Kentucky State Board on Electric Generation and Transmission Siting
McCracken County Solar, LLC – Case No. 2020-00392
Application – Exhibit 14
Volume 2, Tab 14

Additional Information

Respondent: Chris Killenberg

As part of the investigation of the suitability of the proposed site for the Project, the Applicant commissioned additional studies which are summarized below and included as attachments to the Application.

Wetlands Delineation Report

A Wetland and Stream Delineation Report ("Wetlands Delineation"), of the proposed Project site was performed by Copperhead Environmental Consulting, Inc., environmental consulting engineers, 471 Main St., Paint Lick, KY 40461. It is dated January 8, 2021.

The Wetlands Delineation identified a small number of likely jurisdictional wetlands and streams. A request for an Approved Jurisdictional Determination (AJD) has been submitted to the US Army Corps of Engineers. Action on the AJD is expected in mid-2021.

The Site Plan for the proposed facility avoids new encroachment on the aquatic features identified in the Wetlands Delineation. Where existing stream crossings may need to be improved or repaired, the Applicant will seek the necessary permits.

A copy of the Wetlands Determination is provided as Exhibit 14 Attachment 14.1.

Phase I Environmental Site Assessment Report

A Phase I Environmental Site Assessment ("Phase I ESA") of the proposed Project site was performed by Linebach Funkhouser, Inc., environmental compliance and consulting engineers, 114 Fairfax Avenue, Louisville, KY 40207. It is dated January 8, 2021.

The Phase I ESA revealed no evidence of recognized environmental conditions ("RECs") in connection with the site.

A copy of the Phase I Environmental Site Assessment Report is provided as Exhibit 14 Attachment 14.2.

Cultural Resources – Historic

A Cultural Historic Overview Study of the proposed Project site was performed by Cultural Resource Analysts, Inc., 151 Walton Avenue, Lexington, KY 40508 ("CRA"). It is dated January 8, 2021.

CRA investigated two previously identified resources on the site, and determined they lack either significance and/or integrity and appear to be not eligible for listing in the National Register of Historic Places. One newly recorded resource, a cemetery, was recommended for further investigation, but was determined to be off-site.

A copy of the Cultural Historic Overview Study is provided as Exhibit 14 Attachment 14.3.

Cultural Resources – Archeology

An Archaeological Records Review and Site Reconnaissance of the proposed Project site was performed by Cultural Resource Analysts, Inc., 151 Walton Avenue, Lexington, KY 40508 ("CRA"). It is dated January 8, 2021.

CRA identified five locations considered to have high probability for the presence of archaeological sites. All these sites are located at the periphery of the proposed Project site and will be undisturbed by the development of the Project.

A copy of the Archaeological Records Review and Site Reconnaissance Report is provided as Exhibit 14 Attachment 14.4.

Threatened & Endangered Species Habitat

A Threatened and Endangered Species Habitat Assessment ("T&E Assessment") of the proposed Project site was performed by Copperhead Environmental Consulting, Inc., 471 Main St., Paint Lick, KY 40461. It is dated April 26, 2021.

The T&E Assessment concluded that the proposed Project site does not appear to contain suitable habitat for federally-listed bird and mussel species. The T&E Assessment did identify suitable habitat on the proposed Project site for three federally-listed species of bats. Potential effects to these species can be mitigated through project-specific conservation and mitigation methods (i.e., tree cutting avoidance or time of year restrictions). The Applicant intends to observe these conservation and mitigation methods.

The T&E Assessment concluded that the proposed Project is not likely to significantly affect any state-listed species.

A copy of the Threatened and Endangered Species Assessment is provided as Exhibit 14 Attachment 14.5.

Cumulative Environmental Assessment

A Cumulative Environmental Assessment ("CEA") of the proposed Project site was performed by Copperhead Environmental Consulting, Inc., 471 Main St., Paint Lick, KY 40461. It is dated May 6, 2021.

The CEA concludes:

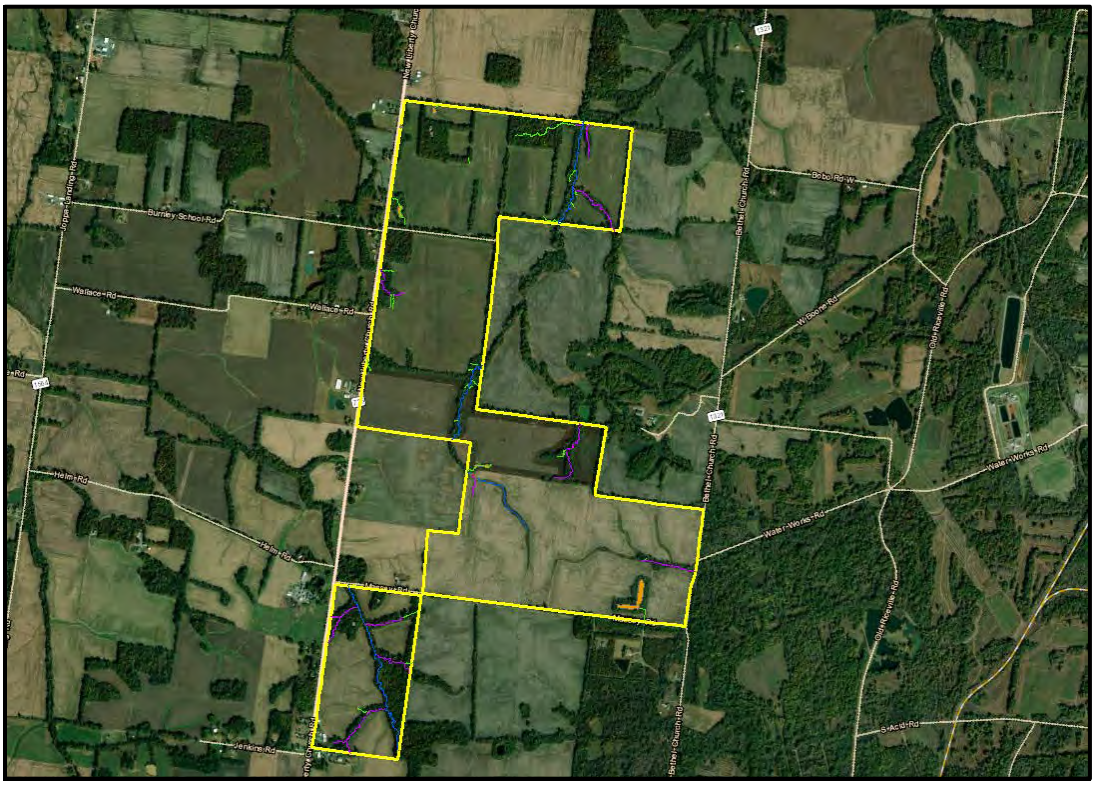
- Air Pollutants
  - Potential impacts to air quality from construction-related activities for the Project will be minor
  - Operation of the Project will result in a net benefit to local and regional air quality
- Water Pollutants
  - The operations and maintenance of the solar facility will have little impact on surface water
  - No direct adverse impacts to groundwater will be anticipated as a result of the Project
- Wastes
  - No adverse effects from waste are anticipated
- Water Withdrawal
  - Operation of solar electricity generating facilities is not water-use intensive

A copy of the Cumulative Environmental Assessment is provided as Exhibit 13 Attachment.

The Cumulative Environmental Assessment was submitted to the Kentucky Energy and Environment Cabinet on May 6, 2021.

EXHIBIT 14
ATTACHMENT 14.1

Wetland and Stream Delineation Report for the Proposed McCracken County Solar LLC Project in McCracken County, Kentucky



8 January 2021

COPPERHEAD
ENVIRONMENTAL CONSULTING

Wetland and Stream Delineation Report for the Proposed McCracken County Solar LLC Project McCracken County, Kentucky

Prepared for

McCracken County Solar LLC
C/O Community Energy
PO Box 17236
Chapel Hill, NC 27516

By:

Copperhead Environmental Consulting, Inc.
PO Box 73
471 Main Street
Paint Lick, KY 40461

Michael Tincher
Natural Resources Manager

January 8, 2021

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ACRONYMS AND ABBREVIATIONS

FEMA	Federal Emergency Management Agency
GPS	global positioning system
KYWRAM	Kentucky Division of Water Wetland Rapid Assessment Method
NHD	National Hydrography Dataset
NLCD	National Land Cover Database
NRCS	Natural Resource Conservation Service
NWI	National Wetlands Inventory
OHWM	ordinary high-water mark
PEM	palustrine emergent wetland
PFO	palustrine forested wetland
PSS	palustrine scrub-shrub wetland
PUB	palustrine unconsolidated bottom wetland (pond)
RBP	Rapid Bioassessment Protocol
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USGS	United States Geological Survey
UT	Unnamed Tributary
WOTUS	Waters of the United States
WL	wetland

1 INTRODUCTION

Community Energy contracted Copperhead Environmental Consulting, Inc. (Copperhead) to conduct a wetland and stream delineation for the proposed McCracken County Solar LLC Project (Project) in McCracken County, Kentucky, to identify and delineate aquatic features that may be considered jurisdictional waters of the United States (WOTUS) or non-jurisdictional waters. The Project consists of an approximately 714-acre Survey Area located near Rossington, Kentucky (Figure 1 – Site Location Map in Appendix A). The field delineation was conducted on November 17-20 and December 1, 2020.

2 METHODS

2.1 Preliminary Desktop Analysis

Prior to the field survey, a preliminary desktop analysis of available information was conducted using the following sources:

- ESRI GeoServer Web Map Service, National Land Cover Database (NLCD)_2016 Land Cover L48;
- Federal Emergency Management Agency (FEMA) National Flood Hazard Map (FEMA 2015);
- National Wetlands Inventory (NWI) Maps (USFWS 2020);
- The National Hydrography Dataset (NHD; U.S. Geological Survey [USGS] 2006);
- U.S. Department of Agriculture (USDA) *Soil Survey of Ballard and McCracken Counties, Kentucky* (1976);
- USDA Natural Resource Conservation Service (NRCS) McCracken County hydric soils lists (USDA NRCS 2020a); and
- Web Soil Survey (USDA NRCS 2020b).

The locations of surface waters, wetlands, and floodplains identified during the preliminary desktop analysis were mapped (Figure 2 – Existing Hydrological Datasets Map in Appendix A) and used as a baseline reference that was compared, verified, and/or modified based on actual conditions observed during the field investigations using the methodologies outlined in Sections 2.2 and 2.3.

2.2 Methods for Delineating Wetlands

Copperhead conducted field investigations to identify the presence or absence of wetlands. When present, the location, extent, and boundaries of wetlands within the Survey Area were delineated in accordance with the 1987 *U.S. Army Corps of Engineers Wetlands Delineation Manual* (USACE 1987) and *Regional Supplement to the Corps of Engineers' Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0)* (USACE 2012). Wetland delineations were based on the presence of hydric soils, hydrophytic (wetland) vegetation, and wetland hydrology. Wetlands were described utilizing Cowardin classes (Cowardin, et al. 1979). The Cowardin classification system was adopted by the US Fish and Wildlife Service (USFWS) and is used by federal agencies to describe the type of wetland feature present.

Soil profiles within each respective community were then sampled to a depth of approximately 18 inches to determine if hydric soil indicators were present. Soil colors were documented using a Munsell Soil Color Chart (Munsell Color 2010). Vegetative cover at each wetland was identified and the wetland indicator status of each plant species was determined according to the 2016 National Wetland Plant List (Lichvar et al. 2018). Finally, observations of the presence of wetland hydrology indicators were made. Areas with the presence of all three wetland indicators (i.e. hydric soils, hydrophytic vegetation, and wetland hydrology) were delineated as wetlands. Please note that long-term agricultural land practices have disturbed soils and vegetation in much of the Survey Area, including in and near wetlands. Therefore, hydric soil indicators were not always readily observable. In these instances, hydric soils were assumed to be disturbed and the predominance of wetland vegetation and multiple indicators of wetland hydrology were used to determine if a site met the criteria for wetlands. Problematic vegetation was also present in many wetland areas.

At locations where wetland indicators were observed (i.e. hydric soils, hydrophytic vegetation, and/or wetland hydrology), a USACE Wetland Determination Data Form was completed. Each data form included supporting rationales for determining the presence or absence of each wetland parameter. The classification of wetlands deemed potentially jurisdictional was computed using the Kentucky Division of Water Wetland Rapid Assessment Method (KYWRAM) version 3. The KYWRAM rating denotes the quality of the wetland and can be used to evaluate mitigation efforts.

The wetland boundaries within the Survey Area were delineated using a Trimble global positioning system (GPS) handheld unit. GPS data were collected using Trimble TerraSync software. The GPS points of wetland boundaries and test pit locations (including coordinates and attribute information) were subsequently imported into ESRI ArcGIS software for creating maps of delineated wetlands and calculating wetland acreages.

2.3 Methods for Assessing Streams

Hydrologic features other than wetlands (e.g. stream channels) were delineated in the field by identifying the ordinary high-water mark (OHWM). OHWM is defined as the line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas (33 CFR 328.3(c)(7)).

Streams were evaluated to assess the flow regime (i.e. ephemeral, intermittent, or perennial). Natural linear features with an intermittent or perennial flow regime with a defined bed and bank, OHWM, and observed or mapped hydrologic connection to navigable waters downstream were considered WOTUS. Natural linear features with an ephemeral flow regime were considered non-jurisdictional. Man-made features (e.g. grassy swales or agricultural drainage ditches) with or without a bed and bank, but no discernable OHWM, were considered to be non-jurisdictional. Delineated streams and man-made features were evaluated and recorded with a Trimble GPS handheld unit.

Stream habitat was evaluated following methods described in the U.S. Environmental Protection Agency's (USEPA) *Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers* (Barbour et al. 1999). The Rapid Bioassessment Protocol (RBP) Habitat Assessment Field Data Sheets was completed to determine habitat quality of each stream.

3 REGULATORY AUTHORITY

Wetlands are defined by the USACE (33 CFR 328.3, 1986) and the U.S. Environmental Protection Agency (40 CFR 230.3, 1980) as "areas that are inundated or saturated by surface or groundwater 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". Many wetlands and other surface water features, including intermittent and perennial streams, are considered waters of the United States by the USACE, and these "jurisdictional" areas are regulated under Section 404 of the Clean Water Act (CWA).

The jurisdictional status of the wetlands and other water features is generally based on the feature being adjacent to or having an obvious hydrologic connection to a known jurisdictional waterway or wetland ("Waters of the United States") as defined by the June 22, 2020 Navigable Waters Protection Rule in 33 CFR 328.3. In the USACE/Environmental Protection Agency CWA regulations (33 CFR 328.3(a)), the term "jurisdictional waters," which is considered waters of the United States, is defined as follows:

1. The territorial seas, and waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including waters which are subject to the ebb and flow of the tide;
2. Tributaries;
3. Lakes and ponds; and impoundments of jurisdictional waters; and
4. Adjacent wetlands, which is defined as (33 CFR 328.3(c)(1)) wetlands that:
    a. Abut, meaning to touch at least at one point or side of, a water identified in paragraph (a)(1), (2), or (3).
    b. Are inundated by flooding from a water identified in (a)(1), (2), or (3) in a typical year;
    c. Are physically separated from a water identified in (a)(1), (2), or (3) only by a natural berm, bank, dune, or similar natural features; or
    d. Are physically separated from a water identified in (a)(1), (2), or (3) of this section only by an artificial dike, barrier, or similar artificial structure so long as that structure allows for a direct hydrologic surface connection between the wetlands and the water identified in (a)(1), (2), or (3) in a typical year.

In the USACE/Environmental Protection Agency CWA regulations (33 CFR 328.3(b)), the term "non-jurisdictional waters," which is not considered waters of the United States, is defined as follows:

1. Waters or water features that are not identified in paragraph (a)(1), (2), (3), or (4);
2. Groundwater, including groundwater drained through subsurface drainage systems;

3. Ephemeral features, including ephemeral streams, swales, gullies, rills, and pools;
4. Diffuse stormwater run-off and directional sheet flow over upland;
5. Ditches that are not water identified in paragraph (a)(1) or (2) and those portions of ditches constructed in water identified in (a)(4) that do not satisfy the conditions of an adjacent wetland;
6. Prior converted cropland;
7. Artificially irrigated areas, including fields flooded for agricultural production, that would revert to upland should application of irrigation water to that area cease;
8. Artificial lakes and ponds, including water storage reservoirs and farm, irrigation, stock watering, and log cleaning ponds, constructed or excavated in upland or in non-jurisdictional waters, so long as those artificial lakes and ponds are not impoundments of jurisdictional waters;
9. Water-filled depressions constructed or excavated in upland or in non-jurisdictional waters incidental to mining or construction activity, and pits excavated in upland or in non-jurisdictional waters for the purpose of obtaining fill, sand, or gravel;
10. Stormwater control features constructed or excavated in upland or in non-jurisdictional waters to convey, treat, infiltrate, or store stormwater run-off;
11. Groundwater recharge, water reuse, and wastewater recycling structures, including detention, retention, and infiltration basins and ponds, constructed or excavated in upland or non-jurisdictional waters; and
12. Water treatment systems.

Impacts to jurisdictional waters will likely require a Section 404 permit and USACE approval. Impacts to non-jurisdictional waters will not require a Section 404 permit or USACE approval. However, impacts to non-jurisdictional water may require state specific Section 401 approval.

4 RESULTS

4.1 Desktop Analysis Results

The following information on soils and hydrology was gathered to inform and prepare the field team completing the delineation.

4.1.1 Site Soils

A review of the NRCS's Web Soil Survey and the Soil Survey of McCracken County, Kentucky, (USDA 1976) identified 11 soil map units within the Survey Area. Three soils types have a hydric soil rating and include: Calloway silt loam (CaA), Falaya-Collins complex (Fa), and Routon silt loam (RtA) (Table 1 and Figure 3 – USDA Soil Types Map).

Table 1. Soil map units in the Survey Area for the McCracken County Solar LLC Project, McCracken County, Kentucky.

Map Unit Symbol	Map Unit Name	Acres	Survey Area %
CaA	Calloway silt loam, 0-2% slopes	200.5	27.9

Map Unit Symbol	Map Unit Name	Acres	Survey Area %
CaB2	Calloway silt loam, 2-4% slopes, eroded	61.5	8.6
Fa	Falaya-Collins complex, 0-2% slopes, occasionally flooded	58.6	8.2
GrA	Grenada silt loam, 0-2% slopes	21.8	3.0
GrB2	Grenada silt loam, 2-6% slopes, eroded	102.6	14.3
GrB3	Grenada silt loam, 4-6% slopes, severely eroded	124.3	17.3
GrC3	Grenada silt loam, 6-12% slopes, severely eroded	100.1	13.9
LoC3	Loring silt loam, 6-12% slopes, severely eroded	1.1	0.2
Pt	Pits, Gravel, and Dumps	8.2	1.1
RtA	Routon silt loam, 0-2% slopes	36.7	5.1
W	Water	3.3	0.5

Source: USDA 2006, USDA NRCS 1976

4.1.2 Site Hydrology

The Survey Area is within the Bayou Creek-Ohio River (Hydrologic Unit Codes 051402060701) subwatershed.

The NWI features in this area were photo-interpreted using 1:58,000 scale color infrared imagery from 1983 (USFWS 1983). The Survey Area includes 14,483 feet of NHD streams, including 5,630 feet of Brushy Creek and 2,854 feet of Newtons Creek. The Study Area includes nine NWI wetlands and eight NHD streams (Figure 2 – Existing Hydrological Datasets Map).

4.2 Field Survey Results

The following sections provide the field survey results for the wetland and stream delineation. Photographic documentation of the site and delineated aquatic features is provided in Appendix B. USACE Wetland Determination Data Forms are provided in Appendix C. RBP Habitat Assessment Field Data Sheets are provided in Appendix D.

4.2.1 Wetland Delineation

The field survey resulted in the identification and delineation of eight wetlands totaling 0.90 acres and three ponds totaling 1.49 acres within the Survey Area (Figure 4 – Streams and Wetlands Map). One wetland (0.10 acres) abuts an intermittent stream and is considered a jurisdictional WOTUS. The remaining seven wetlands and three ponds are considered non-jurisdictional waters. Classifications and acreages of each delineated wetland are described in Table 2. Resumes of Copperhead personnel who completed the delineation are included in Appendix E.

Table 2. Summary of delineated wetland resources within the McCracken County Solar LLC Project Survey Area, McCracken County, Kentucky.

Feature Name	Preliminary Jurisdictional Determination[1]	Feature Size (acres)	Cowardin Classification Code[2]
Pond 1	Non-Jurisdictional	0.04	PUB
Pond 2	Non-Jurisdictional	0.02	PUB
Pond 3	Non-Jurisdictional	1.43	PUB
Wetland A	Non-Jurisdictional	0.03	PEM
Wetland B	Non-Jurisdictional	0.30	PFO
Wetland C	Non-Jurisdictional	0.03	PFO
Wetland D	Non-Jurisdictional	0.13	PEM
Wetland E	Non-Jurisdictional	0.05	PFO
Wetland F	Non-Jurisdictional	0.03	PEM
Wetland H	Non-Jurisdictional	0.23	PFO
Wetland I	Jurisdictional	0.10	PEM
Total Jurisdictional Wetlands		**0.10**	
Total Non-Jurisdictional Wetlands		**2.29**	

[1]Jurisdictional determinations and boundaries when presented are preliminary and are subject to final verification by the USACE.

[2]Classifications are based on Copperhead's professional judgment of actual field conditions.

Wetland A (0.03 acres)

Wetland A is a palustrine emergent (PEM) wetland located in the southeast portion of the Survey Area. This wetland was not depicted on the NWI map. Wetland A receives hydrology from an ephemeral stream, high water table, and overland sheet flow from surrounding forest and agricultural fields. Dominant vegetation in Wetland A consists of Japanese stiltgrass (*Microstegium vimineum*) and dark-green bulrush (*Scirpus atrovirens*). Wetland A abuts ephemeral Stream 12. Wetland A does not meet the definition of an adjacent wetland and is therefore considered a non-jurisdictional feature.

Wetland B (0.30 acres)

Wetland B is a palustrine forested (PFO) wetland located in the north-central portion of the Survey Area. This wetland was depicted on the NWI map. Wetland B receives hydrology from an ephemeral stream, high water table, and overland sheet flow from surrounding forest and agricultural fields. Dominant vegetation consists of black willow (*Salix nigra*), dark-green bulrush, and swamp smartweed (*Persicaria hydropiperoides*). Wetland B abuts ephemeral Stream 25. Wetland B does not meet the definition of an adjacent wetland and is therefore considered a non-jurisdictional feature.

Wetland C (0.03 acres)

Wetland C is a PFO wetland located in the northern portion of the Survey Area. This wetland was not depicted on the NWI map. Wetland C receives hydrology from a high water table and overland sheet flow from surrounding forest and agricultural fields. Dominant vegetation

consists of pin oak (*Quercus palustris*) and silver maple (*Acer saccharinum*). Wetland C does not meet the definition of an adjacent wetland and is therefore considered a non-jurisdictional feature.

Wetland D (0.13 acres)
Wetland D is a PEM wetland located in the northern portion of the Survey Area. This wetland was not depicted on the NWI map. Wetland D receives hydrology from an ephemeral stream, high water table, and overland sheet flow from surrounding agricultural fields. Dominant vegetation consists of rough cocklebur (*Xanthium strumarium*). Wetland D abuts ephemeral Stream 26. Wetland D does not meet the definition of an adjacent wetland and is therefore considered a non-jurisdictional feature.

Wetland E (0.05 acres)
Wetland E is a PFO wetland located in the northern portion of the Survey Area. This wetland was not depicted on the NWI map. Wetland E receives hydrology from a high water table and overland sheet flow from surrounding forest and agricultural fields. Dominant vegetation consists of cherry-bark oak (*Quercus pagoda*), winter grape (*Vitis vulpina*), and poison ivy (*Toxicodendron radicans*). Wetland E does not meet the definition of an adjacent wetland and is therefore considered a non-jurisdictional feature.

Wetland F (0.03 acres)
Wetland F is a is a PEM wetland located in the northern portion of the Survey Area. This wetland was not depicted on the NWI map. Wetland F receives hydrology from a high water table and overland sheet flow from surrounding forest and agricultural fields. Dominant vegetation consists of hackberry (*Celtis occidentalis*) and trumpet vine (*Campsis radicans*). Wetland F does not meet the definition of an adjacent wetland and is therefore considered a non-jurisdictional feature.

Wetland H (0.23 acres)
Wetland H is a PFO wetland located in the southern portion of the Survey Area. This wetland was not depicted on the NWI map. Wetland H receives hydrology from an ephemeral stream, high water table, and overland sheet flow from surrounding agricultural fields. Dominant vegetation consists of black willow and Japanese stiltgrass. Wetland H abuts ephemeral Stream 36. Wetland H does not meet the definition of an adjacent wetland and is therefore considered a non-jurisdictional feature.

Wetland I (0.10 acres)
Wetland I is a PEM wetland located in the southern portion of the Survey Area. This wetland was depicted on the NWI map. Wetland I receives hydrology from Brushy Creek and intermittent Stream 38, high water table, and overland sheet flow from surrounding agricultural fields. Dominant vegetation consists of rice cutgrass. Since Wetland I abuts Brushy Creek and an intermittent stream, it is considered a jurisdictional WOTUS.

4.2.2 Streams Assessments

The field survey resulted in the identification and delineation of 40 streams based on field observation at the time of the survey (Figure 4 – Wetland and Stream Delineation Map). Two perennial and 13 intermittent streams were identified and considered WOTUS. The two perennial streams within the Survey Area are Brushy Creek and Newtons Creek. Twenty-five (25) ephemeral streams were identified and considered isolated. The NHD streams and NWI riverine features identified prior to field work were verified to be present within the Survey Area. Flow regime and length of each of the streams are summarized in Table 3 and described in detail below.

Table 3. Summary of delineated streams within the McCracken County Solar LLC Project Survey Area, McCracken County, Kentucky.

Stream Name	Preliminary Jurisdictional Determination[1]	Linear Feet	Flow Regime	OHWM Average Width (Ft.)	USEPA RBP Score
1	Jurisdictional	1,408	Intermittent	4.0	126
2	Non-Jurisdictional	256	Ephemeral	1.0	27
3 (Newtons Creek)	Jurisdictional	3,625	Perennial	12.0	154
4	Jurisdictional	930	Intermittent	6.0	122
5	Non-Jurisdictional	166	Ephemeral	2.5	58
6	Jurisdictional	810	Intermittent	6.0	107
	Non-Jurisdictional	257	Ephemeral	3.0	38
7	Jurisdictional	955	Intermittent	10.0	145
8	Jurisdictional	207	Intermittent	5.0	129
9	Jurisdictional	1,075	Intermittent	3.0	82
10	Non-Jurisdictional	58	Ephemeral	3.0	55
11	Jurisdictional	1,621	Intermittent	3.0	65
12	Non-Jurisdictional	289	Ephemeral	1.3	58
13	Non-Jurisdictional	258	Ephemeral	2.0	66
14	Jurisdictional	955	Intermittent	4.0	90
15	Non-Jurisdictional	263	Ephemeral	1.0	74
16	Non-Jurisdictional	286	Ephemeral	1.5	41
17	Non-Jurisdictional	285	Ephemeral	1.0	52
18 (Brushy Creek)	Jurisdictional	5,667	Perennial	11.0	120
19	Non-Jurisdictional	124	Ephemeral	0.8	51
20	Non-Jurisdictional	180	Ephemeral	1.0	47
21	Non-Jurisdictional	132	Ephemeral	1.0	50

Stream Name	Preliminary Jurisdictional Determination[1]	Linear Feet	Flow Regime	OHWM Average Width (Ft.)	USEPA RBP Score
22	Non-Jurisdictional	89	Ephemeral	1.5	55
23	Non-Jurisdictional	97	Ephemeral	0.8	47
24	Non-Jurisdictional	159	Ephemeral	1.0	58
25	Non-Jurisdictional	704	Ephemeral	0.7	60
26	Non-Jurisdictional	73	Ephemeral	3.0	50
28	Jurisdictional	134	Intermittent	1.5	122
	Non-Jurisdictional	1,362	Ephemeral	1.5	69
29	Non-Jurisdictional	309	Ephemeral	0.3	32
30	Non-Jurisdictional	124	Ephemeral	0.8	40
31	Non-Jurisdictional	133	Ephemeral	0.8	50
32	Jurisdictional	1,321	Intermittent	1.7	126
33	Non-Jurisdictional	301	Ephemeral	1.0	45
34	Jurisdictional	654	Intermittent	2.0	64
36	Non-Jurisdictional	526	Ephemeral	1.3	42
38	Jurisdictional	350	Intermittent	2.5	36
39	Jurisdictional	283	Intermittent	1.5	69
40	Non-Jurisdictional	315	Ephemeral	1.3	39
Perennial Jurisdictional		**9,292**			
Intermittent Jurisdictional		**10,696**			
Total Jurisdictional		**19,988**			
Total Ephemeral Non-Jurisdictional		**6,880**			

[1] Jurisdictional determinations and boundaries when presented are preliminary and are subject to final verification by the USACE.

Stream 1 (1,408 linear feet)

Stream 1 is an intermittent unnamed tributary of Stream 3 (Newtons Creek) and flows northeast through the Survey Area. Stream 1 has intermittent flow, defined bed and bank, OHWM, and observed hydrologic connection to navigable waters downstream. Stream 1 is considered a jurisdictional WOTUS due to its intermittent flow regime.

Stream 2 (256 linear feet)

Stream 2 is an ephemeral unnamed tributary of Stream 1 that flows southeast through the Study Area. Since Stream 2 has ephemeral flow, it is considered a non-jurisdictional feature.

Stream 3 (3,625 linear feet)
Stream 3 is Newtons Creek, a perennial stream that flows north through the Survey Area. Stream 3 is considered a jurisdictional WOTUS due to its perennial flow regime.

Stream 4 (930 linear feet)
Stream 4 is an intermittent unnamed tributary of Stream 3 (Newtons Creek) and flows northwest through the Survey Area. Stream 4 has intermittent flow, defined bed and bank, OHWM, and observed hydrologic connection to navigable waters downstream. Stream 4 is considered a jurisdictional WOTUS due to its intermittent flow regime.

Stream 5 (166 linear feet)
Stream 5 is an ephemeral unnamed tributary of Stream 4 that flows east through the Survey Area. Since Stream 5 has ephemeral flow, it is considered a non-jurisdictional feature.

Stream 6 (810 linear feet intermittent; 257 linear feet ephemeral)
Stream 6 is an unnamed tributary of Stream 3 (Newtons Creek) and flows west through the Survey Area. Stream 6 has a 257 linear foot section with ephemeral flow. The ephemeral portion of Stream 6 is considered a non-jurisdictional feature due to its flow regime. Downstream of the ephemeral reach, Stream 6 has an 810 linear foot section with intermittent flow, defined bed and bank, OHWM, and observed hydrologic connection to navigable waters downstream. The intermittent portion of Stream 6 is considered a jurisdictional WOTUS.

Stream 7 (955 linear feet)
Stream 7 is an intermittent unnamed tributary of Stream 3 (Newtons Creek) and flows northeast through the Survey Area. Stream 7 has intermittent flow, defined bed and bank, OHWM, and observed hydrologic connection to navigable waters downstream. Stream 7 is considered a jurisdictional WOTUS due to its intermittent flow regime.

Stream 8 (207 linear feet)
Stream 8 is an intermittent unnamed tributary of Stream 3 (Newtons Creek) and flows west through the Survey Area. Stream 8 has intermittent flow, defined bed and bank, OHWM, and observed hydrologic connection to navigable waters downstream. Stream 8 is considered a jurisdictional WOTUS due to its intermittent flow regime.

Stream 9 (1,075 linear feet)
Stream 9 is an intermittent unnamed tributary that flows east through the Survey Area. Stream 9 has intermittent flow, defined bed and bank, OHWM, and observed hydrologic connection to navigable waters downstream. Stream 9 is considered a jurisdictional WOTUS due to its intermittent flow regime.

Stream 10 (58 linear feet)
Stream 10 is an ephemeral unnamed tributary that flows into Stream 9 and south through the Survey Area. Since Stream 10 has ephemeral flow, it is considered a non-jurisdictional feature.

Stream 11 (1,621 linear feet)
Stream 11 is an intermittent unnamed tributary that flows north through the Survey Area. Stream 11 has intermittent flow, defined bed and bank, OHWM, and observed hydrologic connection to navigable waters downstream. Stream 11 is considered a jurisdictional WOTUS due to its intermittent flow regime.

Stream 12 (289 linear feet)
Stream 12 is an ephemeral unnamed tributary of Stream 12 and flows northeast through Wetland A. Since Stream 12 has ephemeral flow, it is considered a non-jurisdictional feature.

Stream 13 (258 linear feet)
Stream 13 is an ephemeral unnamed tributary of Stream 14 and flows west through the Survey Area. Since Stream 13 has ephemeral flow, it is considered a non-jurisdictional feature.

Stream 14 (955 linear feet)
Stream 14 is an intermittent unnamed tributary and flows northwest through the Survey Area. Since Stream 14 has intermittent flow, defined bed and bank, OHWM, and observed hydrologic connection to navigable waters downstream. Stream 14 is considered a jurisdictional WOTUS due to its intermittent flow regime.

Stream 15 (263 linear feet)
Stream 15 is an ephemeral unnamed tributary of Stream 14 and flows north through the Survey Area. Since Stream 15 has ephemeral flow, it is considered a non-jurisdictional feature.

Stream 16 (286 linear feet)
Stream 16 is an ephemeral unnamed tributary of Stream 14 and flows north through the Survey Area. Since Stream 16 has ephemeral flow, it is considered a non-jurisdictional feature.

Stream 17 (285 linear feet)
Stream 17 is an ephemeral unnamed tributary that flows north. Since Stream 17 has ephemeral flow, it is considered a non-jurisdictional feature.

Stream 18 (5,667 linear feet)
Stream 18 is Brushy Creek and north west through the Survey Area. Stream 18 is a perennial stream and flows for 5,667 linear feet within the Survey Area.. Stream 18 has a defined bed and bank, OHWM, and observed hydrologic connection to navigable waters downstream. Stream 18 is considered a jurisdictional WOTUS due to its perennial flow regime.

Stream 19 (124 linear feet)
Stream 19 is an ephemeral unnamed tributary of Stream 18 (Brushy Creek) and flows northeast. Since Stream 19 has ephemeral flow, it is considered a non-jurisdictional feature.

Stream 20 (180 linear feet)
Stream 20 is an ephemeral unnamed tributary of Stream 18 (Brushy Creek) that flows northwest through the Survey Area. Since Stream 20 has ephemeral flow, it is considered a non-jurisdictional feature.

Stream 21 (132 linear feet)
Stream 21 is an ephemeral unnamed tributary of Stream 18 (Brushy Creek) and flows northwest. Since Stream 21 has ephemeral flow, it is considered a non-jurisdictional feature.

Stream 22 (89 linear feet)
Stream 22 is an ephemeral unnamed tributary of Stream 18 (Brushy Creek) and flows east. Since Stream 22 has ephemeral flow, it is considered a non-jurisdictional feature.

Stream 23 (97 linear feet)
Stream 23 is an ephemeral unnamed tributary of Stream 18 (Brushy Creek) and flows east. Since Stream 23 has ephemeral flow, it is considered a non-jurisdictional feature.

Stream 24 (159 linear feet)
Stream 24 is an ephemeral unnamed tributary of Stream 18 (Brushy Creek) and flows southeast. Since Stream 24 has ephemeral flow, it is considered a non-jurisdictional feature.

Stream 25 (704 linear feet)
Stream 25 is an ephemeral unnamed tributary that flows north through Wetland B. Since Stream 25 has ephemeral flow, it is considered a non-jurisdictional feature.

Stream 26 (73 linear feet)
Stream 26 is an ephemeral unnamed tributary that flows north through the Study Area. Stream 26 is separated into two sections by an agricultural field with no defined bed or bank. Since Stream 26 has ephemeral flow, it is considered a non-jurisdictional feature.

Stream 28 (134 linear feet intermittent; 1,362 linear feet ephemeral)
Stream 28 is an unnamed tributary of Brushy Creek and flows east through the Survey Area. Stream 28 has a 1,362 linear foot section with ephemeral flow. The ephemeral portion of Stream 28 is considered a non-jurisdictional feature. Downstream of the ephemeral section, Stream 28 has a 134 linear foot section that has intermittent flow, defined bed and bank, OHWM, and observed hydrologic connection to navigable waters downstream. The intermittent portion of Stream 28 is considered a jurisdictional WOTUS.

Stream 29 (309 linear feet)
Stream 29 is an ephemeral unnamed tributary of Stream 18 (Brushy Creek) and flows east through the Study Area. Since Stream 29 has ephemeral flow, it is considered a non-jurisdictional feature.

Stream 30 (124 linear feet)
Stream 30 is an ephemeral unnamed tributary of Stream 18 (Brushy Creek) and flows northwest through the Study Area. Since Stream 30 has ephemeral flow, it is considered a non-jurisdictional feature.

Stream 31 (133 linear feet)
Stream 31 is an ephemeral unnamed tributary of Stream 32 and flows north through the Study Area. Since Stream 31 has ephemeral flow, it is considered a non-jurisdictional feature.

Stream 32 (1,321 linear feet)
Stream 32 is an intermittent unnamed tributary of Stream 18 (Brushy Creek) and flows northwest through the Survey Area. Since Stream 32 has intermittent flow, defined bed and bank, OHWM, and observed hydrologic connection to navigable waters downstream. Stream 32 is considered a jurisdictional WOTUS due to its intermittent flow regime.

Stream 33 (301 linear feet)
Stream 33 is an ephemeral unnamed tributary of Stream 18 (Brushy Creek) and flows northeast through the Study Area. Since Stream 33 has ephemeral flow, it is considered a non-jurisdictional feature.

Stream 34 (654 linear feet)
Stream 34 is an intermittent unnamed tributary and flows north through the Survey Area. Since Stream 34 has intermittent flow, defined bed and bank, OHWM, and observed hydrologic connection to navigable waters downstream. Stream 34 is considered a jurisdictional WOTUS due to its intermittent flow regime.

Stream 36 (526 linear feet)
Stream 36 is an ephemeral unnamed tributary of Stream 18 (Brushy Creek) and flows west through Wetland 8. Since Stream 36 has ephemeral flow, it is considered a non-jurisdictional feature.

Stream 38 (350 linear feet)
Stream 38 is an intermittent unnamed tributary of Stream 18 (Brushy Creek) and flows north into Wetland I. Since Stream 38 has intermittent flow, defined bed and bank, OHWM, and observed hydrologic connection to navigable waters downstream. Stream 38 is considered a jurisdictional WOTUS due to its intermittent flow regime.

Stream 39 (283 linear feet)
Stream 39 is an intermittent unnamed tributary of Stream 1 and flows north through the Survey Area. Since Stream 39 has intermittent flow, defined bed and bank, OHWM, and observed hydrologic connection to navigable waters downstream. Stream 39 is considered a jurisdictional WOTUS due to its intermittent flow regime.

Stream 40 (315 linear feet)

Stream 40 is an ephemeral unnamed tributary and flows south through the Study Area. Since Stream 40 has ephemeral flow, it is considered a non-jurisdictional feature.

5 CONCLUSIONS

It is Copperhead's professional judgment that the Survey Area contains eigh wetland areas and three ponds totaling approximately 2.39 acres that meet the technical criteria for wetlands (i.e. hydric soils, hydrophytic [wetland] vegetation, and wetland hydrology). One wetland, totaling 0.10 acres, abuts a jurisdictional WOTUS and is considered jurisdictional WOTUS. The remaining seven wetlands and three ponds are considered non-jurisdictional. In addition, two perennial streams, 13 intermittent streams, and 25 ephemeral streams were identified. Two perennial streams and 13 intermittent streams are considered jurisdictional WOTUS. Twenty-five ephemeral streams are considered non-jurisdictional features.

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Appendix A - Figures

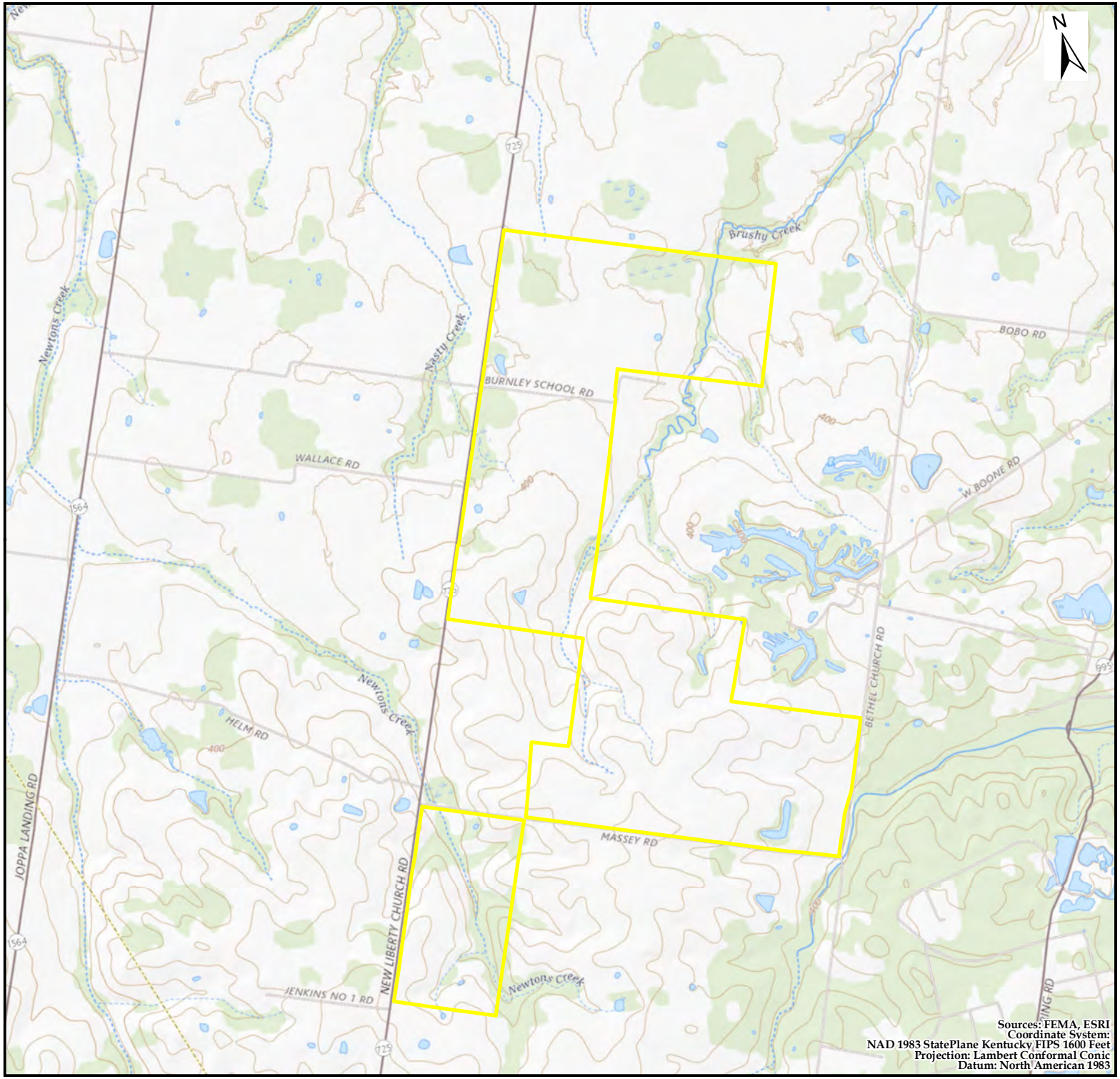

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FIGURE 1:
Project Location Map
McCracken County Solar LLC
McCracken County, Kentucky

Legend

Survey Area

0 2,000 4,000
Feet

Scale: 1 in = 2,000 ft

Prepared by :
Copperhead Environmental Consulting, Inc.
471 Main Street
P.O. Box 73
Paint Lick, Kentucky 40461

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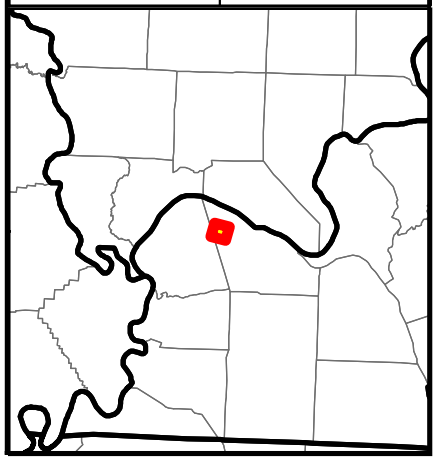
Checked by:	JP	Revision: 00



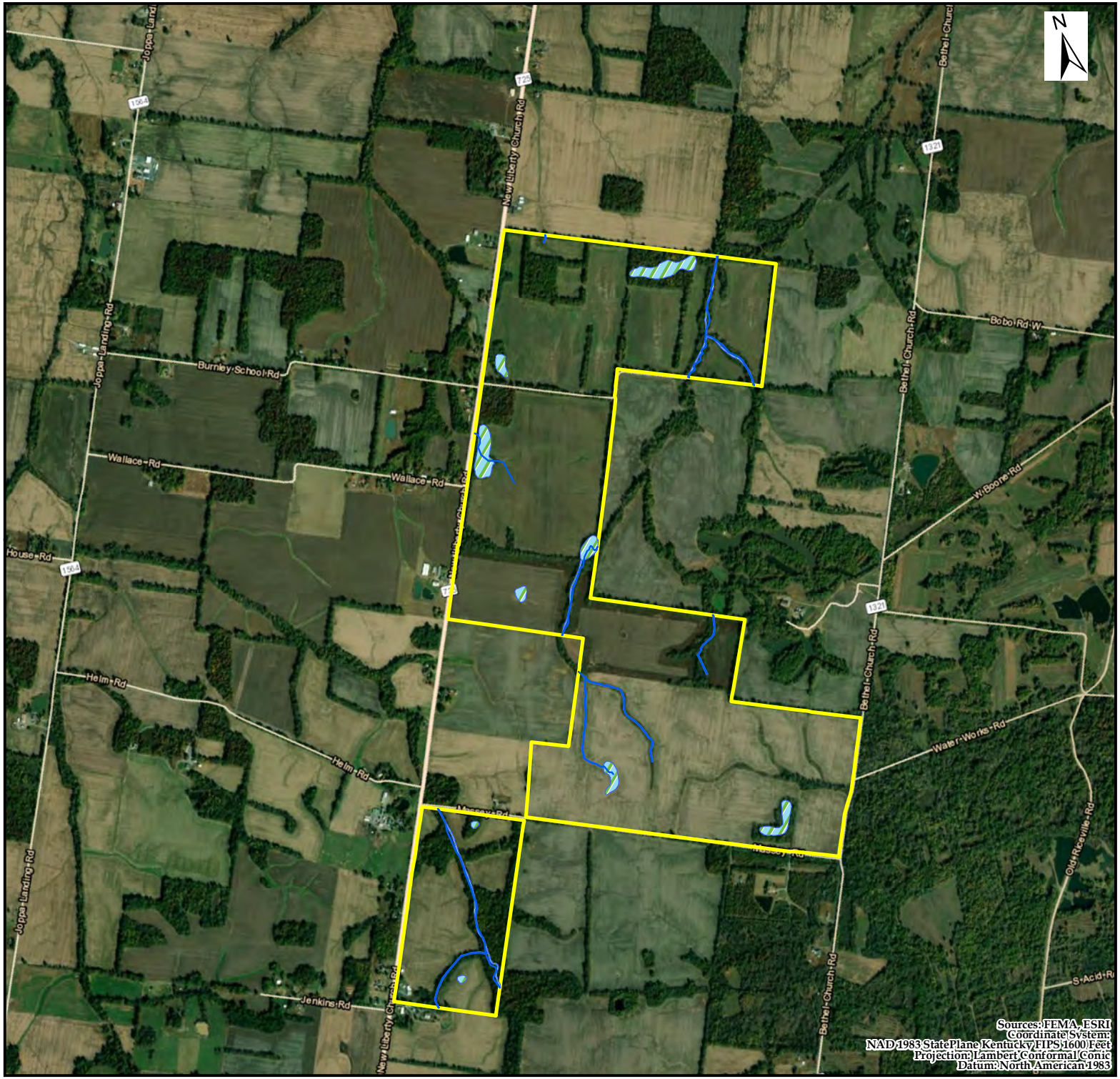


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FIGURE 2:
Existing Hydrological Datasets Map
McCracken County Solar LLC
McCracken County, Kentucky

Legend

- NHD Stream
- NWI Wetland
- Survey Area

0 2,000 4,000
Feet

Scale: 1 in = 2,000 ft

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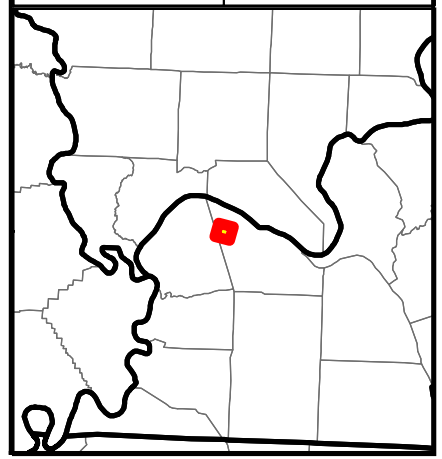

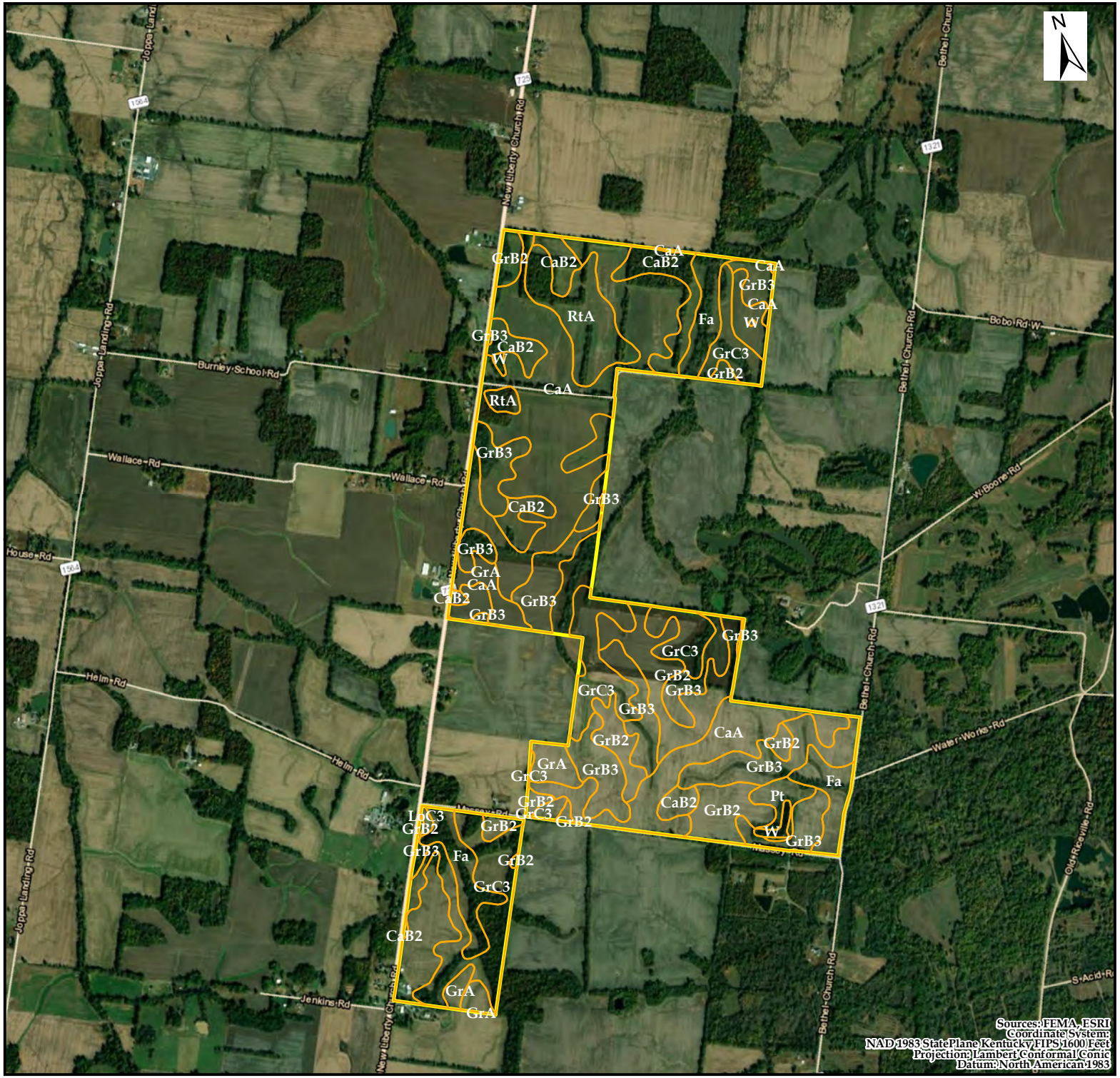

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FIGURE 3:
USDA Soil Types Map
McCracken County Solar LLC
McCracken County, Kentucky

Legend

- Soil Unit Boundary
- Survey Area

0 2,000 4,000
Feet

Scale: 1 in = 2,000 ft

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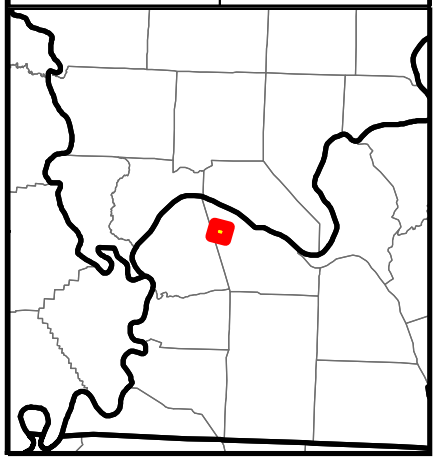

