic approach to provide information about the overall status or condition of each site (Barbour, et al. 1999).

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

Stream lengths, channel location, and limits were determined in the field utilizing manual measuring techniques including range finding, pacing, global positioning, and verification of mapping. Stream flow was determined in the field based upon stream status at the time of visit. The final determination of stream quantity and jurisdiction will be decided by the USACE. See Appendix B for the stream assessment (RBP) forms and photographs.

4. JURISDICTIONAL WATERS SUMMARY & DESCRIPTIONS

Eleven (11) emergent wetlands, eight (8) forested wetlands, five (5) open waters, seven (7) ephemeral streams, and six (6) intermittent streams were located within the project area.

4.1 WETLANDS

Nineteen (19) wetland areas totaling approximately 8.65 acres occur within the study area. Eleven (11) of the wetland areas are emergent (PEM) and the other eight (8) wetland areas are forested (PFO). These wetland areas are denoted on an aerial map located in Appendix A. Descriptions of the individual wetlands are provided below, although these wetland determinations are assigned pending final USACE verifications.

Wetland	Latitude	Longitude	Classification	Connectivity	Wetland Area (sq feet)
PEM1	37.123234	-88.74054	PEM	Connected	16,329
PEM2	37.123283	-88.738651	PEM	Connected	8,964
PEM3	37.122399	-88.736888	PEM	Connected	36,294
PEM4	37.120611	-88.739712	PEM	Isolated	16,736
PEM5	37.119317	-88.744766	PEM	Connected	14,178
PEM6	37.118391	-88.741483	PEM	Isolated	7,863
PEM7	37.117634	-88.741371	PEM	Connected	4,678
PEM8	37.117866	-88.742945	PEM	Connected	8,658
PEM9	37.118186	-88.744042	PEM	Isolated	1,962
PEM10	37.116193	-88.745843	PEM	Connected	12,195
PEM11	37.110915	-88.744977	PEM	Connected	9,554
PFO1	37.123388	-88.737161	PFO	Connected	88,350
PFO2	37.121999	-88.742748	PFO	Connected	17,302
PFO3	37.11879	-88.741968	PFO	Isolated	12,006
PFO4	37.117441	-88.742101	PFO	Connected	18,860
PFO5	37.11623	-88.745226	PFO	Connected	18,839
PFO6	37.115952	-88.743707	PFO	Connected	60,061
PFO7	37.11338	-88.745226	PFO	Connected	13,346
PFO8	37.118968	-88.745689	PFO	Connected	10,483

PEM1 is an emergent wetland has an area 0.37 acres and is connected directly to the eastern edge of a strip of forested area located in the northern portion of the project area. This area receives water from I6 when it overflows its banks during storm events. The area ponds water and does not drain. The dominant herbaceous stratum found within PEM1 consisted primarily of various herbaceous vegetation. The vegetation for

the data point taken within PEM1 indicated a dominant presence of hydrophytic vegetation. Additionally, various hydrologic indicators were observed within the soils. Soils have a silty-clay texture, with a matrix of 10YR 5/2 with redoximorphic features of 10YR 4/4 greater than 2% from 2 to 12 inches. These redoximorphic concentrations within the matrix are defined indicators of hydric soils. PEM1 has a distinctive dividing line between the wetland and upland which includes changes in plant communities, soils, and hydrologic characteristics. It lies within a farmed agricultural field.

PEM2 is an emergent wetland has an area 0.21 acres and is connected directly to the northwestern edge of a forested area located in the northern portion of the project area. This area receives upland runoff from the adjacent farm field. The area ponds water and does not drain since it appears that trees and debris have been pushed into the edge of the woods and prevents the area from draining properly. The dominant herbaceous stratum found within PEM2 consisted primarily of various herbaceous vegetation. The vegetation for the data point taken within PEM1 indicated a dominant presence of hydrophytic vegetation. Additionally, various hydrologic indicators were observed within the soils. Soils have a silty-clay texture, with a matrix of 10YR 5/2 with redoximorphic features of 5YR 4/6 greater than 2% from 2 to 8 inches. These redoximorphic concentrations within the matrix are defined indicators of hydric soils. PEM2 has a distinctive dividing line between the wetland and upland which includes changes in plant communities, soils, and hydrologic characteristics. It lies within a farmed agricultural field.

PEM3 is an emergent wetland has an area 0.83 acres and is connected directly to PFO1 wetland found in the wooded area to the west. This area receives upland runoff from the adjacent farm field as well as runoff from the roadside ditch located north and east of the area. The area ponds water and does not drain well. The dominant herbaceous stratum found within PEM2 consisted primarily of various herbaceous vegetation. The vegetation for the data point taken within PEM1 indicated a dominant presence of hydrophytic vegetation. Additionally, various hydrologic indicators were observed within the soils. Soils have a silty-clay texture, with a matrix of 10YR 6/1 with redoximorphic features of 5YR 4/3 greater than 2% from 3 to 12 inches. These redoximorphic concentrations within the matrix are defined indicators of hydric soils. PEM3 has a distinctive dividing line between the wetland and upland which includes changes in plant communities, soils, and hydrologic characteristics.

PEM4 is an emergent wetland has an area 0.38 acres and is isolated. This area receives upland runoff from the adjacent farm field. There is a rise in topography in the field and a rise in the wooded areas that the wetland lies adjacent which creates a bowl. The wooded area is composed of rows of pecan trees that were most likely planted by the previous resident. The area ponds water and does not drain well. The dominant herbaceous stratum found within PEM4 consisted primarily of various herbaceous vegetation. The vegetation for the data point taken within PEM4 indicated a dominant presence of hydrophytic vegetation. Additionally, various hydrologic indicators were observed within the soils. Soils have a silty-clay texture, with a matrix of 10YR 5/2 with redoximorphic features of 5YR 4/6 greater than 2% from 2 to 12 inches. These redoximorphic concentrations within the matrix are defined indicators of hydric soils. PEM4 has a distinctive dividing line between the wetland and upland which includes changes in plant communities, soils, and hydrologic characteristics.

PEM5 is an emergent wetland has an area 0.33 acres and drains into I4. This area receives upland runoff from the adjacent farm field. It appears that this area was previously clear cut and that there are deep ruts which pond water and indicate that

large equipment was used on this area at one time. The area ponds water and does not drain well. The dominant herbaceous stratum found within PEM5 consisted primarily of various herbaceous vegetation. The vegetation for the data point taken within PEM5 indicated a dominant presence of hydrophytic vegetation. Additionally, various hydrologic indicators were observed within the soils. Soils have a silty-loam texture, with a matrix of 10YR 6/1 with redoximorphic features of 5YR 5/6 greater than 2% from 2 to 12 inches. These redoximorphic concentrations within the matrix are defined indicators of hydric soils. PEM5 has a distinctive dividing line between the wetland and upland which includes changes in plant communities, soils, and hydrologic characteristics.

PEM6 is an emergent wetland has an area 0.18 acres and receives water from the adjacent farm field but is considered isolated. The area ponds water and does not drain well due to farming activities and possibly from the installation of a field tile. The dominant herbaceous stratum found within PEM6 consisted primarily of various herbaceous vegetation. The vegetation for the data point taken within PEM6 indicated a dominant presence of hydrophytic vegetation. Additionally, various hydrologic indicators were observed within the soils. Soils have a silty-clay texture, with a matrix of 10YR 5/2 with redoximorphic features of 5YR 4/6 greater than 2% from 2 to 12 inches. These redoximorphic concentrations within the matrix are defined indicators of hydric soils. PEM6 has a distinctive dividing line between the wetland and upland which includes changes in plant communities, soils, and hydrologic characteristics.

PEM7 is an emergent wetland has an area 0.11 acres and receives water from the adjacent farm field. The farmer has graded the field to drain to this area, enter the wooded area to the west, and has then dug a drainage ditch (E4) that he has routed to I4. The area ponds water and does not drain well. The dominant herbaceous stratum found within PEM7 consisted primarily of various herbaceous vegetation. The vegetation for the data point taken within PEM7 indicated a dominant presence of hydrophytic vegetation. Additionally, various hydrologic indicators were observed within the soils. Soils have a silty-clay texture, with a matrix of 10YR 5/2 with redoximorphic features of 5YR 4/4 greater than 2% from 2 to 12 inches. These redoximorphic concentrations within the matrix are defined indicators of hydric soils. PEM7 has a distinctive dividing line between the wetland and upland which includes changes in plant communities, soils, and hydrologic characteristics.

PEM8 is an emergent wetland has an area 0.20 acres and receives water from the adjacent farm field. The farmer has graded the field to drain to this area, which then enters E5 and drains to I4. The area ponds water and does not drain well. The dominant herbaceous stratum found within PEM8 consisted primarily of various herbaceous vegetation. The vegetation for the data point taken within PEM8 indicated a dominant presence of hydrophytic vegetation. Additionally, various hydrologic indicators were observed within the soils. Soils have a silty-clay texture, with a matrix of 10YR 6/2 with redoximorphic features of 5YR 5/8 greater than 2% from 2 to 12 inches. These redoximorphic concentrations within the matrix are defined indicators of hydric soils. PEM8 has a distinctive dividing line between the wetland and upland which includes changes in plant communities, soils, and hydrologic characteristics.

PEM9 is an emergent wetland has an area 0.05 acres and is considered isolated. This is a low depressional area adjacent to the woods that ponds water because debris has been pushed into the woods by the farmer. The area ponds water and does not drain well. The dominant herbaceous stratum found within PEM9 consisted primarily of various herbaceous vegetation. The vegetation for the data point taken within PEM9 indicated a dominant presence of hydrophytic vegetation. Additionally, various

hydrologic indicators were observed within the soils. Soils have a silty-clay texture, with a matrix of 10YR 6/1 with redoximorphic features of 5YR 5/8 greater than 2% from 2 to 12 inches. These redoximorphic concentrations within the matrix are defined indicators of hydric soils. PEM9 has a distinctive dividing line between the wetland and upland which includes changes in plant communities, soils, and hydrologic characteristics.

PEM10 is an emergent wetland has an area 0.28 acres and receives water from the adjacent farm field as well as overflow from I2. This is a low depressional area adjacent to the woods that ponds water and then enters the wooded area to form PFO5. The area ponds water and does not drain well. The dominant herbaceous stratum found within PEM10 consisted primarily of various herbaceous vegetation. The vegetation for the data point taken within PEM9 indicated a dominant presence of hydrophytic vegetation. Additionally, various hydrologic indicators were observed within the soils. Soils have a silty-clay texture, with a matrix of 10YR 6/1 with redoximorphic features of 5YR 5/8 greater than 2% from 2 to 12 inches. These redoximorphic concentrations within the matrix are defined indicators of hydric soils. PEM10 has a distinctive dividing line between the wetland and upland which includes changes in plant communities, soils, and hydrologic characteristics.

PEM11 is an emergent wetland has an area 0.22 acres and receives water from the adjacent farm field as well as overflow from I3. This is a low depressional area located in the southern portion of the property that lies adjacent to Bobo Road. The area ponds water and does not drain well. The dominant herbaceous stratum found within PEM11 consisted primarily of various herbaceous vegetation. The vegetation for the data point taken within PEM11 indicated a dominant presence of hydrophytic vegetation. Additionally, various hydrologic indicators were observed within the soils. Soils have a silty-clay texture, with a matrix of 10YR 6/1 with redoximorphic features of 5YR 5/8 greater than 2% from 2 to 12 inches. These redoximorphic concentrations within the matrix are defined indicators of hydric soils. PEM11 has a distinctive dividing line between the wetland and upland which includes changes in plant communities, soils, and hydrologic characteristics.

PFO1 is a forested wetland has an area of 2.03 acres and is connected to PEM3. Prior clearing and storm damage has resulted in the creation of a wet ponded areas within these woods. The area receives inundation from stormwater events. The dominant vegetation is primarily comprised of hickory, pin oak, jewelweed, and boneset. Various hydrologic indicators were observed within the soils. Soils have a silty-loam texture, with a matrix of 10YR 5/1 with redoximorphic features of 10YR 4/6 greater than 2% from 3 to 10 inches. These redoximorphic concentrations within the matrix are defined indicators of hydric soils.

PFO2 is a forested wetland has an area of 0.40 acres and receives overflow from I6. The area receives inundation from stormwater events. The dominant vegetation is primarily comprised of hickory, pin oak, jewelweed, and small spike false nettle. Various hydrologic indicators were observed within the soils. Soils have a silty-loam texture, with a matrix of 10YR 5/1 with redoximorphic features of 10YR 4/6 greater than 2% from 3 to 6 inches. These redoximorphic concentrations within the matrix are defined indicators of hydric soils.

PFO3 is a forested wetland has an area of 0.28 acres and lies in the wooded areas located north of PEM6. This is a depressional area located in the wooded area that ponds water after storm events. The dominant vegetation is primarily comprised of red maples. Various hydrologic indicators were observed within the soils. Soils have a silty-

loam texture, with a matrix of 10YR 5/2 with redoximorphic features of 10YR 4/6 greater than 2% from 3 to 10 inches. These redoximorphic concentrations within the matrix are defined indicators of hydric soils.

PFO4 is a forested wetland has an area of 0.43 acres and is connected to E4. Prior clearing and storm damage has resulted in the creation of a wet ponded areas within these woods. E4 was channelized to carry the water from the site to I4. This wetland is located to the west of this conveyance and ponds water after storm events. Large tire tracks indicated that prior clearing activities probably occurred here. The dominant vegetation is primarily comprised of red maple, pin oak, and honeysuckle. Various hydrologic indicators were observed within the soils. Soils have a silty-loam texture, with a matrix of 10YR 5/2 with redoximorphic features of 10YR 4/4 greater than 2% from 3 to 10 inches. These redoximorphic concentrations within the matrix are defined indicators of hydric soils.

PFO5 is a forested wetland has an area of 0.43 acres and is connected to PEM10 and E3. Prior clearing and storm damage has resulted in the creation of a wet ponded areas within these woods. Water quickly leaves the banks of E3 and ponds in these flat areas as well. The area receives inundation from stormwater events and most likely receives water from I2 overflowing as well. The dominant vegetation is primarily comprised of hickory, pin oak, red maple, and jewelweed. Various hydrologic indicators were observed within the soils. Soils have a silty-clay texture, with a matrix of 10YR 5/1 with redoximorphic features of 10YR 5/8 greater than 2% from 3 to 6 inches. These redoximorphic concentrations within the matrix are defined indicators of hydric soils.

PFO6 is a forested wetland has an area of 1.38 acres and is connected to E3. Prior clearing and storm damage has resulted in the creation of a wet ponded areas within these woods. The area receives inundation from stormwater events when E3 overflows its banks. The dominant vegetation is primarily comprised of elm, sweet gum, pin oak, jewelweed, virginia creeper, and poison ivy. Various hydrologic indicators were observed within the soils. Soils have a silty-clay texture, with a matrix of 10YR 6/1 with redoximorphic features of 10YR 4/6 greater than 2% from 4 to 12 inches. These redoximorphic concentrations within the matrix are defined indicators of hydric soils.

PFO7 is a forested wetland has an area of 0.31 acres and is connected to E2. This area receives stormwater runoff from I2 and from the adjacent farm field. The dominant vegetation is primarily comprised of red maple, willow, and poison ivy. Various hydrologic indicators were observed within the soils. Soils have a silty-clay texture, with a matrix of 10YR 6/1 with redoximorphic features of 10YR 4/6 greater than 2% from 0 to 12 inches. These redoximorphic concentrations within the matrix are defined indicators of hydric soils.