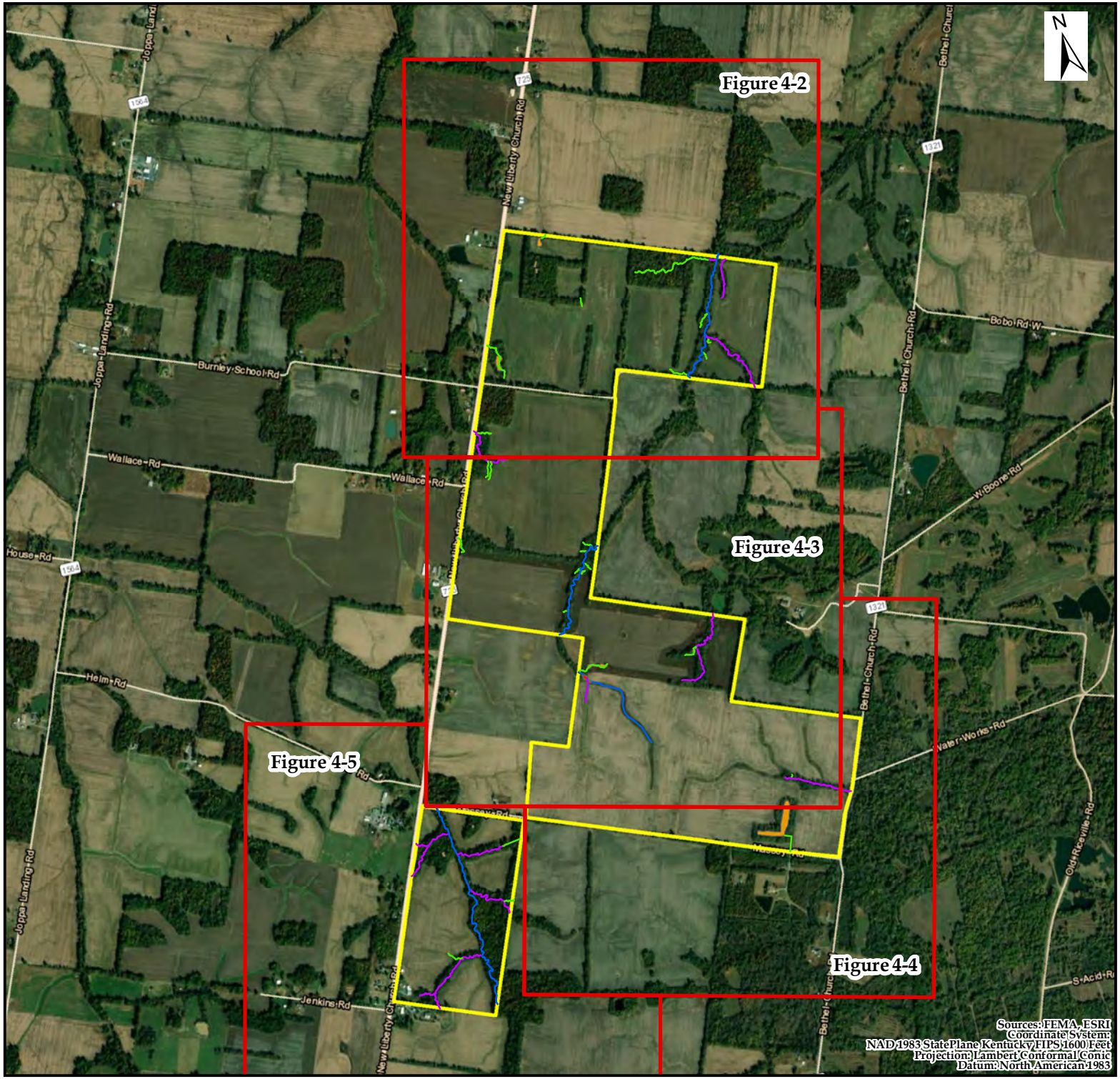

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FIGURE 4-1:
Wetland and Stream Delineation Map
McCracken County Solar LLC
McCracken County, Kentucky

Legend

- Ephemeral Stream
- Intermittent Stream
- Perennial Stream
- Non-Jurisdictional Wetland
- Jurisdictional Wetland
- Survey Area
- Inset

0 2,000 4,000
Feet

Scale: 1 in = 2,000 ft

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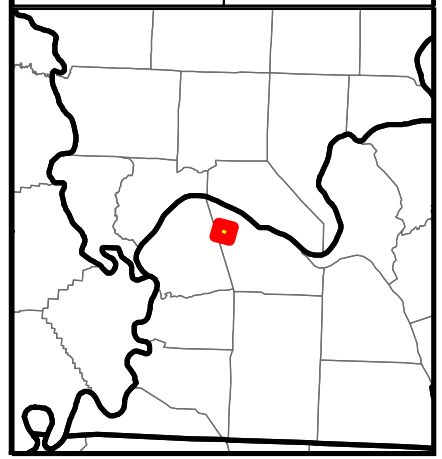

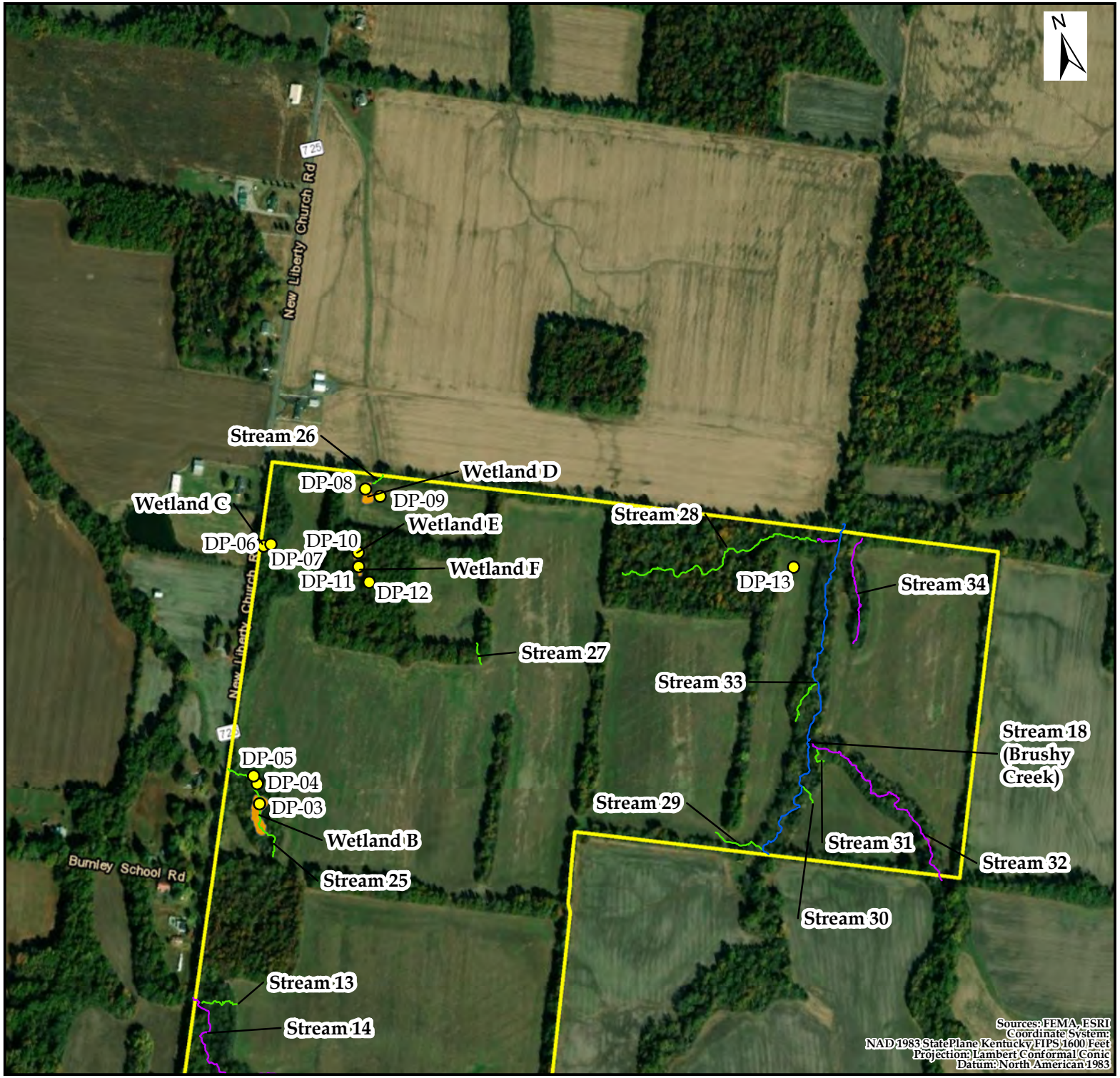

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FIGURE 4-2:
Wetland and Stream Delineation Map
McCracken County Solar LLC
McCracken County, Kentucky

Legend

- Data Point
- Ephemeral Stream
- Intermittent Stream
- Perennial Stream
- Non-Jurisdictional Wetland
- Jurisdictional Wetland
- Survey Area

0 750 1,500
Feet

Scale: 1 in = 750 ft

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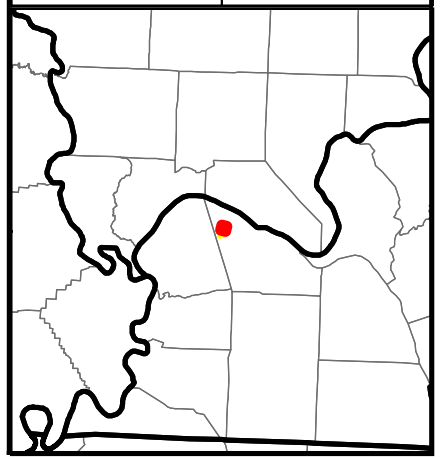

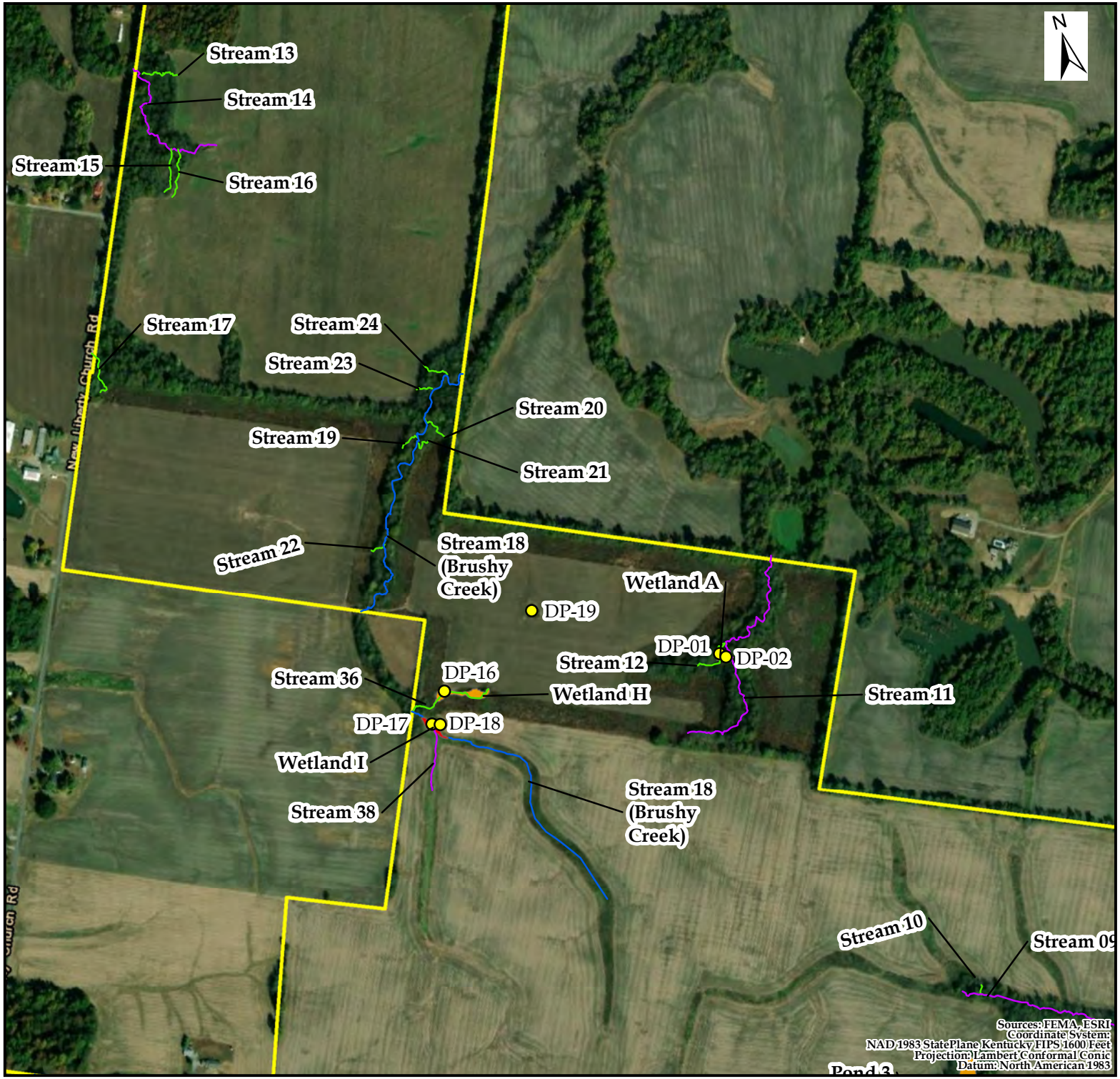

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FIGURE 4-3:
Wetland and Stream Delineation Map
McCracken County Solar LLC
McCracken County, Kentucky

Legend

- Data Point
- Ephemeral Stream
- Intermittent Stream
- Perennial Stream
- Non-Jurisdictional Wetland
- Jurisdictional Wetland
- Survey Area

0 750 1,500
Feet

Scale: 1 in = 750 ft

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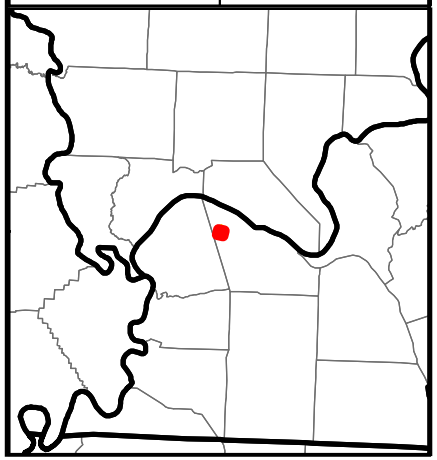

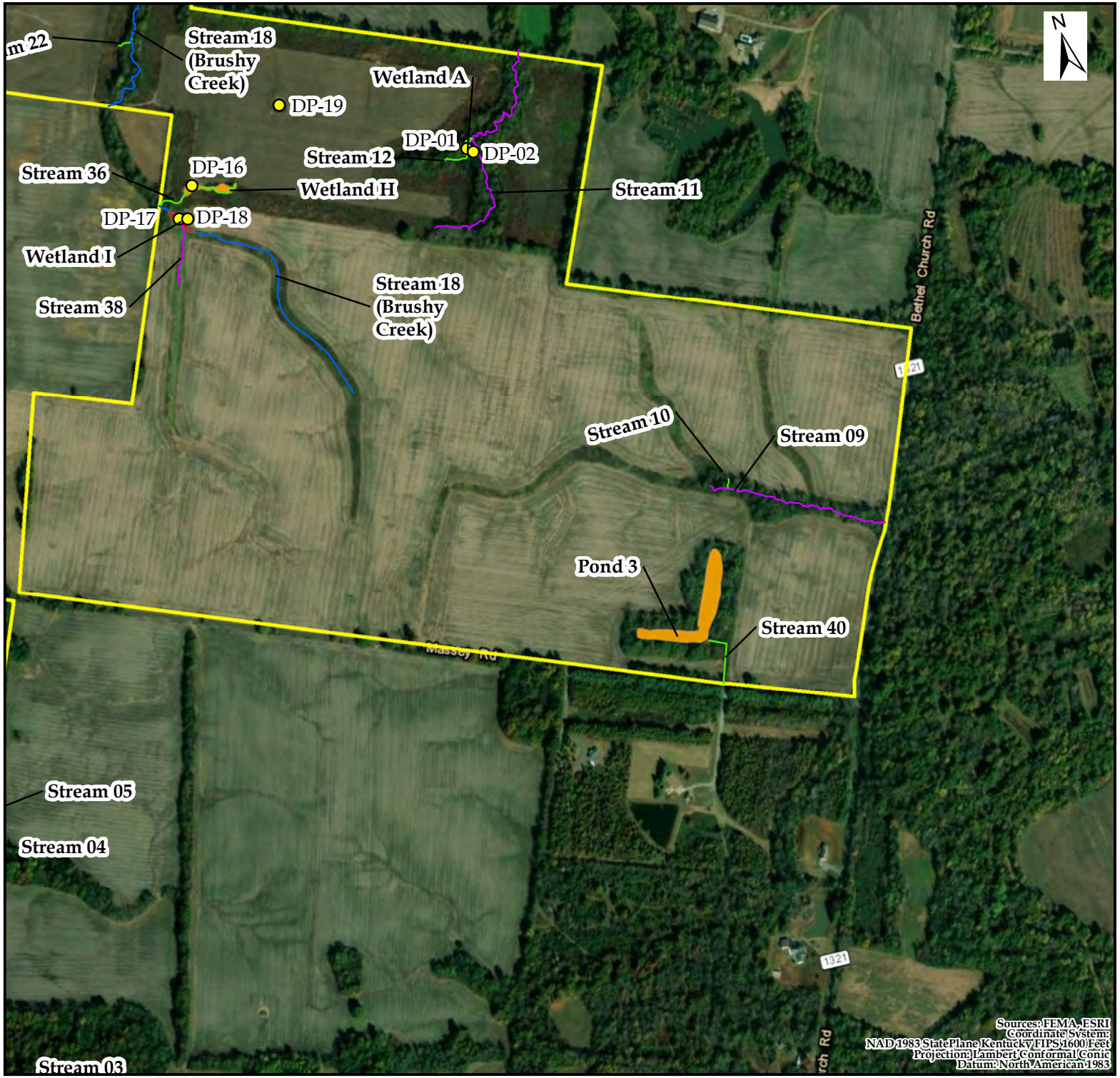

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FIGURE 4-4:
Wetland and Stream Delineation Map
McCracken County Solar LLC
McCracken County, Kentucky

Legend

- Data Point
- Ephemeral Stream
- Intermittent Stream
- Perennial Stream
- Non-Jurisdictional Wetland
- Jurisdictional Wetland
- Survey Area

0 750 1,500
Feet

Scale: 1 in = 750 ft

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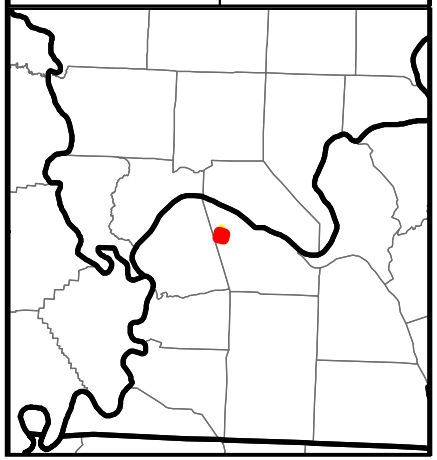

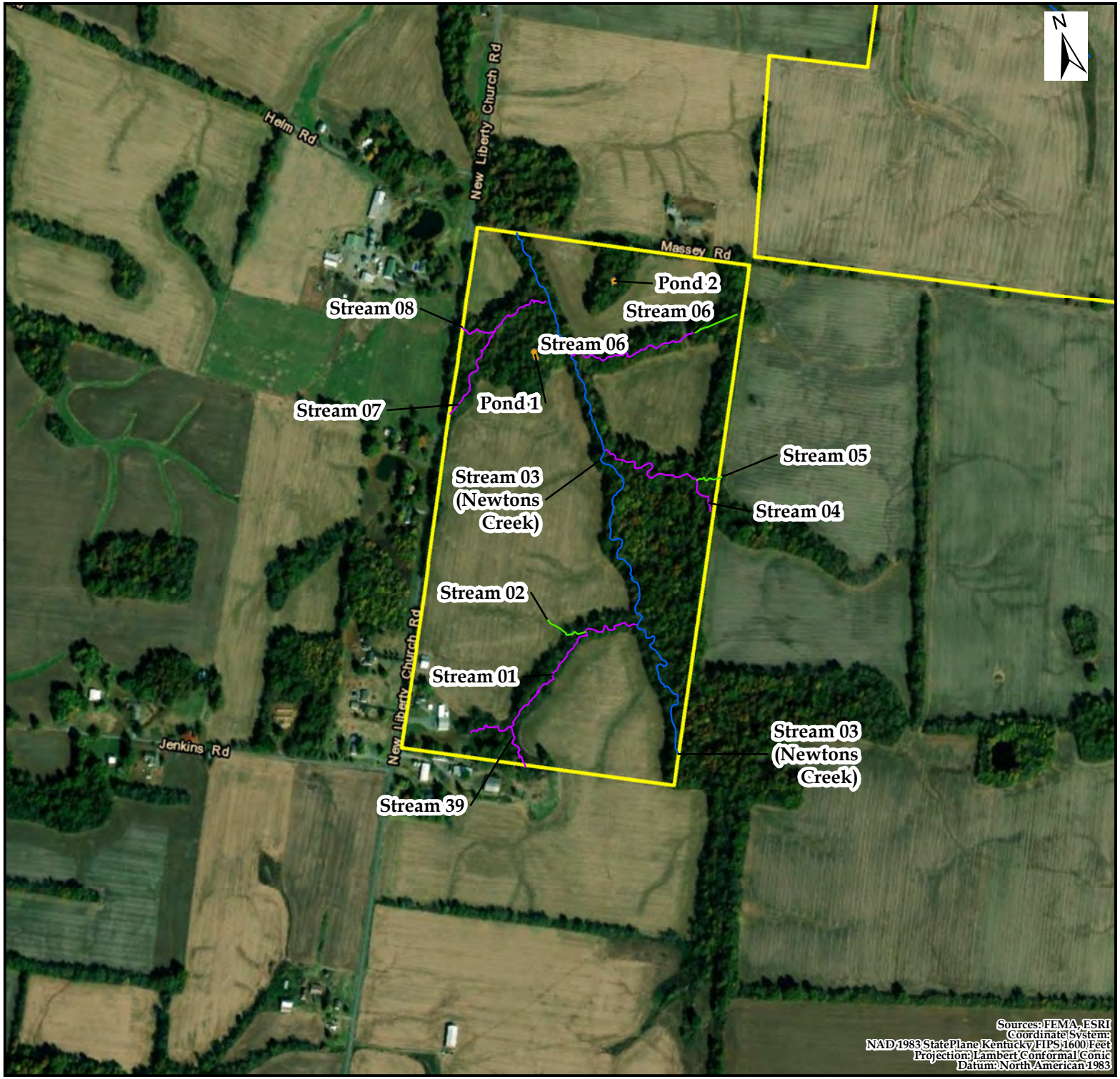

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FIGURE 4-5:
Wetland and Stream Delineation Map
McCracken County Solar LLC
McCracken County, Kentucky

Legend

- Data Point
- Ephemeral Stream
- Intermittent Stream
- Perennial Stream
- Non-Jurisdictional Wetland
- Jurisdictional Wetland
- Survey Area

0 750 1,500
Feet

Scale: 1 in = 750 ft

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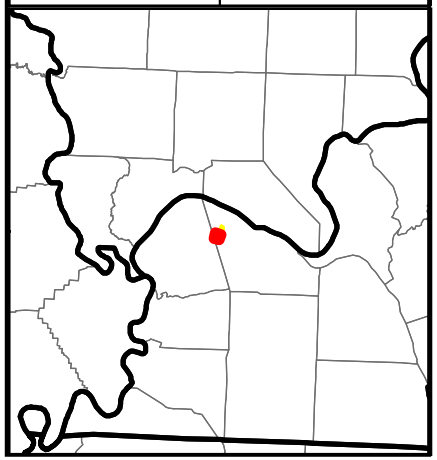
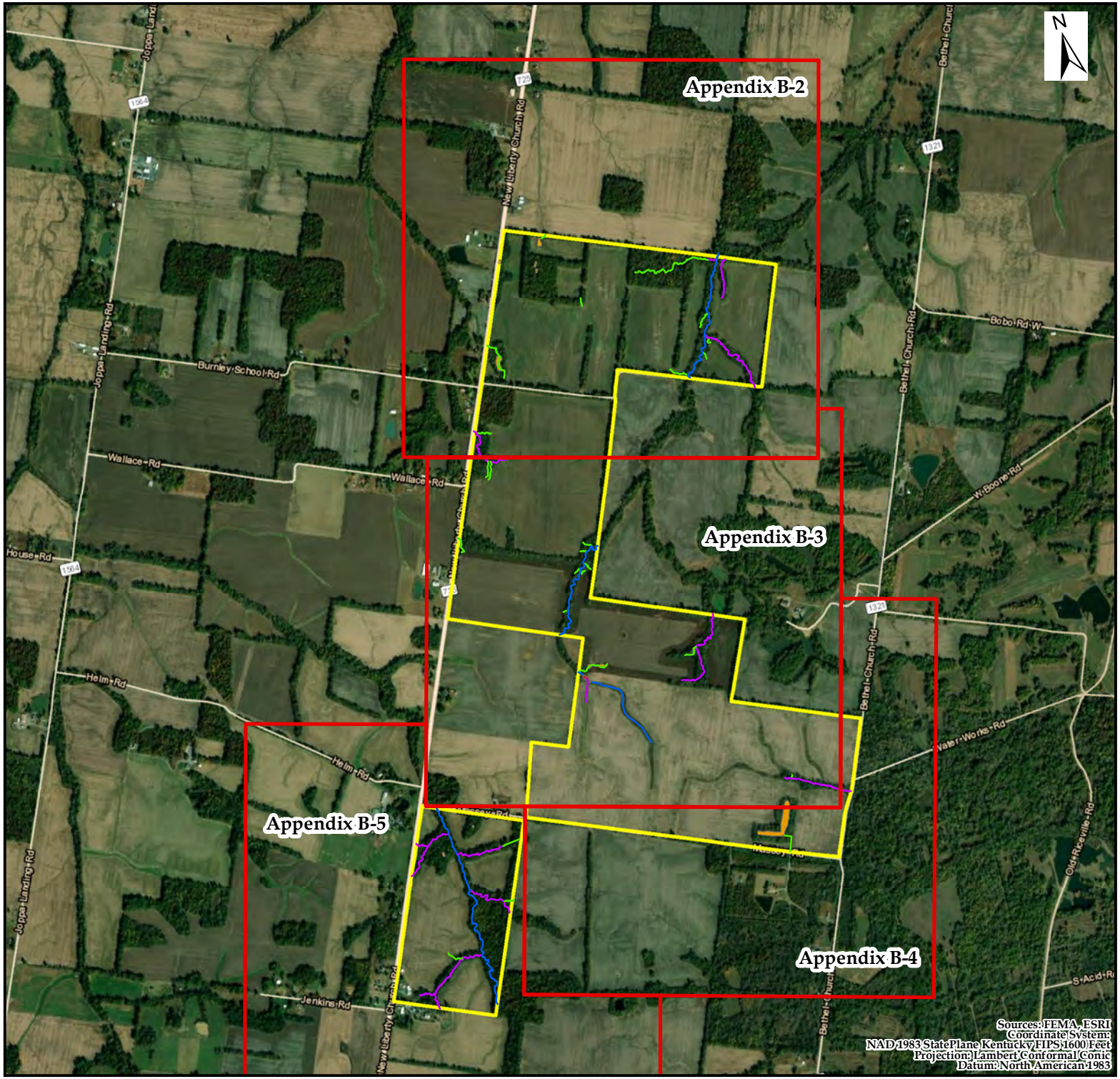


Appendix B – Representative Stream and Wetland Photographs



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Appendix B-1:
Photo Location Map
McCracken County Solar LLC
McCracken County, Kentucky

Legend

- Ephemeral Stream
- Intermittent Stream
- Perennial Stream
- Non-Jurisdictional Wetland
- Jurisdictional Wetland
- Survey Area
- Inset

0 2,000 4,000
Feet

Scale: 1 in = 2,000 ft

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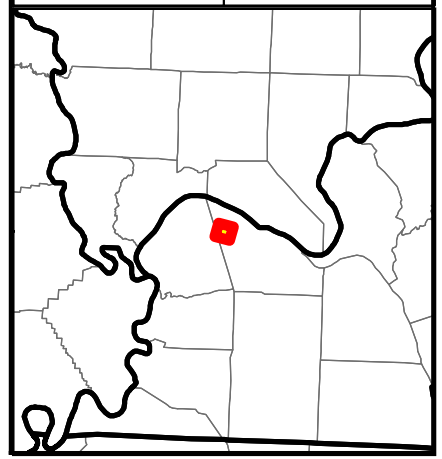

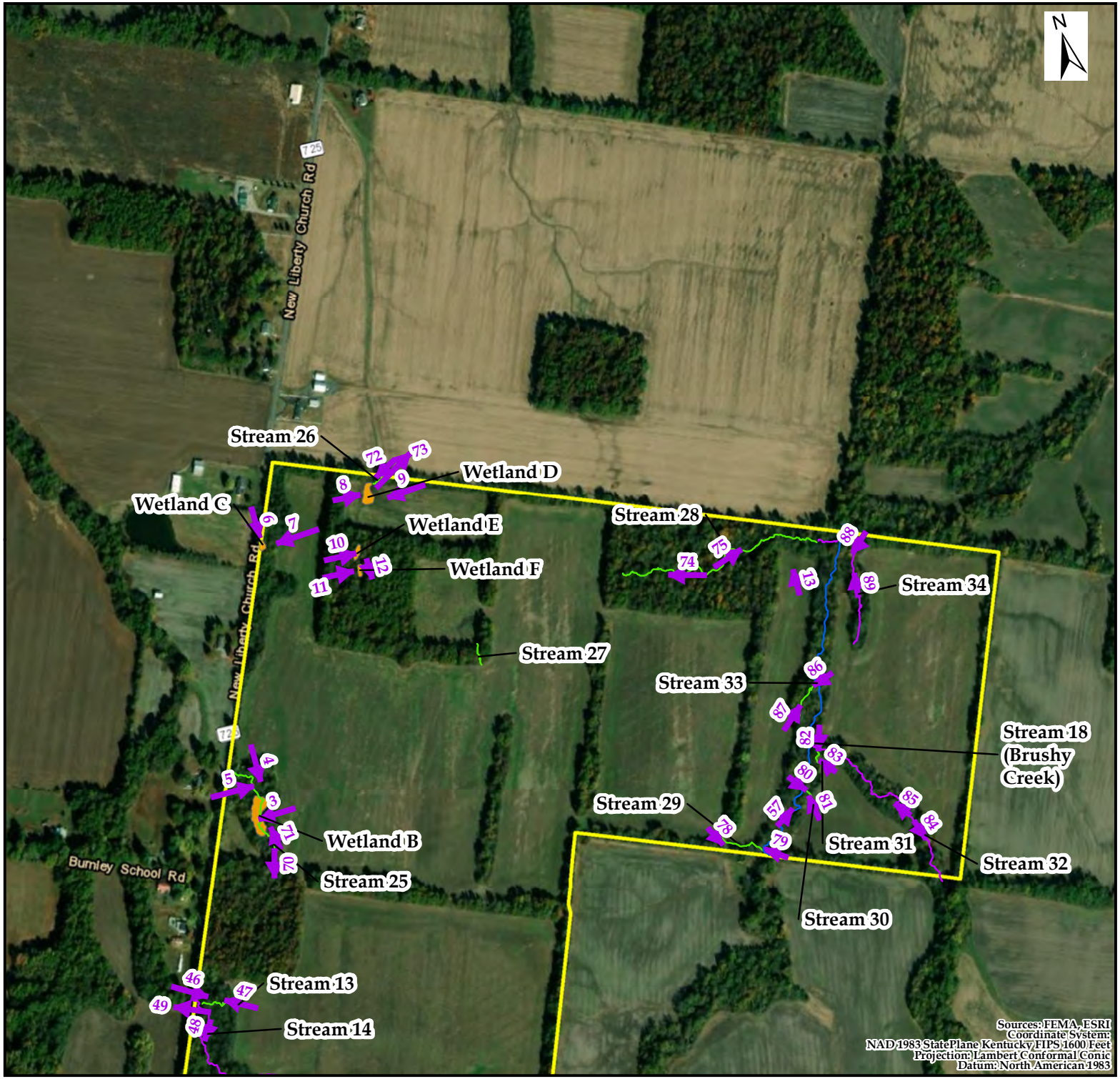

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Appendix B-2:
Photo Location Map
McCracken County Solar LLC
McCracken County, Kentucky

Legend

- Photo Direction
- Ephemeral Stream
- Intermittent Stream
- Perennial Stream
- Non-Jurisdictional Wetland
- Jurisdictional Wetland
- Survey Area

0 750 1,500
Feet

Scale: 1 in = 750 ft

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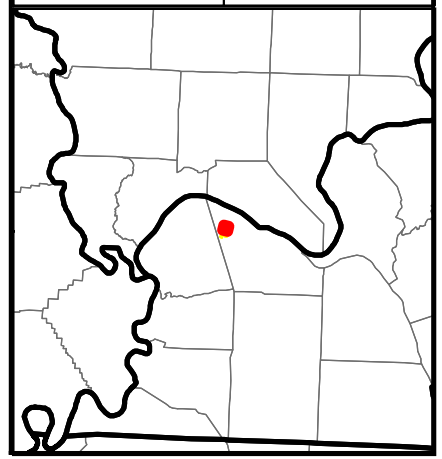

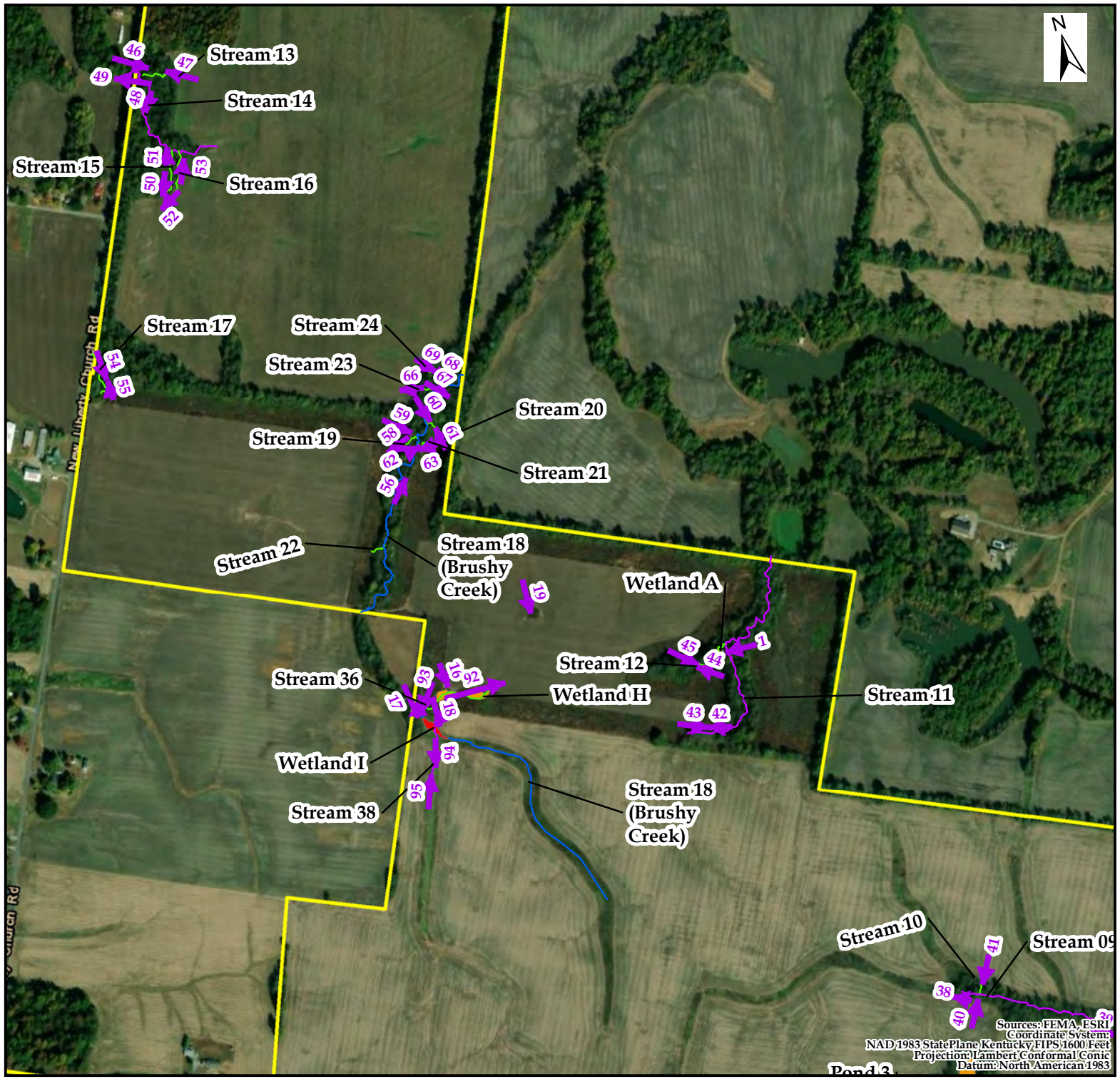

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Appendix B-3:
Photo Location Map
McCracken County Solar LLC
McCracken County, Kentucky

Legend

- Photo Direction
- Ephemeral Stream
- Intermittent Stream
- Perennial Stream
- Non-Jurisdictional Wetland
- Jurisdictional Wetland
- Survey Area

0 750 1,500
Feet

Scale: 1 in = 750 ft

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Paint Lick, Kentucky 40461

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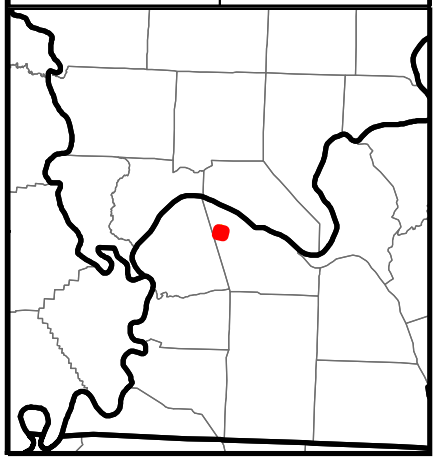

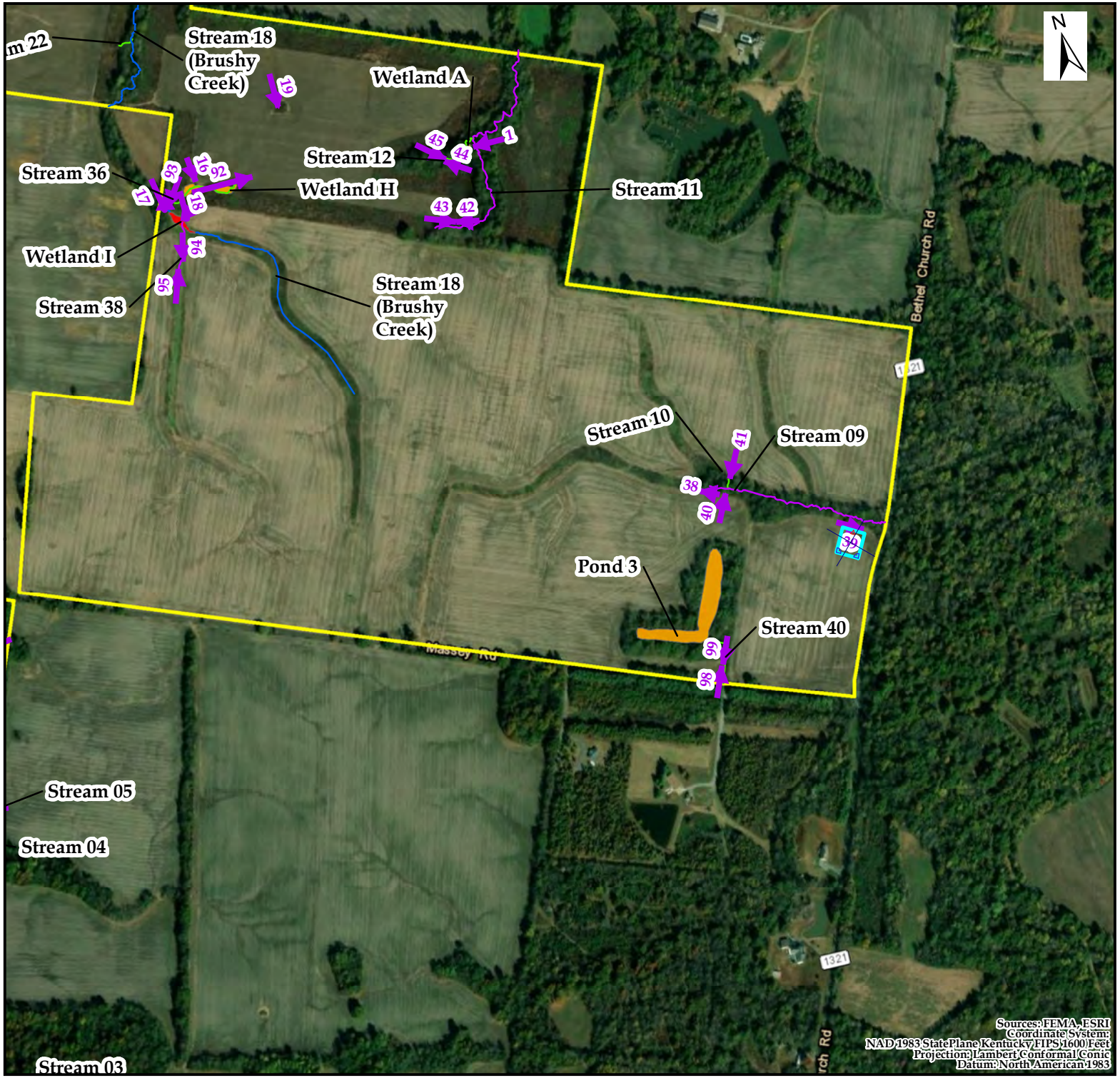

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Appendix B-4:
Photo Location Map
McCracken County Solar LLC
McCracken County, Kentucky

Legend

- Photo Direction
- Ephemeral Stream
- Intermittent Stream
- Perennial Stream
- Non-Jurisdictional Wetland
- Jurisdictional Wetland
- Survey Area

0 750 1,500
Feet

Scale: 1 in = 750 ft

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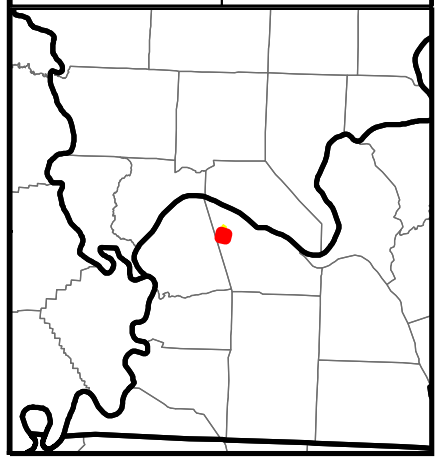
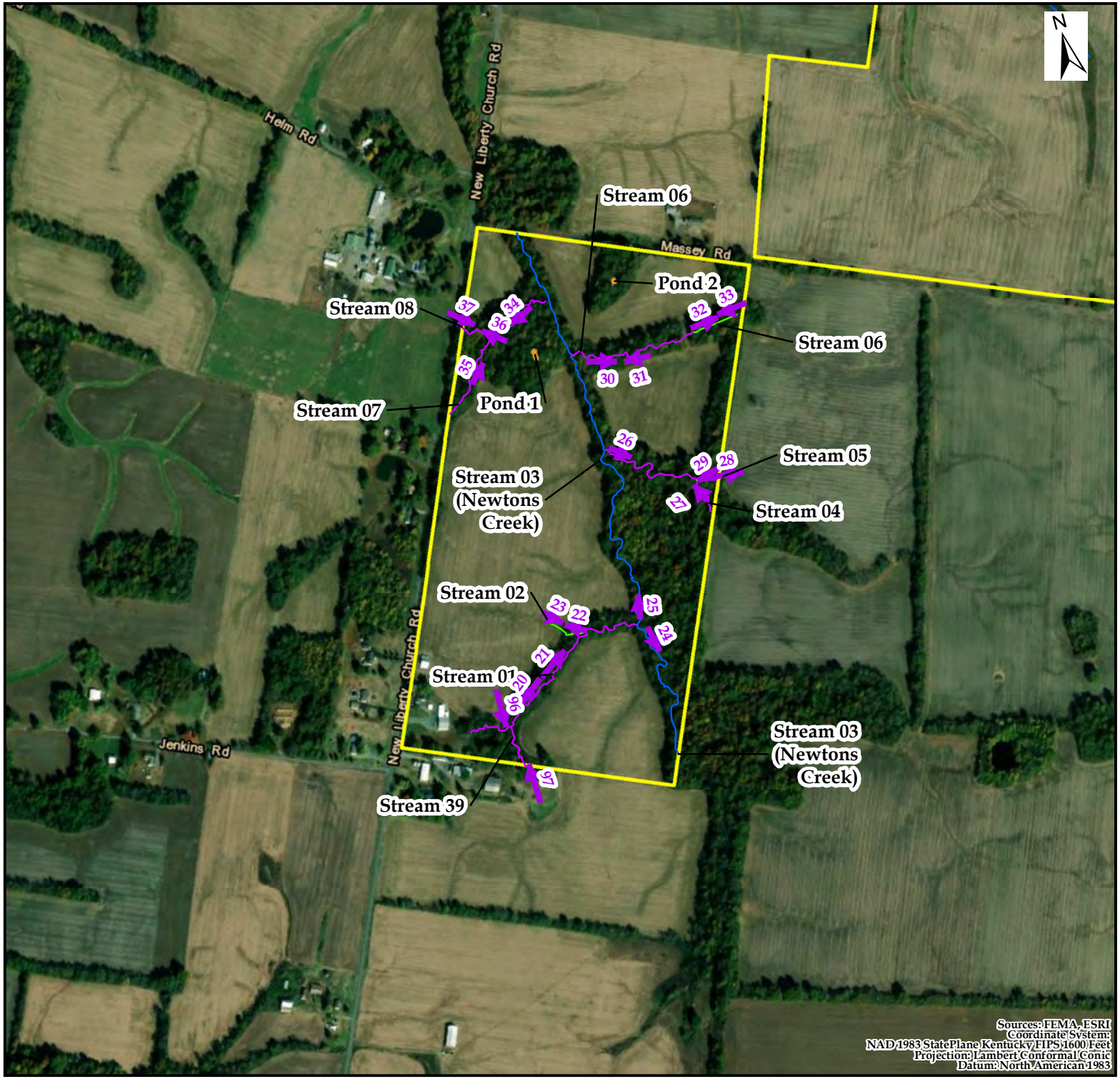
Checked by:	JP	Revision: 00





COPPERHEAD
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Prepared for:

Community Energy

Appendix B-5:
Photo Location Map
McCracken County Solar LLC
McCracken County, Kentucky

Legend

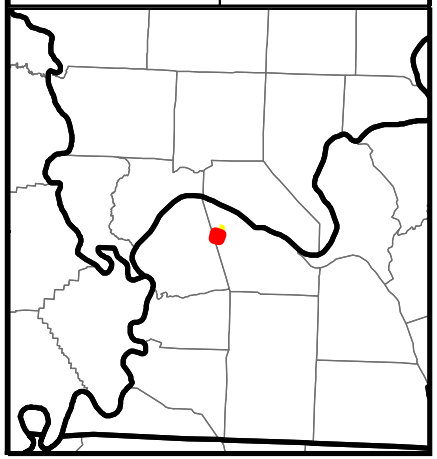
- Photo Direction
- Ephemeral Stream
- Intermittent Stream
- Perennial Stream
- Non-Jurisdictional Wetland
- Jurisdictional Wetland
- Survey Area

0 750 1,500
Feet

Scale: 1 in = 750 ft

Prepared by :
Copperhead Environmental Consulting, Inc.
471 Main Street
P.O. Box 73
Paint Lick, Kentucky 40461

Drawn by:	MRT	Date: 12/16/2020
Checked by:	JP	Revision: 00



COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 1 **Date:** 11/17/2020 **Description:** View of Wetland A from DP-01 facing east.	

Photo No. 2 **Date:** 11/17/2020 **Description:** No photos were taken of upland habitat from DP-02.	

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McCracken County Solar LLC
Photographic Record

Project No.:	Location:	Client:
1013	McCracken County, Kentucky	Community Energy

Photo No.
3

Date:
11/17/2020

Description:
View of Wetland B from DP-03 facing west.

Photo No.
4

Date:
11/17/2020

Description:
View of upland habitat from DP-04 facing south.

COPPERHEAD
ENVIRONMENTAL CONSULTING

McCracken County Solar LLC
Photographic Record

Project No.:	Location:	Client:
1013	McCracken County, Kentucky	Community Energy

Photo No.
5

Date:
11/17/2020

Description:
View of upland habitat from DP-05 facing east.

Photo No.
6

Date:
11/17/2020

Description:
View of Wetland C from DP-06 facing south.

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 7 **Date:** 11/17/2020 **Description:** View of upland habitat from DP-07 facing west.	

Photo No. 8 **Date:** 11/17/2020 **Description:** View of Wetland D from DP-08 facing east.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 9 **Date:** 11/17/2020 **Description:** View of upland habitat from DP-09 facing west.	

Photo No. 10 **Date:** 11/17/2020 **Description:** View of Wetland E from DP-10 facing east.	

COPPERHEAD
ENVIRONMENTAL CONSULTING

McCracken County Solar LLC
Photographic Record

Project No.:	Location:	Client:
1013	McCracken County, Kentucky	Community Energy

Photo No.
11

Date:
11/17/2020

Description:
View of Wetland F from DP-11 facing east

Photo No.
12

Date:
11/17/2020

Description:
View of upland habitat from DP-12 facing south.

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 13 **Date:** 11/17/2020 **Description:** View of upland habitat from DP-13 facing north.	

Photo No. 16 **Date:** 11/17/2020 **Description:** View of Wetland H from DP-16 facing south.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 17 **Date:** 11/17/2020 **Description:** View of Wetland I from DP-17 facing north.	

Photo No. 18 **Date:** 11/17/2020 **Description:** View of upland habitat from DP-18 facing south.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 19 **Date:** 11/17/2020 **Description:** View of upland habitat from DP-19 facing south.	

Photo No. 20 **Date:** 11/17/2020 **Description:** View of intermittent Stream 1 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 21 **Date:** 11/17/2020 **Description:** View of intermittent Stream 1 facing downstream.	

Photo No. 22 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 2 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 23 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 2 facing downstream.	

Photo No. 24 **Date:** 11/17/2020 **Description:** View of perennial Stream 3 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 25 **Date:** 11/17/2020 **Description:** View of perennial Stream 3 facing downstream.	

Photo No. 26 **Date:** 11/17/2020 **Description:** View of intermittent Stream 4 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 27 **Date:** 11/17/2020 **Description:** View of intermittent Stream 4 facing downstream.	

Photo No. 28 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 5 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 29 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 5 facing downstream.	

Photo No. 30 **Date:** 11/17/2020 **Description:** View of intermittent portion of Stream 6 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 31 **Date:** 11/17/2020 **Description:** View of intermittent portion of Stream 6 facing downstream.	

Photo No. 32 **Date:** 11/17/2020 **Description:** View of ephemeral portion of Stream 6 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 33 **Date:** 11/17/2020 **Description:** View of ephemeral portion of Stream 6 facing downstream.	

Photo No. 34 **Date:** 11/17/2020 **Description:** View of intermittent Stream 7 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 35 **Date:** 11/17/2020 **Description:** View of intermittent Stream 7 facing downstream.	

Photo No. 36 **Date:** 11/17/2020 **Description:** View of intermittent Stream 8 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 37 **Date:** 11/17/2020 **Description:** View of intermittent Stream 8 facing downstream.	

Photo No. 38 **Date:** 11/17/2020 **Description:** View of intermittent Stream 9 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 39 **Date:** 11/17/2020 **Description:** View of intermittent Stream 9 facing downstream.	

Photo No. 40 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 10 facing upstream.	

Regulatory Expertise

- Clean Water Act
- National Pollutant Discharge Elimination System
- Federal, state, and local permitting

Industry Clientele

- Oil & Gas
- Commercial Land Development
- Solar
- Energy Transmission
- Non-Profit Organizations

Natural Resource Evaluations

- Stream and Wetland Delineations
- Endangered and Threatened Species
- Stream and Wetland Mitigation and Restoration

Certifications

- Professional Wetland Scientist (PWS)
- Certified Erosion, Sediment, and Stormwater Inspector (CESSWI)
- Pennsylvania Sewage Enforcement Officer (SEO)

Affiliations

- Society of Wetland Scientists
- Ohio Bat Working Group

Education

M.S. Wildlife and Fisheries Resources, 2013, West Virginia University, Morgantown West Virginia

B.S. Wildlife and Fisheries Resources, 2010, West Virginia University, Morgantown West Virginia

Experience

Copperhead Environmental Consulting, Inc., Natural Resources Manager, 2020-present.

Langan Engineering and Environmental Services, Inc., Appalachian Region Natural Resources Leader/Senior Staff Scientist, 2017-2020.

Dieffenbauch & Hritz, LLC. Project Scientist, 2013 – 2017.

GAI Consultants, Inc., Wetland Specialist, 2013.

West Virginia University, Research and Teaching Assistant, 2010-2013.

Qualifications and Background

Mr. Tincher is an experienced stream ecologist and aquatic biologist with extensive experience with Clean Water Act permitting, stream and wetland delineations, stream ecology, fish and aquatic macroinverbrate surveys, plant species and habitat surveys, and stream and groundwater sampling. He has performed work over a wide geographic area throughout the United States. Specific states include Florida, Kansas, Kentucky, Missouri, New York, North Dakota, Ohio, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, and West Virginia. He has served as project manager and field lead on various projects requiring federal, state, and local permitting.
studies.

Trainings

Tennessee Hydrologic Determination Training (2020); Stream Functions Pyramid and Stream Quantification Tool (SQT) Workshop (2020); Certified Erosion, Sediment, and Stormwater Inspector (2018); Pennsylvania Sewage Enforcement Officer (2017); Freshwater Mussels of West Virginia: Life History and Identification (2016); Morphological Soil Investigations, A Plus Environmental Training (2016); Pennsylvania Botany Consulting Botanist's Toolkit Workshop (2015); Swamp School Wetland Delineation Certification (2013).

Project Experience

Wetland Delineation for Project NASA 1(9) – Wallops Island Causeway Bridge, Accomack County, VA – 2020

Project manager and field lead for a stream and wetland delineation and associated Section 404 and Section 10 permitting of a bridge replacement in Accomack County, VA. Two tidal wetlands and one tidally influenced stream were identified. Mean high water, mean tide line, and mean low water were determined and delineated in the field.

Hydrologic Determination for Confidential Project, Campbell County, TN – 2020

Project manager and field lead for a stream and wetland delineation of a 10-acre site in Campbell County, TN. A Hydrologic Determination form was completed for one channel identified on site. The channel was determined to be a wet weather conveyance.

Hydrologic Determination for Holliday Landowner, Jackson County, TN – 2020

Project manager and field lead for a stream and wetland delineation of a 15-acre site in Jackson County, TN. A Hydrologic Determination form was completed for two channels identified on site. One channel was determined to be a wet weather conveyance. The second channel was determined to be an intermittent stream.

Environmental Boundaries Report for SR-2 (US-11) Widening Project, Bradley County, TN – 2020

QA/QC of hydrological determinations (HD), Stream Quantification Tool (SQT) data collection, and all associated reporting. Also conducted an HD and collected SQT data for one wet weather conveyance/ephemeral stream.

Botanical and Wildlife Surveys for Jug Handle Project, Forest County, PA - 2020

Project manager and field lead for botanical and wildlife surveys in the Allegheny National Forest associated with the Jug Handle project. Surveyed for over 40 plant species and 30 wildlife species.

Botanical Survey, Aquatics Survey, and Soils Analysis for proposed Tillman Trails Project, Augusta and Rockingham Counties, VA – 2020

Field lead for botanical and aquatics surveys in the George Washington National Forest for the proposed Tillman Trails. Lead technical writer for botanical, aquatics, and soil analysis reports. The aquatics report also included field results, watershed analysis, and riparian management objective analysis.

Wetland Delineation and Permitting for Proposed Swagelok Building Expansion, Cuyahoga County, OH – 2019

Project manager for the project and conducted the wetland and stream delineation. The project design proposed to permanently impact one PEM wetland and one PSS wetland. A Nationwide Permit 39 (NWP-39) was required and obtained in January 2020 through the USACE. Coordinated with USFWS, ODNR, and OHPO. Mitigation was required was also required for the project. Mitigation credits were purchased through multiple mitigation banks to meet the OEPA and USACE requirements.

Wetland Delineation and Permitting for Proposed Brew Kettle Restaurant, Medina County, OH – 2019-2020
Project manager for the project and conducted the wetland and stream delineation. The project design proposed to permanently impact two PFO wetlands. A Nationwide Permit 39 (NWP-39) was required. Coordinated with USFWS, ODNR, and OHPO. Mitigation was required was also required for the project. Mitigation credits were purchased through multiple mitigation banks to meet the OEPA and USACE requirements.

Wetland Delineation for Proposed Weymouth Road Project, Medina County, OH – 2020
Project manager and field lead for a wetland and stream delineation and associated reporting for an approximately 6-acre site in Medina County, Ohio.

Wetland Delineation for Proposed Franklin Solar Energy Project, Crawford County, PA – 2020
Project manager and field lead for a wetland and stream delineation and associated reporting for an approximately 396-acre site in Crawford County, Pennsylvania.

Wetland Delineation for Proposed Big Bell Solar Energy Project, Crawford County, PA – 2020
Project manager and field lead for a wetland and stream delineation and associated reporting for an approximately 308-acre site in Crawford County, Pennsylvania.

Wetland Delineation for Proposed Ingersoll Solar Energy Project, Crawford County, PA – 2020
Project manager and field lead for a wetland and stream delineation and associated reporting for an approximately 244-acre site in Crawford County, Pennsylvania.
Wetland Delineation for Proposed Gratz Solar Energy Project, Dauphin County, PA – 2020
Project manager for a wetland and stream delineation and associated reporting for an approximately 135-acre site in Dauphin County, Pennsylvania.

Wetland Delineation for Proposed Solar Energy Project, Taylor County, KY – 2020
Project manager for a wetland and stream delineation and associated reporting for an approximately 460-acre site in Taylor County, Kentucky.

Wetland Delineation for Proposed Solar Energy Project, Metcalfe County, KY – 2020
Project manager for a wetland and stream delineation and associated reporting for an approximately 575-acre site in Metcalfe County, Kentucky.

Wetland Delineation for Proposed Solar Energy Project, Russell and Adair Counties, KY – 2020
Project manager and field lead for a wetland and stream delineation and associated reporting for an approximately 548-acre site in Russell and Adair Counties, Kentucky.

Wetland Delineation for Proposed Solar Energy Project, Green County, KY – 2020
Project manager and field lead for a wetland and stream delineation and associated reporting for an approximately 654-acre site in Green County, Kentucky. Approved jurisdictional determination through the USACE Louisville District was also obtained.

Wetland Delineation for Proposed Solar Energy Project, Garrard County, KY – 2020
Project manager for a wetland and stream delineation and associated reporting for an approximately 787-acre site in Metcalfe County, Kentucky. Approved jurisdictional determination through the USACE Louisville District was also obtained.

Wetland Delineation and Permitting for Proposed Distribution Center, James City County, VA – 2018-2020
Conducted a stream and wetland delineation on a 200-acre site in Williamsburg, Virginia. Section 404/401 permitting was required through the USACE and Virginia Department of Environmental Quality to fill 1,115 linear feet of stream and 0.413 acres of wetlands. Mitigation was required and credits were purchased from a mitigation bank within the James River watershed. Section 7 Endangered Species Act coordination was required through the USFWS's Information for Planning and Consultation (IPaC). The project was also within 660-ft of a known bald eagle nest, which required direct coordination with the USFWS and restriction periods for when construction could occur. Project also required coordination with an archaeological subconsultant, Virginia Department of Historic Resources, and James City County due to results from a Phase I archaeological survey. The project required additional Phase II and Phase III archaeological surveys.

Wetland Delineation and Permitting for Proposed BULOD002 to Sand Hill Natural Gas Pipeline, Belmont County, OH – 2019-2020
Project manager for the natural resource aspects of an approximately 1.0 mile proposed natural gas pipeline. Conducted a stream and wetland delineation for the project. A Nationwide Permit 12 (NWP-12) and Director's Authorization through the OEPA were required. In addition, an in-water work waiver for work within perennial streams through ODNR and a county floodplain permit were required and obtained. Assisted with the mussel survey and reporting.

Wetland Delineation and Permitting for Various Proposed Williams Natural Gas Pipelines, Carroll, Columbiana, Harrison, and Jefferson Counties, OH – 2017-2020
Project manager for natural resource aspects of more than 20 natural gas pipeline projects. Conducted route development walks and stream and wetland delineations for over 50 miles of proposed pipeline. NWP-12 through USACE and Director's Authorizations through OEPA were required and obtained for specific projects. All projects required threatened and endangered species coordination with USFWS and ODNR. In-water work waivers were required and obtained through ODNR on specific projects. Two projects also required plant surveys for state listed endangered species. I conducted the plant surveys and associated report writing to obtain ODNR approval.

Threatened and Endangered Species Coordination for 23rd and Railroad Project, Allegheny County, PA – 2020
Coordinated with PAFBC and USFWS for state and federal listed threatened and endangered species and obtained clearance to proceed with proposed work.

Threatened and Endangered Species Coordination for Proposed Gas Station, Allegheny County, PA – 2020
Coordinated with PAFBC and USFWS for state and federal listed threatened and endangered species and obtained clearance to proceed with proposed work.

Wetland Delineation and Permitting for Proposed DCNR Tract 25-4 Well Plugging, Elk County, PA – 2019-2020
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 11 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation and Permitting for Proposed DCNR Tract 37-2 Well Plugging, Elk County, PA – 2019-2020

Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 11 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation and Permitting for Proposed DCNR Tract 49-2 Well Plugging, Clearfield County, PA – 2019-2020
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 11 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation and Permitting for Proposed WM A Donaldson 965 Well Plugging, Washington County, PA – 2019-2020
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation and Permitting for Proposed JF Markle Well Plugging, Clarion County, PA – 2019-2020
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 11 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation and Permitting for Proposed HJ Walker 1 Well Plugging, Westmoreland County, PA – 2019-2020
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation and Permitting for Proposed J. Peppler 827 Well Plugging, Armstrong County, PA – 2019-2020
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 11 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation for Proposed F.F. Piatt 1001 Well Plugging, Washington County, PA – 2019-2020
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed GW McIntire 394 Well Plugging, Armstrong County, PA – 2019-2020
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed W Bowser 892 Well Plugging, Armstrong County, PA – 2019-2020
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Warehouse Facility, Portage County, OH – 2019

Responsible for project management of natural resources. Conducted a stream and wetland delineation for a proposed distribution center in Streetsboro, Portage County, Ohio. Created a permit matrix for the client to help them understand the various construction and permitting scenarios. Also responsible for report writing and review.

NPDES Stormwater Sampling for Antero Landfill and Antero Clearwater Facilities, Doddridge County, WV 2017-2020
Obtained Individual NPDES permits for a landfill site and an industrial site. Project manager and field lead for stormwater and groundwater sampling, site inspections, and reporting. Collected monthly and quarterly stormwater, groundwater monitoring, and leachate samples and analyzed the data. Authored quarterly and annual reports that went to the West Virginia Department of Environmental Protection (WVDEP).

Stormwater Sampling for Pipeyard, Harrison County, WV – 2018-2020
Conducted and oversaw stormwater sampling, site inspections, and reporting for a small pipeyard in Harrison County, West Virginia. Results were reported bi-annually to WVDEP.

Environmental Remediation Groundwater Sampling for FCI McKean, McKean County, PA – 2017-2019.
Conducted field work, created hydrologic groundwater flow maps, and authored reports for groundwater sampling at an environmental remediation site in Pennsylvania. Required knowledge of groundwater hydrology to determine flow of groundwater and whether environmental contaminants were spreading.

Threatened and Endangered Species Coordination for Proposed Great Lakes Cheese Building, Summit County, OH – 2019
Project manager for coordinating with USFWS for potential mist-net survey for the Indiana bat. Responsible for overseeing the mist-net survey and reporting to USFWS.

Wetland Delineation and Permitting for Proposed McClellan Pipeline, Monongahela County, WV – 2019
Served as project manager and field lead for wetland delineation, report writing, preliminary jurisdictional determination, threatened and endangered species coordination, bat habitat assessment and mitigation plan, preparation of a Stream Activity Application through the West Virginia Division of Natural Resources (WVDNR), and preparation of a Nationwide Permit 12 (NWP-12) through the USACE for proposed temporary impacts to streams and wetlands. The project proposed to construct approximately 5.0 miles of natural gas pipeline. The bat habitat assessment and study plan was approved by U.S. Fish and Wildlife Service in January 2020. A Stream Activity Application was approved by WVDNR in November 2019. A NWP-12 was approved by the USACE in January 2020.

Wetland Delineation and Permitting for WALD Passive Treatment Design, Tucker County, WV – 2019
Natural resources project manager for project completed near Thomas, West Virginia. The project paralleled the North Fork Blackwater River and an existing rail trail. A wetland anoxic limestone drain (WALD) system had been installed parallel to the rail trail in the 1990s to remediate acid mine drainage that was flowing from a historic mine portal. The WALD system was no longer functioning properly and was not reducing acidity efficiently. A redesigned system was deemed necessary to lower acidity. A stream and wetland delineation was conducted along the approximately 3,000 linear foot WALD system and rail trail. Non-reporting Section 404/401 permitting was required to impact and redesign the WALD system.

Wetland Delineation for Proposed Distribution Center, Medina County, OH – 2019
Responsible for project management of natural resources. Conducted a stream and wetland delineation for a proposed distribution center in Westfield Township, Medina County, Ohio. Created a permit matrix for the client to help them understand the various construction and permitting scenarios. Also responsible for report writing and review.

Botanical Surveys for Various Proposed Projects, Greene and Washington Counties, PA – 2013-present
Served as project manager and field lead for several botanical surveys in Greene and Washington Counties, Pennsylvania, for state listed plant species of special concern (SOSC) and their habitats. Projects have included linear projects up to 10 miles in length and static, non-linear projects up to 200 acres in size. Specific plant SOSC and associated habitat that have been surveyed for include: single-headed pussy-toe (*Antennaria solitaria*), blue false indigo (*Baptisia australis*), tall larkspur (*Delphinium exaltatum*), American beakgrain (*Diarrhena americana*), white trout lily (*Erythronium albidum*), sourwood (*Oxydendrum arboreum*), yellow passionflower (*Passiflora lutea*), limestone petunia (*Ruellia strepens*), wild senna (*Senna marilandica*), leaf-cup (*Smallanthus uvedalius*), and snow trillium (*Trillium nivale*). Plant SOSC identified in the field include: white trout lily, sourwood, yellow passionflower, wild senna, and leaf-cup. Due to project designs and specific constraints, several projects required transplanting and relocating plant SOSC. When relocating plant SOSC, suitable habitat was identified in close proximity to the project. Specific plant SOSC that were successfully transplanted and relocated include: white trout lily, wild senna, and leaf-cup.

Wetland Delineation, Botanical Survey, Soil Profile/Infiltration Testing, and Permitting for Proposed Barley Wine Well Pad, Greene County, PA - 2019
Served as natural resources project manager and responsible for the wetland delineation, botanical surveys, infiltration testing of proposed BMPs, and stream impact permitting. Botanical survey was conducted for single-headed pussy-toe (*Antennaria solitaria*) and wild senna (*Senna marilandica*). Permit modification to an existing General Permit 11 for replacing an existing culvert was completed.

Wetland Delineation for Meighan Well Pad, Greene County, PA - 2019
Conducted a stream and wetland delineation for a proposed well pad in Greene County, Pennsylvania. Wrote report describing delineation field results.

Wetland Permitting for Proposed Distribution Center, Erie County, NY – 2019
Completed Nationwide Permit 6 (NWP-6) permitting for a proposed distribution center project in Tonawanda, Erie County, New York. The project had several wetlands located throughout the site and geotechnical surveys needed to be conducted within the wetlands.

Approved Jurisdictional Determination for Proposed Redevelopment Site, Franklin County, OH – 2019
Project manager and responsible for obtaining an approved jurisdictional determination through the USACE for a proposed redevelopment site in an urban area in Franklin County, Ohio.

Permitting for Distribution Center, Dorchester County, SC – 2019
Project manager for natural resource aspects for a proposed distribution center in Ridgeville, Dorchester County, South Carolina. Client had recently purchased the property. The previous property owner had obtained several stream and wetland permits for development purposes. Responsible for reviewing the existing permits to ensure the scope of the project would work with existing permits, that the existing

permits were still valid and had not expired, and determine if any other permits or modifications to existing permits would be required.

Wetland Delineation and Approved Jurisdictional Determination for Proposed Distribution Center, Summit County, OH – 2019
Responsible for managing the natural resource aspects of the project for a proposed distribution center in Akron, Summit County, Ohio. Obtained an approved jurisdictional determination with the USACE. The site design avoided impacts to wetland and stream features. Also coordinated with USFWS to determine if clearing trees during the restricted time frame was a possibility. However, USFWS stated there is a known Indiana bat maternity roost within 1.0-miles of the project and that seasonal tree clearing would be required.

Wetland Delineation for Proposed Commercial Development, Lake County, OH – 2019
Responsible for project management of natural resources. Conducted a stream and wetland delineation for a proposed commercial development in the City of Wickliffe, Lake County, Ohio. Also responsible for report writing and review.

Wetland Delineation for Proposed Hospital, Summit County, OH – 2019
Responsible for project management of natural resources. Conducted a stream and wetland delineation for a proposed hospital in Fairlawn, Summit County, Ohio.

Wetland Delineation for Proposed Office Building, Cuyahoga County, OH – 2019
Responsibilities included being the project manager for natural resources, conducting a stream and wetland delineation, reporting, and obtaining a preliminary Jurisdictional Determination.

Wetland Delineation for Proposed Verizon Work Center, Allegheny County, PA – 2019
Responsibilities included being the project manager for natural resources, conducting a stream and wetland delineation, and report writing.

Wetland Delineation for Proposed Mixed-Use Development, Allegheny County, PA – 2019
Responsible for project management of natural resources. Conducted a stream and wetland delineation for a proposed commercial and residential mixed-use development project in Sharpsburg, Allegheny County, Pennsylvania. Created a permit matrix for the client to help them understand the various construction and permitting scenarios. Also responsible for report writing and review.

Wetland Delineation for Proposed Seneca Valley Aquatics Facility, Butler County, PA – 2019
Responsibilities included being the project manager for natural resources, conducting a stream and wetland delineation, and report writing.

Erosion and Sediment Control Environmental Inspections for Various Proposed Natural Gas Projects, Doddridge, Tyler, and Wetzel Counties, WV – 2017-2019.
Conducted environmental inspections for seven Antero Resources projects in Doddridge, Tyler, and Wetzel Counties, West Virginia. Responsibilities included reviewing site design plans and submitting to state regulatory agencies for approval; overseeing E&S installation to make sure it was installed according to WVDEP approved site plans; making field changes to include more stringent E&S controls when it appeared approved plans were not sufficient in certain locations, due to slight variations in survey data used for the design compared to existing field conditions; inspecting sites during construction until close of construction stormwater permit to ensure E&S controls were being maintained

and sediment was not leaving the site; and regularly communicate with the client project manager and construction crews.

Wetland Delineation for Proposed Metzgar, Ursina F-58 Well Plugging, Washington County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Smith, A.H. #70 Well Plugging, Washington County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Raset, E. #1 Well Plugging, Washington County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation and Permitting for Proposed Day, E.D. #134 Well Plugging, Washington County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation and Permitting for Proposed McCullough, S.G. #577 Well Plugging, Washington County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation for Proposed McCullough, N. 1 Well Plugging, Washington County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Thompson, T.H. #680 Well Plugging, Washington County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Burns, A. #779 Well Plugging, Washington County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Gilkeson, C. #934 Well Plugging, Washington County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Grimes, A. #3645 Well Plugging, Greene County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation and Permitting for Proposed Martin, E. #3715 Well Plugging, Greene County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation and Permitting for Proposed Morris, G. 355 Well Plugging, Greene County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a Joint Permit through the Pennsylvania Department of Environmental Protection.

Wetland Delineation and Permitting for Proposed Horn, Z. #784 Well Plugging, Greene County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation and Permitting for Proposed Bailey, H.H. 1021 Well Plugging, Greene County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation for Proposed Gordon, W. I. 297 Well Plugging, Greene County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Huffman, John J. 3566 Well Plugging, Greene County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Nichols, L. #411 Well Plugging, Greene County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation and Permitting for Proposed Higgins, J. 106 Well Plugging, Greene County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation for Proposed Lantz Heirs 594 and Amada Rice 2910 Well Pluggings, Greene County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation and Permitting for Proposed Vendette 3 Well Plugging, Butler County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation for Proposed Boddorf 9071 Well Plugging, Jefferson County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Dobson, W.D. 1291 Well Plugging, Jefferson County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Texas Gulf B-05 Well Plugging, Clinton County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Post, J.M. Well Plugging, Washington County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed J.W. Taylor Well Plugging, Washington County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed W.M. Evans 1015 Well Plugging, Washington County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Thomas Hays 1 Well Plugging, Armstrong County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Finleyville Oil and Gas Well Plugging, Washington County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation and Permitting for Proposed Hob Nob – Pearls Café 2, Allegheny County, PA – 2018-2019
Project manager for the natural resource aspects of a proposed enclosure of 136-linear feet of perennial stream. Responsibilities included conducting a stream and wetland delineation, environmental assessment, report writing, designing on-site stream mitigation, and obtaining a Joint Permit through the Pennsylvania Department of Environmental Protection.

Wetland Delineation for Proposed R.G. Altman 1 and 2 Well Pluggings, Armstrong County, PA – 2018-2019

Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Charleroi 1423 Well Plugging, Elk County, PA – 2018-2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Charleroi MT 1424 Well Plugging, Elk County, PA – 2018-2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed CNG #347 Well Plugging, Elk County, PA – 2018-2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation and Permitting for Proposed E.T. Culp 666 Well Plugging, Armstrong County, PA – 2018-2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation and Permitting for Proposed Isaac Heilman 1137 Well Plugging, Armstrong County, PA – 2018-2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 11 through the Pennsylvania Department of Environmental Protection.

Permitting for Proposed Isaac Heilman 1137 Well Plugging, Armstrong County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included obtaining a minor modification to an existing General Permit 11 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation and Permitting for Proposed J.N & Mary Moore 1343 Well Plugging, Armstrong County, PA – 2018-2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation and Permitting for Proposed Keck, D.A. #448 Well Plugging, Clarion County, PA – 2018-2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation for Proposed Mary Stitt 3001 Well Plugging, Armstrong County, PA – 2018-2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation and Permitting for Proposed Miller, M. #409 Well Plugging, Clarion County, PA – 2018-2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation for Proposed Minick, C. #1 Well Plugging, Clarion County, PA – 2018-2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Reinsel, B.J. #1 Well Plugging, Clarion County, PA – 2018-2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Shick, R.W. #1147 Well Plugging, Armstrong County, PA – 2018-2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation and Permitting for Sheetz Racetrack Road, Washington County, PA – 2018
Project manager for the natural resource aspects of a proposed gas station. A stream and wetland delineation was conducted. The project required a Joint Permit Application through the PADEP for impacts to one stream. The permit was approved in November 2018.

Wetland Delineation, Permitting, and Mussel Survey for Proposed BULOD002 Natural Gas Pipeline, Belmont County, OH – 2018
Project manager for the natural resource aspects of an approximately 5.0 mile proposed natural gas pipeline. Conducted a stream and wetland delineation for the project. A Nationwide Permit 12 (NWP-12) was required and obtained in December 2018. A Director's Authorization through the OEPA was also required and obtained in January 2019. In addition, an in-water work waiver for work within perennial streams through ODNR and a county floodplain permit were required and obtained. Assisted with the mussel survey and reporting.

Wetland Delineation for Proposed Academic Solutions Academy, Broward County, FL – 2018
Responsibilities included conducting a stream and wetland delineation, report writing, and permit strategizing on a 20-acre site in Fort Lauderdale, Broward County, Florida. Assisted the client with permit strategizing and regulatory agency coordination for potentially impacting wetlands and bald cypress (*Taxodium distichum*).

Wetland Delineation for Proposed Charleroi Mtn Club #1 Well Plugging, Elk County, PA – 2018
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed CNG #355 Well Plugging, Elk County, PA – 2018
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed CNG #431 Well Plugging, Elk County, PA – 2018
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Richardson, A. #9064 Well Plugging, Armstrong County, PA – 2018
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation and Permitting for Proposed Schaeffer #2 Well Plugging, Armstrong County, PA – 2018
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation for Proposed Snyder, L.M. #1 Well Plugging, Clarion County, PA – 2018
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Isaiah Span #1221 Well Plugging, Armstrong County, PA – 2018
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed R.M. Townsend #455 Well Plugging, Armstrong County, PA – 2018
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed ProLogis Distribution Center, Harris County, TX – 2017
Responsibilities included conducting a stream and wetland delineation, report writing, and permit strategizing for 65-acre project located in Harris County, Texas.

Wetland Delineation for Proposed Beltway 8 – Energy Commerce Center, Harris County, TX – 2017
Responsibilities included conducting a stream and wetland delineation, report writing, and permit strategizing for a 29-acre project located in Pasadena, Harris County, Texas.

Wetland Delineation for Proposed ProLogis Guhn Road Development, Harris County, TX – 2017
Responsibilities included conducting a stream and wetland delineation, report writing, and permit strategizing for a 10-acre project located in Harris County, Texas.

Wetland Delineation for Proposed American Airlines Expansion, Dallas, TX – 2017
Responsibilities included conducting a stream and wetland delineation, report writing, and permit strategizing for project located at Dallas Fort Worth International Airport.

Spill Prevention, Control, and Countermeasure Plan for Wheatland Meter and Regulation Station, Williams County, North Dakota – 2017
Responsibilities included field work and writing report to complete a Spill Prevention, Control, and Countermeasure Plan for an existing facility in Ray, Williams County, North Dakota.

Spill Prevention, Control, and Countermeasure Plan for DeWitt Compressor Station, Divide County, North Dakota – 2017
Responsibilities included field work and writing report to complete a Spill Prevention, Control, and Countermeasure Plan for an existing facility in Fortuna, Divide County, North Dakota.

Phase II Environmental Site Assessment for Proposed Distribution Center, Cuyahoga County, OH – 2017
Conducted field work related to a Phase II Environmental Site Assessment for a proposed distribution center in North Randall, Cuyahoga County, Ohio. Responsibilities included overseeing excavation of an underground oil storage tank and plugging of a groundwater monitoring well.

Wetland Delineation and Botanical Survey for Proposed Santora Well Pad, Washington County, PA - 2017
Served as natural resources project manager and responsible for the wetland delineation and botanical surveys. Botanical survey was conducted for American beakgrain (*Diarrhena americana*).

Wetland Delineation and Permitting for Westfield Group Country Club, Medina County, OH – 2017
Conducted a stream and wetland delineation of the South Course at the Westfield Group Country Club in Westfield Township, Medina County, Ohio. A Nationwide Permit 39 (NWP-39) was obtained through USACE in 2017.

Wetland Delineation and Permitting for Various Proposed CNX Natural Gas Pipelines, Greene and Washington Counties, PA– 2013-2017
Conducted route development walks and stream and wetland delineations for over 100 miles of proposed pipeline for CNX in Greene and Washington Counties, Pennsylvania. General Permit 5 and General Permit 8 applications were required and obtained for several projects through the PADEP for temporary stream and/or wetland impacts.

Wetland Delineation and Permitting for Various Proposed CNX Natural Gas Pipelines, Belmont County, OH– 2015-2017
Conducted route development walks and stream and wetland delineations for over 10 miles of proposed pipeline for CNX in Belmont County, Ohio. NWP-12 through USACE and Director's Authorizations through OEPA were required and obtained for specific projects. All projects required threatened and endangered species coordination with USFWS and ODNR.

Wetland Delineation and Permitting for Various Proposed CNX Natural Gas Well Pads, Barbour, Marshall, and Tyler Counties, WV – 2013-2017
Conducted stream and wetland delineations for over 15 CNX natural gas well pad and compressor station projects in Barbour, Marshall, and Tyler Counties, West Virginia. NWP-39 through USACE and Stream Activity Applications through WVDNR were required and obtained for specific projects.

Wetland Delineation and Permitting for Various Proposed CNX Natural Gas Well Pads, Belmont, Monroe, and Noble Counties, OH – 2013-2017
Conducted stream and wetland delineations for over 15 CNX natural gas well pad projects in Belmont, Monroe, and Noble Counties, Ohio. NWP-39 through USACE were required and obtained for specific projects.

Wetland Delineation and Permitting for Various Proposed CNX Natural Gas Well Pads, Greene and Washington Counties, PA – 2013-2017
Conducted stream and wetland delineations for over 30 CNX natural gas well pad and compressor station projects located in Greene and Washington Counties, Pennsylvania. Also conducted soil and infiltration testing to comply with Pennsylvania best management practices. Wrote reports describing delineation and infiltration testing results.

Wetland Delineation and Permitting for Various Proposed Rice Midstream Natural Gas Pipelines, Greene and Washington Counties, PA– 2013-2017
Conducted route development walks and stream and wetland delineations for over 100 miles of proposed pipeline for Rice Midstream in Greene and Washington Counties, Pennsylvania. General Permit 5 and General Permit 8 applications were required and obtained for several projects through the PADEP for temporary stream and/or wetland impacts.
Wetland Delineation and Permitting for Various Proposed Rice Midstream Natural Gas Pipelines, Belmont and Monroe Counties, OH– 2013-2017
Conducted route development walks and stream and wetland delineations for over 100 miles of proposed pipeline for Rice Midstream in Belmont and Monroe Counties, Ohio. NWP-12 through USACE and Director's Authorizations through OEPA were required and obtained for specific projects.

Wetland Delineation and Permitting for Various Proposed Rice Energy Natural Gas Well Pads, Belmont and Monroe Counties, OH – 2013-2017
Conducted stream and wetland delineations for over 30 Rice Energy natural gas well pad projects in Belmont and Monroe Counties, Ohio. NWP-39 through USACE were required and obtained for specific projects.

Wetland Delineation and Permitting for Various Proposed Rice Energy Natural Gas Well Pads, Greene and Washington Counties, PA – 2013-2017
Conducted stream and wetland delineations for over 50 Rice Energy natural gas well pad and compressor station projects located in Greene and Washington Counties, Pennsylvania. Also conducted soil and infiltration testing to comply with Pennsylvania best management practices. Wrote reports describing delineation and infiltration testing results.

Wetland Delineation and Permitting for Various Proposed EQT Natural Gas Well Pads, Greene and Washington Counties, PA – 2013-2017
Conducted stream and wetland delineations for over 20 EQT natural gas well pad and compressor station projects located in Greene and Washington Counties, Pennsylvania. Also conducted soil and infiltration testing to comply with Pennsylvania best management practices. Wrote reports describing delineation and infiltration testing results.

Wetland Delineation for Sheme Centralized Pit, Taylor County, WV – 2017
Conducted a stream and wetland delineation for a proposed centralized pit by Mountaineer Keystone, LLC in Taylor County, West Virginia. Wrote report describing delineation field results.

Erosion and Sediment Control Environmental Inspections for Various Proposed Natural Gas Projects, Greene and Washington Counties, PA – 2013-2017.
Conducted environmental inspections for over 50 natural gas projects (i.e. well pads and pipelines) in Greene and Washington Counties, Pennsylvania. Responsibilities included reviewing site design plans and inspecting sites during construction until close of construction stormwater permit to ensure E&S controls were being maintained and sediment was not leaving the site.

Wetland Delineation and Permitting for Wendel Centralized Pit, Taylor County, WV – 2016
Conducted a stream and wetland delineation for a proposed centralized pit by Mountaineer Keystone, LLC in Taylor County, West Virginia. Obtained an approved jurisdictional determination through the USACE. A NWP-39 was also obtained.

Wetland Delineation for AR East Well Pad, Taylor County, WV – 2016
Conducted a stream and wetland delineation for a proposed natural gas well pad by Mountaineer Keystone, LLC in Taylor County, West Virginia. Wrote report describing delineation field results.

Wetland Delineation for SHL1 Centralized Pit, Marshall County, WV – 2016
Conducted a stream and wetland delineation for a proposed centralized pit by Noble Energy in Marshall County, West Virginia. Wrote report describing delineation field results.
Wetland Delineation and Bat Box Installation for RHL1, Greene County, PA – 2016
Conducted a stream and wetland delineation for a proposed project by Noble Energy in Greene County, Pennsylvania. Wrote report describing delineation field results. Also installed mitigation bat boxes.

Wetland Delineation, Water Sampling, and Bat Box Installation for WFN6 Well Site, Washington County, PA – 2014-206
Conducted a stream and wetland delineation for a proposed project by Noble Energy in Washington County, Pennsylvania. Wrote report describing delineation field results. Conducted pre-drill water well sampling. Also installed mitigation bat boxes.

Wetland Delineation and Water Sampling for WFN10 Well Site, Washington County, PA – 2014
Conducted a stream and wetland delineation for a proposed project by Noble Energy in Washington County, Pennsylvania. Wrote report describing delineation field results. Conducted pre-drill water well sampling.
Mussel Survey for Proposed Water In-take Withdrawal, Tyler County, WV – 2016
Helped conduct Phase 1 and Phase 2 mussel surveys following the West Virginia Mussel Survey Protocols in Middle Island Creek.

Macroinvertebrate and Salamander Surveys for Proposed Athena to Walters Natural Gas Pipeline, Belmont County, OH – 2017
Conducted macroinvertebrate and salamander surveys in several streams that were proposed to be impacted by construction of a natural gas pipeline. Macroinvertebrate and salamander species were identified to species level.

Macroinvertebrate and Salamander Surveys for Proposed Horsemill to Marauder Natural Gas Pipeline, Belmont County, OH – 2016
Conducted macroinvertebrate and salamander surveys in several streams that were proposed to be impacted by construction of a natural gas pipeline. Macroinvertebrate and salamander species were identified to species level.

Macroinvertebrate and Salamander Surveys for Proposed Marauder Phase 1 Natural Gas Pipeline, Belmont County, OH – 2016
Conducted macroinvertebrate and salamander surveys in several streams that were proposed to be impacted by construction of a natural gas pipeline. Macroinvertebrate and salamander species were identified to species level.

Macroinvertebrate and Salamander Surveys for Proposed El Toro Loco Well Pad, Belmont County, OH – 2015
Conducted macroinvertebrate and salamander surveys in two streams that were proposed to be impacted by construction of a natural gas well pad. Macroinvertebrate and salamander species were identified to species level.

Macroinvertebrate and Salamander Surveys for Proposed Tuna II Natural Gas Pipeline, Belmont County, OH – 2014-16
Conducted macroinvertebrate and salamander surveys in several streams that were proposed to be impacted by construction of a natural gas pipeline. Macroinvertebrates and salamanders were identified to species level.

Macroinvertebrate and Fish Surveys for Grant Research Project, WV – 2010-2012
Conducted macroinvertebrate and fish surveys within hundreds of streams throughout southern West Virginia. Macroinvertebrates and fishes were identified to species level. Tributaries within the following Hydrologic Unit Code (HUC) 8 watersheds were sampled: Big Sandy, Coal, Elk, Gauley, Greenbrier, Upper Guyandotte, Lower Guyandotte, Upper Kanawha, Tug, and Twelvepole.

Macroinvertebrate and Fish Surveys for Grant Research Project, WV – 2009-2012
Conducted macroinvertebrate and fish surveys within Upper Shavers Fork and several tributaries. Macroinvertebrates and fishes were identified to species level.

Macroinvertebrate and Fish Surveys for Grant Research Project, KY – 2010-2012
Conducted macroinvertebrate and fish surveys within hundreds of streams throughout eastern Kentucky. Macroinvertebrates and fishes were identified to species level. Tributaries within the following HUC 8 watersheds were sampled: Big Sandy, Upper Cumberland, North Fork Kentucky, Middle Fork Kentucky, South Fork Kentucky, Lower Levisa, Licking, and Tug.

Regulatory Expertise

- ESA (Section 7 & 10)
- CWA

Industry Clientele

- Wind
- Utilities/Traditional Energy Sources
- Mines and Reclamation
- US Department of Defense
- US Forest Service
- US Fish and Wildlife Service
- National Park Service
- Corresponding State Agencies
- Transportation
- Tribal Lands
- Academic Institutions & NGOs

Listed Taxa Expertise

- Federal Threatened and Endangered Species Permit Number TE-88809B-0 *Corynorhinus townsendii virginianus, Myotis grisescens. Myotis sodalis, Myotis septentrionalis*

Survey Expertise

- Habitat Assessments
- Aquatic Resource Assessments
- Presence/Absence
- Vegetation Index of Biotic Integrity

Certifications/Trainings

- Hands-on Wetland Restoration Workshop (Biebighauser), 2015
- Bats and Fire Workshop (CAFMS), 2014
- Wetland Plant Identification Course (NCTC), 2014
- Advanced Hydric Soils Course (WTI), 2014
- Vertical Rope Training (Mirza), 2013
- Acoustic Bat Research Techniques (Anabat) Course, 2013
- USACE Wetland Delineation Course (Chin), 2012
- KY Prescribed Fire Council Controlled Burn Workshop, 2012
- USFWS Range-wide Indiana Bat Protection and Enhancement Plan Guidelines Workshop, 2010
- Developing a Biological Assessment (ECS3152), 2009

Qualifications and Background

After earning a B.S. degree in Environmental Studies from Eastern Kentucky University, Ray Eaton started his environmental consulting career in 2009 as an environmental scientist. He worked on a wide variety of natural resource conservation issues for a few years before deciding on the specialty of bat ecology. Since then, conservation research has led him to 18 states and tribal lands. He stays up-to-date with bat research and volunteers with educational programs, winter bat census, and white-nose syndrome (WNS) research.

Ray's skill-set includes designing and implementing study-plans for bat research. He has an understanding of the habitat requirements of all bat species living in the eastern US and can assess habitat suitability for listed and non-listed bats. Research-techniques that he is experienced with include mist-netting, cave census using photography, IR and thermal video recording, ultra-sonic acoustic recording and analysis, and harp-trapping portals. He has a strong understanding of radio-telemetry, and thrives to gather new data on foraging, migration, and roosting. He is adept with GIS and home-range analysis.

Ray has also been working with stream and wetland restoration since 2011, and regularly attends professional conferences regarding the CWA and training courses on soils and botany. He has planted thousands of trees and shrubs, delineated countless wetlands, and classified miles of streams and enjoys the work.

Education

B.S. Environmental Studies, 2008, Eastern Kentucky University, Richmond, Kentucky

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 41 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 10 facing downstream.	

Photo No. 42 **Date:** 11/17/2020 **Description:** View of intermittent Stream 11 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 43 **Date:** 11/17/2020 **Description:** View of intermittent Stream 11 facing downstream.	

Photo No. 44 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 12 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 45 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 12 facing downstream.	

Photo No. 46 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 13 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 47 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 13 facing downstream.	

Photo No. 48 **Date:** 11/17/2020 **Description:** View of intermittent Stream 14 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 49 **Date:** 11/17/2020 **Description:** View of intermittent Stream 14 facing downstream.	

Photo No. 50 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 15 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 51 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 15 facing downstream.	

Photo No. 52 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 16 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 53 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 16 facing downstream.	

Photo No. 54 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 17 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 55 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 17 facing downstream.	

Photo No. 56 **Date:** 11/17/2020 **Description:** View of perennial Stream 18 (Brushy Creek) facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 57 **Date:** 11/17/2020 **Description:** View of perennial Stream 18 (Brushy Creek) facing downstream.	

Photo No. 58 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 19 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 59 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 19 facing downstream.	

Photo No. 60 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 20 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 61 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 20 facing downstream.	

Photo No. 62 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 21 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 63 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 21 facing downstream.	

Photo No. 64 **Date:** 11/17/2020 **Description:** No pictures of Stream 22 were taken.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 65 **Date:** 11/17/2020 **Description:** No pictures of Stream 22 were taken.	

Photo No. 66 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 23 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 67 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 23 facing downstream.	

Photo No. 68 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 24 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 69 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 24 facing downstream.	

Photo No. 70 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 25 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 71 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 25 facing downstream.	

Photo No. 72 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 26 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 73 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 26 facing downstream.	

Photo No. 74 **Date:** 11/17/2020 **Description:** View of ephemeral portion of Stream 28 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 75 **Date:** 11/17/2020 **Description:** View of ephemeral portion of Stream 28 facing downstream.	

Photo No. 76 **Date:** 11/17/2020 **Description:** View of intermittent portion of Stream 28 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 77 **Date:** 11/17/2020 **Description:** View of intermittent portion of Stream 28 facing downstream.	

Photo No. 78 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 29 facing downstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 79 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 29 facing upstream at the confluence with perennial Stream 18 (Brushy Creek).	

Photo No. 80 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 30 facing upstream at the confluence with perennial Stream 18 (Brushy Creek).	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 81 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 30 facing downstream.	

Photo No. 82 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 31 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 83 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 31 facing downstream.	

Photo No. 84 **Date:** 11/17/2020 **Description:** View of intermittent Stream 32 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 85 **Date:** 11/17/2020 **Description:** View of intermittent Stream 32 facing downstream.	

Photo No. 86 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 33 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 87 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 33 facing downstream.	

Photo No. 88 **Date:** 11/17/2020 **Description:** View of intermittent Stream 34 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 89 **Date:** 11/17/2020 **Description:** View of intermittent Stream 34 facing downstream.	

Photo No. 92 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 36 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 93 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 36 facing downstream.	

Photo No. 94 **Date:** 11/17/2020 **Description:** View of intermittent Stream 38 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 95 **Date:** 11/17/2020 **Description:** View of intermittent Stream 38 facing downstream.	

Photo No. 96 **Date:** 11/17/2020 **Description:** View of intermittent Stream 39 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 97 **Date:** 11/17/2020 **Description:** View of intermittent Stream 39 facing downstream.	

Photo No. 98 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 40 facing upstream.	

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar LLC Photographic Record	
Project No.: **1013**	**Location:** **McCracken County, Kentucky**	**Client:** **Community Energy**

Photo No. 99 **Date:** 11/17/2020 **Description:** View of ephemeral Stream 40 facing downstream.	

Appendix C – USACE Wetland Determination Data Forms

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: McCracken County Solar LLC | City/County: McCracken | Sampling Date: 11/17/2020

Applicant/Owner: Community Energy | State: KY | Sampling Point: DP-01

Investigator(s): R. Eaton, E. Bolenbaugh, J. Parsons | Section, Township, Range:

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave | Slope (%): 1-3

Subregion (LRR or MRLA): LRR-P, MLRA-134 | Lat: 37.11841663 | Long: -88.85331694 | Datum: NAD 83

Soil Map Unit Name: Grenada silt loam (GrC3) | NWI Classification: N/A

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

Are vegetation No ,Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present?

Are vegetation No ,Soil No , or Hydrology No naturally problematic? Yes X No ____

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

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

Remarks: Explain alternative procedures here or in a separate report.)

DP-01 is representative of Wetland A.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required: Check all that apply)

				Secondary Indicators (minimum of two required)	
✓	Surface Water (A1)		True Aquatic Plants (B14)		Surface Soil Cracks (B6)
✓	High Water Table (A2)		Hydrogen Sulfide Odor (C1)		Sparsely Vegetated Concave Surface (B8)
✓	Saturation (A3)	✓	Oxidized Rhizospheres on Living Roots (C3)		Drainage Patterns (B10)
	Water Marks (B1)		Presence of Reduced Iron (C4)		Moss Trim Lines (B18)
	Sediment Deposits (B2)		Recent Iron Reduction Tiled Soils (C6)		Dry-Season Water Table (C2)
	Drift Deposits (B3)		Thin Muck Surface (C7)		Crayfish Burrows (C8)
	Algal Mat or Crust (B4)		Other (Explain in Remarks)		Saturation Visible on Aerial Imagery (C9)
	Iron Deposits (B5)				Stunted or Stressed Plants (D1)
	Inundation Visible on Aerial Imagery (B7)				Geomorphic Position (D2)
	Water-Stained Leaves (B9)				Shallow Aquitard (D3)
	Aquatic Fauna (B13)				Microtopographic Relief (D4)
					FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	✓	No	Depth (inches):	6	Wetland Hydrology Present?
Water Table Present?	Yes	✓	No	Depth (inches):	0	
Saturation Present? (includes capillary fringe)	Yes	✓	No	Depth (inches):	0	Yes ✓ No

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

Remarks:

Wetland hydrology is present.

VEGETATION - Use scientific names of plants

Sampling Point: DP-01

Tree Stratum (Plot Size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
Sapling/Shrub Stratum (Plot Size: 15-ft. radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Herb Stratum (Plot Size: 5 ft. radius)			
1. Microstegium vimineum	60	YES	FAC
2. Scirpus atrovirens	25	YES	OBL
3. Gramineae sp.	10	NO	N/A
4. Lycopus sp.	5	NO	N/A
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100 = Total Cover		
Woody Vine Stratum (Plot Size: 30-ft. radius)			
1.			
2.			
3.			
4.			
5.			
6.			
	= 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		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤ 3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Problematic Hydrophytic Vegetation [1]

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

Definitions of Vegetation Strata:

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

Sapling/shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft. tall.

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

Woody vines - All woody vines greater than 3.26 ft. in height

Hydrophytic Vegetation Present?

Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation is present.

SOIL **Sampling Point:** DP-01

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
0-18	10YR 4/1	70	7.5YR 4/6	30	C	PL	SiCL	

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

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ☐ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F17)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (**LRR N, MLRA 136)**
- ☐ Umbric Surface (F13) **(MLRA 136,122)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ☐ Red Parent Material (F21) **(MLRA 127,147)**

Indicators for Problematic Hydric Soils[3]

- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ☐ Piedmont Floodplain Soils (F19) (**MLRA 147, 148)**
- ☐ 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 ✓ No _____

Remarks:

Hydric soil indicators are present.

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: McCracken County Solar LLC | City/County: McCracken | Sampling Date: 11/17/2020

Applicant/Owner: Community Energy | State: KY | Sampling Point: DP-02

Investigator(s): R. Eaton, E. Bolenbaugh, J. Parsons | Section, Township, Range:

Landform (hillslope, terrace, etc.): Plain | Local relief (concave, convex, none): None | Slope (%):

Subregion (LRR or MRLA): LRR-P, MLRA-134 | Lat: 37.1183495 | Long: -88.85321626 | Datum: NAD 83

Soil Map Unit Name: Grenada silt loam (GrC3) | NWI Classification: N/A

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

Are vegetation No ,Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present?

Are vegetation No ,Soil No , or Hydrology No naturally problematic? Yes X No

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

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

Remarks: Explain alternative procedures here or in a separate report.)

DP-02 is an upland plot located adjacent Wetland A.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required: Check all that apply)

Surface Water (A1)	True Aquatic Plants (B14)	Surface Soil Cracks (B6)
High Water Table (A2)	Hydrogen Sulfide Odor (C1)	Sparsely Vegetated Concave Surface (B8)
Saturation (A3)	Oxidized Rhizospheres on Living Roots (C3)	Drainage Patterns (B10)
Water Marks (B1)	Presence of Reduced Iron (C4)	Moss Trim Lines (B18)
Sediment Deposits (B2)	Recent Iron Reduction Tiled Soils (C6)	Dry-Season Water Table (C2)
Drift Deposits (B3)	Thin Muck Surface (C7)	Crayfish Burrows (C8)
Algal Mat or Crust (B4)	Other (Explain in Remarks)	Saturation Visible on Aerial Imagery (C9)
Iron Deposits (B5)		Stunted or Stressed Plants (D1)
Inundation Visible on Aerial Imagery (B7)		Geomorphic Position (D2)
Water-Stained Leaves (B9)		Shallow Aquitard (D3)
Aquatic Fauna (B13)		Microtopographic Relief (D4)
		FAC-Neutral Test (D5)

Secondary Indicators (minimum of two required)

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 No ✓

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

Remarks:

No wetland hydrology indicators present.

VEGETATION - Use scientific names of plants

Sampling Point: DP-02

Tree Stratum (Plot Size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Celtis occidentalis	20	YES	FACU
2. Rhus glabra	20	YES	FACU
3. Ulmus rubra	10	NO	FAC
4. Quercus palustris	10	NO	FACW
5.			
6.			
7.			
8.			
	60	= Total Cover	

Sapling/Shrub Stratum (Plot Size: 15-ft. radius)			
1. Rhus glabra	20	YES	FACU
2. Sassafras albidum	10	YES	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	30	= Total Cover	

Herb Stratum (Plot Size: 5 ft. radius)			
1. Achyranthes japonica	60	YES	FACU
2. Lonicera japonica	20	YES	FACU
3. Rubus allegheniensis	5	NO	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	85	= Total Cover	

Woody Vine Stratum (Plot Size: 30-ft. radius)			
1. Lonicera japonica	20	YES	FACU
2.			
3.			
4.			
5.			
6.			
	20	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤ 3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Problematic Hydrophytic Vegetation [1]

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

Definitions of Vegetation Strata:

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

Sapling/shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft. tall.

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

Woody vines - All woody vines greater than 3.26 ft. in height

Hydrophytic Vegetation Present?

Yes ___ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation is not present.

SOIL **Sampling Point:** DP-02

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
0-18	10YR 4/3	100					SiL	

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

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ☐ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F17)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (**LRR N, MLRA 136)**
- ☐ Umbric Surface (F13) **(MLRA 136,122)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ☐ Red Parent Material (F21) **(MLRA 127,147)**

Indicators for Problematic Hydric Soils[3]

- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ☐ Piedmont Floodplain Soils (F19) (**MLRA 147, 148)**
- ☐ 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 _____ No ✓

Remarks:

Hydric soils are not present.

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: McCracken County Solar LLC | City/County: McCracken | Sampling Date: 11/17/2020

Applicant/Owner: Community Energy | State: KY | Sampling Point: DP-03

Investigator(s): R. Eaton, E. Bolenbaugh, J. Parsons | Section, Township, Range:

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave | Slope (%): 1-3

Subregion (LRR or MRLA): LRR-P, MLRA-134 | Lat: 37.13157424 | Long: -88.85950728 | Datum: NAD 83

Soil Map Unit Name: Water (W) | NWI Classification: PUBHh

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

Are vegetation No ,Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present?

Are vegetation No ,Soil No , or Hydrology No naturally problematic? Yes X No ____

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

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

Remarks: Explain alternative procedures here or in a separate report.)

DP-03 is representative of Wetland B.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required: Check all that apply)

✓	Surface Water (A1)		True Aquatic Plants (B14)		Surface Soil Cracks (B6)
✓	High Water Table (A2)		Hydrogen Sulfide Odor (C1)	✓	Sparsely Vegetated Concave Surface (B8)
✓	Saturation (A3)		Oxidized Rhizospheres on Living Roots (C3)		Drainage Patterns (B10)
	Water Marks (B1)	✓	Presence of Reduced Iron (C4)	✓	Moss Trim Lines (B18)
	Sediment Deposits (B2)		Recent Iron Reduction Tiled Soils (C6)		Dry-Season Water Table (C2)
	Drift Deposits (B3)		Thin Muck Surface (C7)		Crayfish Burrows (C8)
	Algal Mat or Crust (B4)		Other (Explain in Remarks)		Saturation Visible on Aerial Imagery (C9)
	Iron Deposits (B5)				Stunted or Stressed Plants (D1)
	Inundation Visible on Aerial Imagery (B7)				Geomorphic Position (D2)
✓	Water-Stained Leaves (B9)				Shallow Aquitard (D3)
	Aquatic Fauna (B13)				Microtopographic Relief (D4)
					FAC-Neutral Test (D5)

Secondary Indicators (minimum of two required)

Field Observations:

Surface Water Present?	Yes	✓	No	Depth (inches):	0	Wetland Hydrology Present?
Water Table Present?	Yes	✓	No	Depth (inches):	2	
Saturation Present? (includes capillary fringe)	Yes	✓	No	Depth (inches):	0	Yes ✓ No

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

Remarks:

Wetland hydrology is present.

VEGETATION - Use scientific names of plants

Sampling Point: DP-03

Tree Stratum (Plot Size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix nigra	50	YES	OBL
2. Acer rubrum	10	NO	FAC
3. Ulmus rubra	5	NO	FAC
4. Fraxinus pennsylvanica	5	NO	FACW
5.			
6.			
7.			
8.			
	70	= Total Cover	

Sapling/Shrub Stratum (Plot Size: 15-ft. radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
		= Total Cover	

Herb Stratum (Plot Size: 5 ft. radius)			
1. Scirpus atrovirens	20	YES	OBL
2. Persicaria hydropiperoides	15	YES	OBL
3. Aster sp.	10	YES	N/A
4. Achyranthes japonica	5	NO	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	50	= Total Cover	

Woody Vine Stratum (Plot Size: 30-ft. radius)			
1.			
2.			
3.			
4.			
5.			
6.			
		= 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		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:		(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤ 3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Problematic Hydrophytic Vegetation [1]

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

Definitions of Vegetation Strata:

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

Sapling/shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft. tall.

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

Woody vines - All woody vines greater than 3.26 ft. in height

Hydrophytic Vegetation Present?

Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation is present.

SOIL **Sampling Point:** DP-03

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
0-18	10YR 5/2	60	7.5 YR 3/4	40	C	M + PL	SiCL	

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

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

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ☐ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F17)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (**LRR N, MLRA 136)**
- ☐ Umbric Surface (F13) **(MLRA 136,122)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ☐ Red Parent Material (F21) **(MLRA 127,147)**

Indicators for Problematic Hydric Soils[3]

- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ☐ Piedmont Floodplain Soils (F19) (**MLRA 147, 148)**
- ☐ 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 ✓ No _____

Remarks:

Hydric soil indicators are present.

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: McCracken County Solar LLC City/County: McCracken Sampling Date: 11/17/2020

Applicant/Owner: Community Energy State: KY Sampling Point: DP-04

Investigator(s): R. Eaton, E. Bolenbaugh, J. Parsons Section, Township, Range:

Landform (hillslope, terrace, etc.): Plain Local relief (concave, convex, none): None Slope (%):

Subregion (LRR or MRLA): LRR-P, MLRA-134 Lat: 37.13187837 Long: -88.85946045 Datum: NAD 83

Soil Map Unit Name: Calloway silt loam (CaB2) NWI Classification: N/A

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

Are vegetation No ,Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present?

Are vegetation No ,Soil No , or Hydrology No naturally problematic? Yes X No

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

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

Remarks: Explain alternative procedures here or in a separate report.)

DP-04 is an upland plot located adjacent to Wetland B.

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)
- True Aquatic Plants (B14)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction Tiled 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 (B18)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Stunted or Stressed Plants (D1)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- Microtopographic Relief (D4)
- FAC-Neutral Test (D5)

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 No ✓

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

Remarks:

No wetland hydrology indicators present.

VEGETATION - Use scientific names of plants

Sampling Point: DP-04

Tree Stratum (Plot Size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Juglans nigra	5	YES	FACU
2. Fraxinus pennsylvanica	2	YES	FACW
3.			
4.			
5.			
6.			
7.			
8.			
	7	= Total Cover	

Sapling/Shrub Stratum (Plot Size: 15-ft. radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		

Herb Stratum (Plot Size: 5 ft. radius)			
1. Achyranthes japonica	50	YES	FACU
2. Lonicera japonica	5	NO	FACU
3.	2	NO	
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	57	= Total Cover	

Woody Vine Stratum (Plot Size: 30-ft. radius)			
1.			
2.			
3.			
4.			
5.			
6.			
	= 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: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤ 3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Problematic Hydrophytic Vegetation [1]

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

Definitions of Vegetation Strata:

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

Sapling/shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft. tall.

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

Woody vines - All woody vines greater than 3.26 ft. in height

Hydrophytic Vegetation Present?

Yes ___ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation is not present.

SOIL **Sampling Point:** DP-04

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
0-18	10YR 4/4	100					SiL	

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

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ☐ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F17)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (**LRR N, MLRA 136)**
- ☐ Umbric Surface (F13) **(MLRA 136,122)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ☐ Red Parent Material (F21) **(MLRA 127,147)**

Indicators for Problematic Hydric Soils[3]

- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ☐ Piedmont Floodplain Soils (F19) (**MLRA 147, 148)**
- ☐ 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 _____ No ✓

Remarks:

Hydric soils are not present.

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: McCracken County Solar LLC | City/County: McCracken | Sampling Date: 11/17/2020

Applicant/Owner: Community Energy | State: KY | Sampling Point: DP-05

Investigator(s): R. Eaton, E. Bolenbaugh, J. Parsons | Section, Township, Range:

Landform (hillslope, terrace, etc.): Plain | Local relief (concave, convex, none): None | Slope (%):

Subregion (LRR or MRLA): LRR N | Lat: 37.13200567 | Long: -88.85949744 | Datum: NAD 83

Soil Map Unit Name: Calloway silt loam (CaB2) | NWI Classification: N/A

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

Are vegetation No ,Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present?