PFO8 is a forested wetland has an area of 0.24 acres and lies adjacent to I4. This area receives stormwater runoff from the adjacent farm field. The dominant vegetation is primarily comprised of red maple, elm, and virginia creeper. Various hydrologic indicators were observed within the soils. Soils have a silty-loam texture, with a matrix of 10YR 5/2 with redoximorphic features of 10YR 4/6 greater than 2% from 0 to 10 inches. These redoximorphic concentrations within the matrix are defined indicators of hydric soils.

4.2 STREAMS

4.2.1 Intermittent Streams

There were six (6) intermittent streams located within the project boundary.

Stream	Latitude	Longitude	Habitat Score	Stream Type	Studied Length (ft)
I1	37.108159°N	88.745842°W	129.5 (avg)	Intermittent	1,666
I2	37.115185°N	88.747592°W	79	Intermittent	1,110
I3	37.113540°N	88.743411°W	67.5 (avg)	Intermittent	2,173
I4	37.117237°N	88.744709°W	113 (avg)	Intermittent	3,570
I5	37.121364°N	88.745284°W	46.5 (avg)	Intermittent	1,945
I6	37.121139°N	88.743877°W	51.5 (avg)	Intermittent	1,894

Intermittent Stream 1 (I1) is located in the southern section of the study area, flowing east for 1,666 feet. It should be noted that this length only reflects what is located within the study area. This creek is not labeled on USGS topographic maps but is an unnamed tributary to Massac Creek. Due to its length, two (2) assessments were performed. The stream has an average bottom width of 12 feet and an average bankfull width of 17 feet.

The stream habitat assessment (Low Gradient) for the upstream reach (I1-US) indicates the epifaunal substrate/available cover score is in the optimal range. Streambed morphology consists of somewhat equal riffles and runs but did contain more pools; with the majority of the pools present being shallow. The stream substrate consists of silt/clay size material and cobble, but gravel made up the majority of the bottom. Some deposition of fine sediment is present, with 20-50 percent of the bottom affected. Sinuosity scored marginal which indicates that channelization may have occurred sometime in the past. During the assessment, water was utilizing up to 75 percent of the channel bottom but occurred mostly at pooled sections. The banks were moderately stable with some areas of erosion. Vegetative protection scored as sub-optimal since the majority of the assessed sections had vegetative protection. However, the riparian width scored poor to marginal since farmed fields were located just outside of the riparian zones.

The stream habitat assessment (Low Gradient) for the downstream reach (I1-DS) indicates the epifaunal substrate/available cover score is in the optimal range. Streambed morphology consists of somewhat equal riffles and runs but did contain more pools; with the majority of the pools present being shallow. The stream substrate consists of silt/clay size material and cobble, but gravel made up the majority of the bottom. Some deposition of fine sediment is present, with 20-50 percent of the bottom affected. Sinuosity scored marginal which indicates that channelization may have occurred sometime in the past. During the assessment, water was utilizing 25 - 75 percent of the channel bottom but occurred mostly at pooled sections. The banks were moderately unstable with 30-60% of the banks having areas of erosion. Vegetative protection scored as sub-optimal since the majority of the assessed sections had vegetative protection. However, the riparian width scored marginal to suboptimal since farmed fields were located further outside of the riparian zones than that which occurred upstream.

I1 has an average habitat score of 119.5, which corresponds to a stream quality rating of suboptimal. The conductivity value average was 298.5 µS.

Intermittent Stream 2 (I2) is located in the west central section of the study area. It flows east for approximately 1,110 feet within the study boundary. The stream has an average bottom width of two (2) feet, and an average bankfull width of approximately four (4) feet.

The stream habitat assessment (Low Gradient) for the stream indicates the epifaunal substrate/available cover score is in the marginal range due to a 10-30 percent mix of stable substrate, with a less than desirable available habitat. Streambed morphology consists of mostly runs, with few riffles and pools; with the majority of the pools present being shallow. The stream substrate consists of silt/clay size material only. Heavy deposition of fine sediment is present, with more than 80 percent of the bottom affected. There is some evidence of channelization due to farming activities, and sinuosity scored marginal. During the assessment, water was utilizing 25 - 75 percent of the channel bottom. The banks were moderately stable (suboptimal score) with some areas of erosion. Vegetative protection and width of riparian zones scored marginal since farmed areas were located just outside of the stream channel in a lot of the area.

I2 has a habitat score of 79, which corresponds to a stream quality rating near the middle of the marginal category. The conductivity reading was 325 µS.

Intermittent Stream 3 (I3), located in the east central section of the study area, and eventually empties into Massac Creek further offsite. It flows north and then east for approximately 2,173 feet until it leaves the project study area. Due to its length and change in stream type, two (2) assessments were performed. The stream has an average bottom width of approximately 3 feet, and a bankfull width average of approximately 5 feet.

The stream habitat assessment (Low Gradient) for the upstream reach (I3-US) indicates the epifaunal substrate/available cover score is in the poor range since there was a very obvious lack of habitat. Streambed morphology consists of mostly runs, with few pools; with the majority of the pools present being shallow. The stream substrate consists of silt/clay size material only. Heavy deposition of fine sediment is present, with more than 80 percent of the bottom changing frequently. There is evidence of channelization, and sinuosity scored poor. During the assessment, the only water found in the channel was in a few pooled areas. The banks were moderately unstable (marginal score) with 30-60 percent of erosional area. This is due to only having herbaceous and grass vegetation. Vegetative protection scored as marginal, and the riparian width was poor due to previous farming activities.

The stream habitat assessment (Low Gradient) for the downstream reach (I3-DS) indicates epifaunal substrate/available cover scored in the marginal range. Streambed morphology consists of mostly runs with some areas of pools. The stream substrate consists of silt/clay sized material. There was heavy deposition of fine sediment, affecting more than 80 percent of the bottom. There was evidence of some past channelization due to farmed fields to the north and south of the stream, with sinuosity scoring in the marginal range. Banks were moderately stable, with vegetative cover scoring marginal. Riparian zone width scored marginal, with the dominant riparian vegetation again consisting of all four (4) strata.

I3 has an average total habitat score of 68, which corresponds to a stream quality rating of marginal.

Intermittent Stream 4 (I4) is located along the central boundary of the study area. It flows east for approximately 3,570 feet to the property boundary and then continues off-site. The stream has a bottom width average of approximately 8 feet, and a bankfull width average of approximately 12 feet.

The stream habitat assessment (Low Gradient) for the upstream reach (I4-US) indicates the epifaunal substrate/available cover score is in the sub-optimal range since there is a stable mix of habitat. Streambed morphology consists of mostly runs, with some pools and riffles; with the majority of the pools present being shallow. The stream substrate consists of a mix of silt/clay, sand, and gravel. Moderate deposition of fine sediment is present, with 50 - 80 percent of the bottom changing frequently. There is little evidence of channelization, and sinuosity scored sub-optimal. During the assessment, water occupied greater than 50% of the channel and was flowing but also had pooled areas. The banks were moderately stable (sub-optimal score) with 5-30 percent of erosional area. The stream contained all four (4) vegetative stratums. Vegetative protection scored as sub-optimal, but the riparian width was marginal due to previous farming activities.

The stream habitat assessment (Low Gradient) for the downstream reach (I4-DS) indicates epifaunal substrate/available cover scored in the optimal range. Streambed morphology consists of mixture of riffles, runs, and pools. The stream substrate consists of silt/clay sized material, sand, and gravel. There was moderate deposition of fine sediment, affecting 50-80 percent of the bottom. There was no evidence of past channelization and sinuosity scoring in the sub-optimal range. Banks were moderately stable, with vegetative cover scoring sub-optimal. Riparian zone width scored marginal due to farming activities. However, the dominant riparian vegetation again consisted of all four (4) strata.

I4 has a total habitat score of 113, which corresponds to a stream quality rating of sub-optimal. A conductivity reading average was 108 µS.

4.2.2 Ephemeral Streams

There were a total of seven (7) ephemeral streams found within the project boundary.

Stream	Latitude	Longitude	Habitat Score	Stream Type	Studied Length (ft)
E1	37.107744°N	88.744683°W	56	Ephemeral	182
E2	37.113247°N	88.744633°W	46	Ephemeral	460
E3	37.116231°N	88.74331°W	52	Ephemeral	784
E4	37.117411°N	88.741785°W	37	Ephemeral	666
E5	37.117477°N	88.743182°W	51	Ephemeral	371
E6	37.118445°N	88.745665°W	47	Ephemeral	135
E7	37.119179°N	88.74573°W	50	Ephemeral	118

Ephemeral Streams (E1 to E7) are located throughout the project study area. Most of the streams were considered marginal streams, with the exception of E2, E4, and E6 which had poor habitat scores.

In general, the EPA stream habitat assessments for the ephemeral streams

indicated a marginal epifaunal substrate/available cover. The substrates consisted predominantly, or all, silt/clay sized material. Streambed morphology consists primarily of runs only. Typically, there was moderate to heavy deposition of new material, with 50 to 80 percent of the bottom affected. Banks were mostly moderately, many of which contained areas of erosional scarring. No conductivity readings were collected due to dry stream conditions.

4.3 OPEN WATERS

There were five (5) open waters located within the project boundary. These waters are shown in the table below.

OW	Latitude	Longitude	Studied Area (sq feet)
OW1	37.125465°N	88.746222°W	241,607
OW2	37.12476°N	88.747364°W	39,451
OW3	37.12175°N	88.741944°W	27,058
OW4	37.111445°N	88.749051°W	17,408
OW5	37.110462°N	88.747356°W	3,448

All associated data sheets for this delineation including wetland and stream assessment forms can be found in Appendix B. Photographs of the project site can be found in Appendix C.

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Appendix A

Figures / Aerials

88°45'00"W

88°44'24"W

37°07'12"N

37°06'36"N

Carneal Rd

Mayfield Metropolis Rd

Noble Rd

Bobo Rd

Rudy Woods Rd

School Rd

OW1

OW2

OW3

OW4

OW5

PEM1

PEM2

PEM3

PEM4

PEM5

PEM6

PEM7

PEM8

PEM9

PEM10

PEM11

PFO1

PFO2

PFO3

PFO4

PFO5

PFO6

PFO7

PFO8

I1-US

I1-DS

I2-US

I2-DS

I3-US

I3-MS

I3-DS

I4-US

I4-MS

I4-DS

I5-US

I5-DS

I6-US

I6-DS

E1

E2

E3

E4

E5

E6

E7

	Name	Length (Feet)
1	I1	1,666
2	I2	1,110
3	I3-US	697
4	I3-DS	1,476
5	I4-DS	2,656
6	I4-US	914
7	I5-DS	281
8	I5-US	1,665
9	I6-DS	1,127
10	I6-MS	789
11	I6-US	767
12	E1	182
13	E2	460
14	E3	784
15	E4	667
16	E5	371
17	E6	135

	Name	Type	Area (SqFt)
1	PEM1	PEM	16,329
2	PEM2	PEM	8,964
3	PEM3	PEM	36,294
4	PEM4	PEM	16,736
5	PEM5	PEM	14,178
6	PEM6	PEM	7,863
7	PEM7	PEM	4,678
8	PEM8	PEM	8,658
9	PEM9	PEM	1,962
10	PEM10	PEM	12,195
11	PEM11	PEM	9,554
12	PFO1	PFO	88,350
13	PFO2	PFO	17,302
14	PFO3	PFO	12,006
15	PFO4	PFO	18,860
16	PFO5	PFO	18,839
17	PFO6	PFO	60,061
18	PFO7	PFO	13,346
19	PFO8	PFO	10,483
20	OW1	OW	241,607
21	OW2	OW	39,451
22	OW3	OW	27,058
23	OW4	OW	17,408

Legend

GPED Site

Site extent

Wetlands Mapped for this Project

Mapped Streams

Intermittent

Effemeral

Mapped Wetlands

Emergent Wetlands

Forested Wetlands

Open Water

250 0 250 500 750 1000 ft

N

Figure 1: Site Aerial Imagery with Mapped Wetlands

Greater Paducah Economic Development

Project 19097 | 6/24/2019

Drawn by: BPH | Checked by: SLC

BFW
BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.
500 SOUTH 17TH STREET
PADUCAH, KY 42003

88°45'00"W

88°44'24"W

37°07'12"N

37°06'36"N

Carneal Rd

Noble Rd

Mayfield Metropolis Rd

Palestine School Rd

Bobo Rd

Rudy Woods Rd

Mayfield Metropolis Rd

250 0 250 500 750 1000 ft

N

Figure 2: Site Topographic Map

Greater Paducah Economic Development	
Project 19097	6/24/2019
Drawn by: BPH	Checked by: SLC

BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.
500 SOUTH 17TH STREET
PADUCAH, KY 42003

-88°45'0"

-88°44'24"

37°7'12"

37°6'36"

CaA
RtA
UrA
GrA
LpD3
LoC2
Me
WnC2
GrB2
LoC3
CaB2
GrB2
Wa
KrA
uGnA
Fa
GrB3
OkA
CpB
CpC2
CgD
HuA

250 0 250 500 750 1000 ft

N

Legend

USDA Soil Map

Soil Type

- Arkabutla silt loam (Af)
- Calloway silt loam (CaA, CaB2)
- Cascilla silt loam (Cf)
- Cascilla-Colp-Wheeling complex (CgD)
- Colp silt loam (CpB, CpC2)
- Falaya-Collins complex (Fa, Fc)
- Grenada silt loam (GrA, GrB2, GrB3, GrC3)
- Hurst silt loam (HuA)
- Kurk silt loam (KrA)
- Loring silt loam (LoC2, LoC3)
- Loring-Purcahse complex (LpC3, LpD3)
- Melvin silty clay loam (Me)
- Okaw silt loam (OkA)
- Routon silt loam (RtA)
- Ginat silt loam (uGnA)
- Uniontown silt loam (UoA)
- Urban land-Udorthents complex (UrA)
- Waverly silt loam (Wa)
- Wheeling silt loam (WnC2)

Figure 3: USDA Soil Map

Greater Paducah Economic Development

Project 19097	7/02/2019
Drawn by: BPH	Checked by: SLC

BFW
BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.
500 SOUTH 17TH STREET
PADUCAH, KY 42003

-88°45'0"

-88°44'24"

37°7'12"

37°6'36"

PUBH

PUBH

PUBH

PUBHx

PUBHx

PUBHx

R4SBC

R4SBC

R5UBH

R5UBH

PFO1A

PFO1A

PFO1A

PSS1A

250 0 250 500 750 1000 ft

N

Legend

National Wetlands Inventory

- Freshwater Emergent (PEM1C)
- Freshwater Forested/Shrub (PFO1A)
- Freshwater Forested/Shrub (PSS1A)
- Freshwater Pond (PUBH)
- Freshwater Pond (PUBHx)
- Riverine (R2UBH)
- Riverine (R4SBC)
- Riverine (R5UBH)
- Riverine (R2USC)

Figure 4: National Wetlands Mapper

Greater Paducah Economic Development	
Project 19097	7/02/2019
Drawn by: BPH	Checked by: SLC

BFW
BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.
500 SOUTH 17TH STREET
PADUCAH, KY 42003

-88°45'0"

-88°44'24"

37°7'12"

37°6'36"

250 0 250 500 750 1000 ft

N

Legend

Flood Zone (100 year)

- A
- AE

Additional Flood Hazards

- 0.2% Annual chance of flood hazard (500 year)

Figure 5: FEMA Flood Area Map

Greater Paducah Economic Development

Project 19097	6/17/2019
Drawn by: BPH	Checked by: SLC

BFW

BACON | FARMER | WORKMAN

ENGINEERING & TESTING, INC.
500 SOUTH 17TH STREET
PADUCAH, KY 42003

Appendix B

Wetland Delineation Forms and Stream Assessment Forms

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Triple Rail Site City/County: Paducah/McCracken Sampling Date: 6/11/2019

Applicant/Owner: Greater Paducah Economic Development State: KY Sampling Point: PEM1

Investigator(s): SLC Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): _____

Subregion (LRR or MLRA): LRR P Lat: 37.123234 Long: -88.74054 Datum: NAD 83

Soil Map Unit Name: Routon silt loam / Kurk silt loam NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☑ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary 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)**

Field Observations:

Surface Water Present?	Yes X	No _____	Depth (inches): 3"
Water Table Present?	Yes _____	No _____	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 6"

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: PEM1

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (Plot size: 15')			
1. Salix nigra	5%	YES	OBL
2. Fraxinus pennsylvanica	10%	YES	FACW
3.			
4.			
5.			
6.			
7.			
8.			
	15% = Total Cover		

50% of total cover: 7.5% 20% of total cover: 3%

Herb Stratum (Plot size: 5')			
1. Eleocharis obtusa	80%	YES	OBL
2. Echinochloa crus-galli	10%	NO	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	90% = Total Cover		

50% of total cover: 45% 20% of total cover: 18%

Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	85	x 1 =	85
FACW species	20	x 2 =	40
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	105 (A)		125 (B)

Prevalence Index = B/A = 1.19

Hydrophytic Vegetation Indicators:

- [✓] 1 - Rapid Test for Hydrophytic Vegetation
- [✓] 2 - Dominance Test is >50%
- [✓] 3 - Prevalence Index is ≤3.0[1]
- [ ] Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: (If observed, list morphological adaptations below).

There were only a few trees at the edge of this emergent wetland. They were listed on the form but the majority of the wetland was emergent in the field.

SOIL

Sampling Point: PEM1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR5/2	100					SiCl	
2-12	10YR5/2	80	10YR4/4	20	C	M	SiCl	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 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)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Triple Rail Site City/County: Paducah/McCracken Sampling Date: 6/12/2019

Applicant/Owner: Greater Paducah Economic Development State: KY Sampling Point: PEM2

Investigator(s): SLC Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): _____

Subregion (LRR or MLRA): LRR P Lat: 37.123283 Long: -88.738651 Datum: NAD 83

Soil Map Unit Name: Ginat silt loam NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary 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)**

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): 6"

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: PEM2

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	15% = Total Cover		

50% of total cover: 7.5% 20% of total cover: 3%

Herb Stratum (Plot size: 5')			
1. Eleocharis obtusa	80%	YES	OBL
2. Echinochloa crus-galli	10%	NO	FACW
3. Ranunculus sardous	2%	NO	FAC
4. Ambrosia artemisiifolia	2%	NO	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	90% = Total Cover		

50% of total cover: 45% 20% of total cover: 18%

Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	80	x 1 =	80
FACW species	10	x 2 =	20
FAC species	2	x 3 =	6
FACU species	2	x 4 =	8
UPL species		x 5 =	
Column Totals:	94 (A)		114 (B)

Prevalence Index = B/A = 1.21

Hydrophytic Vegetation Indicators:

- [✓] 1 - Rapid Test for Hydrophytic Vegetation
- [✓] 2 - Dominance Test is >50%
- [✓] 3 - Prevalence Index is ≤3.0[1]
- [ ] Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: PEM2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR5/2	100					SiCl	
2-12	10YR5/2	80	10YR4/6	20	C	M	SiCl	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 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)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Triple Rail Site City/County: Paducah/McCracken Sampling Date: 6/12/2019

Applicant/Owner: Greater Paducah Economic Development State: KY Sampling Point: PEM3

Investigator(s): SLC Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): _____

Subregion (LRR or MLRA): LRR P Lat: 37.122399 Long: -88.736888 Datum: NAD 83

Soil Map Unit Name: Ginat silt loam NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary 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)**

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): 6"

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: PEM3

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (Plot size: 15')			
1. Liquidambar styraciflua	10%	YES	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	10% = Total Cover		

50% of total cover: 5% 20% of total cover: 2%

Herb Stratum (Plot size: 5')			
1. Scirpus atrovirens	50%	YES	OBL
2. Juncus scirpoides	30%	YES	FACW
3. Cicuta maculata	10%	NO	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	90% = Total Cover		

50% of total cover: 45% 20% of total cover: 18%

Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	50	x 1 =	50
FACW species	30	x 2 =	60
FAC species	20	x 3 =	60
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	100 (A)		170 (B)

Prevalence Index = B/A = 1.7

Hydrophytic Vegetation Indicators:

- [✓] 1 - Rapid Test for Hydrophytic Vegetation
- [✓] 2 - Dominance Test is >50%
- [✓] 3 - Prevalence Index is ≤3.0[1]
- [ ] Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: PEM3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR6/1	100					SiCl	
3-12	10YR5/2	80	10YR4/3	20	C	M	SiCl	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 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)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Triple Rail Site City/County: Paducah/McCracken Sampling Date: 6/12/2019

Applicant/Owner: Greater Paducah Economic Development State: KY Sampling Point: PEM4

Investigator(s): SLC Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): _____

Subregion (LRR or MLRA): LRR P Lat: 37.120611 Long: -88.739712 Datum: NAD 83

Soil Map Unit Name: Ginat silt loam NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary 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)**

Field Observations:

Surface Water Present?	Yes _____	No _____	Depth (inches): _____
Water Table Present?	Yes _____	No _____	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 4"

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: PEM4

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Herb Stratum (Plot size: 5')			
1. Eleocharis obtusa	90%	YES	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	90% = Total Cover		

50% of total cover: 45% 20% of total cover: 18%

Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	90	x 1 =	90
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = 1

Hydrophytic Vegetation Indicators:

- [x] 1 - Rapid Test for Hydrophytic Vegetation
- [x] 2 - Dominance Test is >50%
- [x] 3 - Prevalence Index is ≤3.0[1]
- [ ] Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: PEM4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR5/2	100					SiLC	
2-12	10YR5/2	80	10YR4/6	20	C	M	SiLC	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 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)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Triple Rail Site City/County: Paducah/McCracken Sampling Date: 6/12/2019

Applicant/Owner: Greater Paducah Economic Development State: KY Sampling Point: PEM5

Investigator(s): SLC Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): _____

Subregion (LRR or MLRA): LRR P Lat: 37.119317 Long: -88.744766 Datum: NAD 83

Soil Map Unit Name: Routon silt loam NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☑ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☑ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary 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)**

Field Observations:

Surface Water Present?	Yes X	No _____	Depth (inches): 2"
Water Table Present?	Yes _____	No _____	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 8"

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: PEM5

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Herb Stratum (Plot size: 5')			
1. Juncus scirpoides	40%	YES	FACW
2. Juncus sp.	40%	YES	FACW
3. Acer rubrum	10%	NO	FAC
4. Eupatorium serotinum	5%	NO	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	95% = Total Cover		

50% of total cover: 47.5% 20% of total cover: 19%

Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species	80	x 2 =	160
FAC species	15	x 3 =	45
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	95 (A)		205 (B)

Prevalence Index = B/A = 2.16

Hydrophytic Vegetation Indicators:

- [x] 1 - Rapid Test for Hydrophytic Vegetation
- [x] 2 - Dominance Test is >50%
- [x] 3 - Prevalence Index is ≤3.0[1]
- [ ] Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: PEM5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR4/3	100					SiL	
2-12	10YR6/1	70	10YR5/6	30	C	M	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 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)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Triple Rail Site City/County: Paducah/McCracken Sampling Date: 6/12/2019

Applicant/Owner: Greater Paducah Economic Development State: KY Sampling Point: PEM6

Investigator(s): SLC Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): _____

Subregion (LRR or MLRA): LRR P Lat: 37.118391 Long: -88.741483 Datum: NAD 83

Soil Map Unit Name: Ginat silt loam NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary 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)**

Field Observations:

Surface Water Present?	Yes _____	No _____	Depth (inches): _____
Water Table Present?	Yes _____	No _____	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 6"

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: PEM6

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Herb Stratum (Plot size: 5')			
1. Eleocharis obtusa	90%	YES	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	90% = Total Cover		

50% of total cover: 45% 20% of total cover: 18%

Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	90	x 1 =	90
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	90 (A)		90 (B)

Prevalence Index = B/A = 1

Hydrophytic Vegetation Indicators:

- [✓] 1 - Rapid Test for Hydrophytic Vegetation
- [✓] 2 - Dominance Test is >50%
- [✓] 3 - Prevalence Index is ≤3.0[1]
- [ ] Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: PEM6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR5/2	100					SiCl	
2-12	10YR5/2	80	10YR4/6	20	C	M	SiCl	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 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)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Triple Rail Site City/County: Paducah/McCracken Sampling Date: 6/12/2019

Applicant/Owner: Greater Paducah Economic Development State: KY Sampling Point: PEM7

Investigator(s): SLC Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): _____

Subregion (LRR or MLRA): LRR P Lat: 37.117634 Long: -88.741371 Datum: NAD 83

Soil Map Unit Name: Ginat silt loam NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary 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)**

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: PEM7

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: 10 20% of total cover:

Sapling/Shrub Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: 20% of total cover:

Herb Stratum (Plot size: 5')			
1. Eleocharis obtusa	80%	YES	OBL
2. Cyperus echinatus	10%	NO	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	90% = Total Cover		

50% of total cover: 45% 20% of total cover: 18%

Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: 20% of total cover:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	80	x 1 =	80
FACW species		x 2 =	
FAC species	10	x 3 =	30
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	90 (A)		110 (B)

Prevalence Index = B/A = 1.22

Hydrophytic Vegetation Indicators:

- [x] 1 - Rapid Test for Hydrophytic Vegetation
- [x] 2 - Dominance Test is >50%
- [x] 3 - Prevalence Index is ≤3.0[1]
- [ ] Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No**

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: PEM7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR5/2	100					SiCl	
2-12	10YR5/2	75	10YR4/4	25	C	M	SiCl	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 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)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Triple Rail Site City/County: Paducah/McCracken Sampling Date: 6/12/2019

Applicant/Owner: Greater Paducah Economic Development State: KY Sampling Point: PEM8

Investigator(s): SLC Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): _____

Subregion (LRR or MLRA): LRR P Lat: 37.117866 Long: -88.742945 Datum: NAD 83

Soil Map Unit Name: Ginat silt loam NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☑ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary 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)**

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Some areas where water ponds. Eventually drains to E5.

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

Sampling Point: PEM8

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: 10 20% of total cover:

Sapling/Shrub Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: 20% of total cover:

Herb Stratum (Plot size: 5')			
1. Eleocharis obtusa	80%	YES	OBL
2. Echinochloa crus-galli	20%	YES	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100% = Total Cover		

50% of total cover: 50% 20% of total cover: 20%

Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: 20% of total cover:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	80	x 1 =	80
FACW species	20	x 2 =	40
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	100 (A)		120 (B)

Prevalence Index = B/A = 1.20

Hydrophytic Vegetation Indicators:

- [x] 1 - Rapid Test for Hydrophytic Vegetation
- [x] 2 - Dominance Test is >50%
- [x] 3 - Prevalence Index is ≤3.0[1]
- [ ] Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No**

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: PEM8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR5/2	100					SiCl	
2-12	10YR6/2	70	10YR5/8	30	C	M	SiCl	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 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)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Triple Rail Site City/County: Paducah/McCracken Sampling Date: 6/12/2019

Applicant/Owner: Greater Paducah Economic Development State: KY Sampling Point: PEM9

Investigator(s): SLC Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): _____

Subregion (LRR or MLRA): LRR P Lat: 37.118186 Long: -88.744042 Datum: NAD 83

Soil Map Unit Name: Ginat silt loam/Kurk silt loam NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☑ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary 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)**

Field Observations:

Surface Water Present?	Yes X	No _____	Depth (inches): 1"
Water Table Present?	Yes _____	No _____	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 4"

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: PEM9

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: 10 20% of total cover:

Sapling/Shrub Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: 20% of total cover:

Herb Stratum (Plot size: 5')			
1. Eleocharis obtusa	80%	YES	OBL
2. Echinochloa crus-galli	20%	NO	FACW
3. Cyperus echinatus	10%	NO	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	110% = Total Cover		

50% of total cover: 55% 20% of total cover: 22%

Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: 20% of total cover:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	80	x 1 =	80
FACW species	20	x 2 =	40
FAC species	10	x 3 =	30
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	110 (A)		150 (B)

Prevalence Index = B/A = 1.36

Hydrophytic Vegetation Indicators:

- [✓] 1 - Rapid Test for Hydrophytic Vegetation
- [✓] 2 - Dominance Test is >50%
- [✓] 3 - Prevalence Index is ≤3.0[1]
- [ ] Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No**

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: PEM9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR6/2	100					SiCl	
2-12	10YR6/1	70	10YR5/8	30	C	M	SiCl	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 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)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Triple Rail Site City/County: Paducah/McCracken Sampling Date: 6/12/2019

Applicant/Owner: Greater Paducah Economic Development State: KY Sampling Point: PEM10

Investigator(s): SLC Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): _____

Subregion (LRR or MLRA): LRR P Lat: 37.116193 Long: -88.745843 Datum: NAD 83

Soil Map Unit Name: Ginat silt loam NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary 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)**

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: PEM10

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover: 10	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 5')			
1. Xanthium strumarium	50%	YES	FAC
2. Echinochloa crus-galli	50%	YES	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100% = Total Cover		
50% of total cover: 50%	20% of total cover: 20%		
Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species	50	x 2 =	100
FAC species	50	x 3 =	150
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	100 (A)		250 (B)

Prevalence Index = B/A = 2.5

Hydrophytic Vegetation Indicators:

- [x] 1 - Rapid Test for Hydrophytic Vegetation
- [x] 2 - Dominance Test is >50%
- [x] 3 - Prevalence Index is ≤3.0[1]
- [ ] Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: PEM10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR6/2	100					SiCl	
2-12	10YR6/1	70	10YR5/8	30	C	M	SiCl	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 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)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Triple Rail Site City/County: Paducah/McCracken Sampling Date: 6/12/2019

Applicant/Owner: Greater Paducah Economic Development State: KY Sampling Point: PEM11

Investigator(s): SLC Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): _____

Subregion (LRR or MLRA): LRR P Lat: 37.110915 Long: -88.744977 Datum: NAD 83

Soil Map Unit Name: Ginat silt loam NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes X	No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X	No _____	
Wetland Hydrology Present?	Yes X	No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☑ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☑ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary 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)**

Field Observations:

Surface Water Present?	Yes X	No _____	Depth (inches): 2"
Water Table Present?	Yes _____	No _____	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 6"

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: PEM11

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: 10 20% of total cover:

Sapling/Shrub Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: 20% of total cover:

Herb Stratum (Plot size: 5')			
1. Juncus marginatus	30%	YES	FACW
2. Ranunculus sardous	15%	NO	FAC
3. Cyperus echinatus	15%	NO	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	60% = Total Cover		

50% of total cover: 30% 20% of total cover: 12%

Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: 20% of total cover:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species 30	x 2 = 60
FAC species 30	x 3 = 90
FACU species	x 4 =
UPL species	x 5 =
Column Totals: 60 (A)	150 (B)

Prevalence Index = B/A = 2.5

Hydrophytic Vegetation Indicators:

- [x] 1 - Rapid Test for Hydrophytic Vegetation
- [x] 2 - Dominance Test is >50%
- [x] 3 - Prevalence Index is ≤3.0[1]
- [ ] Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No**

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: PEM11

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR6/2	100					SiCl	
2-12	10YR6/1	70	10YR5/8	30	C	M	SiCl	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 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)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Triple Rail Site City/County: Paducah/McCracken Sampling Date: 6/11/2019

Applicant/Owner: Greater Paducah Economic Development State: KY Sampling Point: PFO1

Investigator(s): SLC Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): _____

Subregion (LRR or MLRA): LRR P Lat: 37.123388 Long: -88.737161 Datum: NAD 83

Soil Map Unit Name: Ginat silt loam NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary 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)**

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): 4"

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: PFO1

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	20%	YES	FAC
2. Carya ovata	15%	YES	FACU
3. Quercus pagoda	15%	YES	FACW
4.			
5.			
6.			
7.			
8.			
	50%	= Total Cover	
50% of total cover: 25%	20% of total cover: 10%		
Sapling/Shrub Stratum (Plot size: 15')			
1. Acer rubrum	20%	YES	FAC
2. Celtis occidentalis	15%	YES	FACU
3.			
4.			
5.			
6.			
7.			
8.			
	35%	= Total Cover	
50% of total cover: 17.5%	20% of total cover: 7%		
Herb Stratum (Plot size: 5')			
1. Glyceria striata	20%	YES	FACW
2. Parthenocissus quinquefolia	15%	NO	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	35%	= Total Cover	
50% of total cover: 17.5%	20% of total cover: 7%		
Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66.7% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species	35	x 2 =	70
FAC species	55	x 3 =	165
FACU species	30	x 4 =	120
UPL species		x 5 =	
Column Totals:	120 (A)		355 (B)

Prevalence Index = B/A = 2.95

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: (If observed, list morphological adaptations below).