Are vegetation No ,Soil No , or Hydrology No naturally problematic? Yes X No ____

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

Hydrophytic Vegetation Present?	Yes	✓	No		
Hydric Soil Present?	Yes		No	✓	Is the Sampled Area within a Wetland? Yes ____ No ✓
Wetland Hydrology Present?	Yes		No	✓	

Remarks: Explain alternative procedures here or in a separate report.)

DP-05 is an upland plot located adjacent Stream 26.

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)
- ____ True Aquatic Plants (B14)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction Tiled 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 (B18)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

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 ____ No ✓

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

Remarks:

No wetland hydrology indicators present.

VEGETATION - Use scientific names of plants

Sampling Point: DP-05

Tree Stratum (Plot Size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer saccharinum	45	YES	FACW
2. Acer rubrum	20	YES	FAC
3. Fraxinus pennsylvanica	35	YES	FACW
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	

Sapling/Shrub Stratum (Plot Size: 15-ft. radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
		= Total Cover	

Herb Stratum (Plot Size: 5 ft. radius)			
1. Microstegium vimineum	50	YES	FAC
2. Persicaria sp.	15	NO	N/A
3. Allium sp.	10	NO	N/A
4. Aster sp.	25	YES	N/A
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100	= Total Cover	

Woody Vine Stratum (Plot Size: 30-ft. radius)			
1.			
2.			
3.			
4.			
5.			
6.			
		= 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: 4 (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		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:		(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤ 3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Problematic Hydrophytic Vegetation [1]

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

Definitions of Vegetation Strata:

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

Sapling/shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft. tall.

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

Woody vines - All woody vines greater than 3.26 ft. in height

Hydrophytic Vegetation Present?

Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation is present.

SOIL **Sampling Point:** DP-05

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
0-18	10YR 5/3	60	7.5YR 4/6	40	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:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ☐ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F17)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (**LRR N, MLRA 136)**
- ☐ Umbric Surface (F13) **(MLRA 136,122)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ☐ Red Parent Material (F21) **(MLRA 127,147)**

Indicators for Problematic Hydric Soils[3]

- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ☐ Piedmont Floodplain Soils (F19) (**MLRA 147, 148)**
- ☐ 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 _____ No ✓

Remarks:

Hydric soil indicators are not present.

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: McCracken County Solar LLC | City/County: McCracken | Sampling Date: 11/17/2020

Applicant/Owner: Community Energy | State: KY | Sampling Point: DP-06

Investigator(s): R. Eaton, E. Bolenbaugh, J. Parsons | Section, Township, Range:

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave | Slope (%): 1-3

Subregion (LRR or MRLA): LRR-P, MLRA-134 | Lat: 37.13533642 | Long: -88.85833487 | Datum: NAD 83

Soil Map Unit Name: Grenada silt loam (GrB2) | NWI Classification: N/A

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

Are vegetation No ,Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present?

Are vegetation No ,Soil No , or Hydrology No naturally problematic? Yes X No ____

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

Hydrophytic Vegetation Present?	Yes	✓	No		
Hydric Soil Present?	Yes	✓	No		
Wetland Hydrology Present?	Yes	✓	No		

Is the Sampled Area within a Wetland? Yes ✓ No ____

Remarks: Explain alternative procedures here or in a separate report.)

DP-06 is representative of Wetland C.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required: Check all that apply)

	Surface Water (A1)		True Aquatic Plants (B14)
	High Water Table (A2)		Hydrogen Sulfide Odor (C1)
	Saturation (A3)	✓	Oxidized Rhizospheres on Living Roots (C3)
	Water Marks (B1)		Presence of Reduced Iron (C4)
	Sediment Deposits (B2)		Recent Iron Reduction Tiled Soils (C6)
	Drift Deposits (B3)		Thin Muck Surface (C7)
	Algal Mat or Crust (B4)		Other (Explain in Remarks)
	Iron Deposits (B5)		
	Inundation Visible on Aerial Imagery (B7)		
	Water-Stained Leaves (B9)		
	Aquatic Fauna (B13)		

Secondary Indicators (minimum of two required)

	Surface Soil Cracks (B6)
✓	Sparsely Vegetated Concave Surface (B8)
	Drainage Patterns (B10)
✓	Moss Trim Lines (B18)
	Dry-Season Water Table (C2)
	Crayfish Burrows (C8)
	Saturation Visible on Aerial Imagery (C9)
	Stunted or Stressed Plants (D1)
	Geomorphic Position (D2)
	Shallow Aquitard (D3)
	Microtopographic Relief (D4)
	FAC-Neutral Test (D5)

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 ✓ No ____

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

Remarks:

Wetland hydrology is present.

VEGETATION - Use scientific names of plants

Sampling Point: DP-06

Tree Stratum (Plot Size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Quercus palustris	60	YES	FACW
2. Ulmus rubra	10	NO	FAC
3. Quercus falcata	10	NO	FACU
4.			
5.			
6.			
7.			
8.			
	80	= Total Cover	

Sapling/Shrub Stratum (Plot Size: 15-ft. radius)			
1. Acer saccharinum	10	YES	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	10	= Total Cover	

Herb Stratum (Plot Size: 5 ft. radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
		= Total Cover	

Woody Vine Stratum (Plot Size: 30-ft. radius)			
1.			
2.			
3.			
4.			
5.			
6.			
		= 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		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:		(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤ 3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Problematic Hydrophytic Vegetation [1]

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

Definitions of Vegetation Strata:

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

Sapling/shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft. tall.

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

Woody vines - All woody vines greater than 3.26 ft. in height

Hydrophytic Vegetation Present?

Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation is present.

SOIL **Sampling Point:** DP-06

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
0-18	10YR 5/1	85	7.5YR 5/6	15	C	PL	SiCL	

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

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ☐ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F17)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (**LRR N, MLRA 136)**
- ☐ Umbric Surface (F13) **(MLRA 136,122)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ☐ Red Parent Material (F21) **(MLRA 127,147)**

Indicators for Problematic Hydric Soils[3]

- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ☐ Piedmont Floodplain Soils (F19) (**MLRA 147, 148)**
- ☐ 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 ✓ No _____

Remarks:

Hydric soil indicators are present.

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: McCracken County Solar LLC City/County: McCracken Sampling Date: 11/17/2020

Applicant/Owner: Community Energy State: KY Sampling Point: DP-07

Investigator(s): R. Eaton, E. Bolenbaugh, J. Parsons Section, Township, Range:

Landform (hillslope, terrace, etc.): Plain Local relief (concave, convex, none): None Slope (%):

Subregion (LRR or MRLA): LRR-P, MLRA-134 Lat: 37.13533971 Long: -88.85819418 Datum: NAD 83

Soil Map Unit Name: Grenada silt loam (GrB2) NWI Classification: N/A

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

Are vegetation No ,Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present?

Are vegetation No ,Soil No , or Hydrology No naturally problematic? Yes X No

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

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

Remarks: Explain alternative procedures here or in a separate report.)

DP-07 is an upland plot located adjacent to Wetland C.

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)
- True Aquatic Plants (B14)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction Tiled 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 (B18)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Stunted or Stressed Plants (D1)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- Microtopographic Relief (D4)
- FAC-Neutral Test (D5)

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 No ✓

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

Remarks:

No wetland hydrology indicators present.

VEGETATION - Use scientific names of plants

Sampling Point: DP-07

Tree Stratum (Plot Size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Ulmus rubra	25	YES	FAC
2. Quercus coccinea	15	YES	UPL
3. Quercus palustris	15	YES	FACW
4. Celtis occidentalis	15	YES	FACU
5. Quercus velutina	10	NO	UPL
6.			
7.			
8.			
	80	= Total Cover	

Sapling/Shrub Stratum (Plot Size: 15-ft. radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
		= Total Cover	

Herb Stratum (Plot Size: 5 ft. radius)			
1. Achyranthes japonica	80	YES	FACU
2. Lonicera japonica	5	NO	FACU
3. Ageratina altissima	5	NO	FACU
4. Rosa multiflora	2	NO	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	92	= Total Cover	

Woody Vine Stratum (Plot Size: 30-ft. radius)			
1. Vitis vulpina	15	YES	FAC
2.			
3.			
4.			
5.			
6.			
	15	= 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: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of		Multiply by:	
OBL species	0	x 1 =	0
FACW species	15	x 2 =	30
FAC species	25	x 3 =	75
FACU species	107	x 4 =	428
UPL species	25	x 5 =	125
Column Totals:	172 (A)		658 (B)

Prevalence Index = B/A = 3.8

Hydrophytic Vegetation Indicators:

__ 1 - Rapid Test for Hydrophytic Vegetation
__ 2 - Dominance Test is >50%
__ 3 - Prevalence Index is ≤ 3.0[1]
__ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ 5 - Problematic Hydrophytic Vegetation [1]

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

Definitions of Vegetation Strata:

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

Sapling/shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft. tall.

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

Woody vines - All woody vines greater than 3.26 ft. in height

Hydrophytic Vegetation Present?

Yes ____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation is not present.

SOIL **Sampling Point:** DP-07

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
0-18	10YR 5/3	100					SiL	

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

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

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ☐ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F17)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (**LRR N, MLRA 136)**
- ☐ Umbric Surface (F13) **(MLRA 136,122)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ☐ Red Parent Material (F21) **(MLRA 127,147)**

Indicators for Problematic Hydric Soils[3]

- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ☐ Piedmont Floodplain Soils (F19) (**MLRA 147, 148)**
- ☐ 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 _____ No ✓

Remarks:

Hydric soils are not present.

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: McCracken County Solar LLC | City/County: McCracken | Sampling Date: 11/17/2020

Applicant/Owner: Community Energy | State: KY | Sampling Point: DP-08

Investigator(s): R. Eaton, E. Bolenbaugh, J. Parsons | Section, Township, Range:

Landform (hillslope, terrace, etc.): Plain | Local relief (concave, convex, none): None | Slope (%): 1-3

Subregion (LRR or MRLA): LRR-P, MLRA-134 | Lat: 37.13582131 | Long: -88.85622884 | Datum: NAD 83

Soil Map Unit Name: Calloway silt loam (CaB2) | NWI Classification: N/A

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

Are vegetation Yes ,Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present?

Are vegetation No ,Soil No , or Hydrology No naturally problematic? Yes X No ____

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

Hydrophytic Vegetation Present?	Yes	✓	No		
Hydric Soil Present?	Yes	✓	No		
Wetland Hydrology Present?	Yes	✓	No		

Is the Sampled Area within a Wetland? Yes ✓ No ____

Remarks: Explain alternative procedures here or in a separate report.)

DP-08 is representative of Wetland D.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required: Check all that apply)

	Surface Water (A1)		True Aquatic Plants (B14)		Sparsely Vegetated Concave Surface (B8)
	High Water Table (A2)		Hydrogen Sulfide Odor (C1)		Drainage Patterns (B10)
	Saturation (A3)	✓	Oxidized Rhizospheres on Living Roots (C3)		Moss Trim Lines (B18)
	Water Marks (B1)		Presence of Reduced Iron (C4)		Dry-Season Water Table (C2)
	Sediment Deposits (B2)		Recent Iron Reduction Tiled Soils (C6)	✓	Crayfish Burrows (C8)
	Drift Deposits (B3)		Thin Muck Surface (C7)		Saturation Visible on Aerial Imagery (C9)
	Algal Mat or Crust (B4)		Other (Explain in Remarks)		Stunted or Stressed Plants (D1)
	Iron Deposits (B5)				Geomorphic Position (D2)
	Inundation Visible on Aerial Imagery (B7)				Shallow Aquitard (D3)
✓	Water-Stained Leaves (B9)				Microtopographic Relief (D4)
	Aquatic Fauna (B13)				FAC-Neutral Test (D5)

Secondary Indicators (minimum of two required)

✓ Surface Soil Cracks (B6)

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 ✓ No ____

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

Remarks:

Wetland hydrology is present.

VEGETATION - Use scientific names of plants

Sampling Point: DP-08

Tree Stratum (Plot Size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
Sapling/Shrub Stratum (Plot Size: 15-ft. radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Herb Stratum (Plot Size: 5 ft. radius)			
1. Triticum aestivum	5	NO	None
2. Xanthium strumarium	50	YES	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	55 = Total Cover		
Woody Vine Stratum (Plot Size: 30-ft. radius)			
1.			
2.			
3.			
4.			
5.			
6.			
	= 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		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:		(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤ 3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- X 5 - Problematic Hydrophytic Vegetation [1]

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

Definitions of Vegetation Strata:

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

Sapling/shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft. tall.

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

Woody vines - All woody vines greater than 3.26 ft. in height

Hydrophytic Vegetation Present?

Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation is present.

SOIL **Sampling Point:** DP-08

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
0-4	10YR 4/2	60	7.5YR 3/4	40	C	PL	SiCL	
4-18	10TR 4/2	55	7.5YR 3/4	45	C	PL	SiCL	

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

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ☐ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F17)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (**LRR N, MLRA 136)**
- ☐ Umbric Surface (F13) **(MLRA 136,122)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ☐ Red Parent Material (F21) **(MLRA 127,147)**

Indicators for Problematic Hydric Soils[3]

- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ☐ Piedmont Floodplain Soils (F19) (**MLRA 147, 148)**
- ☐ 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 ✓ No _____

Remarks:

Hydric soil indicators are present.

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: McCracken County Solar LLC City/County: McCracken Sampling Date: 11/17/2020

Applicant/Owner: Community Energy State: KY Sampling Point: DP-09

Investigator(s): R. Eaton, E. Bolenbaugh, J. Parsons Section, Township, Range:

Landform (hillslope, terrace, etc.): Plain Local relief (concave, convex, none): None Slope (%): 1-3

Subregion (LRR or MRLA): LRR-P. MLRA-134 Lat: 37.13566488 Long: -88.85599602 Datum: NAD 83

Soil Map Unit Name: Calloway silt loam (CaB2) NWI Classification: N/A

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

Are vegetation No ,Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present?

Are vegetation No ,Soil No , or Hydrology No naturally problematic? Yes X No ____

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

Hydrophytic Vegetation Present?	Yes	____	No ✓	Is the Sampled Area within a Wetland?	Yes ____ No ✓
Hydric Soil Present?	Yes	____	No ✓		
Wetland Hydrology Present?	Yes	____	No ✓		

Remarks: Explain alternative procedures here or in a separate report.)

DP-09 is an upland plot located adjacent to Wetland D.

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)
- ____ True Aquatic Plants (B14)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction Tiled 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 (B18)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

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 ____ No ✓

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

Remarks:

No wetland hydrology indicators present.

VEGETATION - Use scientific names of plants

Sampling Point: DP-09

Tree Stratum (Plot Size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
Sapling/Shrub Stratum (Plot Size: 15-ft. radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Herb Stratum (Plot Size: 5 ft. radius)			
1. Triticum aestivum	100	YES	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100 = Total Cover		
Woody Vine Stratum (Plot Size: 30-ft. radius)			
1.			
2.			
3.			
4.			
5.			
6.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤ 3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Problematic Hydrophytic Vegetation [1]

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

Definitions of Vegetation Strata:

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

Sapling/shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft. tall.

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

Woody vines - All woody vines greater than 3.26 ft. in height

Hydrophytic Vegetation Present?

Yes ___ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation is not present.

SOIL **Sampling Point:** DP-09

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
0-18	10YR 5/3	50					SiL	
	7.5YR 4/4	50						

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

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ☐ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F17)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (**LRR N, MLRA 136)**
- ☐ Umbric Surface (F13) **(MLRA 136,122)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ☐ Red Parent Material (F21) **(MLRA 127,147)**

Indicators for Problematic Hydric Soils[3]

- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ☐ Piedmont Floodplain Soils (F19) (**MLRA 147, 148)**
- ☐ 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 _____ No ✓

Remarks:

Hydric soils are not present.

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: McCracken County Solar LLC | City/County: McCracken | Sampling Date: 11/17/2020

Applicant/Owner: Community Energy | State: KY | Sampling Point: DP-10

Investigator(s): R. Eaton, E. Bolenbaugh, J. Parsons | Section, Township, Range:

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave | Slope (%): 1-3

Subregion (LRR or MRLA): LRR-P, MLRA-134 | Lat: 37.13491928 | Long: -88.85663516 | Datum: NAD 83

Soil Map Unit Name: Calloway silt loam (CaB2) | NWI Classification: N/A

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

Are vegetation No ,Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present?

Are vegetation No ,Soil No , or Hydrology No naturally problematic? Yes X No ____

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

Hydrophytic Vegetation Present?	Yes	✓	No		
Hydric Soil Present?	Yes	✓	No		
Wetland Hydrology Present?	Yes	✓	No		

Is the Sampled Area within a Wetland? Yes ✓ No ____

Remarks: Explain alternative procedures here or in a separate report.)

DP-10 is representative of Wetland E.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required: Check all that apply)

	Surface Water (A1)		True Aquatic Plants (B14)
	High Water Table (A2)		Hydrogen Sulfide Odor (C1)
	Saturation (A3)	✓	Oxidized Rhizospheres on Living Roots (C3)
	Water Marks (B1)		Presence of Reduced Iron (C4)
	Sediment Deposits (B2)		Recent Iron Reduction Tiled Soils (C6)
	Drift Deposits (B3)		Thin Muck Surface (C7)
	Algal Mat or Crust (B4)		Other (Explain in Remarks)
	Iron Deposits (B5)		
	Inundation Visible on Aerial Imagery (B7)		
✓	Water-Stained Leaves (B9)		
	Aquatic Fauna (B13)		

Secondary Indicators (minimum of two required)

	Surface Soil Cracks (B6)
✓	Sparsely Vegetated Concave Surface (B8)
	Drainage Patterns (B10)
	Moss Trim Lines (B18)
	Dry-Season Water Table (C2)
	Crayfish Burrows (C8)
	Saturation Visible on Aerial Imagery (C9)
	Stunted or Stressed Plants (D1)
	Geomorphic Position (D2)
	Shallow Aquitard (D3)
	Microtopographic Relief (D4)
	FAC-Neutral Test (D5)

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 ✓ No ____

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

Remarks:

Wetland hydrology is present.

VEGETATION - Use scientific names of plants

Sampling Point: DP-10

Tree Stratum (Plot Size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Quercus pagoda	60	YES	FACW
2. Ulmus rubra	10	NO	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	70	= Total Cover	

Sapling/Shrub Stratum (Plot Size: 15-ft. radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
		= Total Cover	

Herb Stratum (Plot Size: 5 ft. radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
		= Total Cover	

Woody Vine Stratum (Plot Size: 30-ft. radius)			
1. Vitis vulpina	15	YES	FAC
2. Toxicodendron radicans	10	YES	FAC
3. Campsis radicans	5	NO	FAC
4.			
5.			
6.			
	30	= 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		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤ 3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Problematic Hydrophytic Vegetation [1]

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

Definitions of Vegetation Strata:

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

Sapling/shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft. tall.

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

Woody vines - All woody vines greater than 3.26 ft. in height

Hydrophytic Vegetation Present?

Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation is present.

SOIL **Sampling Point:** DP-10

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
0-18	10YR 5/2	70	7.5YR 4/4	30	C	PL	SiCL	

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

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ☐ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F17)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (**LRR N, MLRA 136)**
- ☐ Umbric Surface (F13) **(MLRA 136,122)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ☐ Red Parent Material (F21) **(MLRA 127,147)**

Indicators for Problematic Hydric Soils[3]

- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ☐ Piedmont Floodplain Soils (F19) (**MLRA 147, 148)**
- ☐ 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 ✓ No _____

Remarks:

Hydric soil indicators are present.

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: McCracken County Solar LLC | City/County: McCracken | Sampling Date: 11/17/2020

Applicant/Owner: Community Energy | State: KY | Sampling Point: DP-11

Investigator(s): R. Eaton, E. Bolenbaugh, J. Parsons | Section, Township, Range:

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave | Slope (%): 1-3

Subregion (LRR or MRLA): LRR-P, MLRA-134 | Lat: 37.13470899 | Long: -88.85668637 | Datum: NAD 83

Soil Map Unit Name: Calloway silt loam (CaB2) | NWI Classification: N/A

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

Are vegetation No ,Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present?

Are vegetation No ,Soil No , or Hydrology No naturally problematic? Yes X No ____

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

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

Remarks: Explain alternative procedures here or in a separate report.)

DP-11 is representative of Wetland F.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required: Check all that apply)

	Surface Water (A1)		True Aquatic Plants (B14)
	High Water Table (A2)		Hydrogen Sulfide Odor (C1)
	Saturation (A3)		Oxidized Rhizospheres on Living Roots (C3)
	Water Marks (B1)		Presence of Reduced Iron (C4)
	Sediment Deposits (B2)		Recent Iron Reduction Tiled Soils (C6)
	Drift Deposits (B3)		Thin Muck Surface (C7)
	Algal Mat or Crust (B4)		Other (Explain in Remarks)
	Iron Deposits (B5)		
	Inundation Visible on Aerial Imagery (B7)		
✓	Water-Stained Leaves (B9)		
	Aquatic Fauna (B13)		

Secondary Indicators (minimum of two required)

	Surface Soil Cracks (B6)
✓	Sparsely Vegetated Concave Surface (B8)
	Drainage Patterns (B10)
	Moss Trim Lines (B18)
	Dry-Season Water Table (C2)
	Crayfish Burrows (C8)
	Saturation Visible on Aerial Imagery (C9)
	Stunted or Stressed Plants (D1)
	Geomorphic Position (D2)
	Shallow Aquitard (D3)
	Microtopographic Relief (D4)
	FAC-Neutral Test (D5)

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 ✓ No

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

Remarks:

Wetland hydrology is present.

VEGETATION - Use scientific names of plants

Sampling Point: DP-11

Tree Stratum (Plot Size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Quercus pagoda	10	YES	FACW
2. Quercus rubra	10	YES	FACU
3.			
4.			
5.			
6.			
7.			
8.			
	20	= Total Cover	

Sapling/Shrub Stratum (Plot Size: 15-ft. radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
		= Total Cover	

Herb Stratum (Plot Size: 5 ft. radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
		= Total Cover	

Woody Vine Stratum (Plot Size: 30-ft. radius)			
1. Campsis radicans	5	YES	FAC
2.			
3.			
4.			
5.			
6.			
	5	= 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: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤ 3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Problematic Hydrophytic Vegetation [1]

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

Definitions of Vegetation Strata:

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

Sapling/shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft. tall.

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

Woody vines - All woody vines greater than 3.26 ft. in height

Hydrophytic Vegetation Present?

Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation is present.

SOIL **Sampling Point:** DP-11

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
0-18	10YR 5/2	80	7.5YR 4/4	20	C	PL	SiCL	

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

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ☐ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F17)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (**LRR N, MLRA 136)**
- ☐ Umbric Surface (F13) **(MLRA 136,122)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ☐ Red Parent Material (F21) **(MLRA 127,147)**

Indicators for Problematic Hydric Soils[3]

- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ☐ Piedmont Floodplain Soils (F19) (**MLRA 147, 148)**
- ☐ 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 ✓ No _____

Remarks:

Hydric soil indicators are present.

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: McCracken County Solar LLC | City/County: McCracken | Sampling Date: 11/17/2020

Applicant/Owner: Community Energy | State: KY | Sampling Point: DP-12

Investigator(s): R. Eaton, E. Bolenbaugh, J. Parsons | Section, Township, Range:

Landform (hillslope, terrace, etc.): Plain | Local relief (concave, convex, none): None | Slope (%):

Subregion (LRR or MRLA): LRR-P, MLRA-134 | Lat: 37.13444626 | Long: -88.85655494 | Datum: NAD 83

Soil Map Unit Name: Routon silt loam (RtA) | NWI Classification: N/A

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

Are vegetation No ,Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present?

Are vegetation No ,Soil No , or Hydrology No naturally problematic? Yes X No

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

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

Remarks: Explain alternative procedures here or in a separate report.)

DP-12 is an upland plot located adjacent Wetland F.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required: Check all that apply)

Surface Water (A1)	True Aquatic Plants (B14)	
High Water Table (A2)	Hydrogen Sulfide Odor (C1)	
Saturation (A3)	Oxidized Rhizospheres on Living Roots (C3)	
Water Marks (B1)	Presence of Reduced Iron (C4)	
Sediment Deposits (B2)	Recent Iron Reduction Tiled Soils (C6)	
Drift Deposits (B3)	Thin Muck Surface (C7)	
Algal Mat or Crust (B4)	Other (Explain in Remarks)	
Iron Deposits (B5)		
Inundation Visible on Aerial Imagery (B7)		
Water-Stained Leaves (B9)		
Aquatic Fauna (B13)		

Secondary Indicators (minimum of two required)

Surface Soil Cracks (B6)
Sparsely Vegetated Concave Surface (B8)
Drainage Patterns (B10)
Moss Trim Lines (B18)
Dry-Season Water Table (C2)
Crayfish Burrows (C8)
Saturation Visible on Aerial Imagery (C9)
Stunted or Stressed Plants (D1)
Geomorphic Position (D2)
Shallow Aquitard (D3)
Microtopographic Relief (D4)
FAC-Neutral Test (D5)

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 No ✓

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

Remarks:

No wetland hydrology indicators present.

VEGETATION - Use scientific names of plants

Sampling Point: DP-12

Tree Stratum (Plot Size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Quercus velutina	25	YES	UPL
2. Quercus pagoda	25	YES	FACW
3. Carya ovata	15	YES	FACU
4.			
5.			
6.			
7.			
8.			
	65	= Total Cover	

Sapling/Shrub Stratum (Plot Size: 15-ft. radius)			
1. Ulmus rubra	10	YES	FAC
2. Aralia spinosa	10	YES	FAC
3. Carya ovata	10	YES	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	30	= Total Cover	

Herb Stratum (Plot Size: 5 ft. radius)			
1. Microstegium vimineum	70	YES	FAC
2. Rubus allegheniensis	5	NO	FACU
3. Achyranthes japonica	5	NO	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	80	= Total Cover	

Woody Vine Stratum (Plot Size: 30-ft. radius)			
1. Toxicodendron radicans	20	YES	FAC
2.			
3.			
4.			
5.			
6.			
	20	= 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: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 62.5 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤ 3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Problematic Hydrophytic Vegetation [1]

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

Definitions of Vegetation Strata:

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

Sapling/shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft. tall.

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

Woody vines - All woody vines greater than 3.26 ft. in height

Hydrophytic Vegetation Present?

Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation is present.

SOIL **Sampling Point:** DP-12

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
0-18	10YR 5/3	100					SiL	

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

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

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ☐ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F17)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (**LRR N, MLRA 136)**
- ☐ Umbric Surface (F13) **(MLRA 136,122)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ☐ Red Parent Material (F21) **(MLRA 127,147)**

Indicators for Problematic Hydric Soils[3]

- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ☐ Piedmont Floodplain Soils (F19) (**MLRA 147, 148)**
- ☐ 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 _____ No ✓

Remarks:

Hydric soils are not present.

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: McCracken County Solar LLC | City/County: McCracken | Sampling Date: 11/17/2020

Applicant/Owner: Community Energy | State: KY | Sampling Point: DP-13

Investigator(s): R. Eaton, E. Bolenbaugh, J. Parsons | Section, Township, Range:

Landform (hillslope, terrace, etc.): Plain | Local relief (concave, convex, none): None | Slope (%):

Subregion (LRR or MRLA): LRR-P, MLRA-134 | Lat: 37.13321944 | Long: -88.84873119 | Datum: NAD 83

Soil Map Unit Name: Falaya-Collins complex (Fa) | NWI Classification: N/A

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

Are vegetation No ,Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present?

Are vegetation No ,Soil No , or Hydrology No naturally problematic? Yes X No ____

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

Hydrophytic Vegetation Present?	Yes	✓	No		
Hydric Soil Present?	Yes		No	✓	Is the Sampled Area within a Wetland? Yes ____ No ✓
Wetland Hydrology Present?	Yes		No	✓	

Remarks: Explain alternative procedures here or in a separate report.)

DP-13 is an upland plot located adjacent Stream 28.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required: Check all that apply)

Surface Water (A1)	True Aquatic Plants (B14)	
High Water Table (A2)	Hydrogen Sulfide Odor (C1)	
Saturation (A3)	Oxidized Rhizospheres on Living Roots (C3)	
Water Marks (B1)	Presence of Reduced Iron (C4)	
Sediment Deposits (B2)	Recent Iron Reduction Tiled Soils (C6)	
Drift Deposits (B3)	Thin Muck Surface (C7)	
Algal Mat or Crust (B4)	Other (Explain in Remarks)	
Iron Deposits (B5)		
Inundation Visible on Aerial Imagery (B7)		
Water-Stained Leaves (B9)		
Aquatic Fauna (B13)		

Secondary Indicators (minimum of two required)

	Surface Soil Cracks (B6)
	Sparsely Vegetated Concave Surface (B8)
	Drainage Patterns (B10)
	Moss Trim Lines (B18)
	Dry-Season Water Table (C2)
✓	Crayfish Burrows (C8)
	Saturation Visible on Aerial Imagery (C9)
	Stunted or Stressed Plants (D1)
	Geomorphic Position (D2)
	Shallow Aquitard (D3)
	Microtopographic Relief (D4)
	FAC-Neutral Test (D5)

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 ____ No ✓

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

Remarks:

No wetland hydrology indicators present.

VEGETATION - Use scientific names of plants

Sampling Point: DP-13

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

Sapling/Shrub Stratum (Plot Size: 15-ft. radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
		= Total Cover	

Herb Stratum (Plot Size: 5 ft. radius)			
1. Xanthium strumarium	40	YES	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	40	= Total Cover	

Woody Vine Stratum (Plot Size: 30-ft. radius)			
1.			
2.			
3.			
4.			
5.			
6.			
		= 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		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤ 3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Problematic Hydrophytic Vegetation [1]

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

Definitions of Vegetation Strata:

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

Sapling/shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft. tall.

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

Woody vines - All woody vines greater than 3.26 ft. in height

Hydrophytic Vegetation Present?

Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation is present.

SOIL **Sampling Point:** DP-13

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
0-18	10YR 5/3	55					SiL	
	7.5YR 4/4	45						

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

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ☐ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F17)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (**LRR N, MLRA 136)**
- ☐ Umbric Surface (F13) **(MLRA 136,122)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ☐ Red Parent Material (F21) **(MLRA 127,147)**

Indicators for Problematic Hydric Soils[3]

- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ☐ Piedmont Floodplain Soils (F19) (**MLRA 147, 148)**
- ☐ 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 _____ No ✓

Remarks:

Hydric soils are not present.

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: McCracken County Solar LLC | City/County: McCracken | Sampling Date: 11/17/2020
Applicant/Owner: Community Energy | State: KY | Sampling Point: DP-16
Investigator(s): R. Eaton, E. Bolenbaugh, J. Parsons | Section, Township, Range:
Landform (hillslope, terrace, etc.): | Local relief (concave, convex, none): | Slope (%):
Subregion (LRR or MRLA): LRR-P, MLRA-134 | Lat: 37.118813 | Long: -88.858497 | Datum: NAD 83
Soil Map Unit Name: Grenada silt loam (GrC3) | NWI Classification: N/A

Are climatic/hydrologic conditions of the site typical for this time of year? Yes X No (If no, explain in Remarks)
Are vegetation No ,Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present?
Are vegetation No ,Soil No , or Hydrology No naturally problematic? Yes X No

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

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

Remarks: Explain alternative procedures here or in a separate report.)
DP-16 is representative of Wetland H.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required: Check all that apply)

	Surface Water (A1)		True Aquatic Plants (B14)		Surface Soil Cracks (B6)
	High Water Table (A2)		Hydrogen Sulfide Odor (C1)		Sparsely Vegetated Concave Surface (B8)
✓	Saturation (A3)	✓	Oxidized Rhizospheres on Living Roots (C3)		Drainage Patterns (B10)
	Water Marks (B1)		Presence of Reduced Iron (C4)		Moss Trim Lines (B18)
	Sediment Deposits (B2)		Recent Iron Reduction Tiled Soils (C6)		Dry-Season Water Table (C2)
	Drift Deposits (B3)		Thin Muck Surface (C7)	✓	Crayfish Burrows (C8)
	Algal Mat or Crust (B4)		Other (Explain in Remarks)		Saturation Visible on Aerial Imagery (C9)
	Iron Deposits (B5)				Stunted or Stressed Plants (D1)
	Inundation Visible on Aerial Imagery (B7)				Geomorphic Position (D2)
	Water-Stained Leaves (B9)				Shallow Aquitard (D3)
	Aquatic Fauna (B13)				Microtopographic Relief (D4)
					FAC-Neutral Test (D5)

Secondary Indicators (minimum of two required)

Field Observations:

Surface Water Present?	Yes		No ✓	Depth (inches):		Wetland Hydrology Present?
Water Table Present?	Yes		No ✓	Depth (inches):		
Saturation Present? (includes capillary fringe)	Yes	✓	No	Depth (inches):	4	Yes ✓ No

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

Remarks:
Wetland hydrology indicators are present.

VEGETATION - Use scientific names of plants

Sampling Point: DP-16

Tree Stratum (Plot Size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix nigra	45	YES	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	45	= Total Cover	

Sapling/Shrub Stratum (Plot Size: 15-ft. radius)			
1. Salix nigra	15	YES	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	15	= Total Cover	

Herb Stratum (Plot Size: 5 ft. radius)			
1. Microstegium vimineum	75	YES	FAC
2. Solidago erecta	10	NO	FACU
3. Lonicera japonica	10	NO	FACU
4. Juncus effusus	10	NO	FACW
5. Scirpus atrovirens	5	NO	OBL
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	110	= Total Cover	

Woody Vine Stratum (Plot Size: 30-ft. radius)			
1.			
2.			
3.			
4.			
5.			
6.			
		= 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		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:		(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤ 3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Problematic Hydrophytic Vegetation [1]

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

Definitions of Vegetation Strata:

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

Sapling/shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft. tall.

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

Woody vines - All woody vines greater than 3.26 ft. in height

Hydrophytic Vegetation Present?

Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation is present.

SOIL **Sampling Point:** DP-16

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
0-18	10YR 5/2	70	7.5YR 5/6	30	C	PL	SiCL	

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

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ☐ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F17)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (**LRR N, MLRA 136)**
- ☐ Umbric Surface (F13) **(MLRA 136,122)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ☐ Red Parent Material (F21) **(MLRA 127,147)**

Indicators for Problematic Hydric Soils[3]

- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ☐ Piedmont Floodplain Soils (F19) (**MLRA 147, 148)**
- ☐ 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 ✓ No _____

Remarks:

Hydric soils are present.

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: McCracken County Solar LLC | City/County: McCracken | Sampling Date: 11/17/2020

Applicant/Owner: Community Energy | State: KY | Sampling Point: DP-17

Investigator(s): R. Eaton, E. Bolenbaugh, J. Parsons | Section, Township, Range:

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave | Slope (%): 1-3

Subregion (LRR or MRLA): LRR-P, MLRA-134 | Lat: 37.11836446 | Long: -88.85887438 | Datum: NAD 83

Soil Map Unit Name: Grenada silt loam (GrC3) | NWI Classification: R4SBC

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

Are vegetation No ,Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present?

Are vegetation No ,Soil No , or Hydrology No naturally problematic? Yes X No ____

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

Hydrophytic Vegetation Present?	Yes	✓	No		
Hydric Soil Present?	Yes	✓	No		
Wetland Hydrology Present?	Yes	✓	No		

Is the Sampled Area within a Wetland? Yes ✓ No ____

Remarks: Explain alternative procedures here or in a separate report.)

DP-17 is representative of Wetland I.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required: Check all that apply)

	Surface Water (A1)		True Aquatic Plants (B14)
	High Water Table (A2)		Hydrogen Sulfide Odor (C1)
✓	Saturation (A3)	✓	Oxidized Rhizospheres on Living Roots (C3)
	Water Marks (B1)		Presence of Reduced Iron (C4)
	Sediment Deposits (B2)		Recent Iron Reduction Tiled Soils (C6)
	Drift Deposits (B3)		Thin Muck Surface (C7)
	Algal Mat or Crust (B4)		Other (Explain in Remarks)
	Iron Deposits (B5)		
	Inundation Visible on Aerial Imagery (B7)		
	Water-Stained Leaves (B9)		
	Aquatic Fauna (B13)		

Secondary Indicators (minimum of two required)

	Surface Soil Cracks (B6)
	Sparsely Vegetated Concave Surface (B8)
	Drainage Patterns (B10)
	Moss Trim Lines (B18)
	Dry-Season Water Table (C2)
	Crayfish Burrows (C8)
	Saturation Visible on Aerial Imagery (C9)
	Stunted or Stressed Plants (D1)
	Geomorphic Position (D2)
	Shallow Aquitard (D3)
	Microtopographic Relief (D4)
	FAC-Neutral Test (D5)

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):	4

Wetland Hydrology Present? Yes ✓ No ____

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

Remarks:

Wetland hydrology indicators are present.

VEGETATION - Use scientific names of plants

Sampling Point: DP-17

Tree Stratum (Plot Size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
Sapling/Shrub Stratum (Plot Size: 15-ft. radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Herb Stratum (Plot Size: 5 ft. radius)			
1. Leersia oryzoides	80	YES	OBL
2. Scirpus atrovirens	15	NO	OBL
3. Typha angustifolia	10	NO	OBL
4. Juncus effusus	5	NO	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	110 = Total Cover		
Woody Vine Stratum (Plot Size: 30-ft. radius)			
1.			
2.			
3.			
4.			
5.			
6.			
	= 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		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:		(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

X 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
__ 3 - Prevalence Index is ≤ 3.0[1]
__ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ 5 - Problematic Hydrophytic Vegetation [1]

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

Definitions of Vegetation Strata:

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

Sapling/shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft. tall.

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

Woody vines - All woody vines greater than 3.26 ft. in height

Hydrophytic Vegetation Present?

Yes ✓ No __

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation is present.

SOIL **Sampling Point:** DP-17

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
0-18	10YR 5/2	80	7.5YR 5/6	20	C	PL	SiCL	

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

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ☐ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F17)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (**LRR N, MLRA 136)**
- ☐ Umbric Surface (F13) **(MLRA 136,122)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ☐ Red Parent Material (F21) **(MLRA 127,147)**

Indicators for Problematic Hydric Soils[3]

- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ☐ Piedmont Floodplain Soils (F19) (**MLRA 147, 148)**
- ☐ 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 ✓ No _____

Remarks:

Hydric soils are present.

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: McCracken County Solar LLC City/County: McCracken Sampling Date: 11/17/2020

Applicant/Owner: Community Energy State: KY Sampling Point: DP- 18

Investigator(s): R. Eaton, E. Bolenbaugh, J. Parsons Section, Township, Range:

Landform (hillslope, terrace, etc.): Plain Local relief (concave, convex, none): None Slope (%):

Subregion (LRR or MRLA): LRR-P, MLRA-134 Lat: 37.118321 Long: -88.858713 Datum: NAD 83

Soil Map Unit Name: Grenada silt loam (GrC3) NWI Classification: N/A

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

Are vegetation No ,Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present?

Are vegetation No ,Soil No , or Hydrology No naturally problematic? Yes X No

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

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

Remarks: Explain alternative procedures here or in a separate report.)

DP-18 is an upland plot located adjacent to Wetlands H & I.

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)
- True Aquatic Plants (B14)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction Tiled 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 (B18)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Stunted or Stressed Plants (D1)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- Microtopographic Relief (D4)
- FAC-Neutral Test (D5)

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 No ✓

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

Remarks:

No wetland hydrology indicators present.

VEGETATION - Use scientific names of plants

Sampling Point: DP- 18

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

Sapling/Shrub Stratum (Plot Size: 15-ft. radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		

Herb Stratum (Plot Size: 5 ft. radius)			
1. Poa pratensis	90	YES	FACU
2. Chamaecrista nictitans	5	NO	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	95 = Total Cover		

Woody Vine Stratum (Plot Size: 30-ft. radius)			
1.			
2.			
3.			
4.			
5.			
6.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤ 3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Problematic Hydrophytic Vegetation [1]

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

Definitions of Vegetation Strata:

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

Sapling/shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft. tall.

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

Woody vines - All woody vines greater than 3.26 ft. in height

Hydrophytic Vegetation Present?

Yes ___ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation is not present.

SOIL **Sampling Point:** DP- 18

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
0-18	10YR 5/4	100					SiL	

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

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

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ☐ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F17)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (**LRR N, MLRA 136)**
- ☐ Umbric Surface (F13) **(MLRA 136,122)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ☐ Red Parent Material (F21) **(MLRA 127,147)**

Indicators for Problematic Hydric Soils[3]

- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ☐ Piedmont Floodplain Soils (F19) (**MLRA 147, 148)**
- ☐ 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 _____ No ✓

Remarks:

Hydric soils are not present.

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: McCracken County Solar LLC | City/County: McCracken | Sampling Date: 11/17/2020

Applicant/Owner: Community Energy | State: KY | Sampling Point: DP-19

Investigator(s): R. Eaton, E. Bolenbaugh, J. Parsons | Section, Township, Range:

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

Subregion (LRR or MRLA): LRR-P, MLRA-134 | Lat: 37.119722 | Long: -88.856550 | Datum: NAD 83

Soil Map Unit Name: Grenada silt loam (GrC3) | NWI Classification: N/A

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

Are vegetation No ,Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present?

Are vegetation No ,Soil No , or Hydrology No naturally problematic? Yes X No

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

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

Remarks: Explain alternative procedures here or in a separate report.)

DP-19 is a plot located in the eastern portion of the Study Area. Hydric soils and hydrophytic vegetation were present. Hydrology indicators were not present.

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)
- True Aquatic Plants (B14)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction Tiled 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 (B18)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Stunted or Stressed Plants (D1)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- Microtopographic Relief (D4)
- FAC-Neutral Test (D5)

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 No ✓

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

Remarks:

No wetland hydrology indicators present.

VEGETATION - Use scientific names of plants

Sampling Point: DP-19

Tree Stratum (Plot Size: 30 ft. radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
Sapling/Shrub Stratum (Plot Size: 15-ft. radius)			
1. Diospyros virginiana	15	YES	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	15 = Total Cover		
Herb Stratum (Plot Size: 5 ft. radius)			
1. Echinochloa crus-galli	25	YES	FAC
2. Phragmites australis	25	YES	FACW
3. Sorghum halepense	20	YES	FACU
4. Setaria faberi	15	NO	UPL
5. Asclepias syriaca	5	NO	FACU
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	90 = Total Cover		
Woody Vine Stratum (Plot Size: 30-ft. radius)			
1. Vitis rotundifolia	5	YES	FAC
2.			
3.			
4.			
5.			
6.			
	5 = 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: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤ 3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Problematic Hydrophytic Vegetation [1]

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

Definitions of Vegetation Strata:

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

Sapling/shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft. tall.

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

Woody vines - All woody vines greater than 3.26 ft. in height

Hydrophytic Vegetation Present?

Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation is present.

SOIL **Sampling Point:** DP-19

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
0-18	10YR 5/4	70	10YR 5/2	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:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ☐ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F17)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (**LRR N, MLRA 136)**
- ☐ Umbric Surface (F13) **(MLRA 136,122)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ☐ Red Parent Material (F21) **(MLRA 127,147)**

Indicators for Problematic Hydric Soils[3]

- ☐ 2 cm Muck (A10) (**LRR N)**
- ☐ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ☐ Piedmont Floodplain Soils (F19) (**MLRA 147, 148)**
- ☐ 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 ✓ No

Remarks:

Hydric soils are present.

Appendix D – RBP Habitat Assessment Field Data Sheets

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 1	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Intermittent	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 13	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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 4 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 7 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 9 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score _ 126

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 2	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Ephemeral	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 0	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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 3 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 3 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 5 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 0 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 0 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 27

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 3	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Perennial	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 14	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 14	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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 9 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score _ 154

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 4	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Intermittent	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 12	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 8	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

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 14	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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 7 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 4 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score _ 122

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 5	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Ephemeral	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 0	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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 5 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 5 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 5 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 58

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 6	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Ephemeral	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 0	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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 3 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 3 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 4 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 2 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 2 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 38

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 6	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Intermittent	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 8	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 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 8 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 6 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 5 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 107

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 7	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Intermittent	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 9	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 14	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 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 14	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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 9 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score _ 145

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 8	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Intermittent	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 11	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 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 8 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 8 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 129

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 9	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Intermittent	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 12	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

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 12	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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 4 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 6 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 2 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 2 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 82

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 10	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Ephemeral	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 4 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 8 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 5 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 55

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 11	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Intermittent	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 4 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 8 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 6 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 65

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 12	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Ephemeral	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 4 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 8 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 5 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score _ 58

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 13	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Ephemeral	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 4 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 4 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 5 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 66

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 14	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Intermittent	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 10	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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 5 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 5 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 6 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 90

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 15	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Ephemeral	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 6 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 8 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 9 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 74

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 16	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Ephemeral	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 4 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 4 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 6 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 0 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 41

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 17	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Ephemeral	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 5 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 2 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 2 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 8 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 52

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 18	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Perennial	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 15	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 11	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

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 15	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 6 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 7 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 5 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 120

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 19	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Ephemeral	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 0	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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 5 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 6 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 5 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 3 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score _ 51

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 20	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Ephemeral	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 0	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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 4 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 3 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 4 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 8 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 3 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 47

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 21	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Ephemeral	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 4 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 5 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 8 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 3 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 50

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 22	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Ephemeral	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 4 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 5 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 8 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 55

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 23	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Ephemeral	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 2 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 2 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 3 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 3 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 8 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 47

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 24	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Ephemeral	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 6 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 7 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 4 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 58

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 25	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Ephemeral	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 2 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 2 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 8 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 60

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 26	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Ephemeral	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 18	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

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 7 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 1 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 1 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score _ 50

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 28	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Ephemeral	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 7	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 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 4 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 3 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 3 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 5 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 69

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 28	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Intermittent	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 10	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 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 10	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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 7 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 5 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 8 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 122

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 29	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Ephemeral	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 0	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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 5 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 2 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 2 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 0 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 0 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 32

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 30	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Ephemeral	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 0	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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 3 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 3 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 2 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 2 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 7 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 40

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 31	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Ephemeral	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 0	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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 5 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 6 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 8 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 50

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 32	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Intermittent	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 15	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 15	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 11	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 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 15	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 15	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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 5 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 5 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 7 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 126

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 33	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Ephemeral	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 14	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 2 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 2 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 2 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 2 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 6 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 45

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 34	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Intermittent	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 4 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 3 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 3 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 6 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 64

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 36	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Ephemeral	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 0	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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 5 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 5 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 3 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 3 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 42

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 38	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Ephemeral	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 0	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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 5 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 5 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 0 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 0 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 36

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 39	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Intermittent	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 4 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 5 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 4 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 2 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 69

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Stream 40	LOCATION McCracken County, KY	
SITE ID # _ REACH ID _	STREAM CLASS Ephemeral	
Lat., Long. (WGS 84 DD)___ _____	RIVER BASIN	
STORET #	AGENCY Copperhead Environmental Consulting	
INVESTIGATORS R. Eaton, E. Bolenbaugh, J. Parsons		
FORM COMPLETED BY E. Bolenbaugh	DATE 11/17/2020 TIME - AM	REASON FOR SURVEY Proposed Development

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
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 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 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

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
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 frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 4 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 4 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 2 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 2 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 39

Appendix E – Resumes

Regulatory Expertise

- Clean Water Act
- National Pollutant Discharge Elimination System
- Federal, state, and local permitting

Industry Clientele

- Oil & Gas
- Commercial Land Development
- Solar
- Energy Transmission
- Non-Profit Organizations

Natural Resource Evaluations

- Stream and Wetland Delineations
- Endangered and Threatened Species
- Stream and Wetland Mitigation and Restoration

Certifications

- Professional Wetland Scientist (PWS)
- Certified Erosion, Sediment, and Stormwater Inspector (CESSWI)
- Pennsylvania Sewage Enforcement Officer (SEO)

Affiliations

- Society of Wetland Scientists
- Ohio Bat Working Group

Education

M.S. Wildlife and Fisheries Resources, 2013, West Virginia University, Morgantown West Virginia

B.S. Wildlife and Fisheries Resources, 2010, West Virginia University, Morgantown West Virginia

Experience

Copperhead Environmental Consulting, Inc., Natural Resources Manager, 2020-present.

Langan Engineering and Environmental Services, Inc., Appalachian Region Natural Resources Leader/Senior Staff Scientist, 2017-2020.

Dieffenbauch & Hritz, LLC. Project Scientist, 2013 – 2017.

GAI Consultants, Inc., Wetland Specialist, 2013.

West Virginia University, Research and Teaching Assistant, 2010-2013.

Qualifications and Background

Mr. Tincher is an experienced stream ecologist and aquatic biologist with extensive experience with Clean Water Act permitting, stream and wetland delineations, stream ecology, fish and aquatic macroinverbrate surveys, plant species and habitat surveys, and stream and groundwater sampling. He has performed work over a wide geographic area throughout the United States. Specific states include Florida, Kansas, Kentucky, Missouri, New York, North Dakota, Ohio, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, and West Virginia. He has served as project manager and field lead on various projects requiring federal, state, and local permitting.
studies.

Trainings

Tennessee Hydrologic Determination Training (2020); Stream Functions Pyramid and Stream Quantification Tool (SQT) Workshop (2020); Certified Erosion, Sediment, and Stormwater Inspector (2018); Pennsylvania Sewage Enforcement Officer (2017); Freshwater Mussels of West Virginia: Life History and Identification (2016); Morphological Soil Investigations, A Plus Environmental Training (2016); Pennsylvania Botany Consulting Botanist's Toolkit Workshop (2015); Swamp School Wetland Delineation Certification (2013).

Project Experience

Wetland Delineation for Project NASA 1(9) – Wallops Island Causeway Bridge, Accomack County, VA – 2020

Project manager and field lead for a stream and wetland delineation and associated Section 404 and Section 10 permitting of a bridge replacement in Accomack County, VA. Two tidal wetlands and one tidally influenced stream were identified. Mean high water, mean tide line, and mean low water were determined and delineated in the field.

Hydrologic Determination for Confidential Project, Campbell County, TN – 2020

Project manager and field lead for a stream and wetland delineation of a 10-acre site in Campbell County, TN. A Hydrologic Determination form was completed for one channel identified on site. The channel was determined to be a wet weather conveyance.

Hydrologic Determination for Holliday Landowner, Jackson County, TN – 2020

Project manager and field lead for a stream and wetland delineation of a 15-acre site in Jackson County, TN. A Hydrologic Determination form was completed for two channels identified on site. One channel was determined to be a wet weather conveyance. The second channel was determined to be an intermittent stream.

Environmental Boundaries Report for SR-2 (US-11) Widening Project, Bradley County, TN – 2020

QA/QC of hydrological determinations (HD), Stream Quantification Tool (SQT) data collection, and all associated reporting. Also conducted an HD and collected SQT data for one wet weather conveyance/ephemeral stream.

Botanical and Wildlife Surveys for Jug Handle Project, Forest County, PA - 2020

Project manager and field lead for botanical and wildlife surveys in the Allegheny National Forest associated with the Jug Handle project. Surveyed for over 40 plant species and 30 wildlife species.

Botanical Survey, Aquatics Survey, and Soils Analysis for proposed Tillman Trails Project, Augusta and Rockingham Counties, VA – 2020

Field lead for botanical and aquatics surveys in the George Washington National Forest for the proposed Tillman Trails. Lead technical writer for botanical, aquatics, and soil analysis reports. The aquatics report also included field results, watershed analysis, and riparian management objective analysis.

Wetland Delineation and Permitting for Proposed Swagelok Building Expansion, Cuyahoga County, OH – 2019

Project manager for the project and conducted the wetland and stream delineation. The project design proposed to permanently impact one PEM wetland and one PSS wetland. A Nationwide Permit 39 (NWP-39) was required and obtained in January 2020 through the USACE. Coordinated with USFWS, ODNR, and OHPO. Mitigation was required was also required for the project. Mitigation credits were purchased through multiple mitigation banks to meet the OEPA and USACE requirements.

Wetland Delineation and Permitting for Proposed Brew Kettle Restaurant, Medina County, OH – 2019-2020
Project manager for the project and conducted the wetland and stream delineation. The project design proposed to permanently impact two PFO wetlands. A Nationwide Permit 39 (NWP-39) was required. Coordinated with USFWS, ODNR, and OHPO. Mitigation was required was also required for the project. Mitigation credits were purchased through multiple mitigation banks to meet the OEPA and USACE requirements.

Wetland Delineation for Proposed Weymouth Road Project, Medina County, OH – 2020
Project manager and field lead for a wetland and stream delineation and associated reporting for an approximately 6-acre site in Medina County, Ohio.

Wetland Delineation for Proposed Franklin Solar Energy Project, Crawford County, PA – 2020
Project manager and field lead for a wetland and stream delineation and associated reporting for an approximately 396-acre site in Crawford County, Pennsylvania.

Wetland Delineation for Proposed Big Bell Solar Energy Project, Crawford County, PA – 2020
Project manager and field lead for a wetland and stream delineation and associated reporting for an approximately 308-acre site in Crawford County, Pennsylvania.

Wetland Delineation for Proposed Ingersoll Solar Energy Project, Crawford County, PA – 2020
Project manager and field lead for a wetland and stream delineation and associated reporting for an approximately 244-acre site in Crawford County, Pennsylvania.
Wetland Delineation for Proposed Gratz Solar Energy Project, Dauphin County, PA – 2020
Project manager for a wetland and stream delineation and associated reporting for an approximately 135-acre site in Dauphin County, Pennsylvania.

Wetland Delineation for Proposed Solar Energy Project, Taylor County, KY – 2020
Project manager for a wetland and stream delineation and associated reporting for an approximately 460-acre site in Taylor County, Kentucky.

Wetland Delineation for Proposed Solar Energy Project, Metcalfe County, KY – 2020
Project manager for a wetland and stream delineation and associated reporting for an approximately 575-acre site in Metcalfe County, Kentucky.

Wetland Delineation for Proposed Solar Energy Project, Russell and Adair Counties, KY – 2020
Project manager and field lead for a wetland and stream delineation and associated reporting for an approximately 548-acre site in Russell and Adair Counties, Kentucky.

Wetland Delineation for Proposed Solar Energy Project, Green County, KY – 2020
Project manager and field lead for a wetland and stream delineation and associated reporting for an approximately 654-acre site in Green County, Kentucky. Approved jurisdictional determination through the USACE Louisville District was also obtained.

Wetland Delineation for Proposed Solar Energy Project, Garrard County, KY – 2020
Project manager for a wetland and stream delineation and associated reporting for an approximately 787-acre site in Metcalfe County, Kentucky. Approved jurisdictional determination through the USACE Louisville District was also obtained.