This area has probably been clear cut in the past 10 years. Many smaller trees/shrubs.

SOIL

Sampling Point: PFO1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR5/2	100					SiL	
3-10+	10YR5/1	75	10YR4/6	25	C	M	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 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)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Triple Rail Site City/County: Paducah/McCracken Sampling Date: 6/11/2019

Applicant/Owner: Greater Paducah Economic Development State: KY Sampling Point: PFO2

Investigator(s): SLC Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): _____

Subregion (LRR or MLRA): LRR P Lat: 37.121999 Long: -88.742748 Datum: NAD 83

Soil Map Unit Name: Ginat silt loam NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary 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)**

Field Observations:

Surface Water Present?	Yes _____	No _____	Depth (inches): _____
Water Table Present?	Yes _____	No _____	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 4"

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: PFO2

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	40%	YES	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	40% = Total Cover		
50% of total cover: 20%	20% of total cover: 8%		
Sapling/Shrub Stratum (Plot size: 15')			
1. Acer rubrum	20%	YES	FAC
2. Liquidambar styraciflua	15%	YES	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	35% = Total Cover		
50% of total cover: 17.5%	20% of total cover: 7%		
Herb Stratum (Plot size: 5')			
1. Euyonomous fortunii	20%	YES	NI
2. Toxicodendron radicans	15%	YES	FAC
3. Impatiens capensis	15%	YES	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	50% = Total Cover		
50% of total cover: 25%	20% of total cover: 10%		
Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 83.3% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species	15	x 2 =	30
FAC species	70	x 3 =	210
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	85 (A)		240 (B)

Prevalence Index = B/A = 2.82

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: (If observed, list morphological adaptations below).

This area has probably been clear cut in the past 10 years. Many smaller trees/shrubs.

SOIL

Sampling Point: PFO2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR5/2	100					SiL	
3-10+	10YR5/1	75	10YR4/6	25	C	M	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 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)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Triple Rail Site City/County: Paducah/McCracken Sampling Date: 6/11/2019

Applicant/Owner: Greater Paducah Economic Development State: KY Sampling Point: PFO3

Investigator(s): SLC Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): _____

Subregion (LRR or MLRA): LRR P Lat: 37.11879 Long: -88.741968 Datum: NAD 83

Soil Map Unit Name: Ginat silt loam NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary 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)**

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: PFO3

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	20%	YES	FAC
2. Ulmus americana	15%	YES	FAC
3. Fraxinus pennsylvanica	15%	YES	FACW
4.			
5.			
6.			
7.			
8.			
	50%	= Total Cover	

50% of total cover: 25% 20% of total cover: 10%

Sapling/Shrub Stratum (Plot size: 15')			
1. Acer rubrum	20%	YES	FAC
2. Fraxinus pennsylvanica	20%	YES	FACW
3.			
4.			
5.			
6.			
7.			
8.			
	40%	= Total Cover	

50% of total cover: 20% 20% of total cover: 8%

Herb Stratum (Plot size: 5')			
1. Toxicodendron radicans	15%	YES	FAC
2. Fraxinus pennsylvanica	15%	YES	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	30%	= Total Cover	

50% of total cover: 15% 20% of total cover: 6%

Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	

50% of total cover: 20% of total cover:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species	35	x 2 =	70
FAC species	85	x 3 =	255
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	120 (A)		325 (B)

Prevalence Index = B/A = 2.70

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No**

Remarks: (If observed, list morphological adaptations below).

This area has been clear cut in the past 10 years. Many smaller trees/shrubs.

SOIL

Sampling Point: PFO3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR5/2	100					SiL	
3-10+	10YR5/2	75	10YR4/6	25	C	M	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 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)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Triple Rail Site City/County: Paducah/McCracken Sampling Date: 6/11/2019

Applicant/Owner: Greater Paducah Economic Development State: KY Sampling Point: PFO4

Investigator(s): SLC Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): _____

Subregion (LRR or MLRA): LRR P Lat: 37.117441 Long: -88.742101 Datum: NAD 83

Soil Map Unit Name: Ginat silt loam NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary 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)**

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: PFO4

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	20%	YES	FAC
2. Ulmus americana	15%	YES	FAC
3. Liquidambar styraciflua	15%	YES	FAC
4. Quercus palustris	10%	NO	FACW
5.			
6.			
7.			
8.			
	60% = Total Cover		
50% of total cover: 30%	20% of total cover: 12%		
Sapling/Shrub Stratum (Plot size: 15')			
1. Acer rubrum	20%	YES	FAC
2. Ulmus americana	15%	YES	FAC
3. Liquidambar styraciflua	15%	YES	FAC
4.			
5.			
6.			
7.			
8.			
	50% = Total Cover		
50% of total cover: 25%	20% of total cover: 10%		
Herb Stratum (Plot size: 5')			
1. Glyceria striata	20%	YES	FAC
2. Microstegium vimineum	5%	YES	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	25% = Total Cover		
50% of total cover: 12.5%	20% of total cover: 5%		
Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
50% of total cover: _____	20% of total cover: _____		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species	10	x 2 =	20
FAC species	125	x 3 =	375
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	135 (A)		395 (B)

Prevalence Index = B/A = 2.93

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: (If observed, list morphological adaptations below).

This area has been clear cut in the past 10 years. Many smaller trees/shrubs. This area is also adjacent to an area that the farmer has dredged to remove water from the field.

SOIL

Sampling Point: PFO4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR5/2	100					SiL	
3-10+	10YR5/2	70	10YR4/4	30	C	M	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 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)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Triple Rail Site City/County: Paducah/McCracken Sampling Date: 6/11/2019

Applicant/Owner: Greater Paducah Economic Development State: KY Sampling Point: PFO5

Investigator(s): SLC Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): _____

Subregion (LRR or MLRA): LRR P Lat: 37.11623 Long: -88.745226 Datum: NAD 83

Soil Map Unit Name: Routon silt loam NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☑ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☑ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary 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)**

Field Observations:

Surface Water Present?	Yes X	No _____	Depth (inches): 2"
Water Table Present?	Yes _____	No _____	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 6"

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Multiple areas of ponded water.

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

Sampling Point: PFO5

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	40%	YES	FAC
2. Salix nigra	15%	YES	OBL
3. Liquidambar styraciflua	15%	YES	FAC
4.			
5.			
6.			
7.			
8.			
	70% = Total Cover		
50% of total cover: 35%	20% of total cover: 14%		
Sapling/Shrub Stratum (Plot size: 15')			
1. Acer rubrum	30%	YES	FAC
2. Ulmus americana	15%	YES	FAC
3. Liquidambar styraciflua	15%	YES	FAC
4.			
5.			
6.			
7.			
8.			
	60% = Total Cover		
50% of total cover: 30%	20% of total cover: 12%		
Herb Stratum (Plot size: 5')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		
50% of total cover:	20% of total cover:		
Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	15	x 1 =	15
FACW species		x 2 =	
FAC species	115	x 3 =	345
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	130 (A)		360 (B)

Prevalence Index = B/A = 2.77

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: (If observed, list morphological adaptations below).

This area has been clear cut in the past 10 years. Many smaller trees/shrubs.

SOIL

Sampling Point: PFO5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR5/1	100					SiLC	
3-10+	10YR5/1	80	10YR5/8	20	C	M	SiLC	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 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)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Triple Rail Site City/County: Paducah/McCracken Sampling Date: 6/11/2019

Applicant/Owner: Greater Paducah Economic Development State: KY Sampling Point: PFO6

Investigator(s): SLC Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): _____

Subregion (LRR or MLRA): LRR P Lat: 37.115952 Long: -88.743707 Datum: NAD 83

Soil Map Unit Name: Ginat silt loam NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☑ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary 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)**

Field Observations:

Surface Water Present?	Yes _____	No _____	Depth (inches): _____
Water Table Present?	Yes _____	No _____	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 6"

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: PFO6

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Liquidambar styraciflua	20%	YES	FAC
2. Acer rubrum	10%	YES	FAC
3. Quercus palustris	15%	YES	FACW
4.			
5.			
6.			
7.			
8.			
	45% = Total Cover		
50% of total cover: 22.5%	20% of total cover: 9%		
Sapling/Shrub Stratum (Plot size: 15')			
1. Acer rubrum	40%	YES	FAC
2. Ulmus americana	30%	YES	FAC
3. Fraxinus pennsylvanica	30%	YES	FAC
4.			
5.			
6.			
7.			
8.			
	100% = Total Cover		
50% of total cover: 50%	20% of total cover: 20%		
Herb Stratum (Plot size: 5')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		
50% of total cover:	20% of total cover:		
Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species	15	x 2 =	30
FAC species	130	x 3 =	390
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	145 (A)		420 (B)

Prevalence Index = B/A = 2.90

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: (If observed, list morphological adaptations below).

This area may have been clear cut in the past 10 years. Many smaller trees/shrubs.

SOIL

Sampling Point: PFO6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR4/2	80	10YR4/6	20			SiLC	
4-12+	10YR6/1	75	10YR4/6	25	C	M	SiLC	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 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)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Triple Rail Site City/County: Paducah/McCracken Sampling Date: 6/11/2019

Applicant/Owner: Greater Paducah Economic Development State: KY Sampling Point: PFO7

Investigator(s): SLC Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): _____

Subregion (LRR or MLRA): LRR P Lat: 37.113388 Long: -88.745226 Datum: NAD 83

Soil Map Unit Name: Ginat silt loam NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☑ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☑ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary 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)**

Field Observations:

Surface Water Present?	Yes X	No _____	Depth (inches): 2"
Water Table Present?	Yes _____	No _____	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 6"

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Areas of ponded water.

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

Sampling Point: PFO7

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	20%	YES	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	20% = Total Cover		
50% of total cover: 10%	20% of total cover: 4%		
Sapling/Shrub Stratum (Plot size: 15')			
1. Acer rubrum	20%	YES	FAC
2. Salix nigra	20%	YES	OBL
3.			
4.			
5.			
6.			
7.			
8.			
	100% = Total Cover		
50% of total cover: 50%	20% of total cover: 20%		
Herb Stratum (Plot size: 5')			
1. Toxicodendron radicans	40%	YES	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		
50% of total cover:	20% of total cover:		
Woody Vine Stratum (Plot size: 30')			
1. Toxicodendron radicans	30%	YES	FAC
2.			
3.			
4.			
5.			
	30% = Total Cover		
50% of total cover: 15%	20% of total cover: 6%		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	20	x 1 =	20
FACW species		x 2 =	
FAC species	110	x 3 =	330
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	130 (A)		350 (B)

Prevalence Index = B/A = 2.7

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: (If observed, list morphological adaptations below).

This area may have been clear cut in the past 10 years. Many smaller trees/shrubs.

SOIL

Sampling Point: PFO7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12+	10YR6/1	85	10YR4/6	15	C	M	SiLC	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 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)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Triple Rail Site City/County: Paducah/McCracken Sampling Date: 6/11/2019

Applicant/Owner: Greater Paducah Economic Development State: KY Sampling Point: PFO8

Investigator(s): SLC Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): _____

Subregion (LRR or MLRA): LRR P Lat: 37.118968 Long: -88.745689 Datum: NAD 83

Soil Map Unit Name: Routon silt loam NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary 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)**

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: PFO8

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Quercus palustris	15%	YES	FACW
2. Quercus lyrata	15%	YES	OBL
3.			
4.			
5.			
6.			
7.			
8.			
	30% = Total Cover		
50% of total cover: 15%	20% of total cover: 6%		
Sapling/Shrub Stratum (Plot size: 15')			
1. Acer rubrum	20%	YES	FAC
2. Fraxinus pennsylvanica	15%	YES	FAC
3. Ulmus americana	15%	YES	FAC
4.			
5.			
6.			
7.			
8.			
	50% = Total Cover		
50% of total cover: 25%	20% of total cover: 10%		
Herb Stratum (Plot size: 5')			
1. Toxicodendron radicans	5%	YES	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	5% = Total Cover		
50% of total cover: 2.5%	20% of total cover: 1%		
Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	15	x 1 =	15
FACW species	15	x 2 =	30
FAC species	55	x 3 =	165
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	85 (A)		210 (B)

Prevalence Index = B/A = 2.47

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: (If observed, list morphological adaptations below).

This area may have been clear cut in the past 10 years. Many smaller trees/shrubs.

SOIL

Sampling Point: PFO8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10+	10YR5/2	70	10YR4/6	30	C	M	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 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)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

Stream Name:	**I1-DS**			**Location:**	**Triple Rail Site**		
				Basin/Watershed:	**Lower Ohio / Massac Creek**		
Lat:	**37.107601**	**Long:**	**-88.744008**	**County:**	**McCracken**	**USGS 7.5 Topo:**	**Paducah West**
Date:	**6/10/2019**			**Investigators:**	**SLC/BPH**		

Type Sample: ☑ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **79** **°F** **26** **°C**

Inches of rainfall in the past 24 hrs: **0** in

20 **% Cloud Cover**

P-Chem: Temp (°F) 70 D.O. (mg/L) 3.6 % Saturation N/A pH (S.U.) 6.5 Conductivity (µS) 291 ☑ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	4	ft
Stream Width BF	20	ft
Stream Bottom Width	14	ft
Avg. Bankfull Depth	3	ft
Avg. H_2O Depth Riffle	1	in

Local Watershed Features:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☐ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☑ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☑ Culverts

Stream Flow: ☐ Dry ☐ Pooled ☐ Low ☑ Normal ☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial	☑ Intermittent
☐ Ephemeral	☐ Seep

Riparian Vegetation:

Dominate Type:

☑ Trees	☑ Shrubs
☑ Grasses	☑ Herbaceous

Number of strata: 4

Dom. Tree/Shrub Taxa:

Red Maple, Sycamore
Sweet Gum
Poison Ivy

Canopy Cover:

- ☐ Fully Exposed (0-25%)
- ☐ Partially Exposed (25-50%)
- ☐ Partially Shaded (50-75%)
- ☑ Fully Shaded (75-100%)

Channel Alterations:

- ☐ Dredging
- ☐ Channelization (☐ Full ☐ Partial)

Substrate: ☑ Est. ☐ P.C.

	Riffle 20 %	Run 10 %	Pool 70 %
Silt/Clay(<0.06 mm / <0.002 in)			
Sand (0.06 - 2 mm / 0.002-0.08 in)	20.0%	10.0%	20.0%
Gravel (2 - 64 mm / 0.08 - 2.5 in)	70.0%	70.0%	60.0%
Cobble (64 - 256 mm / 2.5 - 10.1 in)	10.0%	20.0%	20.0%
Boulders (>256 mm / >10.1 in)			
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	> 50% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

Score **38**

☑ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

2. Pool Substrate / Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
Score **16**	☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
3. Pool Variability	Even mix of large shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep, very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
Score **10**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
Score **13**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
Score **8**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score **16**	☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was in a straight line. (Note - channel braiding is considered coastal plains and other normal low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1-2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
Score **6**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) **4**	Left Bank ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			
Score (RB) **3**	Right Bank ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			

9.	**Vegetative Protection (score each bank)** Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**5**	Left Bank	☐ ☐	☐ ☐ ☐	☑ ☐ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**4**	Right Bank	☐ ☐	☐ ☐ ☐	☐ ☑ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
10.	**Riparian Vegetative Zone Width (score each bank riparian zone)** Note: determine left or right side by facing downstream.	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**4**	Left Bank	☐ ☐	☐ ☐ ☐	☐ ☑ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**6**	Right Bank	☐ ☐	☐ ☐ ☑	☐ ☐ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
TOTAL SCORE	**133**	**Suboptimal**				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

Stream Name:	**I1-US**			**Location:**	**Triple Rail Site**		
				Basin/Watershed:	**Lower Ohio / Massac Creek**		
Lat:	**37.1085971**	**Long:**	**-88.747063**	**County:**	**McCracken**	**USGS 7.5 Topo:**	**Paducah West**
Date:	**6/10/2019**			**Investigators:**	**SLC/BPH**		

Type Sample: ☑ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **79** **°F** **26** **°C**

Inches of rainfall in the past 24 hrs: **0** in

20 **% Cloud Cover**

P-Chem: Temp (°F) 70 D.O. (mg/L) 3.9 % Saturation N/A pH (S.U.) 7.21 Conductivity (µS) 306 ☑ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	6	ft
Stream Width BF	14	ft
Stream Bottom Width	10	ft
Avg. Bankfull Depth	3	ft
Avg. H_2O Depth Riffle	1	in

Local Watershed Features:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☐ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☑ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☐ Culverts

Stream Flow: ☐ Dry ☐ Pooled ☐ Low ☑ Normal ☐ High ☐ Very Rapid or Torrential

Stream Type: ☐ Perennial ☑ Intermittent ☐ Ephemeral ☐ Seep

Riparian Vegetation:

Dominate Type: ☑ Trees ☑ Shrubs ☑ Grasses ☑ Herbaceous

Number of strata: 4

Dom. Tree/Shrub Taxa: American Elm; Muliflora Rose; Japanese Stiltgrass

Canopy Cover:

☐ Fully Exposed (0-25%)
☑ Partially Exposed (25-50%)
☐ Partially Shaded (50-75%)
☐ Fully Shaded (75-100%)

Channel Alterations:

☐ Dredging
☐ Channelization (☐ Full ☐ Partial)

Substrate: ☑ Est. ☐ P.C.	Riffle 15 %	Run 15 %	Pool 70 %
Silt/Clay(<0.06 mm / <0.002 in)			10.0%
Sand (0.06 - 2 mm / 0.002-0.08 in)	15.0%	15.0%	20.0%
Gravel (2 - 64 mm / 0.08 - 2.5 in)	70.0%	70.0%	60.0%
Cobble (64 - 256 mm / 2.5 - 10.1 in)	15.0%	15.0%	10.0%
Boulders (>256 mm / >10.1 in)			
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	> 50% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

Score **16**

☐ 20	☐ 19	☐ 18	☐ 17	☑ 16	☐ 15	☐ 14	☐ 13	☐ 12	☐ 11	☐ 10	☐ 9	☐ 8	☐ 7	☐ 6	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0

2. Pool Substrate / Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
Score **16**	☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
3. Pool Variability	Even mix of large shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep, very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
Score **10**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
Score **13**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
Score **12**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score **16**	☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was in a straight line. (Note - channel braiding is considered coastal plains and other normal low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1-2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
Score **6**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) **8**	Left Bank ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			
Score (RB) **8**	Right Bank ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			

9. **Vegetative Protection (score each bank)** Note: determine left or right side by facing downstream.		More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**8**	Left Bank	☑ 8			
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**8**	Right Bank	☑ 8			
			10 9	8 7 6	5 4 3	2 1 0
10. **Riparian Vegetative Zone Width (score each bank riparian zone)** Note: determine left or right side by facing downstream.		Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**3**	Left Bank	☑ 3			
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**2**	Right Bank	☑ 2			
			10 9	8 7 6	5 4 3	2 1 0
TOTAL SCORE	**126**	**Suboptimal**				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

Stream Name:	I2			**Location:**	Triple Rail Site		
				Basin/Watershed:	Lower Ohio / Massac Creek		
Lat:	37.115408	**Long:**	-88.748876	**County:**	McCracken	**USGS 7.5 Topo:**	Paducah West
Date:	6/10/2019			**Investigators:**	SLC/BPH		

Type Sample: ☑ P-CHEM ☐ Macroinvertebrate ☐ Fish ☐ Bact.

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ Yes ☐ No

Appr. Air Temp: 79 °F 26 °C

Inches of rainfall in the past 24 hrs: 0 in

20 % Cloud Cover

P-Chem: Temp (°F) 70 D.O. (mg/L) 4.8 % Saturation N/A pH (S.U.) 7.1 Conductivity (µS) 325 ☑ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	2.5	ft
Stream Width BF	4	ft
Stream Bottom Width	2	ft
Avg. Bankfull Depth	1	ft
Avg. H_2O Depth Riffle	1	in

Local Watershed Features:
Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☐ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☑ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☑ Culverts

Stream Flow: ☐ Dry ☐ Pooled ☐ Low ☑ Normal ☐ High ☐ Very Rapid or Torrential

Stream Type: ☐ Perennial ☑ Intermittent ☐ Ephemeral ☐ Seep

Riparian Vegetation:

Dominate Type:

☑ Trees	☑ Shrubs	**Dom. Tree/Shrub Taxa:**	Poison Ivy
☑ Grasses	☑ Herbaceous		Virginia Creeper
Number of strata:			4

Canopy Cover:
☐ Fully Exposed (0-25%)
☐ Partially Exposed (25-50%)
☐ Partially Shaded (50-75%)
☑ Fully Shaded (75-100%)

Channel Alterations:
☐ Dredging
☐ Channelization
(☐ Full ☐ Partial)

Substrate: ☑ Est. ☐ P.C.

	Riffle 20 %	Run 60 %	Pool 20 %
Silt/Clay(<0.06 mm / <0.002 in)	100.0%	100.0%	100.0%
Sand (0.06 - 2 mm / 0.002-0.08 in)			
Gravel (2 - 64 mm / 0.08 - 2.5 in)			
Cobble (64 - 256 mm / 2.5 - 10.1 in)			
Boulders (>256 mm / >10.1 in)			
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	> 50% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

Score 5

20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐

2. Pool Substrate / Characterization		Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.	
Score	**7**	☐ 20 ☐ 19 ☐ 18 ☐ 17 ☐ 16	☐ 15 ☐ 14 ☐ 13 ☐ 12 ☐ 11	☐ 10 ☐ 9 ☐ 8 ☑ 7 ☐ 6	☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ 0	
3. Pool Variability		Even mix of large shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep, very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.	
Score	**3**	☐ 20 ☐ 19 ☐ 18 ☐ 17 ☐ 16	☐ 15 ☐ 14 ☐ 13 ☐ 12 ☐ 11	☐ 10 ☐ 9 ☐ 8 ☐ 7 ☐ 6	☐ 5 ☐ 4 ☑ 3 ☐ 2 ☐ 1 ☐ 0	
4. Sediment Deposition		Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.	
Score	**3**	☐ 20 ☐ 19 ☐ 18 ☐ 17 ☐ 16	☐ 15 ☐ 14 ☐ 13 ☐ 12 ☐ 11	☐ 10 ☐ 9 ☐ 8 ☐ 7 ☐ 6	☐ 5 ☐ 4 ☑ 3 ☐ 2 ☐ 1 ☐ 0	
5. Channel Flow Status		Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.	
Score	**7**	☐ 20 ☐ 19 ☐ 18 ☐ 17 ☐ 16	☐ 15 ☐ 14 ☐ 13 ☐ 12 ☐ 11	☐ 10 ☐ 9 ☐ 8 ☑ 7 ☐ 6	☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ 0	
6. Channel Alteration		Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.	
Score	**16**	☐ 20 ☐ 19 ☐ 18 ☐ 17 ☑ 16	☐ 15 ☐ 14 ☐ 13 ☐ 12 ☐ 11	☐ 10 ☐ 9 ☐ 8 ☐ 7 ☐ 6	☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ 0	
7. Channel Sinuosity		The bends in the stream increase the stream length 3-4 times longer than if it was in a straight line. (Note - channel braiding is considered coastal plains and other normal low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1-2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.	
Score	**8**	☐ 20 ☐ 19 ☐ 18 ☐ 17 ☐ 16	☐ 15 ☐ 14 ☐ 13 ☐ 12 ☐ 11	☐ 10 ☐ 9 ☑ 8 ☐ 7 ☐ 6	☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ 0	
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.		Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.	
Score (LB)	**7**	Left Bank ☐ 10 ☐ 9	☐ 8 ☑ 7 ☐ 6	☐ 5 ☐ 4 ☐ 3	☐ 2 ☐ 1 ☐ 0	
Score (RB)	**7**	Right Bank ☐ 10 ☐ 9	☐ 8 ☑ 7 ☐ 6	☐ 5 ☐ 4 ☐ 3	☐ 2 ☐ 1 ☐ 0	

9.	**Vegetative Protection (score each bank)** Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**4**	Left Bank	☐ ☐ 10 9	☐ ☐ ☐ 8 7 6	☐ ☑ ☐ 5 4 3	☐ ☐ ☐ 2 1 0
Score (RB)	**4**	Right Bank	☐ ☐ 10 9	☐ ☐ ☐ 8 7 6	☐ ☑ ☐ 5 4 3	☐ ☐ ☐ 2 1 0
10.	**Riparian Vegetative Zone Width (score each bank riparian zone)** Note: determine left or right side by facing downstream.	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**5**	Left Bank	☐ ☐ 10 9	☐ ☐ ☐ 8 7 6	☑ ☐ ☐ 5 4 3	☐ ☐ ☐ 2 1 0
Score (RB)	**3**	Right Bank	☐ ☐ 10 9	☐ ☐ ☐ 8 7 6	☐ ☐ ☑ 5 4 3	☐ ☐ ☐ 2 1 0
TOTAL SCORE	**79**	**Marginal**				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

Stream Name:	**I3-DS**			**Location:**	**Triple Rail Site**		
				Basin/Watershed:	**Lower Ohio / Massac Creek**		
Lat:	**37.113865**	**Long:**	**-88.741833**	**County:**	**McCracken**	**USGS 7.5 Topo:**	**Paducah West**
Date:	**6/10/2019**			**Investigators:**	**SLC/BPH**		

Type Sample: ☐ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **79** **°F** **26** **°C**

Inches of rainfall in the past 24 hrs: **0** in

20 **% Cloud Cover**

P-Chem: Temp (°F) 70 D.O. (mg/L) N/A % Saturation N/A pH (S.U.) N/A Conductivity (µS) N/A ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	2	ft
Stream Width BF	3	ft
Stream Bottom Width	2	ft
Avg. Bankfull Depth	0.5	ft
Avg. H_2O Depth Riffle	1	in

Local Watershed Features:
Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☐ Forest
☐ Deep Mining	☐ Commercial	☐ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☑ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☐ Culverts

Stream Flow: ☐ Dry ☐ Pooled ☐ Low ☑ Normal ☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial	☑ Intermittent
☐ Ephemeral	☐ Seep

Riparian Vegetation:

Dominate Type:

☑ Trees	☑ Shrubs	**Dom. Tree/Shrub Taxa:**	Red Maple, Hickory
☑ Grasses	☑ Herbaceous		Elm, Virginia Creeper
			Honeysuckle
Number of strata:			4

Canopy Cover:
☐ Fully Exposed (0-25%)
☐ Partially Exposed (25-50%)
☐ Partially Shaded (50-75%)
☑ Fully Shaded (75-100%)

Channel Alterations:
☐ Dredging
☑ Channelization
(☐ Full ☑ Partial)

Substrate: ☑ Est. ☐ P.C.

	Riffle 10 %	Run 80 %	Pool 10 %
Silt/Clay(<0.06 mm / <0.002 in)	100.0%	100.0%	100.0%
Sand (0.06 - 2 mm / 0.002-0.08 in)			
Gravel (2 - 64 mm / 0.08 - 2.5 in)			
Cobble (64 - 256 mm / 2.5 - 10.1 in)			
Boulders (>256 mm / >10.1 in)			
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	> 50% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

Score **6**

20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐

2. Pool Substrate / Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
Score **6**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
3. Pool Variability	Even mix of large shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep, very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
Score **5**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
Score **5**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
Score **6**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score **16**	☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was in a straight line. (Note - channel braiding is considered coastal plains and other normal low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1-2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
Score **6**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) **6**	Left Bank ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			
Score (RB) **6**	Right Bank ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			

9. **Vegetative Protection (score each bank)** Note: determine left or right side by facing downstream.		More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**4**	Left Bank	☐ ☐	☐ ☐ ☐	☐ ☑ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**4**	Right Bank	☐ ☐	☐ ☐ ☐	☐ ☑ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
10. **Riparian Vegetative Zone Width (score each bank riparian zone)** Note: determine left or right side by facing downstream.		Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**4**	Left Bank	☐ ☐	☐ ☐ ☐	☐ ☑ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**4**	Right Bank	☐ ☐	☐ ☐ ☐	☐ ☑ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
TOTAL SCORE	**78**	**Marginal**				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

Stream Name:	**I3-US**			**Location:**	**Triple Rail Site**		
				Basin/Watershed:	**Lower Ohio / Massac Creek**		
Lat:	**37.111839**	**Long:**	**-88.74428**	**County:**	**McCracken**	**USGS 7.5 Topo:**	**Paducah West**
Date:	**6/10/2019**			**Investigators:**	**SLC/BPH**		

Type Sample: ☐ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **79** **°F** **26** **°C**

Inches of rainfall in the past 24 hrs: **0** in

20 **% Cloud Cover**

P-Chem: Temp (°F) 70 D.O. (mg/L) N/A % Saturation N/A pH (S.U.) N/A Conductivity (µS) N/A ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	3	ft
Stream Width BF	4	ft
Stream Bottom Width	2	ft
Avg. Bankfull Depth	0.5	ft
Avg. H_2O Depth Riffle	N/A	in

Local Watershed Features:
Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☐ Forest
☐ Deep Mining	☐ Commercial	☐ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☑ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☐ Culverts

Stream Flow:
☐ Dry ☐ Pooled ☐ Low ☑ Normal
☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial	☐ Intermittent
☑ Ephemeral	☐ Seep

Riparian Vegetation:

Dominate Type:

☐ Trees	☐ Shrubs
☑ Grasses	☑ Herbaceous

Number of strata: 2

Dom. Tree/Shrub Taxa:
Curly Doc, Ragweed
Wild Onion
Hairy Buttercup, Soybean

Canopy Cover:
☑ Fully Exposed (0-25%)
☐ Partially Exposed (25-50%)
☐ Partially Shaded (50-75%)
☐ Fully Shaded (75-100%)

Channel Alterations:
☑ Dredging
☐ Channelization
(☑ Full ☐ Partial)

Substrate: ☑ Est. ☐ P.C.