Wetland Delineation and Permitting for Proposed Distribution Center, James City County, VA – 2018-2020
Conducted a stream and wetland delineation on a 200-acre site in Williamsburg, Virginia. Section 404/401 permitting was required through the USACE and Virginia Department of Environmental Quality to fill 1,115 linear feet of stream and 0.413 acres of wetlands. Mitigation was required and credits were purchased from a mitigation bank within the James River watershed. Section 7 Endangered Species Act coordination was required through the USFWS's Information for Planning and Consultation (IPaC). The project was also within 660-ft of a known bald eagle nest, which required direct coordination with the USFWS and restriction periods for when construction could occur. Project also required coordination with an archaeological subconsultant, Virginia Department of Historic Resources, and James City County due to results from a Phase I archaeological survey. The project required additional Phase II and Phase III archaeological surveys.

Wetland Delineation and Permitting for Proposed BULOD002 to Sand Hill Natural Gas Pipeline, Belmont County, OH – 2019-2020
Project manager for the natural resource aspects of an approximately 1.0 mile proposed natural gas pipeline. Conducted a stream and wetland delineation for the project. A Nationwide Permit 12 (NWP-12) and Director's Authorization through the OEPA were required. In addition, an in-water work waiver for work within perennial streams through ODNR and a county floodplain permit were required and obtained. Assisted with the mussel survey and reporting.

Wetland Delineation and Permitting for Various Proposed Williams Natural Gas Pipelines, Carroll, Columbiana, Harrison, and Jefferson Counties, OH – 2017-2020
Project manager for natural resource aspects of more than 20 natural gas pipeline projects. Conducted route development walks and stream and wetland delineations for over 50 miles of proposed pipeline. NWP-12 through USACE and Director's Authorizations through OEPA were required and obtained for specific projects. All projects required threatened and endangered species coordination with USFWS and ODNR. In-water work waivers were required and obtained through ODNR on specific projects. Two projects also required plant surveys for state listed endangered species. I conducted the plant surveys and associated report writing to obtain ODNR approval.

Threatened and Endangered Species Coordination for 23rd and Railroad Project, Allegheny County, PA – 2020
Coordinated with PAFBC and USFWS for state and federal listed threatened and endangered species and obtained clearance to proceed with proposed work.

Threatened and Endangered Species Coordination for Proposed Gas Station, Allegheny County, PA – 2020
Coordinated with PAFBC and USFWS for state and federal listed threatened and endangered species and obtained clearance to proceed with proposed work.

Wetland Delineation and Permitting for Proposed DCNR Tract 25-4 Well Plugging, Elk County, PA – 2019-2020
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 11 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation and Permitting for Proposed DCNR Tract 37-2 Well Plugging, Elk County, PA – 2019-2020

Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 11 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation and Permitting for Proposed DCNR Tract 49-2 Well Plugging, Clearfield County, PA – 2019-2020
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 11 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation and Permitting for Proposed WM A Donaldson 965 Well Plugging, Washington County, PA – 2019-2020
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation and Permitting for Proposed JF Markle Well Plugging, Clarion County, PA – 2019-2020
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 11 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation and Permitting for Proposed HJ Walker 1 Well Plugging, Westmoreland County, PA – 2019-2020
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation and Permitting for Proposed J. Peppler 827 Well Plugging, Armstrong County, PA – 2019-2020
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 11 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation for Proposed F.F. Piatt 1001 Well Plugging, Washington County, PA – 2019-2020
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed GW McIntire 394 Well Plugging, Armstrong County, PA – 2019-2020
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed W Bowser 892 Well Plugging, Armstrong County, PA – 2019-2020
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Warehouse Facility, Portage County, OH – 2019

Responsible for project management of natural resources. Conducted a stream and wetland delineation for a proposed distribution center in Streetsboro, Portage County, Ohio. Created a permit matrix for the client to help them understand the various construction and permitting scenarios. Also responsible for report writing and review.

NPDES Stormwater Sampling for Antero Landfill and Antero Clearwater Facilities, Doddridge County, WV 2017-2020
Obtained Individual NPDES permits for a landfill site and an industrial site. Project manager and field lead for stormwater and groundwater sampling, site inspections, and reporting. Collected monthly and quarterly stormwater, groundwater monitoring, and leachate samples and analyzed the data. Authored quarterly and annual reports that went to the West Virginia Department of Environmental Protection (WVDEP).

Stormwater Sampling for Pipeyard, Harrison County, WV – 2018-2020
Conducted and oversaw stormwater sampling, site inspections, and reporting for a small pipeyard in Harrison County, West Virginia. Results were reported bi-annually to WVDEP.

Environmental Remediation Groundwater Sampling for FCI McKean, McKean County, PA – 2017-2019.
Conducted field work, created hydrologic groundwater flow maps, and authored reports for groundwater sampling at an environmental remediation site in Pennsylvania. Required knowledge of groundwater hydrology to determine flow of groundwater and whether environmental contaminants were spreading.

Threatened and Endangered Species Coordination for Proposed Great Lakes Cheese Building, Summit County, OH – 2019
Project manager for coordinating with USFWS for potential mist-net survey for the Indiana bat. Responsible for overseeing the mist-net survey and reporting to USFWS.

Wetland Delineation and Permitting for Proposed McClellan Pipeline, Monongahela County, WV – 2019
Served as project manager and field lead for wetland delineation, report writing, preliminary jurisdictional determination, threatened and endangered species coordination, bat habitat assessment and mitigation plan, preparation of a Stream Activity Application through the West Virginia Division of Natural Resources (WVDNR), and preparation of a Nationwide Permit 12 (NWP-12) through the USACE for proposed temporary impacts to streams and wetlands. The project proposed to construct approximately 5.0 miles of natural gas pipeline. The bat habitat assessment and study plan was approved by U.S. Fish and Wildlife Service in January 2020. A Stream Activity Application was approved by WVDNR in November 2019. A NWP-12 was approved by the USACE in January 2020.

Wetland Delineation and Permitting for WALD Passive Treatment Design, Tucker County, WV – 2019
Natural resources project manager for project completed near Thomas, West Virginia. The project paralleled the North Fork Blackwater River and an existing rail trail. A wetland anoxic limestone drain (WALD) system had been installed parallel to the rail trail in the 1990s to remediate acid mine drainage that was flowing from a historic mine portal. The WALD system was no longer functioning properly and was not reducing acidity efficiently. A redesigned system was deemed necessary to lower acidity. A stream and wetland delineation was conducted along the approximately 3,000 linear foot WALD system and rail trail. Non-reporting Section 404/401 permitting was required to impact and redesign the WALD system.

Wetland Delineation for Proposed Distribution Center, Medina County, OH – 2019
Responsible for project management of natural resources. Conducted a stream and wetland delineation for a proposed distribution center in Westfield Township, Medina County, Ohio. Created a permit matrix for the client to help them understand the various construction and permitting scenarios. Also responsible for report writing and review.

Botanical Surveys for Various Proposed Projects, Greene and Washington Counties, PA – 2013-present
Served as project manager and field lead for several botanical surveys in Greene and Washington Counties, Pennsylvania, for state listed plant species of special concern (SOSC) and their habitats. Projects have included linear projects up to 10 miles in length and static, non-linear projects up to 200 acres in size. Specific plant SOSC and associated habitat that have been surveyed for include: single-headed pussy-toe (*Antennaria solitaria*), blue false indigo (*Baptisia australis*), tall larkspur (*Delphinium exaltatum*), American beakgrain (*Diarrhena americana*), white trout lily (*Erythronium albidum*), sourwood (*Oxydendrum arboreum*), yellow passionflower (*Passiflora lutea*), limestone petunia (*Ruellia strepens*), wild senna (*Senna marilandica*), leaf-cup (*Smallanthus uvedalius*), and snow trillium (*Trillium nivale*). Plant SOSC identified in the field include: white trout lily, sourwood, yellow passionflower, wild senna, and leaf-cup. Due to project designs and specific constraints, several projects required transplanting and relocating plant SOSC. When relocating plant SOSC, suitable habitat was identified in close proximity to the project. Specific plant SOSC that were successfully transplanted and relocated include: white trout lily, wild senna, and leaf-cup.

Wetland Delineation, Botanical Survey, Soil Profile/Infiltration Testing, and Permitting for Proposed Barley Wine Well Pad, Greene County, PA - 2019
Served as natural resources project manager and responsible for the wetland delineation, botanical surveys, infiltration testing of proposed BMPs, and stream impact permitting. Botanical survey was conducted for single-headed pussy-toe (*Antennaria solitaria*) and wild senna (*Senna marilandica*). Permit modification to an existing General Permit 11 for replacing an existing culvert was completed.

Wetland Delineation for Meighan Well Pad, Greene County, PA - 2019
Conducted a stream and wetland delineation for a proposed well pad in Greene County, Pennsylvania. Wrote report describing delineation field results.

Wetland Permitting for Proposed Distribution Center, Erie County, NY – 2019
Completed Nationwide Permit 6 (NWP-6) permitting for a proposed distribution center project in Tonawanda, Erie County, New York. The project had several wetlands located throughout the site and geotechnical surveys needed to be conducted within the wetlands.

Approved Jurisdictional Determination for Proposed Redevelopment Site, Franklin County, OH – 2019
Project manager and responsible for obtaining an approved jurisdictional determination through the USACE for a proposed redevelopment site in an urban area in Franklin County, Ohio.

Permitting for Distribution Center, Dorchester County, SC – 2019
Project manager for natural resource aspects for a proposed distribution center in Ridgeville, Dorchester County, South Carolina. Client had recently purchased the property. The previous property owner had obtained several stream and wetland permits for development purposes. Responsible for reviewing the existing permits to ensure the scope of the project would work with existing permits, that the existing

permits were still valid and had not expired, and determine if any other permits or modifications to existing permits would be required.

Wetland Delineation and Approved Jurisdictional Determination for Proposed Distribution Center, Summit County, OH – 2019
Responsible for managing the natural resource aspects of the project for a proposed distribution center in Akron, Summit County, Ohio. Obtained an approved jurisdictional determination with the USACE. The site design avoided impacts to wetland and stream features. Also coordinated with USFWS to determine if clearing trees during the restricted time frame was a possibility. However, USFWS stated there is a known Indiana bat maternity roost within 1.0-miles of the project and that seasonal tree clearing would be required.

Wetland Delineation for Proposed Commercial Development, Lake County, OH – 2019
Responsible for project management of natural resources. Conducted a stream and wetland delineation for a proposed commercial development in the City of Wickliffe, Lake County, Ohio. Also responsible for report writing and review.

Wetland Delineation for Proposed Hospital, Summit County, OH – 2019
Responsible for project management of natural resources. Conducted a stream and wetland delineation for a proposed hospital in Fairlawn, Summit County, Ohio.

Wetland Delineation for Proposed Office Building, Cuyahoga County, OH – 2019
Responsibilities included being the project manager for natural resources, conducting a stream and wetland delineation, reporting, and obtaining a preliminary Jurisdictional Determination.

Wetland Delineation for Proposed Verizon Work Center, Allegheny County, PA – 2019
Responsibilities included being the project manager for natural resources, conducting a stream and wetland delineation, and report writing.

Wetland Delineation for Proposed Mixed-Use Development, Allegheny County, PA – 2019
Responsible for project management of natural resources. Conducted a stream and wetland delineation for a proposed commercial and residential mixed-use development project in Sharpsburg, Allegheny County, Pennsylvania. Created a permit matrix for the client to help them understand the various construction and permitting scenarios. Also responsible for report writing and review.

Wetland Delineation for Proposed Seneca Valley Aquatics Facility, Butler County, PA – 2019
Responsibilities included being the project manager for natural resources, conducting a stream and wetland delineation, and report writing.

Erosion and Sediment Control Environmental Inspections for Various Proposed Natural Gas Projects, Doddridge, Tyler, and Wetzel Counties, WV – 2017-2019.
Conducted environmental inspections for seven Antero Resources projects in Doddridge, Tyler, and Wetzel Counties, West Virginia. Responsibilities included reviewing site design plans and submitting to state regulatory agencies for approval; overseeing E&S installation to make sure it was installed according to WVDEP approved site plans; making field changes to include more stringent E&S controls when it appeared approved plans were not sufficient in certain locations, due to slight variations in survey data used for the design compared to existing field conditions; inspecting sites during construction until close of construction stormwater permit to ensure E&S controls were being maintained

and sediment was not leaving the site; and regularly communicate with the client project manager and construction crews.

Wetland Delineation for Proposed Metzgar, Ursina F-58 Well Plugging, Washington County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Smith, A.H. #70 Well Plugging, Washington County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Raset, E. #1 Well Plugging, Washington County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation and Permitting for Proposed Day, E.D. #134 Well Plugging, Washington County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation and Permitting for Proposed McCullough, S.G. #577 Well Plugging, Washington County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation for Proposed McCullough, N. 1 Well Plugging, Washington County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Thompson, T.H. #680 Well Plugging, Washington County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Burns, A. #779 Well Plugging, Washington County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Gilkeson, C. #934 Well Plugging, Washington County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Grimes, A. #3645 Well Plugging, Greene County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation and Permitting for Proposed Martin, E. #3715 Well Plugging, Greene County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation and Permitting for Proposed Morris, G. 355 Well Plugging, Greene County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a Joint Permit through the Pennsylvania Department of Environmental Protection.

Wetland Delineation and Permitting for Proposed Horn, Z. #784 Well Plugging, Greene County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation and Permitting for Proposed Bailey, H.H. 1021 Well Plugging, Greene County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation for Proposed Gordon, W. I. 297 Well Plugging, Greene County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Huffman, John J. 3566 Well Plugging, Greene County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Nichols, L. #411 Well Plugging, Greene County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation and Permitting for Proposed Higgins, J. 106 Well Plugging, Greene County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation for Proposed Lantz Heirs 594 and Amada Rice 2910 Well Pluggings, Greene County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation and Permitting for Proposed Vendette 3 Well Plugging, Butler County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation for Proposed Boddorf 9071 Well Plugging, Jefferson County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Dobson, W.D. 1291 Well Plugging, Jefferson County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Texas Gulf B-05 Well Plugging, Clinton County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Post, J.M. Well Plugging, Washington County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed J.W. Taylor Well Plugging, Washington County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed W.M. Evans 1015 Well Plugging, Washington County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Thomas Hays 1 Well Plugging, Armstrong County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Finleyville Oil and Gas Well Plugging, Washington County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation and Permitting for Proposed Hob Nob – Pearls Café 2, Allegheny County, PA – 2018-2019
Project manager for the natural resource aspects of a proposed enclosure of 136-linear feet of perennial stream. Responsibilities included conducting a stream and wetland delineation, environmental assessment, report writing, designing on-site stream mitigation, and obtaining a Joint Permit through the Pennsylvania Department of Environmental Protection.

Wetland Delineation for Proposed R.G. Altman 1 and 2 Well Pluggings, Armstrong County, PA – 2018-2019

Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Charleroi 1423 Well Plugging, Elk County, PA – 2018-2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Charleroi MT 1424 Well Plugging, Elk County, PA – 2018-2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed CNG #347 Well Plugging, Elk County, PA – 2018-2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation and Permitting for Proposed E.T. Culp 666 Well Plugging, Armstrong County, PA – 2018-2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation and Permitting for Proposed Isaac Heilman 1137 Well Plugging, Armstrong County, PA – 2018-2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 11 through the Pennsylvania Department of Environmental Protection.

Permitting for Proposed Isaac Heilman 1137 Well Plugging, Armstrong County, PA – 2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included obtaining a minor modification to an existing General Permit 11 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation and Permitting for Proposed J.N & Mary Moore 1343 Well Plugging, Armstrong County, PA – 2018-2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation and Permitting for Proposed Keck, D.A. #448 Well Plugging, Clarion County, PA – 2018-2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation for Proposed Mary Stitt 3001 Well Plugging, Armstrong County, PA – 2018-2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation and Permitting for Proposed Miller, M. #409 Well Plugging, Clarion County, PA – 2018-2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation for Proposed Minick, C. #1 Well Plugging, Clarion County, PA – 2018-2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Reinsel, B.J. #1 Well Plugging, Clarion County, PA – 2018-2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Shick, R.W. #1147 Well Plugging, Armstrong County, PA – 2018-2019
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation and Permitting for Sheetz Racetrack Road, Washington County, PA – 2018
Project manager for the natural resource aspects of a proposed gas station. A stream and wetland delineation was conducted. The project required a Joint Permit Application through the PADEP for impacts to one stream. The permit was approved in November 2018.

Wetland Delineation, Permitting, and Mussel Survey for Proposed BULOD002 Natural Gas Pipeline, Belmont County, OH – 2018
Project manager for the natural resource aspects of an approximately 5.0 mile proposed natural gas pipeline. Conducted a stream and wetland delineation for the project. A Nationwide Permit 12 (NWP-12) was required and obtained in December 2018. A Director's Authorization through the OEPA was also required and obtained in January 2019. In addition, an in-water work waiver for work within perennial streams through ODNR and a county floodplain permit were required and obtained. Assisted with the mussel survey and reporting.

Wetland Delineation for Proposed Academic Solutions Academy, Broward County, FL – 2018
Responsibilities included conducting a stream and wetland delineation, report writing, and permit strategizing on a 20-acre site in Fort Lauderdale, Broward County, Florida. Assisted the client with permit strategizing and regulatory agency coordination for potentially impacting wetlands and bald cypress (*Taxodium distichum*).

Wetland Delineation for Proposed Charleroi Mtn Club #1 Well Plugging, Elk County, PA – 2018
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed CNG #355 Well Plugging, Elk County, PA – 2018
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed CNG #431 Well Plugging, Elk County, PA – 2018
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Richardson, A. #9064 Well Plugging, Armstrong County, PA – 2018
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation and Permitting for Proposed Schaeffer #2 Well Plugging, Armstrong County, PA – 2018
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation, report writing, and obtaining a General Permit 8 through the Pennsylvania Department of Environmental Protection.

Wetland Delineation for Proposed Snyder, L.M. #1 Well Plugging, Clarion County, PA – 2018
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed Isaiah Span #1221 Well Plugging, Armstrong County, PA – 2018
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed R.M. Townsend #455 Well Plugging, Armstrong County, PA – 2018
Project manager for the natural resource aspects of a proposed well plugging project. Responsibilities included conducting a stream and wetland delineation and report writing.

Wetland Delineation for Proposed ProLogis Distribution Center, Harris County, TX – 2017
Responsibilities included conducting a stream and wetland delineation, report writing, and permit strategizing for 65-acre project located in Harris County, Texas.

Wetland Delineation for Proposed Beltway 8 – Energy Commerce Center, Harris County, TX – 2017
Responsibilities included conducting a stream and wetland delineation, report writing, and permit strategizing for a 29-acre project located in Pasadena, Harris County, Texas.

Wetland Delineation for Proposed ProLogis Guhn Road Development, Harris County, TX – 2017
Responsibilities included conducting a stream and wetland delineation, report writing, and permit strategizing for a 10-acre project located in Harris County, Texas.

Wetland Delineation for Proposed American Airlines Expansion, Dallas, TX – 2017
Responsibilities included conducting a stream and wetland delineation, report writing, and permit strategizing for project located at Dallas Fort Worth International Airport.

Spill Prevention, Control, and Countermeasure Plan for Wheatland Meter and Regulation Station, Williams County, North Dakota – 2017
Responsibilities included field work and writing report to complete a Spill Prevention, Control, and Countermeasure Plan for an existing facility in Ray, Williams County, North Dakota.

Spill Prevention, Control, and Countermeasure Plan for DeWitt Compressor Station, Divide County, North Dakota – 2017
Responsibilities included field work and writing report to complete a Spill Prevention, Control, and Countermeasure Plan for an existing facility in Fortuna, Divide County, North Dakota.

Phase II Environmental Site Assessment for Proposed Distribution Center, Cuyahoga County, OH – 2017
Conducted field work related to a Phase II Environmental Site Assessment for a proposed distribution center in North Randall, Cuyahoga County, Ohio. Responsibilities included overseeing excavation of an underground oil storage tank and plugging of a groundwater monitoring well.

Wetland Delineation and Botanical Survey for Proposed Santora Well Pad, Washington County, PA - 2017
Served as natural resources project manager and responsible for the wetland delineation and botanical surveys. Botanical survey was conducted for American beakgrain (*Diarrhena americana*).

Wetland Delineation and Permitting for Westfield Group Country Club, Medina County, OH – 2017
Conducted a stream and wetland delineation of the South Course at the Westfield Group Country Club in Westfield Township, Medina County, Ohio. A Nationwide Permit 39 (NWP-39) was obtained through USACE in 2017.

Wetland Delineation and Permitting for Various Proposed CNX Natural Gas Pipelines, Greene and Washington Counties, PA– 2013-2017
Conducted route development walks and stream and wetland delineations for over 100 miles of proposed pipeline for CNX in Greene and Washington Counties, Pennsylvania. General Permit 5 and General Permit 8 applications were required and obtained for several projects through the PADEP for temporary stream and/or wetland impacts.

Wetland Delineation and Permitting for Various Proposed CNX Natural Gas Pipelines, Belmont County, OH– 2015-2017
Conducted route development walks and stream and wetland delineations for over 10 miles of proposed pipeline for CNX in Belmont County, Ohio. NWP-12 through USACE and Director's Authorizations through OEPA were required and obtained for specific projects. All projects required threatened and endangered species coordination with USFWS and ODNR.

Wetland Delineation and Permitting for Various Proposed CNX Natural Gas Well Pads, Barbour, Marshall, and Tyler Counties, WV – 2013-2017
Conducted stream and wetland delineations for over 15 CNX natural gas well pad and compressor station projects in Barbour, Marshall, and Tyler Counties, West Virginia. NWP-39 through USACE and Stream Activity Applications through WVDNR were required and obtained for specific projects.

Wetland Delineation and Permitting for Various Proposed CNX Natural Gas Well Pads, Belmont, Monroe, and Noble Counties, OH – 2013-2017
Conducted stream and wetland delineations for over 15 CNX natural gas well pad projects in Belmont, Monroe, and Noble Counties, Ohio. NWP-39 through USACE were required and obtained for specific projects.

Wetland Delineation and Permitting for Various Proposed CNX Natural Gas Well Pads, Greene and Washington Counties, PA – 2013-2017
Conducted stream and wetland delineations for over 30 CNX natural gas well pad and compressor station projects located in Greene and Washington Counties, Pennsylvania. Also conducted soil and infiltration testing to comply with Pennsylvania best management practices. Wrote reports describing delineation and infiltration testing results.

Wetland Delineation and Permitting for Various Proposed Rice Midstream Natural Gas Pipelines, Greene and Washington Counties, PA– 2013-2017
Conducted route development walks and stream and wetland delineations for over 100 miles of proposed pipeline for Rice Midstream in Greene and Washington Counties, Pennsylvania. General Permit 5 and General Permit 8 applications were required and obtained for several projects through the PADEP for temporary stream and/or wetland impacts.
Wetland Delineation and Permitting for Various Proposed Rice Midstream Natural Gas Pipelines, Belmont and Monroe Counties, OH– 2013-2017
Conducted route development walks and stream and wetland delineations for over 100 miles of proposed pipeline for Rice Midstream in Belmont and Monroe Counties, Ohio. NWP-12 through USACE and Director's Authorizations through OEPA were required and obtained for specific projects.

Wetland Delineation and Permitting for Various Proposed Rice Energy Natural Gas Well Pads, Belmont and Monroe Counties, OH – 2013-2017
Conducted stream and wetland delineations for over 30 Rice Energy natural gas well pad projects in Belmont and Monroe Counties, Ohio. NWP-39 through USACE were required and obtained for specific projects.

Wetland Delineation and Permitting for Various Proposed Rice Energy Natural Gas Well Pads, Greene and Washington Counties, PA – 2013-2017
Conducted stream and wetland delineations for over 50 Rice Energy natural gas well pad and compressor station projects located in Greene and Washington Counties, Pennsylvania. Also conducted soil and infiltration testing to comply with Pennsylvania best management practices. Wrote reports describing delineation and infiltration testing results.

Wetland Delineation and Permitting for Various Proposed EQT Natural Gas Well Pads, Greene and Washington Counties, PA – 2013-2017
Conducted stream and wetland delineations for over 20 EQT natural gas well pad and compressor station projects located in Greene and Washington Counties, Pennsylvania. Also conducted soil and infiltration testing to comply with Pennsylvania best management practices. Wrote reports describing delineation and infiltration testing results.

Wetland Delineation for Sheme Centralized Pit, Taylor County, WV – 2017
Conducted a stream and wetland delineation for a proposed centralized pit by Mountaineer Keystone, LLC in Taylor County, West Virginia. Wrote report describing delineation field results.

Erosion and Sediment Control Environmental Inspections for Various Proposed Natural Gas Projects, Greene and Washington Counties, PA – 2013-2017.
Conducted environmental inspections for over 50 natural gas projects (i.e. well pads and pipelines) in Greene and Washington Counties, Pennsylvania. Responsibilities included reviewing site design plans and inspecting sites during construction until close of construction stormwater permit to ensure E&S controls were being maintained and sediment was not leaving the site.

Wetland Delineation and Permitting for Wendel Centralized Pit, Taylor County, WV – 2016
Conducted a stream and wetland delineation for a proposed centralized pit by Mountaineer Keystone, LLC in Taylor County, West Virginia. Obtained an approved jurisdictional determination through the USACE. A NWP-39 was also obtained.

Wetland Delineation for AR East Well Pad, Taylor County, WV – 2016
Conducted a stream and wetland delineation for a proposed natural gas well pad by Mountaineer Keystone, LLC in Taylor County, West Virginia. Wrote report describing delineation field results.

Wetland Delineation for SHL1 Centralized Pit, Marshall County, WV – 2016
Conducted a stream and wetland delineation for a proposed centralized pit by Noble Energy in Marshall County, West Virginia. Wrote report describing delineation field results.
Wetland Delineation and Bat Box Installation for RHL1, Greene County, PA – 2016
Conducted a stream and wetland delineation for a proposed project by Noble Energy in Greene County, Pennsylvania. Wrote report describing delineation field results. Also installed mitigation bat boxes.

Wetland Delineation, Water Sampling, and Bat Box Installation for WFN6 Well Site, Washington County, PA – 2014-206
Conducted a stream and wetland delineation for a proposed project by Noble Energy in Washington County, Pennsylvania. Wrote report describing delineation field results. Conducted pre-drill water well sampling. Also installed mitigation bat boxes.

Wetland Delineation and Water Sampling for WFN10 Well Site, Washington County, PA – 2014
Conducted a stream and wetland delineation for a proposed project by Noble Energy in Washington County, Pennsylvania. Wrote report describing delineation field results. Conducted pre-drill water well sampling.
Mussel Survey for Proposed Water In-take Withdrawal, Tyler County, WV – 2016
Helped conduct Phase 1 and Phase 2 mussel surveys following the West Virginia Mussel Survey Protocols in Middle Island Creek.

Macroinvertebrate and Salamander Surveys for Proposed Athena to Walters Natural Gas Pipeline, Belmont County, OH – 2017
Conducted macroinvertebrate and salamander surveys in several streams that were proposed to be impacted by construction of a natural gas pipeline. Macroinvertebrate and salamander species were identified to species level.

Macroinvertebrate and Salamander Surveys for Proposed Horsemill to Marauder Natural Gas Pipeline, Belmont County, OH – 2016
Conducted macroinvertebrate and salamander surveys in several streams that were proposed to be impacted by construction of a natural gas pipeline. Macroinvertebrate and salamander species were identified to species level.

Macroinvertebrate and Salamander Surveys for Proposed Marauder Phase 1 Natural Gas Pipeline, Belmont County, OH – 2016
Conducted macroinvertebrate and salamander surveys in several streams that were proposed to be impacted by construction of a natural gas pipeline. Macroinvertebrate and salamander species were identified to species level.

Macroinvertebrate and Salamander Surveys for Proposed El Toro Loco Well Pad, Belmont County, OH – 2015
Conducted macroinvertebrate and salamander surveys in two streams that were proposed to be impacted by construction of a natural gas well pad. Macroinvertebrate and salamander species were identified to species level.

Macroinvertebrate and Salamander Surveys for Proposed Tuna II Natural Gas Pipeline, Belmont County, OH – 2014-16
Conducted macroinvertebrate and salamander surveys in several streams that were proposed to be impacted by construction of a natural gas pipeline. Macroinvertebrates and salamanders were identified to species level.

Macroinvertebrate and Fish Surveys for Grant Research Project, WV – 2010-2012
Conducted macroinvertebrate and fish surveys within hundreds of streams throughout southern West Virginia. Macroinvertebrates and fishes were identified to species level. Tributaries within the following Hydrologic Unit Code (HUC) 8 watersheds were sampled: Big Sandy, Coal, Elk, Gauley, Greenbrier, Upper Guyandotte, Lower Guyandotte, Upper Kanawha, Tug, and Twelvepole.

Macroinvertebrate and Fish Surveys for Grant Research Project, WV – 2009-2012
Conducted macroinvertebrate and fish surveys within Upper Shavers Fork and several tributaries. Macroinvertebrates and fishes were identified to species level.

Macroinvertebrate and Fish Surveys for Grant Research Project, KY – 2010-2012
Conducted macroinvertebrate and fish surveys within hundreds of streams throughout eastern Kentucky. Macroinvertebrates and fishes were identified to species level. Tributaries within the following HUC 8 watersheds were sampled: Big Sandy, Upper Cumberland, North Fork Kentucky, Middle Fork Kentucky, South Fork Kentucky, Lower Levisa, Licking, and Tug.

Regulatory Expertise

- ESA (Section 7 & 10)
- CWA

Industry Clientele

- Wind
- Utilities/Traditional Energy Sources
- Mines and Reclamation
- US Department of Defense
- US Forest Service
- US Fish and Wildlife Service
- National Park Service
- Corresponding State Agencies
- Transportation
- Tribal Lands
- Academic Institutions & NGOs

Listed Taxa Expertise

- Federal Threatened and Endangered Species Permit Number TE-88809B-0 *Corynorhinus townsendii virginianus, Myotis grisescens. Myotis sodalis, Myotis septentrionalis*

Survey Expertise

- Habitat Assessments
- Aquatic Resource Assessments
- Presence/Absence
- Vegetation Index of Biotic Integrity

Certifications/Trainings

- Hands-on Wetland Restoration Workshop (Biebighauser), 2015
- Bats and Fire Workshop (CAFMS), 2014
- Wetland Plant Identification Course (NCTC), 2014
- Advanced Hydric Soils Course (WTI), 2014
- Vertical Rope Training (Mirza), 2013
- Acoustic Bat Research Techniques (Anabat) Course, 2013
- USACE Wetland Delineation Course (Chin), 2012
- KY Prescribed Fire Council Controlled Burn Workshop, 2012
- USFWS Range-wide Indiana Bat Protection and Enhancement Plan Guidelines Workshop, 2010
- Developing a Biological Assessment (ECS3152), 2009

Qualifications and Background

After earning a B.S. degree in Environmental Studies from Eastern Kentucky University, Ray Eaton started his environmental consulting career in 2009 as an environmental scientist. He worked on a wide variety of natural resource conservation issues for a few years before deciding on the specialty of bat ecology. Since then, conservation research has led him to 18 states and tribal lands. He stays up-to-date with bat research and volunteers with educational programs, winter bat census, and white-nose syndrome (WNS) research.

Ray's skill-set includes designing and implementing study-plans for bat research. He has an understanding of the habitat requirements of all bat species living in the eastern US and can assess habitat suitability for listed and non-listed bats. Research-techniques that he is experienced with include mist-netting, cave census using photography, IR and thermal video recording, ultra-sonic acoustic recording and analysis, and harp-trapping portals. He has a strong understanding of radio-telemetry, and thrives to gather new data on foraging, migration, and roosting. He is adept with GIS and home-range analysis.

Ray has also been working with stream and wetland restoration since 2011, and regularly attends professional conferences regarding the CWA and training courses on soils and botany. He has planted thousands of trees and shrubs, delineated countless wetlands, and classified miles of streams and enjoys the work.

Education

B.S. Environmental Studies, 2008, Eastern Kentucky University, Richmond, Kentucky

Selected Project Experience

Bats in Bridges Model Assessment, NCDOT, Wilkes, Yadkin, Surry, Alleghany, Ashe, and Watuga Counties, NC – 2019
Mr. Eaton led a team in field testing a habitat suitability model developed for bridges in western NC.

Pollinating Insect Survey, USFWS, Bullitt and Hardin Counties, KY – 2018-2019
Mr. Eaton conducted sampled for and identified pollinating insects at 40 sites utilizing various collection methods across the 109,000-acre Ft. Knox.

Indiana Bat Migration Tracking, Alabama DNR, Optimus, Jackson Co. to Cleburn Co., AL – 2019
Mr. Eaton conducted radio-tagging and tracking, roost tree emergence analysis, and habitat characterization of migrating Indiana bats from Sauta Cave National Wildlife Refuge to the Talladega National Forest near Oxford, AL.

Eastern Massasauga Rattlesnake Habitat Assessment, Proposed Wind Farm, Piatte County, IL– 2019
Mr. Eaton conducted a habitat suitability and characterization study for the Eastern Massasauga Rattlesnake (*Sistrurus catenatus catenatus*) at a proposed 75,000-acre wind-energy development near Champaign, IL.

Northern Long-Eared Bat Fall Migration Study, Iowa DNR, Madison County, Iowa – 2019
Mr. Eaton conducted mist-netting, radio-tracking, roost-tree identification and emergence, and habitat characterization of Indiana bats. Bats were tracked to Hannibal, MO.

Northern Long-Eared Bat Fall and Winter Ecology Study, North Carolina DOT, Alligator River NWR, Gull Rock State Game Lands, Dare and Hyde Counties, NC – 2017-2019
Mr. Eaton conducted mist-netting, radio-tagging and tracking, roost-tree identification and emergence, and habitat characterization of northern long-eared bats (*Myotis septentrionalis*).

Indiana Bat Migration Tracking, Arkansas DOT, Optimus, Arkansas to Brandsville, MO – 2018
Mr. Eaton conducted radio-tagging and tracking, roost tree emergence analysis, and habitat characterization of migrating Indiana bats (*Myotis sodalis*) in support of Arkansas DOT's migration tracking project.

Tricolored Bat Spring Migration Study, Arnold Air Force Base, Franklin Co., TN to Peach City. GA – 2018
Mr. Eaton conducted the collection and radio-tagging of tricolored bats (*Perimyotis subflavus*) as part of a study that documented a bat migrating 240 kilometers south-southeast to her maternity colony. This project was funded by Arnold Air Force Base. The research began at Wet Cave, near Suwanee, TN and finished in a forested area surrounding a reservoir south of Atlanta, GA.

Northern Long-Eared Bat Fall Migration Study, Iowa DNR, Hardin County, Iowa – 2017
Mr. Eaton conducted radio-tracking, roost-tree identification and emergence, and habitat characterization of northern long-eared bats. This Iowa DNR funded project allowed for the research to be conducted. Bats were documented using trees late into the fall and traveling short distances to cracks in the cliff-lines and rocky hillsides along the Iowa River.

T&E Bat Presence/Absence Surveys, Eastern Band of Cherokee Indians, multiple locations throughout western North Carolina – 2016
Mr. Eaton conducted surveys targeting T&E bat species on tribal lands located in the western region of North Carolina. No targeted bats were captured during the surveys.

Northern Long-Eared Bat Summer Maternity Colony Studies, Naval Weapons Station Earle, Colts Neck, Monmouth County, New Jersey – 2015
Mr. Eaton conducted mist-netting, roost-tree identification, and habitat characterization of northern long-eared bats. This US Navy funded project allowed for the research to be conducted. Bats were documented utilizing dead trees with sloughing bark, this type of maternity roost is typical throughout the range, based on anecdotal evidence gather through experience.

Virginia Big-Eared Bat Spring Census and Mist-Netting Demonstration, Daniel Boone National Forest, Kentucky – 2014
Mr. Eaton led a mist-netting site near Stillhouse Cave as part of an educational outreach demonstration for USFWS and KDFWR biologists. The netting was in conjunction with emergence counts on all known winter hibernacula of the species in Kentucky.

Indiana Bat Home-Range Analysis, Proposed Champaign County Wind Farm, Cable, Ohio – 2009
Mr. Eaton assisted with mist-netting, radio-tagging and tracking, roost tree identification, and habitat characterization of a colony of Indiana bats in east-central Ohio. He directed three teams triangulating the location of multiple foraging bats for the life of the transmitters. He then used the data to complete a home-range analysis on the colony and delivered maps and GIS data used in the USFW's biological assessment of the proposed wind-farm.

Regulatory Expertise

- Clean Water Act
- Federal, state, and local permitting

Industry Clientele

- Oil & Gas
- Commercial Land Development
- Solar
- Energy Transmission
- Non-Profit Organizations

Natural Resource Evaluations

- Stream and Wetland Delineations
- Water Quality Monitoring
- Surface Elevation Monitoring

Certifications/Trainings

- ESRI ArcGIS Certification
- Wetland and Waters of the US Delineation & Field Training

Education

B.S. Environmental Science, 2020, Indiana University, Bloomington, Indiana

Experience

Copperhead Environmental Consulting, Inc., Wetland Scientist, 2020-present.
Indiana University, Research Technician, 2019-2020.
National Park Service. Water Quality Technician, 2019.
Indiana University, Research Technician, 2017-2018.
Earth Source & Heartland Restoration Services, Wetland Ecologist Intern, 2015-2016.

Qualifications and Background

Ms. Parsons is an experienced wetland scientist and has experience with Clean Water Act permitting, stream and wetland delineations, and stream ecology. She also has experience with ArcGIS.

Project Experience

Wetland Delineation for Proposed Franklin Solar Energy Project, Crawford County, PA - 2020
Assisted with conducting a wetland and stream delineation and associated reporting for an approximately 396-acre site in Crawford County, Pennsylvania.

Wetland Assessment, Campbell County, TN – 2020
Conducted a wetland assessment for an approximate 13-acre site locate in Campbell County, Tennessee.

Stream Hydrologic Determination, Campbell County, TN – 2020
Assisted with conducting a hydrologic determination to determine whether a channel is considered a wet weather conveyance or a stream. The project was located in Campbell County, Tennessee.

Plant Decomposition and Soil Properties Grant Research Project for GCE-LTR, IN – 2019
Examined the predator exclusion impact on plant decomposition and soil properties in a tidal salt marsh. The project was located on Sapelo Island, Georgia.

Lake Michigan Water Quality Monitoring Project for National Park Service, IN – 2019
Collected samples to analyze bacterial levels to ensure health standards were met to allow public entry. The project was location in Chesterton, Indiana.

Stream Monitoring Project for National Park Service, IN – 2019
Conducted stream discharge measurements and collected samples to analyze water quality. The project was located in Chesterton, Indiana.

Grand Calumet River Long-Term Water Quality Monitoring for National Park Service, IN – 2019
Collected samples to analyze water quality for a 5-year monitoring project. The project was located in Gary, Indiana.

Miller Woods Oak Savanna Beaver Impact Project for National Park Service, IN – 2019
Assisted in mapping indications of beaver activity on a 125-acre oak savanna. The project was located in Gary, Indiana.

Industry Clientele

- Oil and Gas
- Wind
- Solar
- Energy Transmission
- Corresponding State Agencies
- U. S. Forest Service
- Tribal Agencies
- Academic Institutions

Listed Taxa Expertise

- Threatened and Endangered Species
- Regional Species of Concern

Survey Expertise

- Presence/Absence
- Habitat Assessment
- Wetland Delineation

Experience

Copperhead Environmental Consulting, Inc., Botanist/Ecologist 2020-present.

SWCA Environmental Consultants Biologist II, Botanist, Crew lead, 2019-2020

U.S Forest Service, Medicine-Bow Routt National Forest, Botanist, 2016-2018

University of Wyoming Adjunct Faculty, Lecturer, 2013-2016

Education

M.S. Botany, (Coursework Complete 2013)

University of Wyoming, Laramie Wyoming

B.S. Microbiology, 2009

University of Wyoming, Laramie Wyoming

Qualifications and Background

Mr. Bolenbaugh is a botanist with extensive experience with Threatened and Endangered Species (TES) surveys, presence/absence, and habitat assessment. He has worked with a broad range of organisms including large game, small mammals, raptors, and bees. He has completed surveys in multiple different environments including Tennessee, Kentucky, and Virginia, as well as several states in the intermountain west most prominently Nevada, Utah, and Wyoming. He has served as crew lead on projects that require federal, tribal, state, and local permitting and is quite capable of survey design and implementation.

Selected Project Experience

Aquatic Resources Delineation for Three Proposed Solar Energy Projects in Russell and Adair Counties, Kentucky.
Botanist and delineator for stream and wetland surveys for a combine 1,600-acre solar energy development project.

Botanical consultant for the Tennessee Valley Authority on a Proposed Rivercane Reintroduction, as a Cultural Resource.
Proposed suitable habitat and restoration methods using GIS and known propagation methods to establish new populations of rivercane (*Arundinaria gigantea*) around Tellico Reservoir. Loudon and Monroe Counties, Tennessee.

Wetland Delineation for Proposed Bridge Construction Accomack County, VA – 2020
Botanist and delineator for an approximately 4,300LF, 26.4 acre proposed bridge right of way. Identified vegetation component of sites and assisted with delineations.

Botanical Surveys. Cherokee National Forest Bradley County, TN
Conducted multi taxa surveys including threatened and endangered species and species of concern.

Botanical and Biological Surveys for Proposed Wind Energy Transmission Line. Carbon County, WY – 2020

Conducted biological surveys for pygmy rabbit (*Brachylagus idahoensis*) presence/absence and botanical surveys for habitat assessment

EXHIBIT 14
ATTACHMENT 14.2

PHASE I ENVIRONMENTAL SITE ASSESSMENT REPORT

McCracken County Solar LLC Project
Woodville, Kentucky

January 8, 2021

Prepared by:

Linebach ▪ Funkhouser, Inc.
ENVIRONMENTAL COMPLIANCE & CONSULTING

Linebach ▪ Funkhouser, Inc.
ENVIRONMENTAL COMPLIANCE & CONSULTING

January 8, 2021

Mr. Marty Marchaterre
Senior Environmental Planner
Copperhead Environmental Consulting, Inc.
151 Walton Avenue
Lexington, Kentucky 40508

Re: Phase I Environmental Site Assessment Report
McCracken County Solar LLC Project
Woodville, Kentucky
Linebach Funkhouser Project Number 270-20

Dear Mr. Marchaterre:

Linebach Funkhouser, Inc. (LFI) has completed the enclosed *Phase I Environmental Site Assessment Report* for the above-referenced property. The assessment activities included a site reconnaissance, interviews with persons knowledgeable about the site, a review of available literature, maps, historical information, and a review of the local, state and federal regulatory agency files regarding the site. The attached report documents the conditions encountered during the assessment and presents our summary and recommendations relative to the site.

We appreciate the opportunity to provide our services to you. Please contact us if you have any questions or comments regarding this submittal, or if we can be of additional service to you.

Sincerely,

Jason P. Boston
Project Scientist

R. William Johnston, PG
Principal Geologist

Enclosure

EXECUTIVE SUMMARY

Linebach Funkhouser, Inc. (LFI) has completed a Phase I Environmental Site Assessment (ESA) of the farm properties located near Woodville in McCracken County, Kentucky. This ESA was prepared in accordance with the scope and limitations of ASTM's *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* (ASTM E1527-13), recognized by the U.S. Environmental Protection Agency (USEPA) as compliant with *Standards and Practices for All Appropriate Inquiries* (AAI) promulgated at 40 CFR Part 312. Results of the assessment, including a site reconnaissance, a review of historical information, a review of federal, state and local records, as well as interviews with persons knowledgeable about the site, are summarized as follows:

Report Section	Environmental Related Item	Description	REC
SITE/AREA DESCRIPTION			
2.6	Current Use of Property	Agricultural, residential and farm related structures	NO
2.7	Current Use of Adjoining Properties	Agricultural; wooded; rural residential	NO
SITE HISTORY AND HISTORICAL RECORDS REVIEW			
3.1	Past Uses of Property	Agricultural; wooded; rural residential	NO
3.2	Past Uses of Adjoining Properties	Kentucky Ordnance Works; agricultural; wooded; rural residential	NO
ENVIRONMENTAL RECORDS REVIEW			
4.1	Subject Property	None	NO
	Adjoining Properties	Old Kentucky Ordnance Works	NO
4.2	Listings within Established Search Radii	No listings	NO
4.3	Vapor Encroachment Screen	Does not exist	NO
SITE RECONNAISSANCE			
5.2	Haz. Substances/Waste and Petroleum Products	None observed	NO
5.3	Storage Tanks (UST/AST)	None observed	NO
5.8	Pits, ponds and lagoons	Former gravel pit on the southeast corner of the site	NO
5.9	Stained soil/pavement	None observed	NO
5.11	Waste Generation, Storage, and Disposal	Areas of historical dumping consisting of general trash, empty containers and discarded appliances and farm equipment were observed in the wooded areas on the northern and southeast portions of the property.	NO

Report Section	Environmental Related Item	Description	REC
5.13	Wells	None observed	NO
INTERVIEWS			
6.1	Site Representative	Mr. Herb Simmons, PLS – Siteworx Survey & Design, LLC	NO
6.3	Local Government Officials	KDEP; Army Corps of Engineers	NO
NON-SCOPE CONSIDERATIONS			
7.1	Asbestos Containing Materials (ACMs)	Property is to be leased from current owners. No survey was conducted.	N/A
7.2	Lead Based Paint (LBP)		
USER PROVIDED INFORMATION			
8.1	Env. Liens / AULs	None provided for review.	NO
9.0	**DATA GAPS**		NO
10.0	**FINDINGS AND OPINIONS**		NO

Recognized Environmental Conditions (RECs)	None Identified
Historical Recognized Environmental Conditions (HRECs)	None Identified
Controlled Recognized Environmental Conditions (CRECs)	None Identified
De Minimis Conditions	None Identified

Conclusions and Recommendations

This assessment has revealed no evidence of *recognized environmental conditions* in connection with the property. Therefore, no further assessment is recommended.

This Executive Summary provides a summation of the results of the Phase I ESA and is not intended to be all-inclusive. The complete report lists the procedures used during our assessment and provides our conclusions and recommendations regarding the site.

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1.0 INTRODUCTION

Linebach Funkhouser, Inc. (LFI) was retained by Copperhead Environmental Consulting, Inc. (the Client), to conduct a Phase I Environmental Site Assessment (ESA) of the farm properties located near Woodville in McCracken County, Kentucky (the "subject property"). LFI understands the properties are to be under a long term lease agreement with the current owners.

1.1 Purpose

The purpose of this ESA was to document current and historical information on the subject property and surrounding areas in order to identify *recognized environmental conditions* (RECs), defined in ASTM E1527-13 as the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment.

The term is not intended to include *de minimis* conditions, defined in ASTM E1527-13 as a condition that generally does not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies. Conditions determined to be *de minimis* conditions are not *recognized environmental conditions* nor *controlled recognized environmental conditions*.

The term *historical recognized environmental condition* (HREC), is defined by ASTM E1527-13 as a past release of any hazardous substances or petroleum products that has occurred in connection with the property and has been addressed to the satisfaction of the applicable regulatory authority (as evidenced by the issuance of a no further action letter or other equivalent closure documentation) or meeting unrestricted use criteria established by a regulatory authority, without subjecting the property to any required controls (e.g., property use restriction, activity and use limitations, institutional controls, or engineering controls).

The term *controlled recognized environmental condition* (CREC), is defined by ASTM E1527-13 as an REC resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority (e.g., as evidenced by the issuance of a no further action letter or equivalent, or meeting risk-based criteria established by

regulatory authority), with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls (e.g., property use restrictions, activity and use limitations, institutional controls, or engineering controls).

1.2 Scope of Work

This ESA was conducted utilizing standard practices consistent with ASTM E1527-13. Any significant scope-of-work additions, deletions or deviations to ASTM E1527-13 are noted below or in the corresponding sections of this report. The scope-of-work for this ESA included an evaluation of the following:

- General physical setting characteristics of the subject property and immediate vicinity through a review of one or more referenced sources, including topographic and geologic maps, soils and hydrologic reports.
- Historical usage of the subject property, adjoining properties, and surrounding area through a review of reasonably ascertainable sources such as land title records, fire insurance maps, city directories, aerial photographs, property tax files, prior environmental assessment reports, and interviews.
- Current land use and existing conditions of the subject property including observations and interviews regarding the use, treatment, storage, disposal or generation of hazardous substances, petroleum products and hazardous, regulated, or medical wastes; equipment that is known or likely to contain PCBs; storage tanks and drums; wells, drains and sumps; and pits, ponds or lagoons.
- Current land use of adjoining and surrounding area properties and the likelihood of known or suspected releases of hazardous substances or petroleum products to impact the subject property.
- Environmental regulatory database information and local environmental records within specified minimum search distances.

Unless otherwise identified in the report, the scope-of-work for this ESA did not include a consideration of the following potential environmental conditions that are outside the scope of ASTM Practice E1527-13 including but not limited to: asbestos-containing building materials, biological agents, cultural and historic resources, ecological resources, endangered species, health and safety, indoor air quality (unrelated to releases of hazardous substances or petroleum products into the environment), industrial hygiene, lead-based paint, lead in drinking water, mold, radon, regulatory compliance, and wetlands.

1.3 Terms and Conditions

This Phase I ESA was performed on behalf of, and solely for the exclusive use of the Client. No other company, entity, or person shall have any rights with regard to LFI's contract with the Client including but not limited to indemnification by LFI, or any rights of reliance on the findings, conclusions, and recommendations of this or any subsequent reports regarding the subject property.

In accordance with ASTM E1527-13 provisions, this report is presumed to be valid for up to one year prior to the date of acquisition or transaction of the property. This presumption assumes that the following components of the report are updated within 180 days prior to the intended date of acquisition or transaction of the property: interviews, environmental lien search, government records reviews, visual inspection of the property and surrounding properties, and declaration by the environmental professional.

1.4 Assumptions, Limitations and Exceptions

This ESA was prepared in accordance with the scope and limitations of ASTM's *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* (ASTM E1527-13), recognized by the U.S. Environmental Protection Agency (USEPA) as compliant with *Standards and Practices for All Appropriate Inquiries* (AAI) promulgated at 40 CFR Part 312.

This Phase I Environmental Site Assessment has been prepared to assess the property with respect to hazardous substances defined in the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (42 U.S.C. §9601), and petroleum products. As such, this assessment is intended to permit the Client to satisfy one of the requirements to qualify for the innocent landowner, contiguous property owner, or bona fide purchaser limitations on CERCLA liability: that is, the practices that constitute "all appropriate inquiry into the previous ownership and uses of the subject property consistent with good commercial or customary practice" as defined in 42 USC §9601 (35)(B).

LFI conducted this ESA using reasonable efforts to identify recognized environmental conditions on the subject property. Findings within this report are based on the information obtained during the site reconnaissance, the electronic regulatory file review, a review of historical records,

interviews, and from reasonably ascertainable and publicly available information obtained from public agencies and other referenced sources. The presence of recognized environmental conditions on a site may not always be apparent; consequently, the completion of a Phase I ESA cannot provide a guarantee that recognized environmental conditions do not exist in connection with a site.

This report is not definitive and should not be assumed to be a complete or specific determination of all conditions above or below grade. Current subsurface conditions may differ from the conditions indicated by surface observations or historical sources and can be most reliably evaluated through intrusive techniques that were beyond the scope of this ESA. Information in this report is not intended for use as a construction document and should not be used for demolition, renovation, or other construction purposes. LFI makes no representation or warranty that the past or current operations at the site are, or have been, in compliance with applicable federal, state and local laws, regulations and codes.

Environmental Data Resources, Inc. (EDR), an independent environmental data research company, provided the records from the government agency databases referenced in this report. Information regarding surrounding area properties was requested for the specified minimum search distances and was assumed to be correct and complete unless obviously contradicted by LFI's observations or other credible referenced sources reviewed during the ESA. LFI is not a professional title insurance or land surveying firm and makes no guarantee, explicit or implied, that any land title records acquired or reviewed, or any physical descriptions or depictions of the site in this report, represent a comprehensive definition or precise delineation of property ownership or boundaries.

2.0 SITE DESCRIPTION

The location, description, and current uses of the subject property, as well as surrounding properties are presented in the following sections.

2.1 Location and Description

The subject property is located near Woodville, Kentucky within McCracken County. The property consists of approximately 714 acres of predominately agricultural land that is owned by three separate entities.

A site location map is provided in **Figure 1** and an aerial photograph depicting the site and surrounding property use is provided in **Figure 2**. Site photographs are included in **Appendix A**.

2.2 Structures / Improvements

The subject property is predominately undeveloped farmland. Wooded areas are located throughout the interior of the site, property boundaries and along its' eastern tributaries. Residential and barn structures are located exclusively on the southernmost portion of the site.

2.3 Municipal Services and Utilities

Properties in the vicinity are serviced by the following municipal services and utilities:

Utility	Provider
Potable Water Supply	City of Kevil
Sewage Disposal	Septic Systems
Natural Gas	Kentucky Utilities Co.
Electricity	

2.4 Roads

The property is located along the east side New Liberty Church Road / KY Route 725, to the north of Massey Road and to the west of Bethel Church Road. Ogdon Landing Road / KY Route 358 is located farther north. Private drives are located throughout the site. No publicly owned roads are located on the property.

2.5 Topography and Drainage

A review of the *Heath, KY* United States Geological Survey (USGS) Topographic Quadrangle (2013) indicates a surface elevation for the subject property averages approximately 390 feet above the National Geodetic Vertical Datum (NGVD) of 1929 (approximately mean sea level). A copy of the topographic map is provided in **Figure 1** and **Appendix B**. According to the United States

Department of Agriculture (USDA) Soil Conservation Service (SCS), the dominant soil composition in the vicinity of the subject property is classified as Grenada, a moderately well-drained silt loam.

Major hydrogeologic features such as a river or lake generally influence regional groundwater flow direction. Surface and/or bedrock topography may also influence regional groundwater flow direction. Based on information gathered during the site visit, the topography of the land, and information contained in the Environmental Data Resources, Inc. (EDR) report, the direction of surface and groundwater flow is interpreted to be northeast with the local topographic gradient towards the Ohio River which is approximately 0.75 mile from the site. In addition, Newton's Creek transects the site southeast to northwest which flows to the Ohio River.

2.6 Current Use of Property

The subject property is predominately undeveloped farmland.

2.7 Current Use of Adjoining Properties

Nearby property usage could potentially impact the surface and subsurface conditions of a site. Developing a history of past to present uses or occupancies can provide an indication of the likelihood of environmental concern. In general, the subject property is located in a low-density area predominantly composed of agricultural and residential properties. An aerial photograph illustrating the surrounding property-use relative to the subject property is included as **Figure 2**. A general description of surrounding land use is as follows:

Current Use of Adjoining Properties

Direction	Description
North	The subject property is adjoined by agricultural and residential property.
South	
East	The subject property is adjoined to the east by agricultural, residential and wooded properties.
West	The subject property is bordered to the west by KY Route 725.

No evidence of potential adverse environmental conditions was observed during the survey of adjacent properties from the subject site.

3.0 SITE HISTORY AND HISTORICAL RECORDS REVIEW

Historical information about the subject property, based on an evaluation of available records reviewed during the Phase I, is included in the following sections.

3.1 Past Uses of Property

LFI attempted to determine the historical use of the subject property dating back to 1940 or the first developed use. The following table summarizes the historical use of the subject property:

Historical Use Summary

Subject Property		
Period		**Source(s)**
1940 - Current	The subject property has been historically and primarily used for agricultural and rural residential purposes.	Topographic Maps Aerial Photographs

3.2 Past Uses of Adjoining Properties

Properties to the north, south and west have been predominately utilized for agricultural and residential purposes. Property to the west which is considered to be cross to downgradient consisted of the former Kentucky Ordnance Works (KOW), a formerly used defense site to be discussed further in Section 4.1.

3.3 Topographic Maps

Historical topographic maps provide information related to physical land configuration such as elevation, ground slope, surface water and other features. While most buildings in densely developed urban centers are not depicted, topographic maps typically show structures equal to or larger than the size of a single-family residence in rural areas. A search for historical topographic maps of the subject property and surrounding area was conducted by EDR and provided to LFI in a *Historical Topographic Map Report* dated December 15, 2020. Topographic maps were provided for various years between 1928 and 2013. The 1966 to 1982 maps were not provided correctly. A copy of the EDR *Historical Topographic Map Report* is included in **Appendix B** and summarized as follows:

Historical Topographic Maps

Year	Issues Noted	Observations
1928 - 1932	No	**Subject Property:** Sparse residential or barn structures are depicted along New Liberty Church Road and Burnley School Road.
		Surrounding Properties: Sparse rural residential properties are observed.
1954 - 1982	No	**Subject Property:** Sparse residential or barn structures are depicted. Brushy Creek is depicted through the site. Newtons Creek runs through the southwest corner of the site. A gravel pit is located on the southeastern corner of the site
		Surrounding Properties: Sparse rural residential properties are observed. The Old Kentucky Ordnance Works facility is depicted farther to the southeast. Gravel pits are depicted in the surrounding areas.
2013(1)	No	**Subject Property:** No structures or identifying features are shown.
		Surrounding Properties: Major roads and highways are shown, no individual structures.

(1) Beginning with the 2010 map updates, the USGS elected to omit building footprints, urban designations, and other points of interest from topographic map updates.

3.4 Aerial Photographs

Aerial photographs are generally of very small scale and only provide a general idea of activity in the area. Aerial photographs are instantaneous records and their usefulness is limited because they do not necessarily reflect the condition of a site before or after the photographs were taken. A search for aerial photographs of the subject property and surrounding area was conducted by EDR and provided to LFI in an *Aerial Photo Decade Package* dated December 17, 2020. Aerial photographs were provided for various years from 1952 to 2016. Additional aerial photographs were obtained from the Google Earth® program. A copy of the EDR *Aerial Photo Report* is included in **Appendix B** and a summary is presented in the following table:

Aerial Photographs

Year	Issues Noted	Observations
1952 - 1998	No	**Subject Property:** Subject property appears to be predominately agricultural in nature. Few residential and barn structures are observed. The gravel pit on the southeast corner of the site is observed.
		Surrounding Properties: The surrounding properties are generally agricultural in nature, the Old Kentucky Ordnance Works facility is shown to the southeast.
2008 - 2016	No	**Subject Property:** Property appears as it is today.
		Surrounding Properties: Adjoining properties are developed similar to their present-day configuration.

3.5 Sanborn Fire Insurance Maps

A search for Sanborn fire insurance maps for the subject property and surrounding area was conducted by EDR and provided to LFI in a *Certified Sanborn Map Report,* dated December 15,

2020. Fire insurance maps were unavailable for the subject property and surrounding areas. A copy of the report stating "Unmapped Property" is provided in **Appendix B**.

3.6 City Directories

A search of historical city directories for the subject property and surrounding properties was conducted by EDR and provided to LFI in a *City Directory Abstract* dated December 17, 2020. City directories along New Liberty Church Road were reviewed for various years between 1992 and 2017. Listings for the surrounding area were found to be primarily residential listings with no evidence of obvious adverse environmental conditions. A copy of the report is provided in **Appendix B**.

4.0 ENVIRONMENTAL RECORDS REVIEW

An electronic database search of files maintained by the U. S. EPA and the Kentucky Department for Environmental Protection (KDEP) was conducted by EDR on December 15, 2020 to evaluate the regulatory history of the subject property and surrounding properties. The search of standard federal, state, and tribal regulatory agency databases was conducted to (1) identify listings for the subject property and adjoining properties and (2) evaluate sites within applicable ASTM E1527-13 and AAI defined search radii that could cause actual or potential environmental impacts to the subject property. A summary of the results of the regulatory agency database search is provided in the following table:

Regulatory Database Search Summary

Regulatory Database	Minimum Search Distance	Property Listed?	# Sites Listed
Federal National Priority List (NPL)	1 Mile	No	0
Federal De-Listed NPL	½ Mile	No	0
Federal CERCLIS	½ Mile	No	0
Federal CERCLIS NFRAP	½ Mile	No	0
Federal RCRA CORRACTS	1 Mile	No	0
Federal RCRA non-CORRACTS TSD	½ Mile	No	0
Federal RCRA Generators	¼ Mile	No	0
Federal Institutional/Engineering Control Registry	½ Mile	No	0
Federal ERNS	¼ Mile	No	0
State/Tribal Haz. Waste Sites (NPL/CERCLIS)	1 Mile	No	0

Regulatory Database Search Summary

Regulatory Database	Minimum Search Distance	Property Listed?	# Sites Listed
State/Tribal Landfill or Solid Waste Disposal Sites	½ Mile	No	0
State/Tribal Leaking Storage Tank Lists	½ Mile	No	0
State/Tribal Registered Storage Tank Lists	¼ Mile	No	0
State/Tribal Institutional/Engineering Control Registry	½ Mile	No	0
State/Tribal Voluntary Cleanup Sites	½ Mile	No	0
Federal/State Brownfield Sites	½ Mile	No	0

The fact that sites do or do not appear on a list does not necessarily indicate that an environmental concern exists. In addition, sites may not be mapped in a list search due to inaccuracy of owner/operator records, government records, or errors occurring during conversion of the data by informational sources. A copy of the EDR report that includes a detailed description of each database and the results of the database inquiries is provided in **Appendix C**.

4.1 Listings for Subject Site or Adjoining Properties

The EDR database search did not identify the subject property or any adjoining properties on ASTM or AAI required databases; however, based on information collected throughout this assessment, one nearby property was identified:

Former Kentucky Ordnance Works
Address: Unknown (appears to be adjoining to west; cross to downgradient)
Location: East across Bethel Church Road
Summary:

According to information provided in a publication by the Army Corps of Engineers, the former Kentucky Ordnance Works (KOW) is a formerly used defense site located in McCracken County, Kentucky. The 16,126 acre site is located on the east bank of the Ohio River, approximately nine miles west of the city of Paducah, KY. The former KOW was an explosives manufacturing facility that operated during WWII, from December 1942 until August 1945 and produced approximately 196,490 tons of TNT. After the plant closed, the property was originally transferred to the Atomic Energy Commission. Most of the former property is now owned by the Tennessee Valley Authority (Shawnee Steam Plant), the Department of Energy (United States Enrichment Corporation) and the Commonwealth of Kentucky (West Kentucky Wildlife Management Area). The West Kentucky Wildlife Management Area is over 4,000 acres and is managed by the Kentucky Department of Fish and Wildlife. The area is accessible to the public

for hunting, fishing and recreation. Since 1991, the U.S. Army Corps of Engineers (USACE) Louisville District has been actively involved in the investigation and remediation of KOW. Environmental response actions at DERP/FUDS conform to the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

Underground Storage Tanks (USTs). In the early stages of the Corps' work, USTs were found to remain on the former KOW property. According to a drawing from May 7, 1942, there were four USTs that were located on Kentucky Ordnance Works property near the coal storage silos. The drawing showed the Kentucky Ordnance Works Power Area, Acid Area and Shops Area. Two tanks were located east of the four coal silos. One tank was located along the railroad siding at a location east of building 718, the Locomotive House. One tank was located south of building 718 and south of the railroad siding that was placed between the millwright shop and the riggers shop. In order to distinguish between them these tanks were named Power #1 Tank, Power #2 Tank, Locomotive Tank and Shops Tank. The Louisville District and its agent, CATI, Inc., performed excavation work in June 2003 at three sites uncovering each of these four tanks. The Locomotive Tank and the Shops Tank were deemed to be 12,000 gallons each in capacity. Documentation was submitted to the Division of Waste Management of the Commonwealth of Kentucky. In a Jan. 12, 2009 letter, the Underground Storage Tank Branch of the Division of Waste Management stated the project had reached no further action status for the Locomotive Tank and the Shops Tank. The two tanks located east of the four coal silos were each deemed to be 14,000 gallons each. Work was performed in 2009 and 2010 to demonstrate that all potential for contamination has been resolved at this tank site. The Kentucky Department of Environmental Protection (DEP) has agreed that no further work is required for the tanks located by the coal silos. Exploration activities were conducted in two other areas of the former KOW suspected of having USTs. During 2009 test trenches were dug in the locations of two former garages that were operated as part of the KOW facility. No storage tanks were found during these activities, and no evidence of a release was found.

West Gravel Pits. Sampling of the West Gravel Pits showed concentrations of metals that represented a threat to ecological receptors in the surface soils. A Focused Feasibility Study and Proposed Plan were completed in 2007. The Focused Feasibility Study and Proposed Plan outlined three potential remedial actions. Alternative 3 was the capping of exposed fill material and rerouting of the surface drainage. This alternative would apply a soil cover to only the exposed waste material. Alternative 3 was the recommended cleanup remedy and a final Decision Document was signed in December 2007. Contract specifications were developed in 2008 and a competition was held in 2008 to select the contractor to install the remedy. A contractor was given the formal authorization to proceed in 2008, and site work was performed in 2009. Key to maintaining the soil cover is having live plants living on the cover material. The site has had erosion resistant mats placed

at various slopes of the covered site. Vehicle traffic is prohibited from the site to prevent erosion of the installed cover.

Based on this site's currently regulatory status and its apparent cross to downgradient direction, it does not represent an REC. KDEP correspondence regarding the site is included in **Appendix D**.

4.2 Listings within Established Search Radii

No additional site listings were identified in the EDR report.

The EDR environmental records search also provides a list of "orphan" sites, which are properties identified on ASTM/AAI required databases but that could not be mapped due to poor or inaccurate address information. EDR's records search listed no orphan sites.

4.3 Vapor Encroachment Screen

LFI conducted a Vapor Encroachment Screen (VES) utilizing the Tier 1 methodology provided in ASTM's *Standard Guide for Vapor Encroachment Screening on Property Involved in Real Estate Transactions* (E2600-15). The Tier 1 methodology in E2600-15 was utilized in order to identify a *Vapor Encroachment Condition* (VEC), which is "the presence or likely presence of chemicals of concern (COC) (i.e. – petroleum hydrocarbons and/or chlorinated solvents) vapors in the vadose zone of the subject property caused by the release of vapors from contaminated soil and/or groundwater either on or near the subject property". Information provided by EDR was reviewed to identify facilities within the Area of Concern (AOC) to evaluate whether contamination at nearby properties could represent a vapor encroachment condition (VEC) on the Site. The AOC for chlorinated solvents is defined in ASTM E2600-15 as the area within 1/3 mile of the property boundaries. For facilities at which the only COCs are petroleum hydrocarbons, the AOC includes the area within 0.1 mile of the property boundaries.

A review of historical use information and regulatory database documentation collected in the course of this Phase I ESA did not identify obvious evidence of COC that may migrate as vapors onto the subject property as a result of contaminated soil and/or groundwater known to be present on or near the subject property. Therefore, our opinion based on the Tier 1 VES is that a VEC does not exist on the property.

5.0 SITE RECONNAISSANCE

A site reconnaissance was conducted on December 10, 2020 by Mr. Jason Boston, Project Scientist with LFI. Mr. Boston was unaccompanied during the site reconnaissance.

5.1 Site Reconnaissance Methodologies

The purpose of the reconnaissance was to gather information regarding the environmental conditions at the subject property and surrounding areas. The site reconnaissance consisted of visual observations of the subject property and any existing improvements, adjoining properties as viewed from the subject property, and observations of nearby properties made from public thoroughfares.

At the time of the site reconnaissance, weather conditions were clear and approximately 60° Fahrenheit. No limiting conditions were present. Photographs taken during the site reconnaissance, depicting site conditions at the time of the visit, are provided in **Appendix A**.

5.2 Hazardous Substances/Waste and Petroleum Products

No obvious indications of generation, use, storage, treatment, or disposal of hazardous substances/wastes or petroleum products were observed during site reconnaissance.

5.3 Underground Storage Tanks (USTs) & Aboveground Storage Tanks (ASTs)

The site reconnaissance included a search for physical features such as fill ports, slumped pavement/ground surface, patched pavement, and evidence of underground piping or pump stations commonly associated with the current or historical presence of storage tanks. The absence of common physical features cannot completely rule out the current or historical existence of storage tanks. Site characteristics such as overgrown vegetation, new pavement, or past renovation/construction/demolition activities may prevent the identification of storage tanks.

5.3.1 Underground Storage Tanks (USTs)

No evidence of current or former USTs was observed or reported during site reconnaissance.

5.3.2 Aboveground Storage Tanks (ASTs)

No evidence of current or former ASTs was observed during site reconnaissance.

5.4 Odors

No strong, pungent or noxious odors were noticed during the site reconnaissance.

5.5 Drums and Containers

Areas of historical dumping were observed in the wooded areas on the northern and southeast portions of the property. No other obvious indications of drums or containers were observed during the site reconnaissance.

5.6 Polychlorinated Biphenyls (PCBs)

Polychlorinated biphenyls (PCBs) are organic compounds that have been used extensively in electrical capacitors and transformers, lighting ballasts, hydraulic fluids, heat exchange fluids, lubricants, inks, sealants, adhesives and surface coatings since development in 1929. PCB production was banned in the U.S. in 1979 due to health and environmental hazards. Under the Toxic Substances Control Act (TSCA), as outlined in Title 40 of the Code of Federal Regulations (CFR) Part C, 761, the owners of PCB containing equipment are responsible for environmental impairment and liabilities caused by leakage of PCBs to the environment.

No equipment with the potential to contain PCBs was observed during the site reconnaissance.

5.7 Drains and Sumps

No evidence of drains or sumps was observed during the site reconnaissance.

5.8 Pits, Ponds, and Lagoons

No obvious evidence of pits, ponds or lagoons used for waste treatment or disposal was observed or reported during the site reconnaissance.

5.9 Stained Soil / Pavement

No obvious evidence of stained soil or pavement was during the site reconnaissance.

5.10 Stressed Vegetation

No obvious areas of stressed vegetation were observed on the site.

5.11 Waste Generation, Storage, and Disposal

Areas of historical dumping were observed in the wooded areas on the northern and southeast portions of the property that consisting of general trash, empty containers and discarded appliances and farm equipment. No other obvious evidence of improper waste generation or storage was observed during the site reconnaissance.

5.12 Waste Water

No obvious evidence of process waste water discharge into a drain, ditch, or stream was observed on the subject property during the site reconnaissance.

5.13 Wells

No wells were observed during the site reconnaissance. The EDR Radius Report identified numerous water supply wells on adjoining properties to the west and south.

5.14 Septic Systems

Area in the vicinity of the subject property is rural in nature. A septic system is reportedly utilized for single home located on the site.

6.0 INTERVIEWS

The following interviews were conducted during the assessment in an effort to obtain information indicating potential RECs in connection with the subject property.

6.1 Property Representative

An interview was conducted with Mr. Herb Simmons, PLS with Siteworx Survey & Design, LLC during the site reconnaissance. Mr. Simmons had been at the site for one week prior to LFI's reconnaissance and reported no observed environmental concerns associated with the subject property.

6.2 Occupants

The subject property is utilized for agricultural and residential purposes.

6.3 Local Government Officials

KDEP was contacted as part of this environmental site assessment based on current and historical uses of the subject property and adjoining properties. No records were available on the subject site or surrounding properties. Email correspondence is included in **Appendix D**. Publications provided by the Army Corp of Engineers were reviewed during this assessment.

7.0 NON-SCOPE CONSIDERATIONS

The following sections address environmental issues or conditions on the subject property that are outside the scope of ASTM E1527-13. Substances or materials may be present on the subject property that may lead to contamination of the subject property but are not defined by CERCLA as hazardous substances.

7.1 Asbestos Containing Materials (ACMs)

Asbestos is a general term for a group of fibrous minerals (primarily chrysotile, amosite and crocidolite) that have long been used as fireproof insulation and as a strengthener in pipe insulation, roofing tiles, floor tiles, wall coverings and other materials. Undisturbed asbestos-containing material (ACM) is not dangerous; however, when ACM is broken or torn, as during remodeling or demolition, the fibers can be spread into the air, especially if the material is friable. A friable material, by definition, is one that can be crushed, crumbled, pulverized, or reduced by hand pressure when dry. Due to health hazards, ACM use has been phased out since approximately 1978. The U.S. EPA classifies ACM as any material which contains more than 1% asbestos by Polarized Light Microscopy (PLM) analysis.

An ACM survey was not included in the scope of work for this assessment. The properties are to be leased from the current owners.

7.2 Lead-Based Paint (LBP)

Use of lead in household paint was banned by the U.S. EPA effective January 1, 1978. The U.S. EPA and the U.S. Department of Housing and Urban Development (HUD) define lead-based paint (LBP) as any paint that contains 1.0 mg/cm^2 or higher of lead by x-ray fluorescence (XRF) analysis or 0.5% (5,000 ppm) lead by weight.

An LBP survey was not included in the scope of work for this assessment. The properties are to be leased from the current owners.

8.0 USER PROVIDED INFORMATION

In accordance with the ASTM E1527-13 and AAI standards, the user of this ESA, Copperhead Environmental Consulting, Inc. (the Client), may obtain information through other due diligence activities associated with the pending property transaction that could help identify the possibility of potential environmental conditions in connection with the subject property. A copy of the User Questionnaire form completed by Community Energy is included in **Appendix E**.

8.1 Environmental Liens or Activity and Use Limitations

No information regarding environmental liens or use limitations has been reported.

8.2 Common/Specialized Knowledge or Experience

No information regarding common/specialized knowledge or experience relative to the subject property has been reported.

8.3 Reasons for Significantly Lower Purchase Price

The land agreement is a lease and it was reported that the lease rate reasonably reflects the fair market value of the property.

9.0 DATA GAPS

No data gaps as defined by ASTM E1527-13, (i.e. considered to have significantly affected the ability to identify recognized environmental conditions in connection with the subject property) were identified during completion of this assessment with the exception of a site owner with prior

knowledge of the site history. However, due to rural nature of the site based on other available historical information, LFI does not consider this to be a significant data gap.

10.0 FINDINGS AND OPINIONS

The following summarizes known or suspected RECs, HRECs, CRECs, *de minimis* conditions, and non-scope environmental conditions in connection with the subject property based on information collected during the assessment. For each condition, LFI provides an opinion of the impact on the site based on an evaluation of the results of record reviews, site reconnaissance work and interviews performed as part of this assessment. LFI also provides a rationale for concluding that an environmental condition is or is not a REC.

Recognized Environmental Conditions (REC)

This assessment has revealed no evidence of RECs in connection with the subject property.

Historical Recognized Environmental Conditions (HREC)

This assessment has revealed no evidence of HRECs in connection with the subject property.

Controlled Recognized Environmental Conditions (CREC)

This assessment has revealed no evidence of CRECs in connection with the subject property.

De Minimis Conditions

No *de minimis* conditions were observed in connection with the subject property.

Non-Scope Environmental Conditions

No non-scope environmental conditions were observed in connection with the subject property.

11.0 CONCLUSIONS AND RECOMMENDATIONS

LFI has performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Practice E1527-13 of the farm property located in McCracken County, Kentucky, the subject property. Any exceptions to, or deletions from, this practice were described in this report. This assessment has revealed no evidence of *recognized environmental conditions* in connection with the property. Therefore, no further assessment is recommended.

12.0 CERTIFICATION OF ENVIRONMENTAL PROFESSIONAL

LFI has the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. We have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312. We declare that, to the best of our professional knowledge and belief, we meet the definition of Environmental Professional as defined in §312.10 of this part.

Environmental Professional	January 8, 2021 Date

13.0 REFERENCES

Environmental Data Resources, Inc. *The EDR Radius Map Report McCracken Co. New Liberty Church Road Kevil, KY 42053. Inquiry Number: 5946033.2s*. December 15, 2020.

Environmental Data Resources, Inc. *EDR Historical Topographic Map Report McCracken Co. New Liberty Church Road Kevil, KY 42053. Inquiry Number: 5946033.4*. December 15, 2020.

Environmental Data Resources, Inc. *EDR Aerial Photo Decade Package McCracken Co. New Liberty Church Road Kevil, KY 42053. Inquiry Number: 5946033.9*. December 17, 2020.

Environmental Data Resources, Inc. *Certified Sanborn Map Report McCracken Co. New Liberty Church Road Kevil, KY 42053. Inquiry Number: 5946033.3*. December 15, 2020.

Environmental Data Resources, Inc. *EDR City Directory Image Report McCracken Co. New Liberty Church Road Kevil, KY 42053. Inquiry Number: 5946033.5*. December 18, 2020.

Kentucky Department for Environmental Protection

Army Corps of Engineers – Louisville District

Figures

SCALE 1:24,000

1/2 0 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

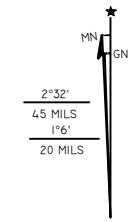
5 0 KILOMETER

CONTOUR INTERVAL 10 FEET

SUPPLEMENTARY CONTOUR INTERVAL 5 FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929

LEGEND



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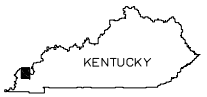


QUADRANGLE LOCATION

SITE LOCATION MAP	SCALE: 1:24,000	FIGURE 1
	DATE: 12/15/20	
FARM PROPERTY McCRACKEN COUNTY, KENTUCKY	PROJ#: 270-20	
	DRAWN BY : MKA	
	CHECKED BY:	

Linebach • Funkhouser, Inc.
ENVIRONMENTAL COMPLIANCE & CONSULTING

LEGEND

0 300 600
SCALE (FT)

SOURCE: Google Earth, Imagery Date: February 2, 2020.

AERIAL PHOTOGRAPH SHOWING SITE AND VICINITY	SCALE: 1"=600'	FIGURE 2
	DATE: 12/15/20	
FARM PROPERTY McCRACKEN COUNTY, KENTUCKY	PROJ#: 270-20	
	DRAWN BY : MKA	
	CHECKED BY:	

Linebach ▪ Funkhouser, Inc.
ENVIRONMENTAL COMPLIANCE & CONSULTING

Appendix A

Site Photographs

Linebach Funkhouser, Inc.
environmental compliance & consulting

Photographic Record

Client: Copperhead Environmental
Site Name: McCracken County Solar LLC
Project Number: 270-20
Site Location: New Liberty Church, Massey & Bethel Church

Photo Number: 1 **Photographer:** Jason Boston **Date:** December 10, 2020 **Direction:** North **Comments:** General view of the site.	
Photo Number: 2 **Photographer:** Jason Boston **Date:** December 10, 2020 **Direction:** North **Comments:** View of the Brushy Creek that runs through the site.	

Linebach Funkhouser, Inc.
environmental compliance & consulting

Photographic Record

Client: Copperhead Environmental
Site Name: McCracken County Solar LLC
Project Number: 270-20
Site Location: New Liberty Church, Massey & Bethel Church

Photo Number: 3
Photographer: Jason Boston
Date: December 10, 2020
Direction: South
Comments: View of the Brushy Creek that runs through the site.

Photo Number: 4
Photographer: Jason Boston
Date: December 10, 2020
Direction: East
Comments: General view of the site.

Linebach Funkhouser, Inc.
environmental compliance & consulting

Photographic Record

Client: Copperhead Environmental **Site Name:** McCracken County Solar LLC

Project Number: 270-20 **Site Location:** New Liberty Church, Massey & Bethel Church

Photo Number: 5 **Photographer:** Jason Boston **Date:** December 10, 2020 **Direction:** South **Comments:** View of Newton's Creek that runs through the southwestern portion of the site.	
Photo Number: 6 **Photographer:** Jason Boston **Date:** December 10, 2020 **Direction:** West **Comments:** View of the former gravel pit located on the southeast corner of the site.	

Linebach Funkhouser, Inc.
environmental compliance & consulting

Photographic Record

Client: Copperhead Environmental
Site Name: McCracken County Solar LLC
Project Number: 270-20
Site Location: New Liberty Church, Massey & Bethel Church

Photo Number: 7
Photographer: Jason Boston
Date: December 10, 2020
Direction: East
Comments: View of the dump area near the southeast corner of the site.

Photo Number: 8
Photographer: Jason Boston
Date: December 10, 2020
Direction: Northeast
Comments: View of the dump area near the southeast corner of the site.

Appendix B

Historical Research Documentation

Mccracken Co.
New Liberty Church Road
Kevil, KY 42053

Inquiry Number: 6302950.4
December 15, 2020

EDR Historical Topo Map Report

with QuadMatch™

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Historical Topo Map Report

12/15/20

Site Name:	Client Name:
Mccracken Co.	Linebach Funkhouser Inc.
New Liberty Church Road	114 Fairfax Ave
Kevil, KY 42053	Louisville, KY 40207
EDR Inquiry # 6302950.4	Contact: Jason Boston

EDR Topographic Map Library has been searched by EDR and maps covering the target property location as provided by Linebach Funkhouser Inc. were identified for the years listed below. EDR's Historical Topo Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topo Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the late 1800s.

Search Results:		*Coordinates:*	
P.O.#	NA	**Latitude:**	37.122881 37° 7' 22" North
Project:	270-20	**Longitude:**	-88.857496 -88° 51' 27" West
		UTM Zone:	Zone 16 North
		UTM X Meters:	334985.73
		UTM Y Meters:	4110118.76
		Elevation:	390.11' above sea level

Maps Provided:

2012, 2013
1982
1975, 1978
1966, 1967
1954
1932
1928

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

2012, 2013 Source Sheets

Joppa
2012
7.5-minute, 24000

La Center
2013
7.5-minute, 24000

Bandana
2013
7.5-minute, 24000

Heath
2013
7.5-minute, 24000

1982 Source Sheets

Joppa
1982
7.5-minute, 24000
Aerial Photo Revised 1978

Bandana
1982
7.5-minute, 24000
Aerial Photo Revised 1978

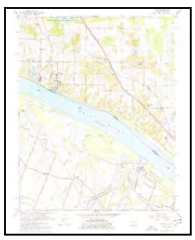
1975, 1978 Source Sheets

La Center
1975
7.5-minute, 24000
Aerial Photo Revised 1974

Heath
1978
7.5-minute, 24000
Aerial Photo Revised 1974

1966, 1967 Source Sheets

Bandana
1966
7.5-minute, 24000
Aerial Photo Revised 1965



Joppa
1967
7.5-minute, 24000
Aerial Photo Revised 1965

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

1954 Source Sheets

Joppa
1954
7.5-minute, 24000
Aerial Photo Revised 1952

Bandana
1954
7.5-minute, 24000
Aerial Photo Revised 1952

Heath
1954
7.5-minute, 24000
Aerial Photo Revised 1952

La Center
1954
7.5-minute, 24000
Aerial Photo Revised 1952

1932 Source Sheets

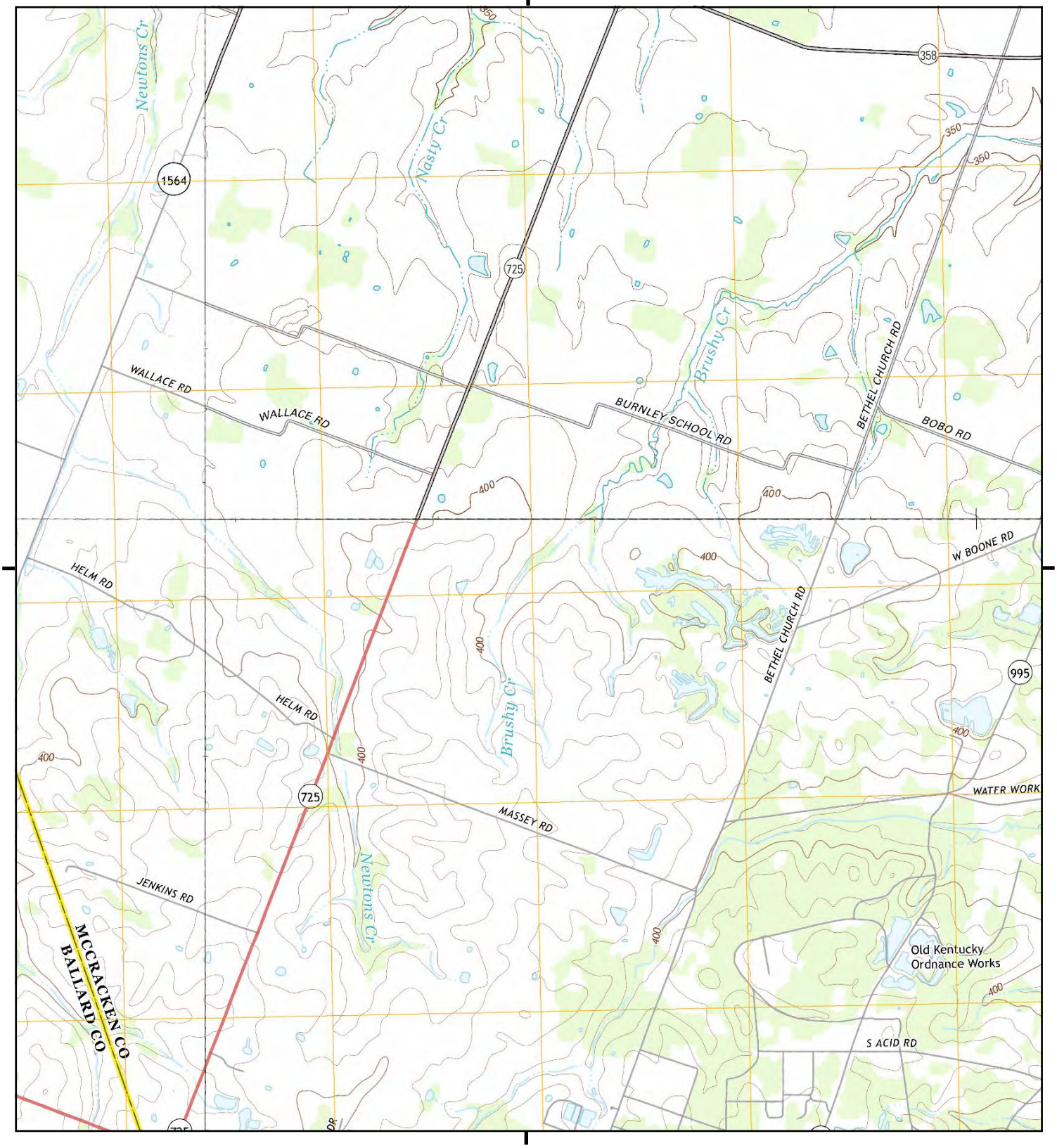
La Center
1932
15-minute, 62500

1928 Source Sheets

La Center
1928
15-minute, 62500

Historical Topo Map

2012, 2013



This report includes information from the following map sheet(s).

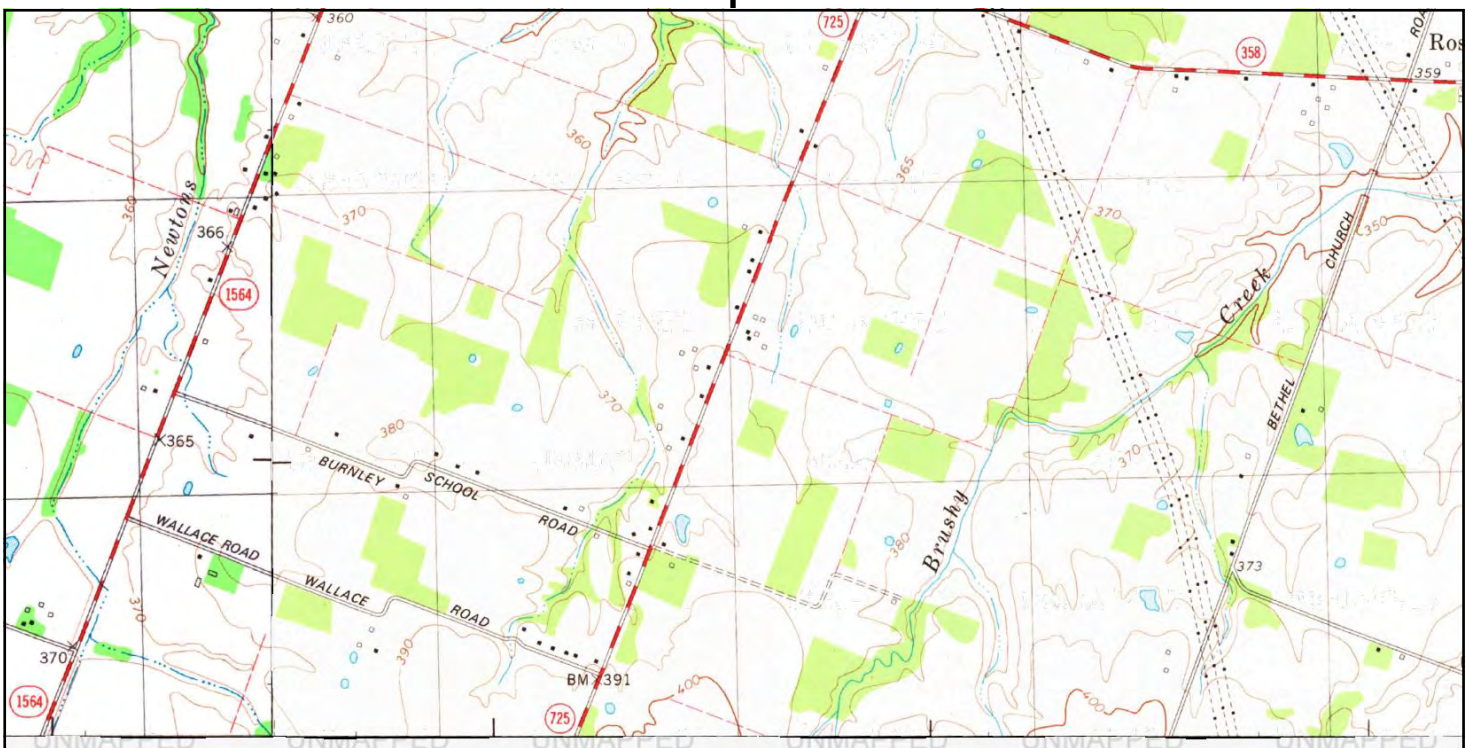
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Heath, 2013, 7.5-minute
NE, Joppa, 2012, 7.5-minute
SW, La Center, 2013, 7.5-minute
NW, Bandana, 2013, 7.5-minute

SITE NAME: Mccracken Co.
ADDRESS: New Liberty Church Road
Kevil, KY 42053
CLIENT: Linebach Funkhouser Inc.

N



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W E
SW S SE

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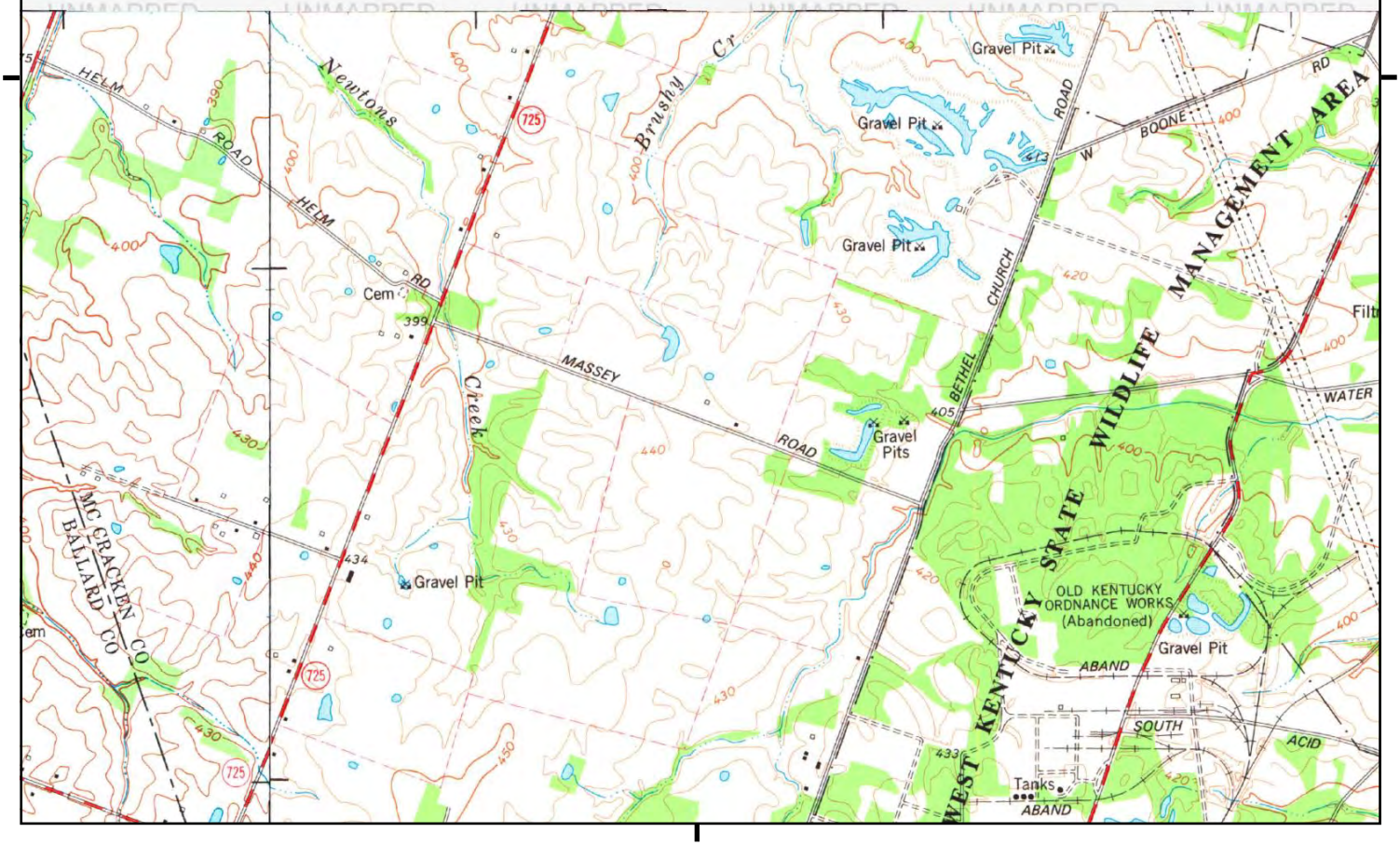
NW, Bandana, 1982, 7.5-minute

SITE NAME: Mccracken Co.
ADDRESS: New Liberty Church Road
Kevil, KY 42053
CLIENT: Linebach Funkhouser Inc.

N



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W E
SW S SE

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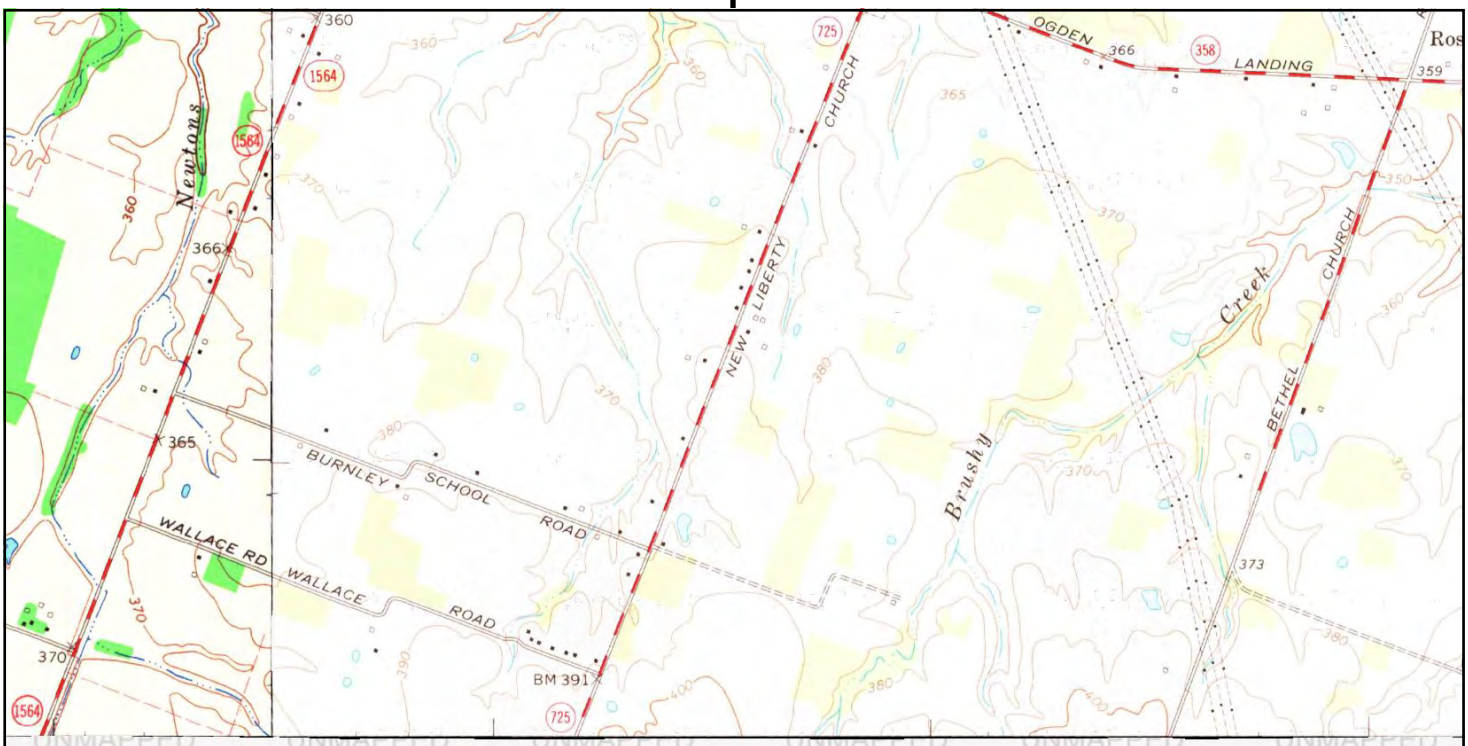
SW, La Center, 1975, 7.5-minute

SITE NAME: Mccracken Co.
ADDRESS: New Liberty Church Road
Kevil, KY 42053
CLIENT: Linebach Funkhouser Inc.

N

Historical Topo Map

1966, 1967



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W E
SW S SE

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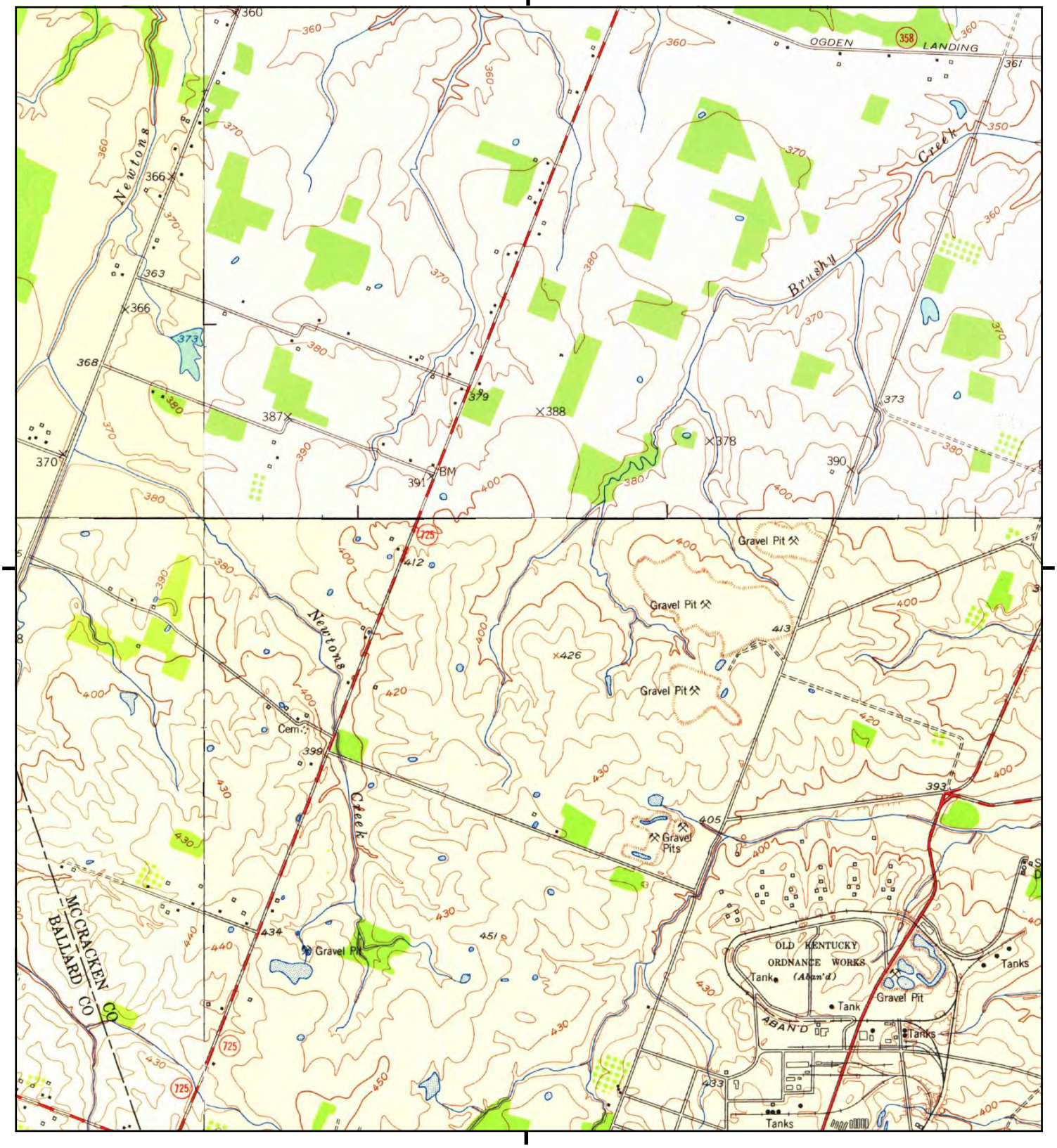
SITE NAME: Mccracken Co.
ADDRESS: New Liberty Church Road
Kevil, KY 42053
CLIENT: Linebach Funkhouser Inc.

N



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W E
SW S SE

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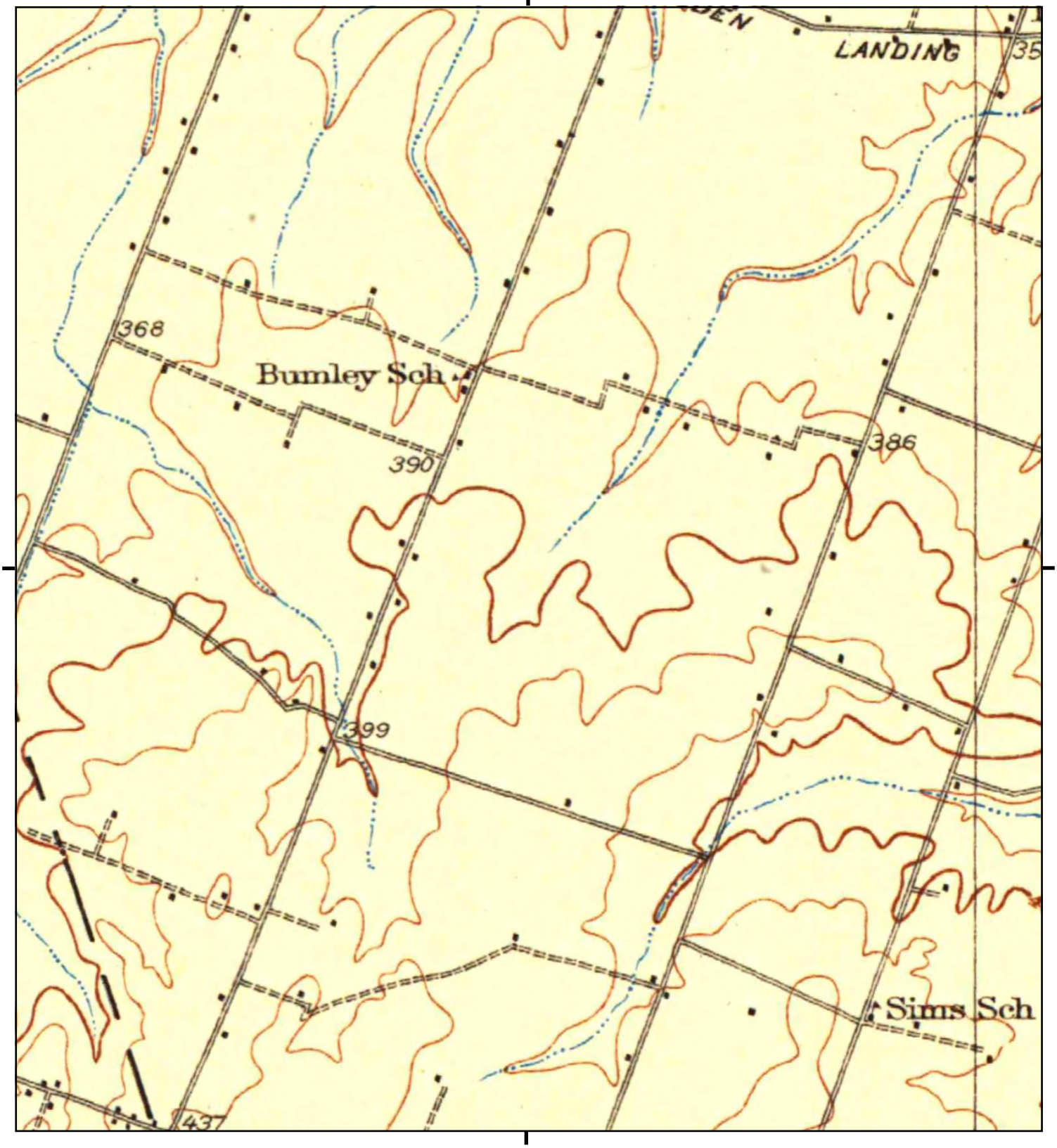
NE, Joppa, 1954, 7.5-minute
SW, La Center, 1954, 7.5-minute
NW, Bandana, 1954, 7.5-minute

SITE NAME: Mccracken Co.
ADDRESS: New Liberty Church Road
Kevil, KY 42053
CLIENT: Linebach Funkhouser Inc.

N



This report includes information from the following map sheet(s).

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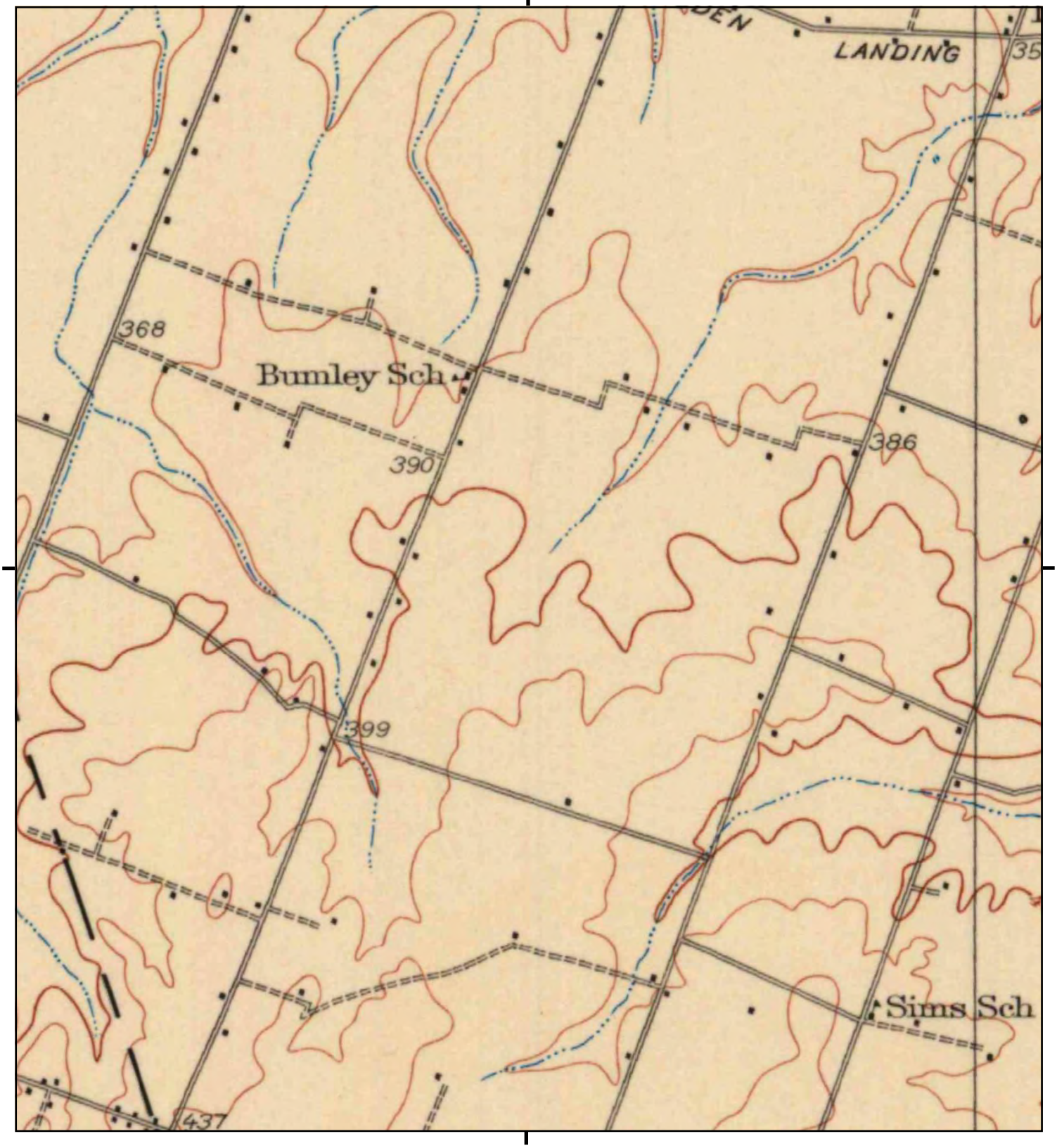
NW N NE
W E
SW S SE

TP, La Center, 1932, 15-minute

SITE NAME: Mccracken Co.
ADDRESS: New Liberty Church Road
Kevil, KY 42053
CLIENT: Linebach Funkhouser Inc.