	Riffle %	Run 90 %	Pool 10 %
Silt/Clay(<0.06 mm / <0.002 in)		100.0%	100.0%
Sand (0.06 - 2 mm / 0.002-0.08 in)			
Gravel (2 - 64 mm / 0.08 - 2.5 in)			
Cobble (64 - 256 mm / 2.5 - 10.1 in)			
Boulders (>256 mm / >10.1 in)			
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	> 50% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

Score **5**

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐

20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

2. Pool Substrate / Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
Score **6**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
3. Pool Variability	Even mix of large shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep, very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
Score **3**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
Score **4**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
Score **2**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score **8**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was in a straight line. (Note - channel braiding is considered coastal plains and other normal low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1-2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
Score **3**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) **5**	Left Bank ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			
Score (RB) **5**	Right Bank ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			

9.	**Vegetative Protection (score each bank)** Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**5**	Left Bank	☐ ☐	☐ ☐ ☐	☑ ☐ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**5**	Right Bank	☐ ☐	☐ ☐ ☐	☑ ☐ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
10.	**Riparian Vegetative Zone Width (score each bank riparian zone)** Note: determine left or right side by facing downstream.	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**3**	Left Bank	☐ ☐	☐ ☐ ☐	☐ ☐ ☑	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**3**	Right Bank	☐ ☐	☐ ☐ ☐	☐ ☐ ☑	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
TOTAL SCORE	**57**	**Marginal**				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

Stream Name:	**I4-DS**			**Location:**	**Triple Rail Site**		
				Basin/Watershed:	**Lower Ohio / Massac Creek**		
Lat:	**37.11597**	**Long:**	**-88.741603**	**County:**	**McCracken**	**USGS 7.5 Topo:**	**Paducah West**
Date:	**6/10/2019**			**Investigators:**	**SLC/BPH**		

Type Sample: ☑ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **79** °F **26** °C

Inches of rainfall in the past 24 hrs: **0** in

20 **% Cloud Cover**

P-Chem: Temp (°F) 70 D.O. (mg/L) 5.7 % Saturation N/A pH (S.U.) 7.15 Conductivity (µS) 104 ☑ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	3	ft
Stream Width BF	13	ft
Stream Bottom Width	8	ft
Avg. Bankfull Depth	4	ft
Avg. H_2O Depth Riffle	3	in

Local Watershed Features:
Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☐ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☑ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☑ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☐ Culverts

Stream Flow: ☐ Dry ☐ Pooled ☐ Low ☑ Normal ☐ High ☐ Very Rapid or Torrential

Stream Type: ☐ Perennial ☑ Intermittent ☐ Ephemeral ☐ Seep

Riparian Vegetation:

Dominate Type: ☑ Trees ☑ Shrubs ☑ Grasses ☑ Herbaceous

Number of strata: 4

Dom. Tree/Shrub Taxa: Green Ash, Honeysuckle, Poision Ivy

Canopy Cover:
☐ Fully Exposed (0-25%)
☐ Partially Exposed (25-50%)
☐ Partially Shaded (50-75%)
☑ Fully Shaded (75-100%)

Channel Alterations:
☐ Dredging
☐ Channelization (☐ Full ☐ Partial)

Substrate: ☑ Est. ☐ P.C.	Riffle 15 %	Run 60 %	Pool 25 %
Silt/Clay(<0.06 mm / <0.002 in)	10.0%	20.0%	20.0%
Sand (0.06 - 2 mm / 0.002-0.08 in)	10.0%	10.0%	20.0%
Gravel (2 - 64 mm / 0.08 - 2.5 in)	80.0%	70.0%	60.0%
Cobble (64 - 256 mm / 2.5 - 10.1 in)			
Boulders (>256 mm / >10.1 in)			
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	> 50% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

Score **16**

☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

2. Pool Substrate / Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
Score **13**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
3. Pool Variability	Even mix of large shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep, very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
Score **10**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
Score **9**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
Score **8**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score **13**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was in a straight line. (Note - channel braiding is considered coastal plains and other normal low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1-2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
Score **11**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) **5**	Left Bank ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			
Score (RB) **5**	Right Bank ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			

9. **Vegetative Protection (score each bank)** Note: determine left or right side by facing downstream.		More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
Score (LB)	**5**	Left Bank	☐ ☐	☐ ☐ ☐	☑ ☐ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**5**	Right Bank	☐ ☐	☐ ☐ ☐	☑ ☐ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
10. **Riparian Vegetative Zone Width (score each bank riparian zone)** Note: determine left or right side by facing downstream.		Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
Score (LB)	**8**	Left Bank	☐ ☐	☑ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**4**	Right Bank	☐ ☐	☐ ☐ ☐	☐ ☑ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
TOTAL SCORE	**112**	**Suboptimal**				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

Stream Name:	**I4-US**			**Location:**	**Triple Rail Site**		
				Basin/Watershed:	**Lower Ohio / Massac Creek**		
Lat:	**37.119793**	**Long:**	**-88.747525**	**County:**	**McCracken**	**USGS 7.5 Topo:**	**Paducah West**
Date:	**6/10/2019**			**Investigators:**	**SLC/BPH**		

Type Sample: ☑ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **79** °F **26** °C

Inches of rainfall in the past 24 hrs: **0** in

20 **% Cloud Cover**

P-Chem: Temp (°F) 70 D.O. (mg/L) 4.7 % Saturation N/A pH (S.U.) 7.06 Conductivity (µS) 112 ☑ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	9	ft
Stream Width BF	11	ft
Stream Bottom Width	8	ft
Avg. Bankfull Depth	32	ft
Avg. H_2O Depth Riffle	8	in

Local Watershed Features:
Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☐ Forest
☐ Deep Mining	☐ Commercial	☐ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☑ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☐ Culverts

Stream Flow: ☐ Dry ☐ Pooled ☐ Low ☑ Normal ☐ High ☐ Very Rapid or Torrential

Stream Type: ☐ Perennial ☑ Intermittent ☐ Ephemeral ☐ Seep

Riparian Vegetation:

Dominate Type:

☑ Trees	☑ Shrubs	**Dom. Tree/Shrub Taxa:**	Red Maple, Pin Oak
☑ Grasses	☑ Herbaceous		Honeysuckle
			Violets, Poison Ivy
Number of strata:			4

Canopy Cover:
☐ Fully Exposed (0-25%)
☐ Partially Exposed (25-50%)
☐ Partially Shaded (50-75%)
☑ Fully Shaded (75-100%)

Channel Alterations:
☐ Dredging
☐ Channelization
(☐ Full ☐ Partial)

Substrate: ☑ Est. ☐ P.C.

	Riffle 20 %	Run 60 %	Pool 20 %
Silt/Clay(<0.06 mm / <0.002 in)	10.0%	40.0%	30.0%
Sand (0.06 - 2 mm / 0.002-0.08 in)	10.0%	10.0%	10.0%
Gravel (2 - 64 mm / 0.08 - 2.5 in)	80.0%	50.0%	60.0%
Cobble (64 - 256 mm / 2.5 - 10.1 in)			
Boulders (>256 mm / >10.1 in)			
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	> 50% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

Score **15**

☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

| | | |

9. **Vegetative Protection (score each bank)** Note: determine left or right side by facing downstream.		More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**6**	Left Bank	☐ 10 ☐ 9	☐ 8 ☐ 7 ☑ 6	☐ 5 ☐ 4 ☐ 3	☐ 2 ☐ 1 ☐ 0
Score (RB)	**6**	Right Bank	☐ 10 ☐ 9	☐ 8 ☐ 7 ☑ 6	☐ 5 ☐ 4 ☐ 3	☐ 2 ☐ 1 ☐ 0
10. **Riparian Vegetative Zone Width (score each bank riparian zone)** Note: determine left or right side by facing downstream.		Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**4**	Left Bank	☐ 10 ☐ 9	☐ 8 ☐ 7 ☐ 6	☐ 5 ☑ 4 ☐ 3	☐ 2 ☐ 1 ☐ 0
Score (RB)	**4**	Right Bank	☐ 10 ☐ 9	☐ 8 ☐ 7 ☐ 6	☐ 5 ☑ 4 ☐ 3	☐ 2 ☐ 1 ☐ 0
TOTAL SCORE	**114**	**Suboptimal**				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

Stream Name:	**I5-DS**			**Location:**	**Triple Rail Site**		
				Basin/Watershed:	**Lower Ohio / Massac Creek**		
Lat:	**37.121444**	**Long:**	**-88.745259**	**County:**	**McCracken**	**USGS 7.5 Topo:**	**Paducah West**
Date:	**6/10/2019**			**Investigators:**	**SLC/BPH**		

Type Sample: ☑ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **79** **°F** **26** **°C**

Inches of rainfall in the past 24 hrs: **0** in

20 **% Cloud Cover**

P-Chem: Temp (°F) 70 D.O. (mg/L) 11 % Saturation N/A pH (S.U.) 8.3 Conductivity (µS) 82 ☑ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	1	ft
Stream Width BF	2	ft
Stream Bottom Width	0.8	ft
Avg. Bankfull Depth	0.5	ft
Avg. H_2O Depth Riffle	N/A	in

Local Watershed Features:
Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☐ Forest
☐ Deep Mining	☐ Commercial	☐ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☐ Culverts

Stream Flow:
☐ Dry ☐ Pooled ☐ Low ☑ Normal
☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial	☑ Intermittent
☐ Ephemeral	☐ Seep

Riparian Vegetation:

Dominate Type:

☐ Trees	☐ Shrubs	**Dom. Tree/Shrub Taxa:**	Johnson Grass
☑ Grasses	☑ Herbaceous		Sedges/Rushes
			Goldenrod

Number of strata: 2

Canopy Cover:
☑ Fully Exposed (0-25%)
☐ Partially Exposed (25-50%)
☐ Partially Shaded (50-75%)
☐ Fully Shaded (75-100%)

Channel Alterations:
☐ Dredging
☑ Channelization
(☑ Full ☐ Partial)

Substrate: ☑ Est. ☐ P.C.

	Riffle 0 %	Run 85 %	Pool 15 %
Silt/Clay(<0.06 mm / <0.002 in)		100.0%	100.0%
Sand (0.06 - 2 mm / 0.002-0.08 in)			
Gravel (2 - 64 mm / 0.08 - 2.5 in)			
Cobble (64 - 256 mm / 2.5 - 10.1 in)			
Boulders (>256 mm / >10.1 in)			
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	> 50% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

Score **3**

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐

20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

2. Pool Substrate / Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
Score **3**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
3. Pool Variability	Even mix of large shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep, very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
Score **3**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
Score **3**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
Score **3**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score **6**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was in a straight line. (Note - channel braiding is considered coastal plains and other normal low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1-2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
Score **2**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) **6**	Left Bank ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			
Score (RB) **6**	Right Bank ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			

9.	**Vegetative Protection (score each bank)** Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**4**	Left Bank	☐ ☐	☐ ☐ ☐	☐ ☑ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**4**	Right Bank	☐ ☐	☐ ☐ ☐	☐ ☑ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
10.	**Riparian Vegetative Zone Width (score each bank riparian zone)** Note: determine left or right side by facing downstream.	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**2**	Left Bank	☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☑ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**2**	Right Bank	☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☑ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
TOTAL SCORE	**47**	**Poor**				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

Stream Name:	**I5-US**			**Location:**	**Triple Rail Site**		
				Basin/Watershed:	**Lower Ohio / Massac Creek**		
Lat:	**37.123011**	**Long:**	**-88.745922**	**County:**	**McCracken**	**USGS 7.5 Topo:**	**Paducah West**
Date:	**6/10/2019**			**Investigators:**	**SLC/BPH**		

Type Sample: ☑ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **79** °F **26** °C

Inches of rainfall in the past 24 hrs: **0** in

20 **% Cloud Cover**

P-Chem: Temp (°F) 70 D.O. (mg/L) 11 % Saturation N/A pH (S.U.) 9.6 Conductivity (µS) 52 ☑ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	0.5	ft
Stream Width BF	2	ft
Stream Bottom Width	1	ft
Avg. Bankfull Depth	0.33	ft
Avg. H_2O Depth Riffle	N/A	in

Local Watershed Features:
Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☐ Forest
☐ Deep Mining	☐ Commercial	☐ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☑ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☐ Culverts

Stream Flow:
☐ Dry ☐ Pooled ☐ Low ☑ Normal
☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial	☑ Intermittent
☐ Ephemeral	☐ Seep

Riparian Vegetation:

Dominate Type:

☐ Trees	☐ Shrubs
☑ Grasses	☑ Herbaceous

Number of strata: 2

Dom. Tree/Shrub Taxa:
Morning Glory
Johnson Grass
Ragweed

Canopy Cover:
☑ Fully Exposed (0-25%)
☐ Partially Exposed (25-50%)
☐ Partially Shaded (50-75%)
☐ Fully Shaded (75-100%)

Channel Alterations:
☐ Dredging
☑ Channelization
(☑ Full ☐ Partial)

Substrate: ☑ Est. ☐ P.C.

	Riffle 0 %	Run 80 %	Pool 20 %
Silt/Clay(<0.06 mm / <0.002 in)		100.0%	100.0%
Sand (0.06 - 2 mm / 0.002-0.08 in)			
Gravel (2 - 64 mm / 0.08 - 2.5 in)			
Cobble (64 - 256 mm / 2.5 - 10.1 in)			
Boulders (>256 mm / >10.1 in)			
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	> 50% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

Score **3**

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐

20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

2. Pool Substrate / Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
Score **6**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
3. Pool Variability	Even mix of large shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep, very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
Score **2**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
Score **3**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
Score **3**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score **6**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was in a straight line. (Note - channel braiding is considered coastal plains and other normal low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1-2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
Score **1**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) **6**	Left Bank ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			
Score (RB) **6**	Right Bank ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			

9.	**Vegetative Protection (score each bank)** Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**3**	Left Bank	☐ ☐	☐ ☐ ☐	☐ ☐ ☑	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**3**	Right Bank	☐ ☐	☐ ☐ ☐	☐ ☐ ☑	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
10.	**Riparian Vegetative Zone Width (score each bank riparian zone)** Note: determine left or right side by facing downstream.	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**2**	Left Bank	☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☑ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**2**	Right Bank	☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☑ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
TOTAL SCORE	**46**	**Poor**				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

Stream Name:	**I6-DS**			**Location:**	**Triple Rail Site**		
				Basin/Watershed:	**Lower Ohio / Massac Creek**		
Lat:	**37.121025**	**Long:**	**-88.744262**	**County:**	**McCracken**	**USGS 7.5 Topo:**	**Paducah West**
Date:	**6/10/2019**			**Investigators:**	**SLC/BPH**		

Type Sample: ☐ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **79** °F **26** °C

Inches of rainfall in the past 24 hrs: **0** in

20 **% Cloud Cover**

P-Chem: Temp (°F) N/A D.O. (mg/L) N/A % Saturation N/A pH (S.U.) N/A Conductivity (µS) N/A ☑ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	1	ft
Stream Width BF	4	ft
Stream Bottom Width	1.75	ft
Avg. Bankfull Depth	1.5	ft
Avg. H_2O Depth Riffle		in

Local Watershed Features:
Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☐ Forest
☐ Deep Mining	☐ Commercial	☐ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☑ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☐ Culverts

Stream Flow: ☐ Dry ☐ Pooled ☐ Low ☑ Normal ☐ High ☐ Very Rapid or Torrential

Stream Type: ☐ Perennial ☑ Intermittent ☐ Ephemeral ☐ Seep

Riparian Vegetation:

Dominate Type: ☐ Trees ☐ Shrubs ☑ Grasses ☑ Herbaceous

Number of strata: 2

Dom. Tree/Shrub Taxa: Pigweed, Johnson Grass

Canopy Cover: ☑ Fully Exposed (0-25%) ☐ Partially Exposed (25-50%) ☐ Partially Shaded (50-75%) ☐ Fully Shaded (75-100%)

Channel Alterations: ☐ Dredging ☑ Channelization (☐ Full ☑ Partial)

Substrate: ☑ Est. ☐ P.C.