N



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NW N NE
W E
SW S SE

TP, La Center, 1928, 15-minute

SITE NAME: Mccracken Co.
ADDRESS: New Liberty Church Road
Kevil, KY 42053
CLIENT: Linebach Funkhouser Inc.

N

Mccracken Co.

New Liberty Church Road

Kevil, KY 42053

Inquiry Number: 6302950.8

December 17, 2020

The EDR Aerial Photo Decade Package

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

12/17/20

Site Name:

Mccracken Co.
New Liberty Church Road
Kevil, KY 42053
EDR Inquiry # 6302950.8

Client Name:

Linebach Funkhouser Inc.
114 Fairfax Ave
Louisville, KY 40207
Contact: Jason Boston

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

Search Results:

Year	Scale	Details	Source
2016	1"=500'	Flight Year: 2016	USDA/NAIP
2012	1"=500'	Flight Year: 2012	USDA/NAIP
2008	1"=500'	Flight Year: 2008	USDA/NAIP
1998	1"=500'	Acquisition Date: November 22, 1998	USGS/DOQQ
1993	1"=750'	Flight Date: March 06, 1993	USGS
1988	1"=1000'	Flight Date: March 22, 1988	USGS
1983	1"=1000'	Flight Date: November 24, 1983	USGS
1978	1"=500'	Flight Date: April 07, 1978	USGS
1965	1"=500'	Flight Date: February 22, 1965	USGS
1952	1"=500'	Flight Date: February 21, 1952	USGS

When delivered electronically by EDR, the aerial photo images included with this report are for ONE TIME USE ONLY. Further reproduction of these aerial photo images is prohibited without permission from EDR. For more information contact your EDR Account Executive.


INQUIRY #: 6302950.8
YEAR: 2016
= 500'
N
EDR


INQUIRY #: 6302950.8
YEAR: 2012
= 500'
N
EDR


INQUIRY #: 6302950.8
YEAR: 2008
= 500'
N
EDR

INQUIRY #: 6302950.8

YEAR: 1998

= 500'

N

EDR

INQUIRY #: 6302950.8

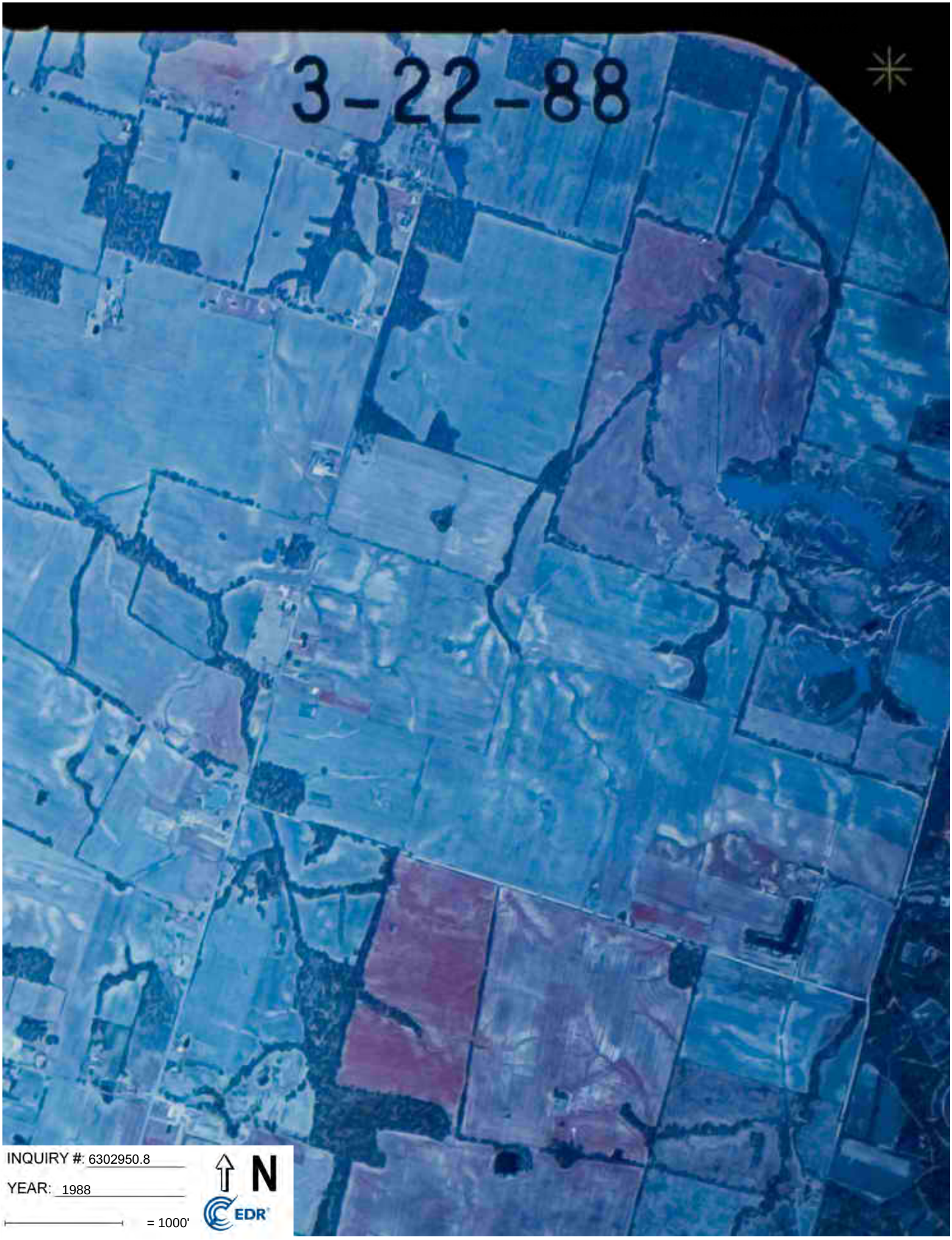
YEAR: 1993

= 750'

N

EDR

Subject boundary not shown because it exceeds image extent or image is not georeferenced.


3-22-88
INQUIRY #: 6302950.8
YEAR: 1988
= 1000'
N
EDR

INQUIRY #: 6302950.8

YEAR: 1983

= 1000'

N

EDR


INQUIRY #: 6302950.8
YEAR: 1978
= 500'
N
EDR

INQUIRY #: 6302950.8

YEAR: 1965

= 500'

N

EDR

INQUIRY #: 6302950.8

YEAR: 1952

= 500'

N

EDR

Mccracken Co.
New Liberty Church Road
Kevil, KY 42053

Inquiry Number: 6302950.3
December 15, 2020

Certified Sanborn® Map Report

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

12/15/20

Site Name:

Mccracken Co.
New Liberty Church Road
Kevil, KY 42053
EDR Inquiry # 6302950.3

Client Name:

Linebach Funkhouser Inc.
114 Fairfax Ave
Louisville, KY 40207
Contact: Jason Boston

The Sanborn Library has been searched by EDR and maps covering the target property location as provided by Linebach Funkhouser Inc. were identified for the years listed below. The Sanborn Library is the largest, most complete collection of fire insurance maps. The collection includes maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow, and others. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by the Sanborn Library LLC, the copyright holder for the collection. Results can be authenticated by visiting www.edrnet.com/sanborn.

The Sanborn Library is continually enhanced with newly identified map archives. This report accesses all maps in the collection as of the day this report was generated.

Certified Sanborn Results:

Certification # 088C-4580-8567

PO # NA

Project 270-20

UNMAPPED PROPERTY

This report certifies that the complete holdings of the Sanborn Library, LLC collection have been searched based on client supplied target property information, and fire insurance maps covering the target property were not found.

Sanborn® Library search results

Certification #: 088C-4580-8567

The Sanborn Library includes more than 1.2 million fire insurance maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow and others which track historical property usage in approximately 12,000 American cities and towns. Collections searched:

- ☑ Library of Congress
- ☑ University Publications of America
- ☑ EDR Private Collection

The Sanborn Library LLC Since 1866™

Limited Permission To Make Copies

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Mccracken Co.
New Liberty Church Road
Kevil, KY 42053

Inquiry Number: 6302950.5
December 18, 2020

The EDR-City Directory Image Report

Environmental Data Resources Inc

6 Armstrong Road
Shelton, CT 06484
800.352.0050
www.edrnet.com

TABLE OF CONTENTS

SECTION

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

DESCRIPTION

Environmental Data Resources, Inc.'s (EDR) City Directory Report is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's City Directory Report includes a search of available city directory data at 5 year intervals.

RECORD SOURCES

EDR's Digital Archive combines historical directory listings from sources such as Cole Information and Dun & Bradstreet. These standard sources of property information complement and enhance each other to provide a more comprehensive report.

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Data by infoUSA®

RESEARCH SUMMARY

The following research sources were consulted in the preparation of this report. A check mark indicates where information was identified in the source and provided in this report.

Year	Target Street	Cross Street	Source
2017	☐	☑	EDR Digital Archive
2014	☐	☑	EDR Digital Archive
2010	☐	☑	EDR Digital Archive
2005	☐	☑	EDR Digital Archive
2000	☐	☑	EDR Digital Archive
1995	☐	☑	EDR Digital Archive
1992	☐	☑	EDR Digital Archive

FINDINGS

TARGET PROPERTY STREET

New Liberty Church Road
Kevil, KY 42053

No Addresses Found

FINDINGS

CROSS STREETS

Year	*CD Image*	*Source*
NEW LIBERTY CHURCH RD		
2017	pg. A2	EDR Digital Archive
2014	pg. A4	EDR Digital Archive
2010	pg. A6	EDR Digital Archive
2005	pg. A8	EDR Digital Archive
2000	pg. A10	EDR Digital Archive
1995	pg. A12	EDR Digital Archive
1992	pg. A13	EDR Digital Archive

City Directory Images

NEW LIBERTY CHURCH RD 2017

128	BOSS, JEAN
	BOWEN, SANDRA
	BROWN, RACHEL E
	CRAWFORD, JOAN A
	ELLIS, ELAINE
	FINNELL, BETTY S
	FOOTE, MARTHA F
	FRANKS, B
	HOOK, ADA L
	JACKSON, JIMMY C
	KELLY, JOHN T
	MCGOWAN, THOMAS W
	MURPHY, GEORGE H
	PARRA, CAROLYN
	SMITH, MINNIE
	THROGMORTON, KATIE
	WALKER, THERESA A
151	HIGGINS, NATHAN W
272	WRAY, GEORGE R
298	JETT, LEWANDA C
440	HONCHELL, BENJAMIN F
449	LAMB, MARK D
477	RIDDLE, JESSICA
478	DOWNS, MARK B
487	MERCER, MIKE S
577	MCCLURE, AMANDA L
665	THROGMORTON, EDDIE T
722	SUMMERS, JERRY D
739	HENSON, SHIRLEY L
755	RICHARDSON, LINDELL L
843	BALDWIN, PATRICK
1030	THROGMORTON, PAUL E
1031	SULLIVAN, ROGER C
4350	BENTON, LISA A
4410	WEIR, ERIC
4415	BYERS, CLYDE R
4455	LYNN, ALAN S
4460	BLANKENSHIP, ERIC D
4470	BENTON, DWIGHT G
4475	CALDWELL, LARRY E
4530	ROETTGER, KENNETH E
4550	ROETTGER, TODD M
4580	TWENTE, FRANK C
4630	SULLIVAN, MICAH D
4715	DAVIS, ROY L
4860	SULLIVAN, WAYNE C
4905	LYNN, GERALD G
4925	WORLEY, JOY M
4940	SANDERS, BETTY
4955	POWELL, TERRY B

NEW LIBERTY CHURCH RD 2017 (Cont'd)

5115	BROWN, MICHAEL D
5255	SULLIVAN, JEFF W
5415	CREWS, ALFRED M
5525	KNIGHT, SYLVIA D
5645	SIMMONS, RYAN
5705	SIMMONS, DARRELL L
5905	ESTES, JOSEPH
6025	TISDAL, SIGRID B
6045	TISDAL, WAYNE E
6065	LINER, RICHARD D
6145	LINER, MARION E
6235	WILKINS, JOHN J
6315	BURNETT, RUTH S
6405	D & G ROOFING
	REEDY, DANIEL
6435	DODD, DONALD
6445	WALLS, GEORGE H
6620	EVERETT, DANIEL F
6660	LAWSON, MICHAEL G
6665	SHADE, LINDA K
6670	COLLIER, RYAN R
6725	POOLE, HILLARY D
6805	SHELTON, CHAD W
6955	NEW LIBERTY UNITED
7325	BROWN, HAROLD E
7335	UPCHURCH, BEN
7415	BEYER, CHASE H
7702	MITCHELL, JOHN
8155	JERRELL, JEFF D
8180	SHELTON, MARTY J

NEW LIBERTY CHURCH RD 2014

128	BEAVERS, JAMES W
	BOSS, JEAN
	BROWN, ROBERT R
	BURGESS, MICHAEL G
	ELLIS, RUTH E
	EVANS, JANET I
	FRANKS, B
	FREEMAN, LYNDA L
	HARGROVE, NANCY J
	HOOK, ADA L
	LEWIS, DIANA K
	MCVEY, ALMA W
	MURPHY, GEORGE H
	NORTHINGTON, EVERETT
	SANDERS, CLAUDETTE B
	SINGLETON, ANDRE R
	SULLIVAN, MAXINE M
	WARD, WILLIE J
151	HIGGINS, NATHAN W
173	MINTON, KYLE D
272	WRAY, GEORGE R
298	JETT, GARLAND C
440	HONCHELL, BENJAMIN F
449	LAMB, MARK D
462	ABERNATHY, TIM E
477	RIDDLE, JESSICA
478	DOWNS, MARK B
487	SNYDER, DOROTHY H
577	MCCLURE, DERRICK M
665	THROGMORTON, EDDIE T
722	SUMMERS, THOMAS A
739	HENSON, SHIRLEY L
755	RICHARDSON, BRANDON K
843	BALDWIN, PATRICK
1030	THROGMORTON, PAUL E
1031	SULLIVAN, ROGER C
4350	BENTON, LISA A
4410	STEINBECK, LEE
4415	BYERS, CLYDE R
4445	NELSON, CHARLENE L
4455	KAROLYN, K L
4460	BLANKENSHIP, ERIC D
4470	BENTON, DWIGHT G
4475	CALDWELL, LARRY E
4530	ROETTGER, KENNETH E
4550	ROETTGER, TODD M
4580	TWENTE, FRANK C
4630	SULLIVAN, MICAH D
4715	DAVIS, ROY L
4860	SULLIVAN, WAYNE C

NEW LIBERTY CHURCH RD 2014 (Cont'd)

4905	LYNN, REX G
4925	WORLEY, JOY M
4940	SANDERS, BETTY
4955	POWELL, TERRY B
5055	CAYLOR, KEITH K
5115	BROWN, MICHAEL D
5255	SULLIVAN, JEFF W
5415	OCCUPANT UNKNOWN,
5525	ALBRITTON, KEM C
5645	SIMMONS, RYAN
5705	SIMMONS, DARRELL
5905	ESTES, JOSEPH
6025	TISDAL, SIGRID B
6045	TISDAL, WAYNE E
6065	LINER, RICHARD D
6145	LINER, BILL A
6235	WILKINS, JOHN D
6315	BURNETT, RUTH S
6370	GIBSON, LEON L
6405	SMITH, EMILY M
6435	D & G ROOFING
	DODD, DONALD
6445	OCCUPANT UNKNOWN,
6505	CAYLOR, THOMAS E
6620	OCCUPANT UNKNOWN,
6660	LAWSON, MICHAEL G
6665	SHADE, LINDA K
6670	COLLIER & SON TAXIDERMY
	COLLIER, DAVID R
6715	BALLARD RURAL TELEPHONE
6725	OCCUPANT UNKNOWN,
6805	SHELTON, CHAD W
6955	MORRISON, KIM
7325	BROWN, HAROLD E
7335	UPCHURCH, CHARLES M
7415	BEYER, CHASE H
7702	MITCHELL, JOHN
7734	PEREZ, MANUEL
8015	CHUMBLER, LEWIS D
8155	JERRELL, JEFF D
8180	SHELTON, MARTY J

NEW LIBERTY CHURCH RD 2010

128	BEAVERS, JAMES W
	BOSS, JEAN
	BROWN, MARSHALL D
	COOPER, TOMMY
	ELLIS, RUTH E
	FRANKS, B
	HEDDY, HERBERT J
	HOOK, ADA L
	JACKSON, JIMMY
	MCVEY, ALMA W
	MURPHY, GEORGE H
	PARRA, CAROLYN
	SANDERS, BOB J
	SULLIVAN, MARION M
	THROGMORTON, ANITA F
151	GOLDSBERRY, DONALD H
173	MINTON, KYLE D
272	WRAY, GEORGE R
298	JETT, GARLAND C
440	HONCHELL, BENJAMIN F
445	GRAVES, DON K
449	LAMB, MARK D
462	ABERNATHY, TIM E
477	KING, DANIELLE S
478	DOWNS, BRAD
487	SNYDER, DOROTHY H
577	MCCLURE, DERRICK M
665	THROGMORTON, EDDIE T
722	SUMMERS, JERRY R
739	HENSON, SHIRLEY L
755	RICHARDSON, LINDELL L
1030	THROGMORTON, PAUL E
1031	SULLIVAN, ROGER C
4350	BENTON, WALTER K
4410	WEIR, ERIC
4415	BYERS IRON WORKS
4445	NELSON, CHARLENE L
4460	BLANKENSHIP, ERIC D
4470	BENTON, DWIGHT G
4530	ROETTGER, KENNETH E
4550	ROETTGER, TODD M
4580	TWENTE, FRANK C
4630	SULLIVAN, MICAH D
4715	DAVIS, ROY L
4860	SULLIVAN FARMS
	SULLIVAN, WAYNE C
4905	LYNN, REX G
4940	SANDERS, BETTY
4955	POWELL, TERRY B
5055	CAYLOR, KEITH K

NEW LIBERTY CHURCH RD 2010 (Cont'd)

5115	BROWN, MICHAEL D
5255	SULLIVAN, JEFF W
5415	CREWS, EVA N
5460	BOBO, JOHN T
5525	ALBRITTON, KEM C
5645	SIMMONS, RYAN
5705	SIMMONS, DORIS L
6025	TISDAL, SIGRID B
6045	TISDAL, WAYNE E
6065	LINER, RICHARD D
6145	LINER, BILL A
6235	WILKINS, JOHN J
6315	BURNETT, BILLY J
6405	D & G ROOFING
	SMITH, EMILY M
6445	HENDERSON, MICHAEL R
6505	CAYLOR, BRIAN K
6620	EVERETT, DANIEL F
6660	LAWSON, MICHAEL G
6665	SHADE, LINDA K
6670	COLLIER, RYAN D
6715	BALLARD RURAL TELEPHONE
6725	LUBCKE, STEVE R
6805	SHELTON, CHAD W
6925	JOHNSON, LEROY H
6955	MORRISON, KIM
7225	SCARBROUGH, JOEL A
7325	BROWN, HAROLD E
7335	UPCHURCH, CHARLES M
7415	BEYER, LYNN C
7702	MITCHELL, JOHN
7710	TAYLOR, WILLA F
7734	PEREZ, MANUEL
8015	CHUMBLER, LEWIS D
8155	JERRELL, JEFF D
8180	SHELTON, MARTY J

NEW LIBERTY CHURCH RD 2005

128	BOLEN, JO A
	BROWN, MARSHALL
	FRANKS, B
	FUQUA, LEWIS E
	HOLMES, LARRY A
	JAMES, JESSE L
	MCCANE, CLAUDETTE B
	MURPHY, GEORGE H
	MURPHY, ROBBIE A
	PLEASANT VALLEY PRESBYTERIAN CHURCH
	RILEY, DORIS
	SANDERS, BOB
	SULLIVAN, MARION M
	TALLEY, LUNELL J
	WILKERSON, MARY L
151	MAGEE, DARYL V
173	MINTON, KYLE D
272	WRAY, GEORGE R
298	JETT, GARLAND C
440	BF HONCHELL CORP
	HONCHELL, BENJAMIN F
445	NANCE, TRACY S
449	LAMB, MARK D
477	BOYER, ALECIA
478	DOWNS, BRAD
487	SNYDER, DOROTHY H
577	ROBINSON, BOB R
580	HOWARD, JEREMY
665	THROGMORTON FARMS
	THROGMORTON, EDDIE T
722	GREEAR, MARY M
739	HENSON, SHIRLEY F
755	RICHARDSON, LINDELL L
843	ARMSTRONG, K D
1030	THROGMORTON, PAUL
1031	SULLIVAN, ROGER
4350	BENTON, WALTER K
4410	WEIR, ERIC
4445	NELSON, CHARLENE L
4455	LYNN, T
4460	BLANKENSHIP, ERIC
4475	REDDICK, GARY A
4530	ROETTGER, KENNETH E
4550	ROETTGER, TODD M
4580	HOWARD, RICKY L
4630	SULLIVAN, MICAH
4715	WALKER, DAVID
4860	SULLIVAN FARMS
	SULLIVAN, WAYNE C
4905	LYNN, GERALD

NEW LIBERTY CHURCH RD 2005 (Cont'd)

4940	SANDERS, BETTY
4955	POWELL, TERRY B
5055	CAYLOR, DONALD G
5115	BROWN, MICHAEL D
5255	JEFFERY SULLIVAN
	SULLIVAN, JEFF W
5415	CREWS, EVA L
5460	BOBO, JOHN N
5525	JENKINS, ANDREW M
5645	SIMMONS, RYAN
5705	SIMMONS, DORIS L
6025	TISDAL, SIGRID B
6045	TISDAL, WAYNE E
6065	HERBALIFE AN INDEPENDENT DISTRIBUTOR
	LINER, RICHARD D
6235	LONG, HOWARD C
6315	BURNETT, BILLY J
6370	GIBSON, LEON L
6405	LEE, GAIL E
6445	WALLS, GEORGE H
6660	LAWSON, MICHAEL G
6665	SHADE, LINDA K
6670	COLLIER, RYAN R
6725	THIEL, RANDELL C
6805	SHELTON, CHAD
6925	JOHNSON, JOAN
7225	SCARBROUGH, JOEL A
7325	BRWON, H
7335	UPCHURCH, CHARLES M
7415	BEYER, LYNN J
7702	JETT, KENNEY W
7710	TAYLOR, WILLA F
8155	JERRELL, JEFF D
8180	SHELTON, MARTY J

NEW LIBERTY CHURCH RD 2000

128	BOLEN, JOANNA
	CRAIN, PAUL H
	FEEZOR, MAGGIE
	FRANKS, E B
	FUQUA, LEWIS E
	HITE, BONNIE
	HOPWOOD, A E
	LINDSEY, MARTHA B
	MURPHY, VERNON C
	POVIACH, M G
	PRICE, WILFORD
	SULLIVAN, M M
	THROGMORTON, KATIE
	TOMLIN, M
	TOMLIN, WALLACE
	VANCE, GROVER
	WALKER, ED
151	KINSEY, JESS
173	CASH, WANDA
174	KEVIL TOOL & DIE
272	WRAY, GEORGE
440	HONCHELL, V
449	LAMB, MARK
462	CLINE, FRED
477	VAUGHAN, JERRY
	VAUGHN, JERRY
478	CRUMP, MARIE
487	SNYDER, D H
538	KELLY, JOHN T
577	ROBINSON, BOB R
665	THROGMORTON, EDDIE T
722	GREEAR, CARL A
739	HENSON, S F
755	RICHARDSON, LINDELL
4350	BENTON, WALTER K
	ROETTGER, KENNETH E
4445	NELSON, C
4455	PATRICK, BUTCH L
4460	SUMMERS, CARL
4475	REDDICK, GARY
4550	LYNN, JESSE
4715	DAVIS, HOLBERT
	MOSS, JAMES M
4860	SULLIVAN, WAYNE C
4905	LYNN, GERALD
4940	SCOTT, JAMES R
4955	POWELL, TERRY B
5055	CAYLOR, KEITH
5115	BROWN, MICHAEL
5255	SULLIVAN, JEFF

NEW LIBERTY CHURCH RD 2000 (Cont'd)

5415	CREWS, E N
5460	BOBO, TOMMY
5525	JENKINS, ANDREW
5705	SIMMONS, DORIS L
5905	LAMPKIN, TEX W
6025	TISDAL, SIGRID
6045	TISDAL, WAYNE
6065	LINER, RICHARD D
6235	LONG, H C
6315	BURNETT, BILLY J
6370	GIBSON, LEON
6405	SHARPTON, JAMES W
6445	WALLS, GEORGE H
6660	LAWSON, MICHAEL G
6665	SHADE, P H
6670	COLLIER, RYAN
6725	HARMON, KAREN
6925	JOHNSON, JOAN
7225	SCARBROUGH, JOEL
7335	UPCHURCH, CHARLES
7415	BEYER, LYNN
	WEST KENTUCKY WATERCARE
7710	TAYLOR, JIM
8015	CHUMBLER, GUY
8155	JERRELL, JEFF
8180	SHELTON, MARTY

NEW LIBERTY CHURCH RD 1995

128	CRAIN, PAUL H
	FEEZOR, MAGGIE
	GIBSON, JAMES
	HARRIS, STANLEY
	HITE, BONNIE
	HOLMAN, ELMER
	HUNTER, WALTER
	HURLEY, L M
	POVIACH, M
	PRICE, WILFORD
	THROGMORTON, KATIE
	TOMLIN, M
	TROXELL, BERTHA
	VAUGHN, W B
	WALKER, ED
	WILLHARBER, MARY
151	KINSEY, JESS
174	KEVIL TOOL & DIE
238	BEELER, DANNY
272	QUARLES, TERRY
410	COGNITIVE COUNSLNG
440	HONCHELL, V
449	TUCKER, DELLA B
462	GIBSON, PAMELA
478	COWAN, B
487	HOUSE, LISLE
538	KELLY, JOHN T
665	THROGMORTON, EDDIE T
722	GREEAR, CARL A SR
739	HENSON, FORREST JR
755	RICHARDSON, LINDELL
843	HOOK, DENNIS
4350	BENTON, WALTER K
4715	DAVIS, HOLBERT
5055	CAYLOR, KEITH
5415	CREWS, J A
5460	BOBO, TOMMY
5525	JENKINS, ANDREW
6315	BURNETT, BILLY J
6370	GIBSON, LEON
8015	CHUMBLER, GUY
8155	COLVIN, HERBERT
8180	SHELTON, MARTY

NEW LIBERTY CHURCH RD 1992

4350	BENTON, WALTER K
4905	BAKER, B M
5055	CAYLOR, KEITH
5115	COSSLER, WILLIAM R JR
5415	CREWS, J A
5460	BOBO, TOMMY
5525	JENKINS, ANDREW
6315	BURNETT, BILLY J
6370	GIBSON, LEON
8015	CHUMBLER, GUY
8155	COLVIN, HERBERT

Appendix C

Regulatory Database Documentation

Mccracken Co.
New Liberty Church Road
Kevil, KY 42053

Inquiry Number: 6302950.2s
December 15, 2020

The EDR Radius Map™ Report with GeoCheck®

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13), the ASTM Standard Practice for Environmental Site Assessments for Forestland or Rural Property (E 2247-16), the ASTM Standard Practice for Limited Environmental Due Diligence: Transaction Screen Process (E 1528-14) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

NEW LIBERTY CHURCH ROAD
KEVIL, KY 42053

COORDINATES

Latitude (North):	37.1228810 - 37° 7' 22.37''
Longitude (West):	88.8574960 - 88° 51' 26.98''
Universal Tranverse Mercator:	Zone 16
UTM X (Meters):	334981.7
UTM Y (Meters):	4109915.2
Elevation:	390 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	5940063 HEATH, KY
Version Date:	2013
Northeast Map:	5657065 JOPPA, IL
Version Date:	2012
Southwest Map:	5939893 LA CENTER, KY
Version Date:	2013
Northwest Map:	5940053 BANDANA, KY
Version Date:	2013

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20140619
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
NEW LIBERTY CHURCH ROAD
KEVIL, KY 42053

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

EXECUTIVE SUMMARY

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL ---------- National Priority List
Proposed NPL ---------- Proposed National Priority List Sites
NPL LIENS ---------- Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ---------- National Priority List Deletions

Federal CERCLIS list

FEDERAL FACILITY ---------- Federal Facility Site Information listing
SEMS ---------- Superfund Enterprise Management System

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE ---------- Superfund Enterprise Management System Archive

Federal RCRA CORRACTS facilities list

CORRACTS ---------- Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF ---------- RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG ---------- RCRA - Large Quantity Generators
RCRA-SQG ---------- RCRA - Small Quantity Generators
RCRA-VSQG ---------- RCRA - Very Small Quantity Generators (Formerly Conditionally Exempt Small Quantity Generators)

Federal institutional controls / engineering controls registries

LUCIS ---------- Land Use Control Information System

EXECUTIVE SUMMARY

US ENG CONTROLS..... Engineering Controls Sites List
US INST CONTROLS..... Institutional Controls Sites List

Federal ERNS list

ERNS..... Emergency Response Notification System

State- and tribal - equivalent CERCLIS

SHWS..... State Leads List

State and tribal landfill and/or solid waste disposal site lists

SWF/LF..... Solid Waste Facilities List

State and tribal leaking storage tank lists

PSTEAF..... Facility Ranking List
INDIAN LUST..... Leaking Underground Storage Tanks on Indian Land
SB193..... SB193 Branch Site Inventory List

State and tribal registered storage tank lists

FEMA UST..... Underground Storage Tank Listing
UST..... Underground Storage Tank Database
AST..... Above Ground Storage Tanks
INDIAN UST..... Underground Storage Tanks on Indian Land

State and tribal institutional control / engineering control registries

ENG CONTROLS..... Engineering Controls Site Listing
INST CONTROL..... State Superfund Database

State and tribal voluntary cleanup sites

INDIAN VCP..... Voluntary Cleanup Priority Listing
VCP..... Voluntary Cleanup Program Sites

State and tribal Brownfields sites

BROWNFIELDS..... Kentucky Brownfield Inventory

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS..... A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

SWRCY..... Recycling Facilities
HIST LF..... Historical Landfills
INDIAN ODI..... Report on the Status of Open Dumps on Indian Lands
DEBRIS REGION 9..... Torres Martinez Reservation Illegal Dump Site Locations

EXECUTIVE SUMMARY

ODI ---------- Open Dump Inventory
IHS OPEN DUMPS ---------- Open Dumps on Indian Land

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL ---------- Delisted National Clandestine Laboratory Register
CDL ---------- Clandestine Drub Lab Location Listing
US CDL ---------- National Clandestine Laboratory Register

Local Land Records

LIENS 2 ---------- CERCLA Lien Information

Records of Emergency Release Reports

HMIRS ---------- Hazardous Materials Information Reporting System
SPILLS ---------- State spills

Other Ascertainable Records

RCRA NonGen / NLR ---------- RCRA - Non Generators / No Longer Regulated
FUDS ---------- Formerly Used Defense Sites
DOD ---------- Department of Defense Sites
SCRD DRYCLEANERS ---------- State Coalition for Remediation of Drycleaners Listing
US FIN ASSUR ---------- Financial Assurance Information
EPA WATCH LIST ---------- EPA WATCH LIST
2020 COR ACTION ---------- 2020 Corrective Action Program List
TSCA ---------- Toxic Substances Control Act
TRIS ---------- Toxic Chemical Release Inventory System
SSTS ---------- Section 7 Tracking Systems
ROD ---------- Records Of Decision
RMP ---------- Risk Management Plans
RAATS ---------- RCRA Administrative Action Tracking System
PRP ---------- Potentially Responsible Parties
PADS ---------- PCB Activity Database System
ICIS ---------- Integrated Compliance Information System
FTTS ---------- FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
MLTS ---------- Material Licensing Tracking System
COAL ASH DOE ---------- Steam-Electric Plant Operation Data
COAL ASH EPA ---------- Coal Combustion Residues Surface Impoundments List
PCB TRANSFORMER ---------- PCB Transformer Registration Database
RADINFO ---------- Radiation Information Database
HIST FTTS ---------- FIFRA/TSCA Tracking System Administrative Case Listing
DOT OPS ---------- Incident and Accident Data
CONSENT ---------- Superfund (CERCLA) Consent Decrees
INDIAN RESERV ---------- Indian Reservations
FUSRAP ---------- Formerly Utilized Sites Remedial Action Program
UMTRA ---------- Uranium Mill Tailings Sites
LEAD SMELTERS ---------- Lead Smelter Sites
US AIRS ---------- Aerometric Information Retrieval System Facility Subsystem
US MINES ---------- Mines Master Index File
ABANDONED MINES ---------- Abandoned Mines
FINDS ---------- Facility Index System/Facility Registry System
DOCKET HWC ---------- Hazardous Waste Compliance Docket Listing

EXECUTIVE SUMMARY

UXO	Unexploded Ordnance Sites
ECHO	Enforcement & Compliance History Information
FUELS PROGRAM	EPA Fuels Program Registered Listing
AIRS	Permitted Airs Facility Listing
ASBESTOS	Asbestos Notification Listing
COAL ASH	Coal Ash Disposal Sites
DRYCLEANERS	Drycleaner Listing
Financial Assurance	Financial Assurance Information Listing
LEAD	Environmental Lead Program Report Tracking Database
NPDES	Permitted Facility Listing
UIC	UIC Information
MINES MRDS	Mineral Resources Data System

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP	EDR Proprietary Manufactured Gas Plants
EDR Hist Auto	EDR Exclusive Historical Auto Stations
EDR Hist Cleaner	EDR Exclusive Historical Cleaners

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA HWS	Recovered Government Archive State Hazardous Waste Facilities List
RGA LF	Recovered Government Archive Solid Waste Facilities List

SURROUNDING SITES: SEARCH RESULTS

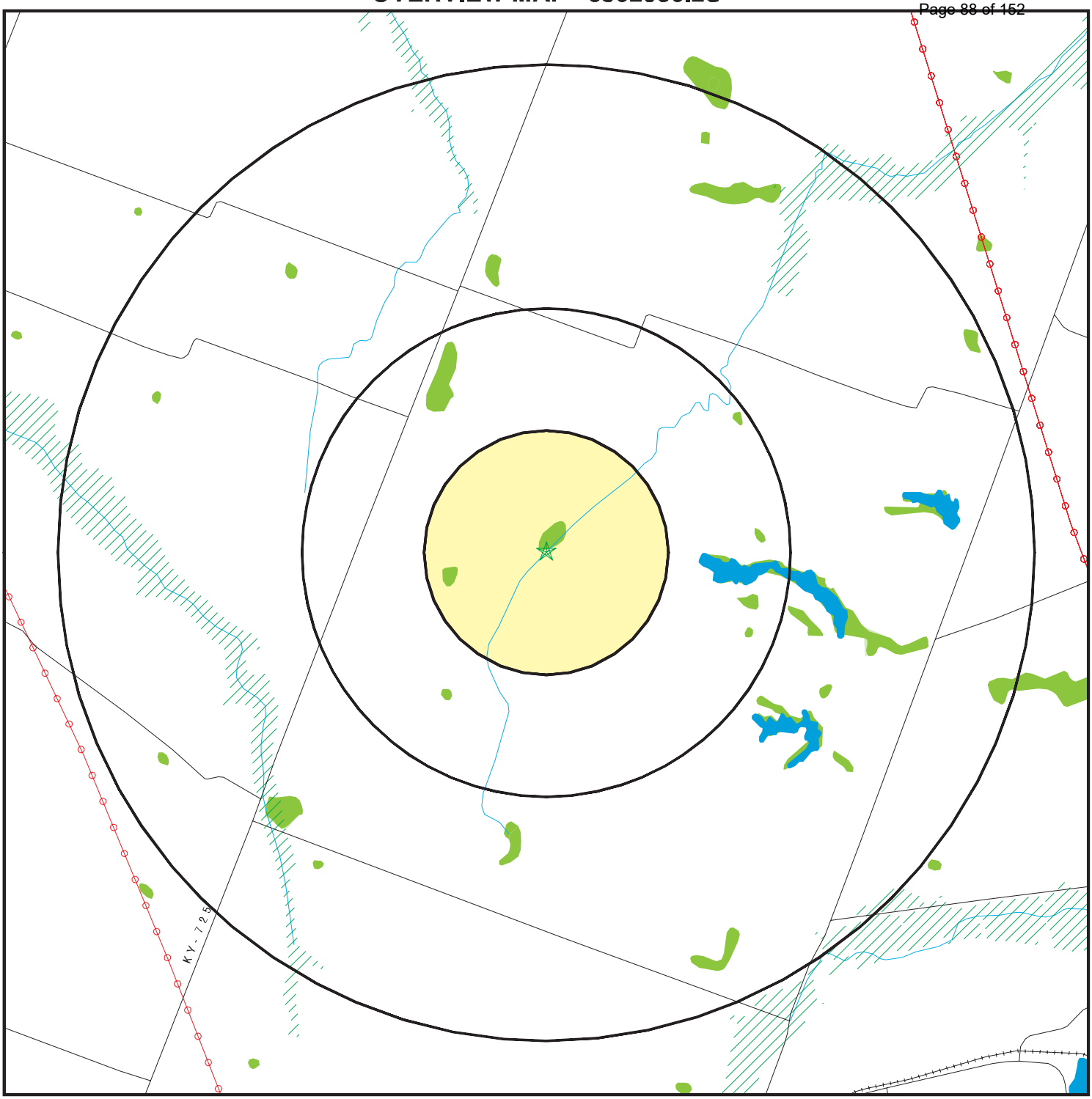
Surrounding sites were not identified.

Unmappable (orphan) sites are not considered in the foregoing analysis.

EXECUTIVE SUMMARY

There were no unmapped sites in this report.

OVERVIEW MAP - 6302950.2S

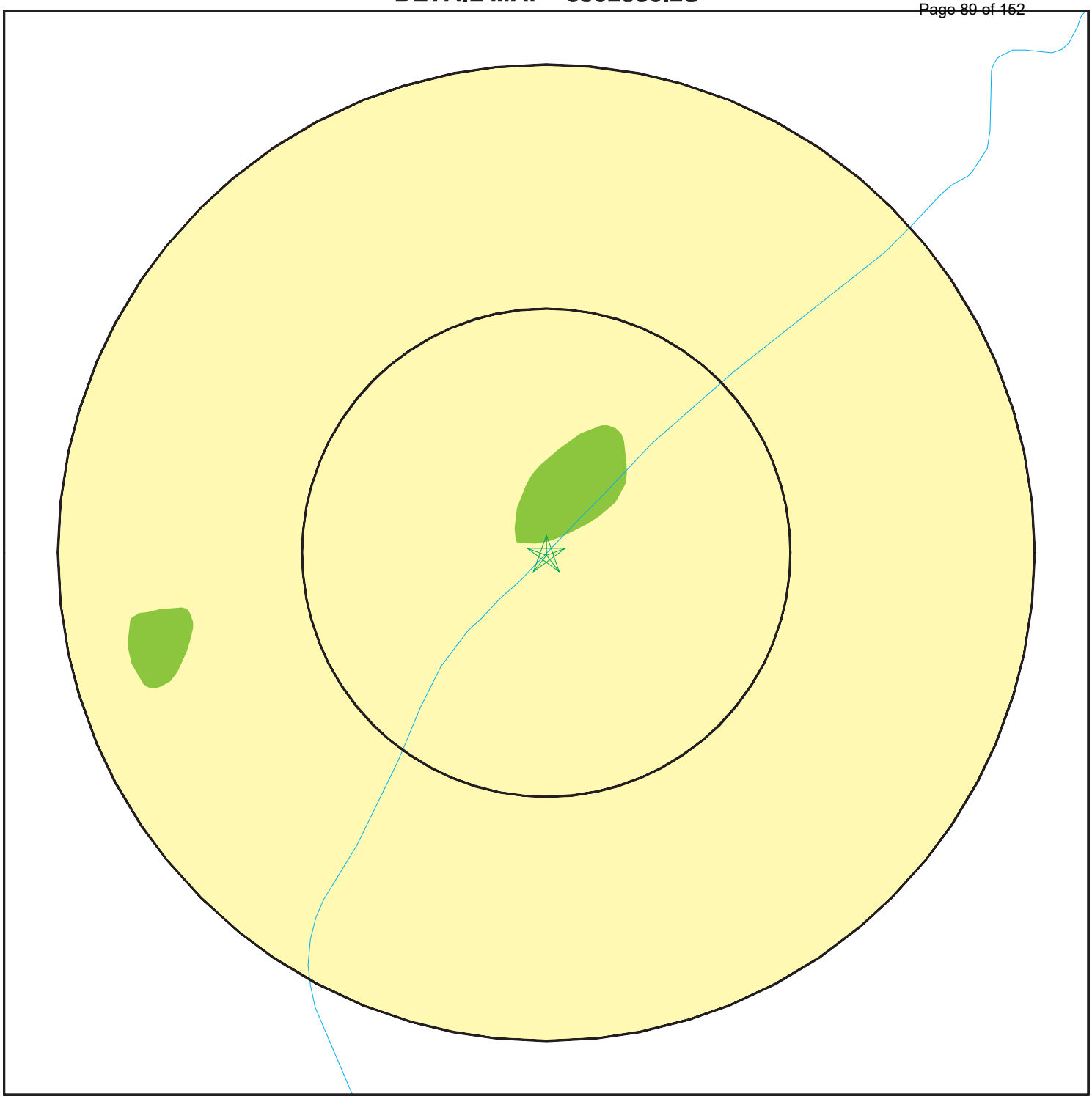


- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Power transmission lines
- Special Flood Hazard Area (1%)
- 0.2% Annual Chance Flood Hazard
- National Wetland Inventory
- State Wetlands

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	Mccracken Co.	CLIENT:	Linebach Funkhouser Inc.
ADDRESS:	New Liberty Church Road Kevil KY 42053	CONTACT:	Jason Boston
LAT/LONG:	37.122881 / 88.857496	INQUIRY #:	6302950.2s
		DATE:	December 15, 2020 4:41 pm

DETAIL MAP - 6302950.2S



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- National Wetland Inventory
- State Wetlands

0 1/16 1/8 1/4 Miles

N

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Mccracken Co.	CLIENT: Linebach Funkhouser Inc.
ADDRESS: New Liberty Church Road Kevil KY 42053	CONTACT: Jason Boston INQUIRY #: 6302950.2s
LAT/LONG: 37.122881 / 88.857496	DATE: December 15, 2020 4:42 pm

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	1.000		0	0	0	0	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	0	NR	NR	0
Federal CERCLIS NFRAP site list								
SEMS-ARCHIVE	0.500		0	0	0	NR	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS	1.000		0	0	0	0	NR	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		0	0	NR	NR	NR	0
RCRA-VSQG	0.250		0	0	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROLS	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	TP		NR	NR	NR	NR	NR	0
State- and tribal - equivalent CERCLIS								
SHWS	1.000		0	0	0	0	NR	0
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	0.500		0	0	0	NR	NR	0
State and tribal leaking storage tank lists								
PSTEAF	0.500		0	0	0	NR	NR	0
INDIAN LUST	0.500		0	0	0	NR	NR	0
SB193	0.500		0	0	0	NR	NR	0
State and tribal registered storage tank lists								
FEMA UST	0.250		0	0	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
UST	0.250		0	0	NR	NR	NR	0
AST	0.250		0	0	NR	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
State and tribal institutional control / engineering control registries								
ENG CONTROLS	0.500		0	0	0	NR	NR	0
INST CONTROL	0.500		0	0	0	NR	NR	0
State and tribal voluntary cleanup sites								
INDIAN VCP	0.500		0	0	0	NR	NR	0
VCP	0.500		0	0	0	NR	NR	0
State and tribal Brownfields sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
SWRCY	0.500		0	0	0	NR	NR	0
HIST LF	0.500		0	0	0	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
IHS OPEN DUMPS	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	TP		NR	NR	NR	NR	NR	0
CDL	TP		NR	NR	NR	NR	NR	0
US CDL	TP		NR	NR	NR	NR	NR	0
Local Land Records								
LIENS 2	TP		NR	NR	NR	NR	NR	0
Records of Emergency Release Reports								
HMIRS	TP		NR	NR	NR	NR	NR	0
SPILLS	TP		NR	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	0	NR	NR	NR	0
FUDS	1.000		0	0	0	0	NR	0
DOD	1.000		0	0	0	0	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	TP		NR	NR	NR	NR	NR	0
EPA WATCH LIST	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	TP		NR	NR	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ROD	1.000		0	0	0	0	NR	0
RMP	TP		NR	NR	NR	NR	NR	0
RAATS	TP		NR	NR	NR	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
FTTS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
HIST FTTS	TP		NR	NR	NR	NR	NR	0
DOT OPS	TP		NR	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	TP		NR	NR	NR	NR	NR	0
US AIRS	TP		NR	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
ABANDONED MINES	0.250		0	0	NR	NR	NR	0
FINDS	TP		NR	NR	NR	NR	NR	0
DOCKET HWC	TP		NR	NR	NR	NR	NR	0
UXO	1.000		0	0	0	0	NR	0
ECHO	TP		NR	NR	NR	NR	NR	0
FUELS PROGRAM	0.250		0	0	NR	NR	NR	0
AIRS	TP		NR	NR	NR	NR	NR	0
ASBESTOS	TP		NR	NR	NR	NR	NR	0
COAL ASH	0.500		0	0	0	NR	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
Financial Assurance	TP		NR	NR	NR	NR	NR	0
LEAD	TP		NR	NR	NR	NR	NR	0
NPDES	TP		NR	NR	NR	NR	NR	0
UIC	TP		NR	NR	NR	NR	NR	0
MINES MRDS	TP		NR	NR	NR	NR	NR	0
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	0	NR	0
EDR Hist Auto	0.125		0	NR	NR	NR	NR	0
EDR Hist Cleaner	0.125		0	NR	NR	NR	NR	0
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA HWS	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
RGA LF	TP		NR	NR	NR	NR	NR	0
- Totals --		0	0	0	0	0	0	0

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

MAP FINDINGS

Map ID Direction Distance Elevation	Site	Database(s)	EDR ID Number EPA ID Number

NO SITES FOUND

Count: 0 records.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
		NO SITES FOUND			

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 10/28/2020
Date Data Arrived at EDR: 11/05/2020
Date Made Active in Reports: 11/25/2020
Number of Days to Update: 20

Source: EPA
Telephone: N/A
Last EDR Contact: 12/02/2020
Next Scheduled EDR Contact: 01/11/2021
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 10/28/2020
Date Data Arrived at EDR: 11/05/2020
Date Made Active in Reports: 11/25/2020
Number of Days to Update: 20

Source: EPA
Telephone: N/A
Last EDR Contact: 12/02/2020
Next Scheduled EDR Contact: 01/11/2021
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

Federal Delisted NPL site list

Delisted NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 10/28/2020
Date Data Arrived at EDR: 11/05/2020
Date Made Active in Reports: 11/25/2020
Number of Days to Update: 20

Source: EPA
Telephone: N/A
Last EDR Contact: 12/02/2020
Next Scheduled EDR Contact: 01/11/2021
Data Release Frequency: Quarterly

Federal CERCLIS list

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 04/03/2019
Date Data Arrived at EDR: 04/05/2019
Date Made Active in Reports: 05/14/2019
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 10/02/2020
Next Scheduled EDR Contact: 01/11/2021
Data Release Frequency: Varies

SEMS: Superfund Enterprise Management System

SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly know as CERCLIS, renamed to SEMS by the EPA in 2015. The list contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 10/28/2020
Date Data Arrived at EDR: 11/05/2020
Date Made Active in Reports: 11/25/2020
Number of Days to Update: 20

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 12/02/2020
Next Scheduled EDR Contact: 01/25/2021
Data Release Frequency: Quarterly

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that. based upon available information, the location is not judged to be potential NPL site.

Date of Government Version: 10/28/2020
Date Data Arrived at EDR: 11/05/2020
Date Made Active in Reports: 11/25/2020
Number of Days to Update: 20

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 12/02/2020
Next Scheduled EDR Contact: 01/25/2021
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 06/15/2020
Date Data Arrived at EDR: 06/22/2020
Date Made Active in Reports: 09/17/2020
Number of Days to Update: 87

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 09/22/2020
Next Scheduled EDR Contact: 01/04/2021
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 06/15/2020
Date Data Arrived at EDR: 06/22/2020
Date Made Active in Reports: 09/18/2020
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 09/22/2020
Next Scheduled EDR Contact: 01/04/2021
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 06/15/2020
Date Data Arrived at EDR: 06/22/2020
Date Made Active in Reports: 09/18/2020
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 09/22/2020
Next Scheduled EDR Contact: 01/04/2021
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 06/15/2020
Date Data Arrived at EDR: 06/22/2020
Date Made Active in Reports: 09/18/2020
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 09/22/2020
Next Scheduled EDR Contact: 01/04/2021
Data Release Frequency: Quarterly

RCRA-VSQG: RCRA - Very Small Quantity Generators (Formerly Conditionally Exempt Small Quantity Generators)

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Very small quantity generators (VSQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 06/15/2020
Date Data Arrived at EDR: 06/22/2020
Date Made Active in Reports: 09/18/2020
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 09/22/2020
Next Scheduled EDR Contact: 01/04/2021
Data Release Frequency: Quarterly

Federal institutional controls / engineering controls registries

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 08/06/2020
Date Data Arrived at EDR: 08/21/2020
Date Made Active in Reports: 11/11/2020
Number of Days to Update: 82

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 11/05/2020
Next Scheduled EDR Contact: 02/22/2021
Data Release Frequency: Varies

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 10/28/2020
Date Data Arrived at EDR: 11/05/2020
Date Made Active in Reports: 11/18/2020
Number of Days to Update: 13

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 11/05/2020
Next Scheduled EDR Contact: 03/08/2021
Data Release Frequency: Varies

US INST CONTROLS: Institutional Controls Sites List

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 10/28/2020
Date Data Arrived at EDR: 11/05/2020
Date Made Active in Reports: 11/18/2020
Number of Days to Update: 13

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 11/05/2020
Next Scheduled EDR Contact: 03/08/2021
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 06/15/2020
Date Data Arrived at EDR: 06/22/2020
Date Made Active in Reports: 09/17/2020
Number of Days to Update: 87

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 09/22/2020
Next Scheduled EDR Contact: 01/04/2021
Data Release Frequency: Quarterly

State- and tribal - equivalent CERCLIS

SHWS: State Leads List

State Hazardous Waste Sites. State hazardous waste site records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. Available information varies by state.

Date of Government Version: 08/24/2020
Date Data Arrived at EDR: 08/26/2020
Date Made Active in Reports: 11/17/2020
Number of Days to Update: 83

Source: Department of Environmental Protection
Telephone: 502-564-6716
Last EDR Contact: 11/16/2020
Next Scheduled EDR Contact: 03/08/2021
Data Release Frequency: Quarterly

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: Solid Waste Facilities List

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 05/21/2020
Date Data Arrived at EDR: 07/24/2020
Date Made Active in Reports: 10/12/2020
Number of Days to Update: 80

Source: Department of Environmental Protection
Telephone: 502-564-6716
Last EDR Contact: 10/14/2020
Next Scheduled EDR Contact: 02/08/2021
Data Release Frequency: Semi-Annually

State and tribal leaking storage tank lists

PSTEAF: Facility Ranking List

The Underground Storage Tank Branch (USTB) has ranked all PSTEAF reimbursable facilities requiring corrective action, in accordance with 401 KAR 42:290. Directive letters will be issued on the basis of facility ranking and available PSTEAF funding in sequential order as ranked. For example, Rank 2 facilities will be issued directives before Rank 3 facilities.

Date of Government Version: 07/01/2020
Date Data Arrived at EDR: 07/07/2020
Date Made Active in Reports: 09/24/2020
Number of Days to Update: 79

Source: Department of Environmental Protection
Telephone: 502-564-5981
Last EDR Contact: 10/06/2020
Next Scheduled EDR Contact: 01/18/2021
Data Release Frequency: Quarterly

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 04/14/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 04/14/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84
Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: Varies

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 04/29/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84
Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: Varies

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land
Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 04/14/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84
Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 04/14/2020
Date Data Arrived at EDR: 05/26/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 78
Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: Varies

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 04/08/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84
Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 04/08/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84
Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 04/15/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84
Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

SB193: SB193 Branch Site Inventory List

The inventory indicates facilities that have performed permanent closure activities at a regulated underground storage tank facility and have known soil and/or groundwater contamination.

Date of Government Version: 09/05/2006
Date Data Arrived at EDR: 09/13/2006
Date Made Active in Reports: 10/18/2006
Number of Days to Update: 35

Source: Department of Environmental Protection
Telephone: 502-564-5981
Last EDR Contact: 04/08/2016
Next Scheduled EDR Contact: 07/25/2016
Data Release Frequency: No Update Planned

State and tribal registered storage tank lists

FEMA UST: Underground Storage Tank Listing

A listing of all FEMA owned underground storage tanks.

Date of Government Version: 07/21/2020
Date Data Arrived at EDR: 09/03/2020
Date Made Active in Reports: 11/25/2020
Number of Days to Update: 83

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 10/01/2020
Next Scheduled EDR Contact: 01/18/2021
Data Release Frequency: Varies

UST: Underground Storage Tank Database

Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 08/05/2020
Date Data Arrived at EDR: 08/26/2020
Date Made Active in Reports: 11/17/2020
Number of Days to Update: 83

Source: Department of Environmental Protection
Telephone: 502-564-5981
Last EDR Contact: 11/19/2020
Next Scheduled EDR Contact: 03/08/2021
Data Release Frequency: Quarterly

AST: Above Ground Storage Tanks

A listing of aboveground storage tank site locations.

Date of Government Version: 08/18/2020
Date Data Arrived at EDR: 08/19/2020
Date Made Active in Reports: 11/06/2020
Number of Days to Update: 79

Source: Office of State Fire Marshal
Telephone: 502-564-4010
Last EDR Contact: 11/16/2020
Next Scheduled EDR Contact: 03/08/2021
Data Release Frequency: Varies

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 04/14/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/13/2020
Number of Days to Update: 85

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: Varies

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 04/03/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 04/29/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 04/14/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: Varies

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 04/08/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 04/08/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: Varies

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 04/14/2020
Date Data Arrived at EDR: 05/20/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 84

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 04/14/2020
Date Data Arrived at EDR: 05/26/2020
Date Made Active in Reports: 08/12/2020
Number of Days to Update: 78

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 10/23/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

State and tribal institutional control / engineering control registries

ENG CONTROLS: Engineering Controls Site Listing
A listing of sites that use engineering controls.