	Riffle %	Run 90 %	Pool 10 %
Silt/Clay(<0.06 mm / <0.002 in)		100.0%	100.0%
Sand (0.06 - 2 mm / 0.002-0.08 in)			
Gravel (2 - 64 mm / 0.08 - 2.5 in)			
Cobble (64 - 256 mm / 2.5 - 10.1 in)			
Boulders (>256 mm / >10.1 in)			
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	> 50% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

Score **3**

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐

20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

2. Pool Substrate / Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
Score **6**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
3. Pool Variability	Even mix of large shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep, very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
Score **2**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
Score **2**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
Score **5**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score **2**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was in a straight line. (Note - channel braiding is considered coastal plains and other normal low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1-2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
Score **2**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) **7**	Left Bank ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			
Score (RB) **7**	Right Bank ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			

9. **Vegetative Protection (score each bank)** Note: determine left or right side by facing downstream.		More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
Score (LB)	**5**	Left Bank	☐ ☐	☐ ☐ ☐	☑ ☐ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**5**	Right Bank	☐ ☐	☐ ☐ ☐	☑ ☐ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
10. **Riparian Vegetative Zone Width (score each bank riparian zone)** Note: determine left or right side by facing downstream.		Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
Score (LB)	**2**	Left Bank	☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☑ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**2**	Right Bank	☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☑ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
TOTAL SCORE	**50**	**Marginal**				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

Stream Name:	**I6-US**			**Location:**	**Triple Rail Site**		
				Basin/Watershed:	**Lower Ohio / Massac Creek**		
Lat:	**37.12481**	**Long:**	**-88.741389**	**County:**	**McCracken**	**USGS 7.5 Topo:**	**Paducah West**
Date:	**6/10/2019**			**Investigators:**	**SLC/BPH**		

Type Sample: ☐ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **79** °F **26** °C

Inches of rainfall in the past 24 hrs: **0** in

20 **% Cloud Cover**

P-Chem: Temp (°F) N/A D.O. (mg/L) N/A % Saturation N/A pH (S.U.) N/A Conductivity (µS) N/A ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	N/A	ft
Stream Width BF	3	ft
Stream Bottom Width	1.5	ft
Avg. Bankfull Depth	0.5	ft
Avg. H_2O Depth Riffle	N/A	in

Local Watershed Features:
Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☐ Forest
☐ Deep Mining	☐ Commercial	☐ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☑ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☐ Culverts

Stream Flow:
☐ Dry ☐ Pooled ☐ Low ☑ Normal
☐ High ☐ Very Rapid or Torrential

Stream Type:
☐ Perennial ☑ Intermittent
☐ Ephemeral ☐ Seep

Riparian Vegetation:

Dominate Type:
☐ Trees ☐ Shrubs
☑ Grasses ☑ Herbaceous
Number of strata: 2

Dom. Tree/Shrub Taxa:
Crabgrass
Hairy Buttercup
Johnson Grass

Canopy Cover:
☑ Fully Exposed (0-25%)
☐ Partially Exposed (25-50%)
☐ Partially Shaded (50-75%)
☐ Fully Shaded (75-100%)

Channel Alterations:
☐ Dredging
☑ Channelization
(☑ Full ☐ Partial)

Substrate: ☑ Est. ☐ P.C.

	Riffle %	Run 90 %	Pool 10 %
Silt/Clay(<0.06 mm / <0.002 in)		100.0%	100.0%
Sand (0.06 - 2 mm / 0.002-0.08 in)			
Gravel (2 - 64 mm / 0.08 - 2.5 in)			
Cobble (64 - 256 mm / 2.5 - 10.1 in)			
Boulders (>256 mm / >10.1 in)			
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	> 50% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

Score **3**

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐

20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

2. Pool Substrate / Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
Score **4**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
3. Pool Variability	Even mix of large shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep, very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
Score **4**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
Score **3**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
Score **3**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score **6**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was in a straight line. (Note - channel braiding is considered coastal plains and other normal low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1-2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
Score **6**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) **6**	Left Bank ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			
Score (RB) **6**	Right Bank ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			

9.	**Vegetative Protection (score each bank)** Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**4**	Left Bank	☐ ☐	☐ ☐ ☐	☐ ☑ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**4**	Right Bank	☐ ☐	☐ ☐ ☐	☐ ☑ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
10.	**Riparian Vegetative Zone Width (score each bank riparian zone)** Note: determine left or right side by facing downstream.	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**2**	Left Bank	☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☑ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**2**	Right Bank	☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☑ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
TOTAL SCORE	**53**	**Marginal**				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

Stream Name:	**E1**			**Location:**	**Triple Rail Site**		
				Basin/Watershed:	**Lower Ohio / Massac Creek**		
Lat:	**37.107744**	**Long:**	**-88.744683**	**County:**	**McCracken**	**USGS 7.5 Topo:**	**Paducah West**
Date:	**6/10/2019**			**Investigators:**	**SLC/BPH**		

Type Sample: ☐ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **79** **°F** **26** **°C**

Inches of rainfall in the past 24 hrs: **0** in

20 **% Cloud Cover**

P-Chem: Temp (°F) N/A D.O. (mg/L) N/A % Saturation N/A pH (S.U.) N/A Conductivity (µS) N/A ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	N/A	ft
Stream Width BF	3	ft
Stream Bottom Width	N/A	ft
Avg. Bankfull Depth	1	ft
Avg. H_2O Depth Riffle	N/A	in

Local Watershed Features:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☐ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☑ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☐ Culverts

Stream Flow:

☑ Dry ☐ Pooled ☐ Low ☐ Normal

☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial	☐ Intermittent
☑ Ephemeral	☐ Seep

Riparian Vegetation:

Dominate Type:

☑ Trees ☑ Shrubs

☑ Grasses ☑ Herbaceous

Number of strata: 4

Dom. Tree/Shrub Taxa:

Sycamore

Green Ash

Trumpet Creeper

Canopy Cover:

☐ Fully Exposed (0-25%)

☐ Partially Exposed (25-50%)

☐ Partially Shaded (50-75%)

☑ Fully Shaded (75-100%)

Channel Alterations:

☐ Dredging

☐ Channelization

(☐ Full ☐ Partial)

Substrate: ☑ Est. ☐ P.C.

	Riffle %	Run 100 %	Pool %
Silt/Clay(<0.06 mm / <0.002 in)		100.0%	
Sand (0.06 - 2 mm / 0.002-0.08 in)			
Gravel (2 - 64 mm / 0.08 - 2.5 in)			
Cobble (64 - 256 mm / 2.5 - 10.1 in)			
Boulders (>256 mm / >10.1 in)			
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	> 50% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

Score **0**

☐ ☑

20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

2. Pool Substrate / Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
Score **2**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
3. Pool Variability	Even mix of large shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep, very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
Score **0**	☐ ☑			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
Score **0**	☐ ☑			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
Score **0**	☐ ☑			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score **16**	☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was in a straight line. (Note - channel braiding is considered coastal plains and other normal low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1-2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
Score **2**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) **6**	Left Bank ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			
Score (RB) **6**	Right Bank ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			

9.	**Vegetative Protection (score each bank)** Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**3**	Left Bank	☐ ☐	☐ ☐ ☐	☐ ☐ ☑	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**3**	Right Bank	☐ ☐	☐ ☐ ☐	☐ ☐ ☑	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
10.	**Riparian Vegetative Zone Width (score each bank riparian zone)** Note: determine left or right side by facing downstream.	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**9**	Left Bank	☐ ☑	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**9**	Right Bank	☐ ☑	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
TOTAL SCORE	**56**	**Marginal**				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

Stream Name:	**E2**			**Location:**	**Triple Rail Site**		
				Basin/Watershed:	**Lower Ohio / Massac Creek**		
Lat:	**37.113247**	**Long:**	**-88.744633**	**County:**	**McCracken**	**USGS 7.5 Topo:**	**Paducah West**
Date:	**6/10/2019**			**Investigators:**	**SLC/BPH**		

Type Sample: ☐ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **79** **°F** **26** **°C**

Inches of rainfall in the past 24 hrs: **0** in

20 **% Cloud Cover**

P-Chem: Temp (°F) N/A D.O. (mg/L) N/A % Saturation N/A pH (S.U.) N/A Conductivity (µS) N/A ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	N/A	ft
Stream Width BF	2	ft
Stream Bottom Width	1	ft
Avg. Bankfull Depth	0.2	ft
Avg. H_2O Depth Riffle	N/A	in

Local Watershed Features:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☐ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☑ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☐ Culverts

Stream Flow:

☐ Dry ☐ Pooled ☐ Low ☑ Normal

☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial	☐ Intermittent
☑ Ephemeral	☐ Seep

Riparian Vegetation:

Dominate Type:

☑ Trees	☑ Shrubs	**Dom. Tree/Shrub Taxa:**	Elm, Virginia Creeper
☐ Grasses	☑ Herbaceous		Hickory, Red Maple
			Poision Ivy

Number of strata: 3

Canopy Cover:

☐ Fully Exposed (0-25%)

☐ Partially Exposed (25-50%)

☑ Partially Shaded (50-75%)

☐ Fully Shaded (75-100%)

Channel Alterations:

☐ Dredging

☐ Channelization

(☐ Full ☐ Partial)

Substrate: ☑ Est. ☐ P.C.

	Riffle ____ %	Run 100 %	Pool ____ %
Silt/Clay(<0.06 mm / <0.002 in)		100.0%	
Sand (0.06 - 2 mm / 0.002-0.08 in)			
Gravel (2 - 64 mm / 0.08 - 2.5 in)			
Cobble (64 - 256 mm / 2.5 - 10.1 in)			
Boulders (>256 mm / >10.1 in)			
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	> 50% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

Score **1**

20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐

2. Pool Substrate / Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
Score **1**	☐ ☑ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
3. Pool Variability	Even mix of large shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep, very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
Score **1**	☐ ☑ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
Score **3**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
Score **1**	☐ ☑ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score **1**	☐ ☑ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was in a straight line. (Note - channel braiding is considered coastal plains and other normal low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1-2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
Score **6**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) **5**	Left Bank ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			
Score (RB) **5**	Right Bank ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			

9. **Vegetative Protection (score each bank)** Note: determine left or right side by facing downstream.		More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
Score (LB)	**5**	Left Bank	☐ ☐	☐ ☐ ☐	☑ ☐ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**5**	Right Bank	☐ ☐	☐ ☐ ☐	☑ ☐ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
10. **Riparian Vegetative Zone Width (score each bank riparian zone)** Note: determine left or right side by facing downstream.		Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
Score (LB)	**10**	Left Bank	☑ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**2**	Right Bank	☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☑ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
TOTAL SCORE	**46**	**Poor**				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

Stream Name:	**E3**			**Location:**	**Triple Rail Site**		
				Basin/Watershed:	**Lower Ohio / Massac Creek**		
Lat:	**37.116231**	**Long:**	**-88.74331**	**County:**	**McCracken**	**USGS 7.5 Topo:**	**Paducah West**
Date:	**6/10/2019**			**Investigators:**	**SLC/BPH**		

Type Sample: ☐ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **79** **°F** **26** **°C**

Inches of rainfall in the past 24 hrs: **0** in

20 **% Cloud Cover**

P-Chem: Temp (°F) N/A D.O. (mg/L) N/A % Saturation N/A pH (S.U.) N/A Conductivity (µS) N/A ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	N//A	ft
Stream Width BF	4	ft
Stream Bottom Width	2	ft
Avg. Bankfull Depth	1	ft
Avg. H_2O Depth Riffle	3	in

Local Watershed Features:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☐ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☐ Culverts

Stream Flow:

☐ Dry ☐ Pooled ☐ Low ☑ Normal

☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial	☐ Intermittent
☑ Ephemeral	☐ Seep

Riparian Vegetation:

Dominate Type:

☑ Trees ☑ Shrubs ☐ Grasses ☑ Herbaceous

Number of strata: 3

Dom. Tree/Shrub Taxa:

Small Spike False Nettle

Red Maple, Elm

Jewelweed

Canopy Cover:

☐ Fully Exposed (0-25%)

☐ Partially Exposed (25-50%)

☐ Partially Shaded (50-75%)

☑ Fully Shaded (75-100%)

Channel Alterations:

☐ Dredging

☐ Channelization

(☐ Full ☐ Partial)

Substrate: ☑ Est. ☐ P.C.

	Riffle 15 %	Run 85 %	Pool %
Silt/Clay(<0.06 mm / <0.002 in)	30.0%	40.0%	
Sand (0.06 - 2 mm / 0.002-0.08 in)	10.0%	20.0%	
Gravel (2 - 64 mm / 0.08 - 2.5 in)	60.0%	40.0%	
Cobble (64 - 256 mm / 2.5 - 10.1 in)			
Boulders (>256 mm / >10.1 in)			
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	> 50% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

Score **3**

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐

20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

2. Pool Substrate / Characterization		Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.	
Score	**3**	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☑ ☐ ☐ ☐	
		20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
3. Pool Variability		Even mix of large shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep, very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.	
Score	**1**	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☑ ☐	
		20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
4. Sediment Deposition		Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.	
Score	**3**	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☑ ☐ ☐ ☐	
		20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
5. Channel Flow Status		Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.	
Score	**1**	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☑ ☐	
		20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
6. Channel Alteration		Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.	
Score	**2**	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☑ ☐ ☐	
		20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
7. Channel Sinuosity		The bends in the stream increase the stream length 3-4 times longer than if it was in a straight line. (Note - channel braiding is considered coastal plains and other normal low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1-2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.	
Score	**7**	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☑ ☐	☐ ☐ ☐ ☐ ☐ ☐	
		20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.		Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.	
Score (LB)	**3**	Left Bank ☐ ☐	☐ ☐ ☐	☐ ☐ ☑	☐ ☐ ☐	
		10 9	8 7 6	5 4 3	2 1 0	
Score (RB)	**3**	Right Bank ☐ ☐	☐ ☐ ☐	☐ ☐ ☑	☐ ☐ ☐	
		10 9	8 7 6	5 4 3	2 1 0	

9. **Vegetative Protection (score each bank)** Note: determine left or right side by facing downstream.		More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
Score (LB)	**3**	Left Bank		☑	
		10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**3**	Right Bank		☑	
		10 9	8 7 6	5 4 3	2 1 0
10. **Riparian Vegetative Zone Width (score each bank riparian zone)** Note: determine left or right side by facing downstream.		Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
Score (LB)	**10**	Left Bank	☑		
		10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**10**	Right Bank	☑		
		10 9	8 7 6	5 4 3	2 1 0
TOTAL SCORE	**52**	**Marginal**			

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

Stream Name:	**E4**			**Location:**	**Triple Rail Site**		
				Basin/Watershed:	**Lower Ohio / Massac Creek**		
Lat:	**37.117411**	**Long:**	**-88.741875**	**County:**	**McCracken**	**USGS 7.5 Topo:**	**Paducah West**
Date:	**6/10/2019**			**Investigators:**	**SLC/BPH**		

Type Sample: ☐ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **79** **°F** **26** **°C**

Inches of rainfall in the past 24 hrs: **0** in

20 **% Cloud Cover**

P-Chem: Temp (°F) N/A D.O. (mg/L) N/A % Saturation N/A pH (S.U.) N/A Conductivity (µS) N/A ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	N/A	ft
Stream Width BF	4	ft
Stream Bottom Width	1.5	ft
Avg. Bankfull Depth	2	ft
Avg. H_2O Depth Riffle	N/A	in

Local Watershed Features:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☐ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☑ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☐ Culverts

Stream Flow: ☑ Dry ☐ Pooled ☐ Low ☐ Normal ☐ High ☐ Very Rapid or Torrential

Stream Type: ☐ Perennial ☐ Intermittent ☐ Ephemeral ☐ Seep

Riparian Vegetation:

Dominate Type: ☑ Trees ☑ Shrubs ☐ Grasses ☑ Herbaceous

Number of strata: 3

Dom. Tree/Shrub Taxa:

Elm, Honeysuckle

Green Ash

Fowl Manna Grass

Canopy Cover:

☐ Fully Exposed (0-25%)
☐ Partially Exposed (25-50%)
☐ Partially Shaded (50-75%)
☑ Fully Shaded (75-100%)

Channel Alterations:

☑ Dredging
☐ Channelization
(☐ Full ☐ Partial)

Substrate: ☑ Est. ☐ P.C.

	Riffle %	Run 100 %	Pool %
Silt/Clay(<0.06 mm / <0.002 in)		100.0%	
Sand (0.06 - 2 mm / 0.002-0.08 in)			
Gravel (2 - 64 mm / 0.08 - 2.5 in)			
Cobble (64 - 256 mm / 2.5 - 10.1 in)			
Boulders (>256 mm / >10.1 in)			
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	> 50% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

Score **1**

20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐

2. Pool Substrate / Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
Score **1**	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☑ ☐
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep, very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
Score **1**	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☑ ☐
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
Score **1**	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☑ ☐
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
Score **1**	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☑ ☐
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score **1**	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☑ ☐
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was in a straight line. (Note - channel braiding is considered coastal plains and other normal low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1-2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
Score **1**	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☑ ☐
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) **6**	Left Bank ☐ ☐	☐ ☐ ☑	☐ ☐ ☐	☐ ☐ ☐
	10 9	8 7 6	5 4 3	2 1 0
Score (RB) **6**	Right Bank ☐ ☐	☐ ☐ ☑	☐ ☐ ☐	☐ ☐ ☐
	10 9	8 7 6	5 4 3	2 1 0

9. **Vegetative Protection (score each bank)** Note: determine left or right side by facing downstream.		More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
Score (LB)	**3**	Left Bank	☐ ☐	☐ ☐ ☐	☐ ☐ ☑	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**3**	Right Bank	☐ ☐	☐ ☐ ☐	☐ ☐ ☑	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
10. **Riparian Vegetative Zone Width (score each bank riparian zone)** Note: determine left or right side by facing downstream.		Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
Score (LB)	**2**	Left Bank	☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☑ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**10**	Right Bank	☑ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
TOTAL SCORE	**37**	**Poor**				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

Stream Name:	**E5**			**Location:**	**Triple Rail Site**		
				Basin/Watershed:	**Lower Ohio / Massac Creek**		
Lat:	**37.117477**	**Long:**	**-88.743182**	**County:**	**McCracken**	**USGS 7.5 Topo:**	**Paducah West**
Date:	**6/10/2019**			**Investigators:**	**SLC/BPH**		

Type Sample: ☐ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **79** **°F** **26** **°C**

Inches of rainfall in the past 24 hrs: **0** in

20 **% Cloud Cover**

P-Chem: Temp (°F) N/A D.O. (mg/L) N/A % Saturation N/A pH (S.U.) N/A Conductivity (µS) N/A ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	N/A	ft
Stream Width BF	3	ft
Stream Bottom Width	1.25	ft
Avg. Bankfull Depth	1	ft
Avg. H_2O Depth Riffle	N/A	in

Local Watershed Features:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☐ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☐ Culverts

Stream Flow:

☐ Dry ☐ Pooled ☐ Low ☑ Normal

☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial ☐ Intermittent

☑ Ephemeral ☐ Seep

Riparian Vegetation:

Dominate Type:

☑ Trees ☑ Shrubs

☑ Grasses ☑ Herbaceous

Number of strata: 4

Dom. Tree/Shrub Taxa:

Boneset

Red Maple, Elm

Poison Ivy, Blackberry

Canopy Cover:

☐ Fully Exposed (0-25%)

☐ Partially Exposed (25-50%)

☐ Partially Shaded (50-75%)

☑ Fully Shaded (75-100%)

Channel Alterations:

☑ Dredging

☐ Channelization

(☐ Full ☐ Partial)

Substrate: ☑ Est. ☐ P.C.

	Riffle 15 %	Run 70 %	Pool 15 %
Silt/Clay(<0.06 mm / <0.002 in)	100.0%	100.0%	100.0%
Sand (0.06 - 2 mm / 0.002-0.08 in)			
Gravel (2 - 64 mm / 0.08 - 2.5 in)			
Cobble (64 - 256 mm / 2.5 - 10.1 in)			
Boulders (>256 mm / >10.1 in)			
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	> 50% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

Score **2**

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐

20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

2. Pool Substrate / Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
Score **2**	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☑ ☐ ☐
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep, very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
Score **1**	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☑ ☐
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
Score **1**	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☑ ☐
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
Score **1**	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☑ ☐
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score **2**	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☑ ☐ ☐
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was in a straight line. (Note - channel braiding is considered coastal plains and other normal low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1-2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
Score **2**	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☑ ☐ ☐
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) **6**	Left Bank ☐ ☐	☐ ☐ ☑	☐ ☐ ☐	☐ ☐ ☐
	10 9	8 7 6	5 4 3	2 1 0
Score (RB) **6**	Right Bank ☐ ☐	☐ ☐ ☑	☐ ☐ ☐	☐ ☐ ☐
	10 9	8 7 6	5 4 3	2 1 0

9. **Vegetative Protection (score each bank)** Note: determine left or right side by facing downstream.		More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**4**	Left Bank	☐ ☐	☐ ☐ ☐	☐ ☑ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**4**	Right Bank	☐ ☐	☐ ☐ ☐	☐ ☑ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
10. **Riparian Vegetative Zone Width (score each bank riparian zone)** Note: determine left or right side by facing downstream.		Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**10**	Left Bank	☑ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**10**	Right Bank	☑ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
TOTAL SCORE	**51**	**Marginal**				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

Stream Name:	**E6**			**Location:**	**Triple Rail Site**		
				Basin/Watershed:	**Lower Ohio / Massac Creek**		
Lat:	**37.118445**	**Long:**	**-88.745665**	**County:**	**McCracken**	**USGS 7.5 Topo:**	**Paducah West**
Date:	**6/10/2019**			**Investigators:**	**SLC/BPH**		

Type Sample: ☐ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **79** °F **26** °C

Inches of rainfall in the past 24 hrs: **0** in

20 **% Cloud Cover**

P-Chem: Temp (°F) N/A D.O. (mg/L) N/A % Saturation N/A pH (S.U.) N/A Conductivity (µS) N/A ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	N/A	ft
Stream Width BF	1.2	ft
Stream Bottom Width	0.6	ft
Avg. Bankfull Depth	0.15	ft
Avg. H_2O Depth Riffle	N/A	in

Local Watershed Features:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☐ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☑ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☐ Culverts

Stream Flow:

☑ Dry ☐ Pooled ☐ Low ☐ Normal

☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial	☐ Intermittent
☑ Ephemeral	☐ Seep

Riparian Vegetation:

Dominate Type:

☑ Trees ☑ Shrubs ☐ Grasses ☑ Herbaceous

Number of strata: 3

Dom. Tree/Shrub Taxa:

Elms

Green Ash

Virginia Creeper

Canopy Cover:

☐ Fully Exposed (0-25%)

☐ Partially Exposed (25-50%)

☑ Partially Shaded (50-75%)

☐ Fully Shaded (75-100%)

Channel Alterations:

☐ Dredging

☑ Channelization

(☐ Full ☑ Partial)

Substrate: ☑ Est. ☐ P.C.

	Riffle %	Run 100 %	Pool %
Silt/Clay(<0.06 mm / <0.002 in)		100.0%	
Sand (0.06 - 2 mm / 0.002-0.08 in)			
Gravel (2 - 64 mm / 0.08 - 2.5 in)			
Cobble (64 - 256 mm / 2.5 - 10.1 in)			
Boulders (>256 mm / >10.1 in)			
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	> 50% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

Score **1**

20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐

2.	**Pool Substrate / Characterization**	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.					Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.					All mud or clay or sand bottom; little or no root mat; no submerged vegetation.					Hard-pan clay or bedrock; no root mat or vegetation.									
Score	**1**	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐				
		20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0					
3.	**Pool Variability**	Even mix of large shallow, large-deep, small-shallow, small-deep pools present.					Majority of pools large-deep, very few shallow.					Shallow pools much more prevalent than deep pools.					Majority of pools small-shallow or pools absent.									
Score	**1**	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐					
		20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0					
4.	**Sediment Deposition**	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.					Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 20-50% of the bottom affected; slight deposition in pools.					Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.					Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.									
Score	**2**	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐					
		20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0					
5.	**Channel Flow Status**	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.					Water fills >75% of the available channel; or <25% of channel substrate is exposed.					Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.					Very little water in channel and mostly present as standing pools.									
Score	**1**	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐					
		20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0					
6.	**Channel Alteration**	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.									
Score	**1**	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐					
		20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0					
7.	**Channel Sinuosity**	The bends in the stream increase the stream length 3-4 times longer than if it was in a straight line. (Note - channel braiding is considered coastal plains and other normal low-lying areas. This parameter is not easily rated in these areas.)					The bends in the stream length 2-3 times longer than if it was in a straight line.					The bends in the stream increase the stream length 1-2 times longer than if it was in a straight line.					Channel straight; waterway has been channelized for a long distance.									
Score	**6**	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐					
		20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0					
8.	**Bank Stability (score each bank)** Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.					Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.					Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.									
Score (LB)	**6**	Left Bank	☐	☐			☐	☐	☑			☐	☐	☐			☐	☐	☐								
			10	9			8	7	6			5	4	3			2	1	0								
Score (RB)	**6**	Right Bank	☐	☐			☐	☐	☑			☐	☐	☐			☐	☐	☐								
			10	9			8	7	6			5	4	3			2	1	0								

9.	**Vegetative Protection (score each bank)** Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**2**	Left Bank	☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☑ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**2**	Right Bank	☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☑ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
10.	**Riparian Vegetative Zone Width (score each bank riparian zone)** Note: determine left or right side by facing downstream.	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**9**	Left Bank	☐ ☑	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**9**	Right Bank	☐ ☑	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
TOTAL SCORE	**47**	**Poor**				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

Stream Name:	**E7**			**Location:**	**Triple Rail Site**		
				Basin/Watershed:	**Lower Ohio / Massac Creek**		
Lat:	**37.119179**	**Long:**	**-88.74573**	**County:**	**McCracken**	**USGS 7.5 Topo:**	**Paducah West**
Date:	**6/10/2019**			**Investigators:**	**SLC/BPH**		

Type Sample: ☐ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **79** **°F** **26** **°C**

Inches of rainfall in the past 24 hrs: **0** in

20 **% Cloud Cover**

P-Chem: Temp (°F) N/A D.O. (mg/L) N/A % Saturation N/A pH (S.U.) N/A Conductivity (µS) N/A ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	N/A	ft
Stream Width BF	1	ft
Stream Bottom Width	0.5	ft
Avg. Bankfull Depth	0.15	ft
Avg. H_2O Depth Riffle	N/A	in

Local Watershed Features:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☐ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☑ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☐ Culverts

Stream Flow: ☑ Dry ☐ Pooled ☐ Low ☐ Normal ☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial	☐ Intermittent
☑ Ephemeral	☐ Seep

Riparian Vegetation:

Dominate Type:

☑ Trees	☑ Shrubs	**Dom. Tree/Shrub Taxa:**	Elm, Red Maple
☐ Grasses	☑ Herbaceous		Trumpet Creeper
			Honeysuckle
Number of strata:			3

Canopy Cover:

- ☐ Fully Exposed (0-25%)
- ☐ Partially Exposed (25-50%)
- ☑ Partially Shaded (50-75%)
- ☐ Fully Shaded (75-100%)

Channel Alterations:

- ☐ Dredging
- ☑ Channelization (☐ Full ☑ Partial)

Substrate: ☑ Est. ☐ P.C.

	Riffle ____ %	Run 100 %	Pool ____ %
Silt/Clay(<0.06 mm / <0.002 in)		100.0%	
Sand (0.06 - 2 mm / 0.002-0.08 in)			
Gravel (2 - 64 mm / 0.08 - 2.5 in)			
Cobble (64 - 256 mm / 2.5 - 10.1 in)			
Boulders (>256 mm / >10.1 in)			
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	> 50% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

Score **1**

20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐

2. Pool Substrate / Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
Score **1**	☐ ☑ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
3. Pool Variability	Even mix of large shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep, very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
Score **1**	☐ ☑ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
Score **2**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
Score **1**	☐ ☑ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score **2**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was in a straight line. (Note - channel braiding is considered coastal plains and other normal low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1-2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
Score **6**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) **6**	Left Bank ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			
Score (RB) **6**	Right Bank ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			

9.	**Vegetative Protection (score each bank)** Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**3**	Left Bank	☐ ☐	☐ ☐ ☐	☐ ☐ ☑	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**3**	Right Bank	☐ ☐	☐ ☐ ☐	☐ ☐ ☑	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
10.	**Riparian Vegetative Zone Width (score each bank riparian zone)** Note: determine left or right side by facing downstream.	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**9**	Left Bank	☐ ☑	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**9**	Right Bank	☐ ☑	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
TOTAL SCORE	**50**	**Marginal**				

Appendix C

Photographs

PEM Wetland Photographs

	PEM1
	PEM2

PEM Wetland Photographs

	PEM3
	PEM4

PEM Wetland Photographs

	PEM5
	PEM6

PEM Wetland Photographs

	PEM7
	PEM8

PEM Wetland Photographs

	PEM9
	PEM10

PEM Wetland Photographs

	PEM11

PFO Wetland Photographs

	PFO1
	PFO2

PFO Wetland Photographs

	PFO3
	PFO4

PFO Wetland Photographs

	PFO5
	PFO6

PFO Wetland Photographs

	PFO7
	PFO8

Stream Photographs

	I1-US
	I1-DS

Stream Photographs

	I2
	I3-US

Stream Photographs

	I3-DS
	I4-US

Stream Photographs

	I4-DS
	I5-US

Stream Photographs

	I5-DS
	I6-US

Stream Photographs

	I6-DS

Stream Photographs

	E1
	E2

Stream Photographs

	E3
	E4

Stream Photographs

	E5
	E6

Stream Photographs

	E7

Open Water Photographs

	Open Water 1
	Open Water 2

Open Water Photographs

	Open Water 3
	Open Water 4

Open Water Photographs

	Open Water 5