Date of Government Version: 08/24/2020
Date Data Arrived at EDR: 08/26/2020
Date Made Active in Reports: 11/17/2020
Number of Days to Update: 83

Source: Department of Environmental Protection
Telephone: 502-564-6716
Last EDR Contact: 11/16/2020
Next Scheduled EDR Contact: 03/08/2021
Data Release Frequency: Varies

INST CONTROL: State Superfund Database
A list of closed sites in the State Superfund Database. Institutional controls would be in place at any site that uses Contained or Managed as a Closure Option.

Date of Government Version: 08/24/2020
Date Data Arrived at EDR: 08/26/2020
Date Made Active in Reports: 11/17/2020
Number of Days to Update: 83

Source: Department of Environmental Protection
Telephone: 502-564-6716
Last EDR Contact: 11/15/2020
Next Scheduled EDR Contact: 03/08/2021
Data Release Frequency: Varies

State and tribal voluntary cleanup sites

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng
A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

INDIAN VCP R1: Voluntary Cleanup Priority Listing
A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 07/27/2015
Date Data Arrived at EDR: 09/29/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 142

Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 09/16/2020
Next Scheduled EDR Contact: 01/04/2021
Data Release Frequency: Varies

VCP: Voluntary Cleanup Program Sites
Sites that have been accepted into the Voluntary Cleanup Program or have submitted an application.

Date of Government Version: 06/23/2020
Date Data Arrived at EDR: 06/25/2020
Date Made Active in Reports: 09/11/2020
Number of Days to Update: 78

Source: Department of Environmental Protection
Telephone: 502-564-6716
Last EDR Contact: 09/23/2020
Next Scheduled EDR Contact: 01/11/2021
Data Release Frequency: Varies

State and tribal Brownfields sites

BROWNFIELDS: Kentucky Brownfield Inventory
The Kentucky Brownfield Program has created an inventory of brownfield sites in order to market the properties to those interested in brownfield redevelopment. The Kentucky Brownfield Program is working to promote the redevelopment of these sites by helping to remove barriers that prevent reuse, providing useful information to communities, developers and the public and encouraging a climate that fosters redevelopment of contaminated sites.

Date of Government Version: 05/06/2020
Date Data Arrived at EDR: 07/09/2020
Date Made Active in Reports: 09/24/2020
Number of Days to Update: 77

Source: Division of Compliance Assistance
Telephone: 502-564-0323
Last EDR Contact: 10/07/2020
Next Scheduled EDR Contact: 01/25/2021
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 09/14/2020
Date Data Arrived at EDR: 09/15/2020
Date Made Active in Reports: 12/10/2020
Number of Days to Update: 86

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 12/11/2020
Next Scheduled EDR Contact: 03/29/2021
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

SWRCY: Recycling Facilities

A listing of recycling facilities located in the state of Kentucky.

Date of Government Version: 09/13/2019
Date Data Arrived at EDR: 10/23/2019
Date Made Active in Reports: 01/03/2020
Number of Days to Update: 72

Source: Department of Environmental Protection
Telephone: 502-564-6716
Last EDR Contact: 10/12/2020
Next Scheduled EDR Contact: 01/25/2021
Data Release Frequency: Varies

HIST LF: Historical Landfills

This solid waste facility listing contains detail information that is not included in the landfill listing. A listing with detail information is no longer available by the Department of Environmental Protection.

Date of Government Version: 05/01/2003
Date Data Arrived at EDR: 03/30/2006
Date Made Active in Reports: 05/01/2006
Number of Days to Update: 32

Source: Department of Environmental Protection
Telephone: 502-564-6716
Last EDR Contact: 02/23/2009
Next Scheduled EDR Contact: 05/25/2009
Data Release Frequency: No Update Planned

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands

Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 10/20/2020
Next Scheduled EDR Contact: 02/08/2021
Data Release Frequency: Varies

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations
A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137
Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 10/13/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: No Update Planned

IHS OPEN DUMPS: Open Dumps on Indian Land
A listing of all open dumps located on Indian Land in the United States.

Date of Government Version: 04/01/2014
Date Data Arrived at EDR: 08/06/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 176
Source: Department of Health & Human Serivces, Indian Health Service
Telephone: 301-443-1452
Last EDR Contact: 10/30/2020
Next Scheduled EDR Contact: 02/08/2021
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL: National Clandestine Laboratory Register
A listing of clandestine drug lab locations that have been removed from the DEAs National Clandestine Laboratory Register.

Date of Government Version: 03/18/2020
Date Data Arrived at EDR: 03/19/2020
Date Made Active in Reports: 06/09/2020
Number of Days to Update: 82
Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 11/16/2020
Next Scheduled EDR Contact: 03/08/2021
Data Release Frequency: No Update Planned

CDL: Clandestine Drub Lab Location Listing
Clandestine drug lab site locations.

Date of Government Version: 08/24/2020
Date Data Arrived at EDR: 08/26/2020
Date Made Active in Reports: 11/16/2020
Number of Days to Update: 82
Source: Department of Environmental Protection
Telephone: 502-564-6716
Last EDR Contact: 11/16/2020
Next Scheduled EDR Contact: 03/08/2021
Data Release Frequency: Varies

US CDL: Clandestine Drug Labs
A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 03/18/2020
Date Data Arrived at EDR: 03/19/2020
Date Made Active in Reports: 06/09/2020
Number of Days to Update: 82
Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 11/16/2020
Next Scheduled EDR Contact: 03/08/2021
Data Release Frequency: Quarterly

Local Land Records

LIENS 2: CERCLA Lien Information
A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 10/28/2020
Date Data Arrived at EDR: 11/05/2020
Date Made Active in Reports: 11/25/2020
Number of Days to Update: 20

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 12/02/2020
Next Scheduled EDR Contact: 01/11/2021
Data Release Frequency: Semi-Annually

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 09/20/2020
Date Data Arrived at EDR: 09/22/2020
Date Made Active in Reports: 12/14/2020
Number of Days to Update: 83

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 09/22/2020
Next Scheduled EDR Contact: 01/04/2021
Data Release Frequency: Quarterly

SPILLS: State spills

A listing of spill and/or release related incidents.

Date of Government Version: 06/25/2020
Date Data Arrived at EDR: 07/09/2020
Date Made Active in Reports: 09/24/2020
Number of Days to Update: 77

Source: DEP, Emergency Response
Telephone: 502-564-2380
Last EDR Contact: 10/07/2020
Next Scheduled EDR Contact: 01/25/2021
Data Release Frequency: Varies

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 06/15/2020
Date Data Arrived at EDR: 06/22/2020
Date Made Active in Reports: 09/18/2020
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 09/22/2020
Next Scheduled EDR Contact: 01/04/2021
Data Release Frequency: Quarterly

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 08/05/2020
Date Data Arrived at EDR: 08/13/2020
Date Made Active in Reports: 10/21/2020
Number of Days to Update: 69

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 11/17/2020
Next Scheduled EDR Contact: 03/01/2021
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 10/13/2020
Next Scheduled EDR Contact: 01/25/2021
Data Release Frequency: Semi-Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 04/02/2018
Date Data Arrived at EDR: 04/11/2018
Date Made Active in Reports: 11/06/2019
Number of Days to Update: 574

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 10/08/2020
Next Scheduled EDR Contact: 01/18/2021
Data Release Frequency: N/A

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 01/01/2017
Date Data Arrived at EDR: 02/03/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 63

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 11/09/2020
Next Scheduled EDR Contact: 02/22/2021
Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 09/21/2020
Date Data Arrived at EDR: 09/22/2020
Date Made Active in Reports: 12/14/2020
Number of Days to Update: 83

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 09/22/2020
Next Scheduled EDR Contact: 01/04/2021
Data Release Frequency: Quarterly

EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 11/02/2020
Next Scheduled EDR Contact: 02/15/2021
Data Release Frequency: Quarterly

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 09/30/2017
Date Data Arrived at EDR: 05/08/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 73

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 11/06/2020
Next Scheduled EDR Contact: 02/15/2021
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 06/17/2020
Date Made Active in Reports: 09/10/2020
Number of Days to Update: 85

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 09/18/2020
Next Scheduled EDR Contact: 12/28/2020
Data Release Frequency: Every 4 Years

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2018
Date Data Arrived at EDR: 08/14/2020
Date Made Active in Reports: 11/04/2020
Number of Days to Update: 82

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 11/17/2020
Next Scheduled EDR Contact: 03/01/2021
Data Release Frequency: Annually

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 07/20/2020
Date Data Arrived at EDR: 07/21/2020
Date Made Active in Reports: 10/08/2020
Number of Days to Update: 79

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 10/19/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: Annually

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 10/28/2020
Date Data Arrived at EDR: 11/05/2020
Date Made Active in Reports: 11/25/2020
Number of Days to Update: 20

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 12/02/2020
Next Scheduled EDR Contact: 03/15/2021
Data Release Frequency: Annually

RMP: Risk Management Plans

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 07/24/2020
Date Data Arrived at EDR: 08/03/2020
Date Made Active in Reports: 10/21/2020
Number of Days to Update: 79

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 10/14/2020
Next Scheduled EDR Contact: 02/01/2021
Data Release Frequency: Varies

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

PRP: Potentially Responsible Parties

A listing of verified Potentially Responsible Parties

Date of Government Version: 04/27/2020
Date Data Arrived at EDR: 05/06/2020
Date Made Active in Reports: 06/09/2020
Number of Days to Update: 34

Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 12/02/2020
Next Scheduled EDR Contact: 02/15/2021
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 10/09/2019
Date Data Arrived at EDR: 10/11/2019
Date Made Active in Reports: 12/20/2019
Number of Days to Update: 70

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 10/02/2020
Next Scheduled EDR Contact: 01/18/2021
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 11/18/2016
Date Data Arrived at EDR: 11/23/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 79

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 10/01/2020
Next Scheduled EDR Contact: 01/18/2021
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25
Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: No Update Planned

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25
Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: No Update Planned

MLTS: Material Licensing Tracking System
MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 08/05/2020
Date Data Arrived at EDR: 08/10/2020
Date Made Active in Reports: 10/08/2020
Number of Days to Update: 59
Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 10/12/2020
Next Scheduled EDR Contact: 01/31/2021
Data Release Frequency: Quarterly

COAL ASH DOE: Steam-Electric Plant Operation Data
A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2018
Date Data Arrived at EDR: 12/04/2019
Date Made Active in Reports: 01/15/2020
Number of Days to Update: 42
Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 12/01/2020
Next Scheduled EDR Contact: 03/15/2021
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List
A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 01/12/2017
Date Data Arrived at EDR: 03/05/2019
Date Made Active in Reports: 11/11/2019
Number of Days to Update: 251
Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 11/30/2020
Next Scheduled EDR Contact: 03/15/2021
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 09/13/2019
Date Data Arrived at EDR: 11/06/2019
Date Made Active in Reports: 02/10/2020
Number of Days to Update: 96
Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 11/06/2021
Next Scheduled EDR Contact: 02/15/2021
Data Release Frequency: Varies

RADINFO: Radiation Information Database
The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 07/01/2019
Date Data Arrived at EDR: 07/01/2019
Date Made Active in Reports: 09/23/2019
Number of Days to Update: 84

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 09/24/2020
Next Scheduled EDR Contact: 01/11/2021
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing

A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 01/02/2020
Date Data Arrived at EDR: 01/28/2020
Date Made Active in Reports: 04/17/2020
Number of Days to Update: 80

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 10/27/2020
Next Scheduled EDR Contact: 02/08/2021
Data Release Frequency: Quarterly

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 06/30/2020
Date Data Arrived at EDR: 07/15/2020
Date Made Active in Reports: 07/21/2020
Number of Days to Update: 6

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 10/01/2020
Next Scheduled EDR Contact: 01/18/2021
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2017
Date Data Arrived at EDR: 06/22/2020
Date Made Active in Reports: 11/20/2020
Number of Days to Update: 151

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 09/22/2020
Next Scheduled EDR Contact: 01/04/2021
Data Release Frequency: Biennially

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 07/14/2015
Date Made Active in Reports: 01/10/2017
Number of Days to Update: 546

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 10/06/2020
Next Scheduled EDR Contact: 01/18/2021
Data Release Frequency: Semi-Annually

FUSRAP: Formerly Utilized Sites Remedial Action Program

DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations.

Date of Government Version: 08/08/2017
Date Data Arrived at EDR: 09/11/2018
Date Made Active in Reports: 09/14/2018
Number of Days to Update: 3

Source: Department of Energy
Telephone: 202-586-3559
Last EDR Contact: 11/06/2020
Next Scheduled EDR Contact: 02/15/2021
Data Release Frequency: Varies

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 08/30/2019
Date Data Arrived at EDR: 11/15/2019
Date Made Active in Reports: 01/28/2020
Number of Days to Update: 74

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 11/20/2020
Next Scheduled EDR Contact: 03/01/2021
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 10/28/2020
Date Data Arrived at EDR: 11/05/2020
Date Made Active in Reports: 11/25/2020
Number of Days to Update: 20

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 12/02/2020
Next Scheduled EDR Contact: 01/11/2021
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36

Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data
A listing of minor source facilities.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

MINES VIOLATIONS: MSHA Violation Assessment Data
Mines violation and assessment information. Department of Labor, Mine Safety & Health Administration.

Date of Government Version: 09/10/2020
Date Data Arrived at EDR: 09/15/2020
Date Made Active in Reports: 11/20/2020
Number of Days to Update: 66

Source: DOL, Mine Safety & Health Admi
Telephone: 202-693-9424
Last EDR Contact: 11/24/2020
Next Scheduled EDR Contact: 03/15/2021
Data Release Frequency: Quarterly

US MINES: Mines Master Index File
Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 08/04/2020
Date Data Arrived at EDR: 08/25/2020
Date Made Active in Reports: 11/18/2020
Number of Days to Update: 85

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 11/23/2020
Next Scheduled EDR Contact: 03/08/2021
Data Release Frequency: Semi-Annually

US MINES 2: Ferrous and Nonferrous Metal Mines Database Listing
This map layer includes ferrous (ferrous metal mines are facilities that extract ferrous metals, such as iron ore or molybdenum) and nonferrous (Nonferrous metal mines are facilities that extract nonferrous metals, such as gold, silver, copper, zinc, and lead) metal mines in the United States.

Date of Government Version: 05/06/2020
Date Data Arrived at EDR: 05/27/2020
Date Made Active in Reports: 08/13/2020
Number of Days to Update: 78

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 11/25/2020
Next Scheduled EDR Contact: 03/08/2021
Data Release Frequency: Varies

US MINES 3: Active Mines & Mineral Plants Database Listing
Active Mines and Mineral Processing Plant operations for commodities monitored by the Minerals Information Team of the USGS.

Date of Government Version: 04/14/2011
Date Data Arrived at EDR: 06/08/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 97

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 11/25/2020
Next Scheduled EDR Contact: 03/08/2021
Data Release Frequency: Varies

ABANDONED MINES: Abandoned Mines
An inventory of land and water impacted by past mining (primarily coal mining) is maintained by OSMRE to provide information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). The inventory contains information on the location, type, and extent of AML impacts, as well as, information on the cost associated with the reclamation of those problems. The inventory is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 09/16/2020
Date Data Arrived at EDR: 09/17/2020
Date Made Active in Reports: 12/10/2020
Number of Days to Update: 84

Source: Department of Interior
Telephone: 202-208-2609
Last EDR Contact: 12/10/2020
Next Scheduled EDR Contact: 03/22/2021
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 09/04/2020
Date Data Arrived at EDR: 09/15/2020
Date Made Active in Reports: 11/20/2020
Number of Days to Update: 66

Source: EPA
Telephone: (404) 562-9900
Last EDR Contact: 12/01/2020
Next Scheduled EDR Contact: 03/15/2021
Data Release Frequency: Quarterly

UXO: Unexploded Ordnance Sites

A listing of unexploded ordnance site locations

Date of Government Version: 12/31/2018
Date Data Arrived at EDR: 07/02/2020
Date Made Active in Reports: 09/17/2020
Number of Days to Update: 77

Source: Department of Defense
Telephone: 703-704-1564
Last EDR Contact: 10/08/2020
Next Scheduled EDR Contact: 01/25/2021
Data Release Frequency: Varies

DOCKET HWC: Hazardous Waste Compliance Docket Listing

A complete list of the Federal Agency Hazardous Waste Compliance Docket Facilities.

Date of Government Version: 05/31/2018
Date Data Arrived at EDR: 07/26/2018
Date Made Active in Reports: 10/05/2018
Number of Days to Update: 71

Source: Environmental Protection Agency
Telephone: 202-564-0527
Last EDR Contact: 11/17/2020
Next Scheduled EDR Contact: 03/08/2021
Data Release Frequency: Varies

ECHO: Enforcement & Compliance History Information

ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

Date of Government Version: 06/27/2020
Date Data Arrived at EDR: 07/02/2020
Date Made Active in Reports: 09/28/2020
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 202-564-2280
Last EDR Contact: 10/06/2020
Next Scheduled EDR Contact: 01/18/2021
Data Release Frequency: Quarterly

FUELS PROGRAM: EPA Fuels Program Registered Listing

This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

Date of Government Version: 08/17/2020
Date Data Arrived at EDR: 08/17/2020
Date Made Active in Reports: 10/21/2020
Number of Days to Update: 65

Source: EPA
Telephone: 800-385-6164
Last EDR Contact: 11/13/2020
Next Scheduled EDR Contact: 03/01/2021
Data Release Frequency: Quarterly

AIRS: Permitted Airs Facility Listing

A listing of permitted Airs facilities.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 07/14/2020
Date Data Arrived at EDR: 07/15/2020
Date Made Active in Reports: 07/22/2020
Number of Days to Update: 7

Source: Department of Environmental Protection
Telephone: 502-573-3382
Last EDR Contact: 10/20/2020
Next Scheduled EDR Contact: 02/08/2021
Data Release Frequency: Semi-Annually

ASBESTOS: Asbestos Notification Listing
Asbestos sites

Date of Government Version: 08/26/2020
Date Data Arrived at EDR: 08/26/2020
Date Made Active in Reports: 11/18/2020
Number of Days to Update: 84

Source: Department of Environmental Protection
Telephone: 502-782-6780
Last EDR Contact: 12/04/2020
Next Scheduled EDR Contact: 03/15/2021
Data Release Frequency: Varies

COAL ASH: Coal Ash Disposal Sites
A listing of coal ash pond site locations.

Date of Government Version: 04/17/2020
Date Data Arrived at EDR: 04/20/2020
Date Made Active in Reports: 05/06/2020
Number of Days to Update: 16

Source: Department of Environmental Protection
Telephone: 502-564-6716
Last EDR Contact: 10/09/2020
Next Scheduled EDR Contact: 02/08/2021
Data Release Frequency: No Update Planned

DRYCLEANERS: Drycleaner Listing
A listing of drycleaner facility locations.

Date of Government Version: 07/14/2020
Date Data Arrived at EDR: 07/15/2020
Date Made Active in Reports: 07/22/2020
Number of Days to Update: 7

Source: Department of Environmental Protection
Telephone: 502-573-3382
Last EDR Contact: 10/20/2020
Next Scheduled EDR Contact: 02/08/2021
Data Release Frequency: Semi-Annually

Financial Assurance 1: Financial Assurance Information Listing
A listing of financial assurance information.

Date of Government Version: 07/23/2020
Date Data Arrived at EDR: 07/24/2020
Date Made Active in Reports: 10/12/2020
Number of Days to Update: 80

Source: Department of Environmental Protection
Telephone: 502-564-6716
Last EDR Contact: 07/21/2020
Next Scheduled EDR Contact: 02/08/2021
Data Release Frequency: Varies

Financial Assurance 2: Financial Assurance Information Listing
Financial Assurance information for underground storage tank facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 05/14/2014
Date Data Arrived at EDR: 06/06/2014
Date Made Active in Reports: 06/24/2014
Number of Days to Update: 18

Source: Department of Environmental Protection
Telephone: 502-564-5981
Last EDR Contact: 10/20/2020
Next Scheduled EDR Contact: 02/08/2021
Data Release Frequency: Varies

Financial Assurance 3: Financial Assurance Information Listing
A listing of financial assurance information for solid waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 07/23/2020
Date Data Arrived at EDR: 07/24/2020
Date Made Active in Reports: 10/12/2020
Number of Days to Update: 80

Source: Department of Environmental Protection
Telephone: 502-564-6716
Last EDR Contact: 10/20/2020
Next Scheduled EDR Contact: 02/08/2021
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

LEAD: Environmental Lead Program Report Tracking Database
Lead Report Tracking Database

Date of Government Version: 01/27/2017
Date Data Arrived at EDR: 02/02/2017
Date Made Active in Reports: 08/21/2017
Number of Days to Update: 200

Source: Department of Public Health
Telephone: 502-564-4537
Last EDR Contact: 10/28/2020
Next Scheduled EDR Contact: 02/15/2021
Data Release Frequency: Varies

NPDES: Permitted Facility Listing
A listing of permitted wastewater facilities.

Date of Government Version: 04/27/2020
Date Data Arrived at EDR: 04/29/2020
Date Made Active in Reports: 07/16/2020
Number of Days to Update: 78

Source: Department of Environmental Protection
Telephone: 502-564-3410
Last EDR Contact: 10/20/2020
Next Scheduled EDR Contact: 02/15/2021
Data Release Frequency: Semi-Annually

UIC: UIC Information
A listing of wells identified as underground injection wells, in the Kentucky Oil & Gas Wells data base.

Date of Government Version: 07/01/2020
Date Data Arrived at EDR: 07/14/2020
Date Made Active in Reports: 09/30/2020
Number of Days to Update: 78

Source: Kentucky Geological Survey
Telephone: 859-323-0544
Last EDR Contact: 10/13/2020
Next Scheduled EDR Contact: 01/25/2021
Data Release Frequency: Quarterly

PCS: Permit Compliance System
PCS is a computerized management information system that contains data on National Pollutant Discharge Elimination System (NPDES) permit holding facilities. PCS tracks the permit, compliance, and enforcement status of NPDES facilities.

Date of Government Version: 07/14/2011
Date Data Arrived at EDR: 08/05/2011
Date Made Active in Reports: 09/29/2011
Number of Days to Update: 55

Source: EPA, Office of Water
Telephone: 202-564-2496
Last EDR Contact: 10/02/2020
Next Scheduled EDR Contact: 01/18/2021
Data Release Frequency: Semi-Annually

PCS INACTIVE: Listing of Inactive PCS Permits
An inactive permit is a facility that has shut down or is no longer discharging.

Date of Government Version: 11/05/2014
Date Data Arrived at EDR: 01/06/2015
Date Made Active in Reports: 05/06/2015
Number of Days to Update: 120

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 10/02/2020
Next Scheduled EDR Contact: 01/18/2021
Data Release Frequency: Semi-Annually

PCS ENF: Enforcement data
No description is available for this data

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 02/05/2015
Date Made Active in Reports: 03/06/2015
Number of Days to Update: 29

Source: EPA
Telephone: 202-564-2497
Last EDR Contact: 10/02/2020
Next Scheduled EDR Contact: 01/18/2021
Data Release Frequency: Varies

MINES MRDS: Mineral Resources Data System
Mineral Resources Data System

Date of Government Version: 04/06/2018
Date Data Arrived at EDR: 10/21/2019
Date Made Active in Reports: 10/24/2019
Number of Days to Update: 3

Source: USGS
Telephone: 703-648-6533
Last EDR Contact: 11/25/2020
Next Scheduled EDR Contact: 03/08/2021
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR Hist Auto: EDR Exclusive Historical Auto Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR Hist Cleaner: EDR Exclusive Historical Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA HWS: Recovered Government Archive State Hazardous Waste Facilities List

The EDR Recovered Government Archive State Hazardous Waste database provides a list of SHWS incidents derived from historical databases and includes many records that no longer appear in current government lists.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/03/2014
Number of Days to Update: 186

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

RGA LF: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/15/2014
Number of Days to Update: 198

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data

Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 08/10/2020
Date Data Arrived at EDR: 10/20/2020
Date Made Active in Reports: 11/02/2020
Number of Days to Update: 13

Source: Department of Energy & Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 11/09/2020
Next Scheduled EDR Contact: 02/22/2021
Data Release Frequency: No Update Planned

NJ MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2018
Date Data Arrived at EDR: 04/10/2019
Date Made Active in Reports: 05/16/2019
Number of Days to Update: 36

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 10/09/2020
Next Scheduled EDR Contact: 01/18/2021
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data

Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 01/01/2019
Date Data Arrived at EDR: 04/29/2020
Date Made Active in Reports: 07/10/2020
Number of Days to Update: 72

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 10/30/2020
Next Scheduled EDR Contact: 02/08/2021
Data Release Frequency: Quarterly

PA MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 06/30/2018
Date Data Arrived at EDR: 07/19/2019
Date Made Active in Reports: 09/10/2019
Number of Days to Update: 53

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 10/07/2020
Next Scheduled EDR Contact: 01/25/2021
Data Release Frequency: Annually

RI MANIFEST: Manifest information

Hazardous waste manifest information

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 12/31/2018
Date Data Arrived at EDR: 10/02/2019
Date Made Active in Reports: 12/10/2019
Number of Days to Update: 69

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 11/11/2020
Next Scheduled EDR Contact: 03/01/2021
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 05/31/2018
Date Data Arrived at EDR: 06/19/2019
Date Made Active in Reports: 09/03/2019
Number of Days to Update: 76

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 12/03/2020
Next Scheduled EDR Contact: 03/22/2021
Data Release Frequency: Annually

Oil/Gas Pipelines
Source: Endeavor Business Media
Petroleum Bundle (Crude Oil, Refined Products, Petrochemicals, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)) N = Natural Gas Bundle (Natural Gas, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)). This map includes information copyrighted by Endeavor Business Media. This information is provided on a best effort basis and Endeavor Business Media does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of Endeavor Business Media.

Electric Power Transmission Line Data
Source: Endeavor Business Media
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Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Certified Child Care Homes
Source: Cabinet for Families & Children
Telephone: 502-564-7130

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.

Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetland Inventory

Source: Environmental & Public Protection Cabinet
Telephone: 502-564-6736

Current USGS 7.5 Minute Topographic Map

Source: U.S. Geological Survey

STREET AND ADDRESS INFORMATION

GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

MCCRACKEN CO.
NEW LIBERTY CHURCH ROAD
KEVIL, KY 42053

TARGET PROPERTY COORDINATES

Latitude (North):	37.122881 - 37° 7' 22.37''
Longitude (West):	88.857496 - 88° 51' 26.99''
Universal Tranverse Mercator:	Zone 16
UTM X (Meters):	334981.7
UTM Y (Meters):	4109915.2
Elevation:	390 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	5940063 HEATH, KY
Version Date:	2013
Northeast Map:	5657065 JOPPA, IL
Version Date:	2012
Southwest Map:	5939893 LA CENTER, KY
Version Date:	2013
Northwest Map:	5940053 BANDANA, KY
Version Date:	2013

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

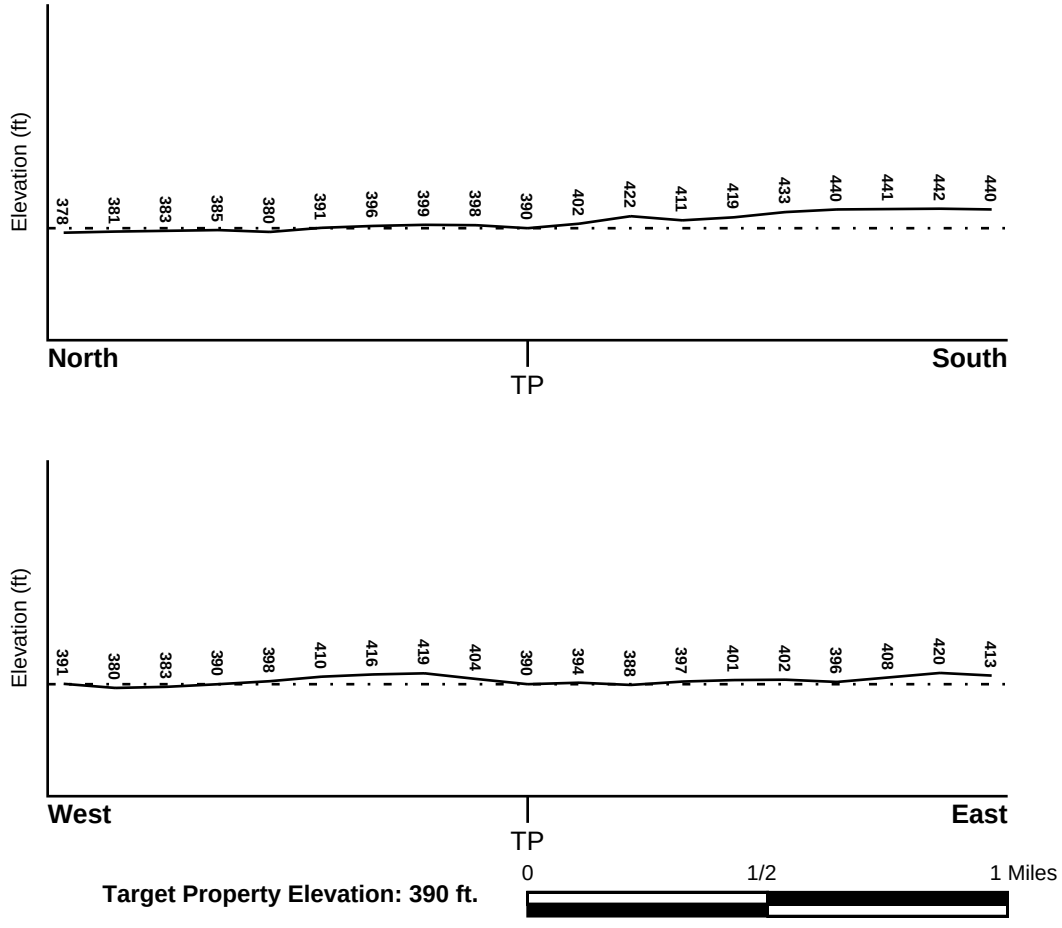
TOPOGRAPHIC INFORMATION

Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General NE

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES



Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Flood Plain Panel at Target Property	FEMA Source Type
21145C0105F	FEMA FIRM Flood data

Additional Panels in search area:	FEMA Source Type
21145C0020F	FEMA FIRM Flood data
21145C0040F	FEMA FIRM Flood data
21145C0100F	FEMA FIRM Flood data

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
HEATH	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

Era:	Cenozoic
System:	Tertiary
Series:	Paleocene
Code:	Tx *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Stratified Sequence

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps. The following information is based on Soil Conservation Service STATSGO data.

Soil Component Name:	GRENADA
Soil Surface Texture:	silt loam
Hydrologic Group:	Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.
Soil Drainage Class:	Moderately well drained. Soils have a layer of low hydraulic conductivity, wet state high in the profile. Depth to water table is 3 to 6 feet.

Hydric Status: Soil does not meet the requirements for a hydric soil.

Corrosion Potential - Uncoated Steel:	MODERATE
Depth to Bedrock Min:	> 60 inches
Depth to Bedrock Max:	> 60 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification			
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil	Permeability Rate (in/hr)	Soil Reaction (pH)
1	0 inches	5 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 2.00 Min: 0.60	Max: 6.00 Min: 4.50
2	5 inches	21 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 2.00 Min: 0.60	Max: 6.00 Min: 4.50
3	21 inches	24 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay. FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 2.00 Min: 0.60	Max: 6.00 Min: 4.50
4	24 inches	42 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 0.20 Min: 0.06	Max: 6.00 Min: 4.50
5	42 inches	60 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 0.20 Min: 0.06	Max: 7.30 Min: 5.10

OTHER SOIL TYPES IN AREA

Based on Soil Conservation Service STATSGO data, the following additional subordinant soil types may appear within the general area of target property.

Soil Surface Textures: No Other Soil Types

Surficial Soil Types: No Other Soil Types

Shallow Soil Types: No Other Soil Types

Deeper Soil Types: silt

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
2	USGS40000380140	1/4 - 1/2 Mile WNW
4	USGS40000380133	1/4 - 1/2 Mile West
B11	USGS40000380181	1/2 - 1 Mile NW
D12	USGS40000380175	1/2 - 1 Mile NW
E16	USGS40000380224	1/2 - 1 Mile NNW
G21	USGS40000380049	1/2 - 1 Mile SW
24	USGS40000380006	1/2 - 1 Mile South
H26	USGS40000380244	1/2 - 1 Mile North
28	USGS40000380187	1/2 - 1 Mile WNW
30	USGS40000380132	1/2 - 1 Mile East
32	USGS40000380230	1/2 - 1 Mile NW
33	USGS40000380150	1/2 - 1 Mile East
34	USGS40000380257	1/2 - 1 Mile North

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

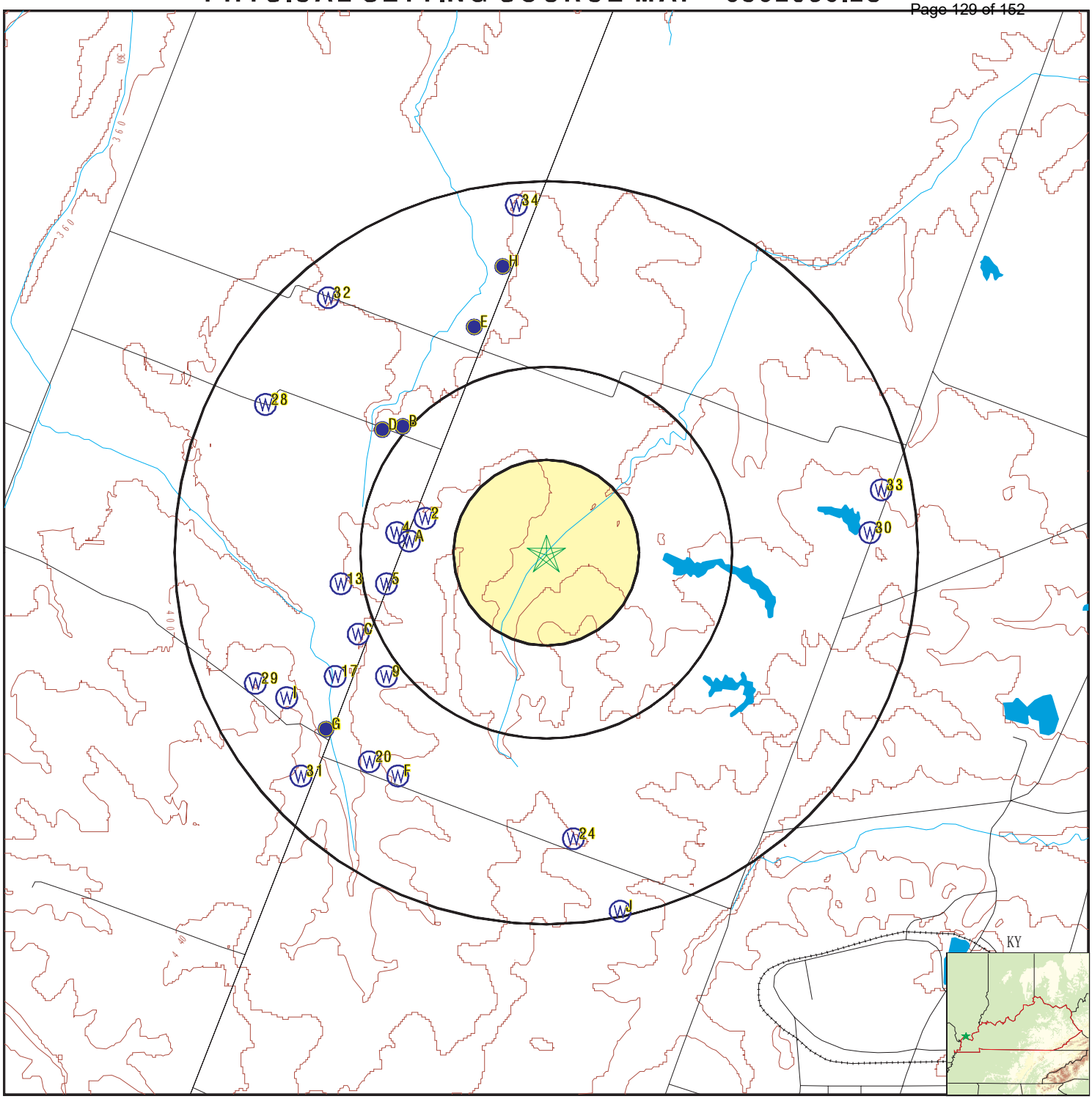
MAP ID	WELL ID	LOCATION FROM TP
A1	KY6000000008174	1/4 - 1/2 Mile West
A3	KY6000000020938	1/4 - 1/2 Mile West
5	KY6000000031330	1/4 - 1/2 Mile West
B6	KY6000000045989	1/4 - 1/2 Mile NW
B7	KY6000000030039	1/2 - 1 Mile NW
C8	KY6000000046346	1/2 - 1 Mile WSW
9	KY6000000020941	1/2 - 1 Mile SW
D10	KY6000000045543	1/2 - 1 Mile NW

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
13	KY6000000012618	1/2 - 1 Mile West
C14	KY6000000043670	1/2 - 1 Mile WSW
E15	KY6000000023022	1/2 - 1 Mile NNW
17	KY6000000020935	1/2 - 1 Mile WSW
F18	KY6000000033021	1/2 - 1 Mile SSW
F19	KY6000000033022	1/2 - 1 Mile SSW
20	KY6000000033023	1/2 - 1 Mile SW
H22	KY6000000020934	1/2 - 1 Mile North
G23	KY6000000002526	1/2 - 1 Mile SW
I25	KY6000000002527	1/2 - 1 Mile WSW
I27	KY6000000002525	1/2 - 1 Mile WSW
29	KY6000000002528	1/2 - 1 Mile WSW
31	KY6000000020933	1/2 - 1 Mile SW
J35	KY6000000014881	1/2 - 1 Mile SSE
J36	KY6000000014882	1/2 - 1 Mile SSE

PHYSICAL SETTING SOURCE MAP - 6302950.2S



- County Boundary
- Major Roads
- Contour Lines
- Earthquake epicenter, Richter 5 or greater
- Water Wells
- Public Water Supply Wells
- Cluster of Multiple Icons
- Groundwater Flow Direction
- GI Indeterminate Groundwater Flow at Location
- GV Groundwater Flow Varies at Location
- Oil, gas or related wells

SITE NAME:	Mccracken Co.	CLIENT:	Linebach Funkhouser Inc.
ADDRESS:	New Liberty Church Road Kevil KY 42053	CONTACT:	Jason Boston
		INQUIRY #:	6302950.2s
LAT/LONG:	37.122881 / 88.857496	DATE:	December 15, 2020 4:42 pm

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

A1
West
1/4 - 1/2 Mile
Higher

KY WELLS **KY6000000008174**

Fid:	8173	Akgwa:	11032
Altid:	Not Reported	Latdecimal:	37.12305556
Longdecima:	-88.86361111	County:	McCracken
Quadname:	Heath	Physiograp:	Jackson Purchase
Type:	W	Surfaceele:	400
Usage:	Agriculture - Irrigation	Enddate:	23-SEP-88
Site id:	KY6000000008174		

2
WNW
1/4 - 1/2 Mile
Higher

FED USGS **USGS40000380140**

Organization ID:	USGS-KY	Organization Name:	USGS Kentucky Water Science Center
Monitor Location:	I04D0115	Type:	Well
Description:	Not Reported	HUC:	05140206
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Not Reported	Formation Type:	Not Reported
Aquifer Type:	Not Reported	Construction Date:	19640811
Well Depth:	Not Reported	Well Depth Units:	Not Reported
Well Hole Depth:	27	Well Hole Depth Units:	ft

A3
West
1/4 - 1/2 Mile
Higher

KY WELLS **KY6000000020938**

Fid:	20937	Akgwa:	35115
Altid:	Not Reported	Latdecimal:	37.12361111
Longdecima:	-88.86472222	County:	McCracken
Quadname:	Heath	Physiograp:	Jackson Purchase
Type:	W	Surfaceele:	410
Usage:	Not Reported	Enddate:	01-JAN-00
Site id:	KY6000000020938		

4
West
1/4 - 1/2 Mile
Higher

FED USGS **USGS40000380133**

Organization ID:	USGS-KY	Organization Name:	USGS Kentucky Water Science Center
Monitor Location:	I04D0108	Type:	Well
Description:	Not Reported	HUC:	05140206
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Not Reported	Formation Type:	Not Reported
Aquifer Type:	Not Reported	Construction Date:	1964
Well Depth:	40.7	Well Depth Units:	ft
Well Hole Depth:	Not Reported	Well Hole Depth Units:	Not Reported

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Ground water levels,Number of Measurements:	1	Level reading date:	1965-07-13
Feet below surface:	29.30	Feet to sea level:	Not Reported
Note:	Not Reported		

5
West
1/4 - 1/2 Mile
Higher

KY WELLS **KY6000000031330**

Fid:	31329	Akgwa:	53149
Altid:	Not Reported	Latdecimal:	37.12166667
Longdecima:	-88.86527778	County:	McCracken
Quadname:	Heath	Physiograp:	Jackson Purchase
Type:	W	Surfaceele:	410
Usage:	Agriculture - Livestock Watering	Enddate:	12-MAY-00
Site id:	KY6000000031330		

B6
NW
1/4 - 1/2 Mile
Lower

KY WELLS **KY6000000045989**

Fid:	45988	Akgwa:	40000527
Altid:	Not Reported	Latdecimal:	37.127552
Longdecima:	-88.863953	County:	Mccracken
Quadname:	Joppa IL	Physiograp:	Purchase
Type:	W	Surfaceele:	0
Usage:	Domestic - Single Household	Enddate:	Not Reported
Site id:	KY6000000045989		

B7
NW
1/2 - 1 Mile
Lower

KY WELLS **KY6000000030039**

Fid:	30038	Akgwa:	51343
Altid:	Not Reported	Latdecimal:	37.12777778
Longdecima:	-88.86444444	County:	McCracken
Quadname:	Joppa	Physiograp:	Jackson Purchase
Type:	W	Surfaceele:	385
Usage:	Domestic - Single Household	Enddate:	04-APR-99
Site id:	KY6000000030039		

C8
WSW
1/2 - 1 Mile
Higher

KY WELLS **KY6000000046346**

Fid:	46345	Akgwa:	40000893
Altid:	Not Reported	Latdecimal:	37.120052
Longdecima:	-88.866447	County:	Mccracken
Quadname:	Heath	Physiograp:	Purchase
Type:	W	Surfaceele:	400
Usage:	Domestic - Single Household	Enddate:	Not Reported
Site id:	KY6000000046346		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

9
SW
1/2 - 1 Mile
Higher

KY WELLS **KY6000000020941**

Fid:	20940	Akgwa:	35119
Altid:	Not Reported	Latdecimal:	37.11805556
Longdecima:	-88.86527778	County:	McCracken
Quadname:	Heath	Physiograp:	Jackson Purchase
Type:	W	Surfaceele:	410
Usage:	Not Reported	Enddate:	01-JAN-00
Site id:	KY6000000020941		

D10
NW
1/2 - 1 Mile
Lower

KY WELLS **KY6000000045543**

Fid:	45542	Akgwa:	40000077
Altid:	Not Reported	Latdecimal:	37.127831
Longdecima:	-88.865341	County:	Mccracken
Quadname:	Joppa IL	Physiograp:	Purchase
Type:	W	Surfaceele:	0
Usage:	Domestic - Single Household	Enddate:	Not Reported
Site id:	KY6000000045543		

B11
NW
1/2 - 1 Mile
Lower

FED USGS **USGS40000380181**

Organization ID:	USGS-KY	Organization Name:	USGS Kentucky Water Science Center
Monitor Location:	I04B0702	Type:	Well
Description:	Not Reported	HUC:	05140206
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Not Reported	Formation Type:	Not Reported
Aquifer Type:	Not Reported	Construction Date:	19640403
Well Depth:	57.8	Well Depth Units:	ft
Well Hole Depth:	Not Reported	Well Hole Depth Units:	Not Reported

Ground water levels,Number of Measurements:	1	Level reading date:	1964-04-03
Feet below surface:	21.82	Feet to sea level:	Not Reported
Note:	Not Reported		

D12
NW
1/2 - 1 Mile
Lower

FED USGS **USGS40000380175**

Organization ID:	USGS-KY	Organization Name:	USGS Kentucky Water Science Center
Monitor Location:	I04B0720	Type:	Well
Description:	Not Reported	HUC:	05140206
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Not Reported	Formation Type:	Not Reported

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Aquifer Type:	Not Reported	Construction Date:	19641214
Well Depth:	Not Reported	Well Depth Units:	Not Reported
Well Hole Depth:	52	Well Hole Depth Units:	ft

13
West
1/2 - 1 Mile
Higher

KY WELLS **KY6000000012618**

Fid:	12617	Akgwa:	18308
Altid:	Not Reported	Latdecimal:	37.12166667
Longdecima:	-88.8675	County:	McCracken
Quadname:	Heath	Physiograp:	Jackson Purchase
Type:	W	Surfaceele:	400
Usage:	Domestic - Single Household	Enddate:	07-JUN-91
Site id:	KY6000000012618		

C14
WSW
1/2 - 1 Mile
Higher

KY WELLS **KY6000000043670**

Fid:	43669	Akgwa:	30006829
Altid:	Not Reported	Latdecimal:	37.119354
Longdecima:	-88.866859	County:	Mccracken
Quadname:	Heath	Physiograp:	Purchase
Type:	W	Surfaceele:	0
Usage:	Domestic - Single Household	Enddate:	Not Reported
Site id:	KY6000000043670		

E15
NNW
1/2 - 1 Mile
Lower

KY WELLS **KY6000000023022**

Fid:	23021	Akgwa:	41345
Altid:	Not Reported	Latdecimal:	37.13138889
Longdecima:	-88.86138889	County:	McCracken
Quadname:	Joppa	Physiograp:	Jackson Purchase
Type:	W	Surfaceele:	370
Usage:	Domestic - Single Household	Enddate:	28-JUL-95
Site id:	KY6000000023022		

E16
NNW
1/2 - 1 Mile
Lower

FED USGS **USGS40000380224**

Organization ID:	USGS-KY	Organization Name:	USGS Kentucky Water Science Center
Monitor Location:	I04B0703	Type:	Well
Description:	Not Reported	HUC:	05140206
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Not Reported	Formation Type:	Not Reported
Aquifer Type:	Not Reported	Construction Date:	Not Reported
Well Depth:	38.2	Well Depth Units:	ft
Well Hole Depth:	Not Reported	Well Hole Depth Units:	Not Reported

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Ground water levels,Number of Measurements:	1	Level reading date:	1964-04-02
Feet below surface:	29.62	Feet to sea level:	Not Reported
Note:	Not Reported		

17
WSW
1/2 - 1 Mile
Higher

KY WELLS **KY6000000020935**

Fid:	20934	Akgwa:	35112
Altid:	Not Reported	Latdecimal:	37.11805556
Longdecima:	-88.86777778	County:	McCracken
Quadname:	Heath	Physiograp:	Jackson Purchase
Type:	W	Surfaceele:	390
Usage:	Not Reported	Enddate:	01-JAN-00
Site id:	KY6000000020935		

F18
SSW
1/2 - 1 Mile
Higher

KY WELLS **KY6000000033021**

Fid:	33020	Akgwa:	55657
Altid:	Not Reported	Latdecimal:	37.11416667
Longdecima:	-88.86472222	County:	McCracken
Quadname:	Heath	Physiograp:	Jackson Purchase
Type:	W	Surfaceele:	430
Usage:	Domestic - Single Household	Enddate:	08-NOV-00
Site id:	KY6000000033021		

F19
SSW
1/2 - 1 Mile
Higher

KY WELLS **KY6000000033022**

Fid:	33021	Akgwa:	55658
Altid:	Not Reported	Latdecimal:	37.11416667
Longdecima:	-88.86472222	County:	McCracken
Quadname:	Heath	Physiograp:	Jackson Purchase
Type:	W	Surfaceele:	430
Usage:	Not Reported	Enddate:	08-NOV-00
Site id:	KY6000000033022		

20
SW
1/2 - 1 Mile
Higher

KY WELLS **KY6000000033023**

Fid:	33022	Akgwa:	55659
Altid:	Not Reported	Latdecimal:	37.11472222
Longdecima:	-88.86611111	County:	McCracken
Quadname:	Heath	Physiograp:	Jackson Purchase
Type:	W	Surfaceele:	410
Usage:	Not Reported	Enddate:	08-NOV-00
Site id:	KY6000000033023		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

G21
SW
1/2 - 1 Mile
Lower

FED USGS **USGS40000380049**

Organization ID:	USGS-KY	Organization Name:	USGS Kentucky Water Science Center
Monitor Location:	I04D0113	Type:	Well
Description:	Not Reported	HUC:	05140206
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Not Reported	Formation Type:	Not Reported
Aquifer Type:	Not Reported	Construction Date:	19600627
Well Depth:	Not Reported	Well Depth Units:	Not Reported
Well Hole Depth:	65	Well Hole Depth Units:	ft

H22
North
1/2 - 1 Mile
Lower

KY WELLS **KY6000000020934**

Fid:	20933	Akgwa:	35111
Altid:	Not Reported	Latdecimal:	37.13388889
Longdecima:	-88.85972222	County:	McCracken
Quadname:	Joppa	Physiograp:	Jackson Purchase
Type:	W	Surfaceele:	375
Usage:	Not Reported	Enddate:	01-JAN-00
Site id:	KY6000000020934		

G23
SW
1/2 - 1 Mile
Higher

KY WELLS **KY6000000002526**

Fid:	2525	Akgwa:	2521
Altid:	Not Reported	Latdecimal:	37.11611111
Longdecima:	-88.86861111	County:	McCracken
Quadname:	Heath	Physiograp:	Jackson Purchase
Type:	W	Surfaceele:	395
Usage:	Domestic - Single Household	Enddate:	13-AUG-86
Site id:	KY6000000002526		

24
South
1/2 - 1 Mile
Higher

FED USGS **USGS40000380006**

Organization ID:	USGS-KY	Organization Name:	USGS Kentucky Water Science Center
Monitor Location:	I04D0106	Type:	Well
Description:	Not Reported	HUC:	05140206
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Not Reported	Formation Type:	Not Reported
Aquifer Type:	Not Reported	Construction Date:	Not Reported
Well Depth:	56.3	Well Depth Units:	ft
Well Hole Depth:	Not Reported	Well Hole Depth Units:	Not Reported

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Ground water levels,Number of Measurements:	1	Level reading date:	1965-02-15
Feet below surface:	49.20	Feet to sea level:	Not Reported
Note:	Not Reported		

I25
WSW
1/2 - 1 Mile
Higher

KY WELLS **KY6000000002527**

Fid:	2526	Akgwa:	2522
Altid:	Not Reported	Latdecimal:	37.1175
Longdecima:	-88.87	County:	McCracken
Quadname:	Heath	Physiograp:	Jackson Purchase
Type:	W	Surfaceele:	405
Usage:	Not Reported	Enddate:	12-AUG-86
Site id:	KY6000000002527		

H26
North
1/2 - 1 Mile
Lower

FED USGS **USGS40000380244**

Organization ID:	USGS-KY	Organization Name:	USGS Kentucky Water Science Center
Monitor Location:	I04AB0705	Type:	Well
Description:	Not Reported	HUC:	05140206
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Not Reported	Formation Type:	Not Reported
Aquifer Type:	Not Reported	Construction Date:	Not Reported
Well Depth:	43.7	Well Depth Units:	ft
Well Hole Depth:	Not Reported	Well Hole Depth Units:	Not Reported

Ground water levels,Number of Measurements:	1	Level reading date:	1964-03-23
Feet below surface:	30.2	Feet to sea level:	Not Reported
Note:	Not Reported		

I27
WSW
1/2 - 1 Mile
Higher

KY WELLS **KY6000000002525**

Fid:	2524	Akgwa:	2520
Altid:	Not Reported	Latdecimal:	37.11694444
Longdecima:	-88.87027778	County:	McCracken
Quadname:	Heath	Physiograp:	Jackson Purchase
Type:	W	Surfaceele:	410
Usage:	Not Reported	Enddate:	12-AUG-86
Site id:	KY6000000002525		

28
WNW
1/2 - 1 Mile
Lower

FED USGS **USGS40000380187**

Organization ID:	USGS-KY	Organization Name:	USGS Kentucky Water Science Center
Monitor Location:	I04B0721	Type:	Well
Description:	Not Reported	HUC:	05140206

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Not Reported	Formation Type:	Not Reported
Aquifer Type:	Not Reported	Construction Date:	19641208
Well Depth:	Not Reported	Well Depth Units:	Not Reported
Well Hole Depth:	140	Well Hole Depth Units:	ft

29
WSW
1/2 - 1 Mile
Higher

KY WELLS **KY6000000002528**

Fid:	2527	Akgwa:	2523
Altid:	Not Reported	Latdecimal:	37.11777778
Longdecima:	-88.87166667	County:	McCracken
Quadname:	Heath	Physiograp:	Jackson Purchase
Type:	W	Surfaceele:	410
Usage:	Not Reported	Enddate:	08-AUG-86
Site id:	KY6000000002528		

30
East
1/2 - 1 Mile
Higher

FED USGS **USGS40000380132**

Organization ID:	USGS-KY	Organization Name:	USGS Kentucky Water Science Center
Monitor Location:	I04D0114	Type:	Well
Description:	Not Reported	HUC:	05140206
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Not Reported	Formation Type:	Not Reported
Aquifer Type:	Not Reported	Construction Date:	19640811
Well Depth:	Not Reported	Well Depth Units:	Not Reported
Well Hole Depth:	52	Well Hole Depth Units:	ft

31
SW
1/2 - 1 Mile
Higher

KY WELLS **KY6000000020933**

Fid:	20932	Akgwa:	35110
Altid:	Not Reported	Latdecimal:	37.11416667
Longdecima:	-88.86944444	County:	McCracken
Quadname:	Heath	Physiograp:	Jackson Purchase
Type:	W	Surfaceele:	415
Usage:	Not Reported	Enddate:	01-JAN-00
Site id:	KY6000000020933		

32
NW
1/2 - 1 Mile
Lower

FED USGS **USGS40000380230**

Organization ID:	USGS-KY	Organization Name:	USGS Kentucky Water Science Center
Monitor Location:	I04B0724	Type:	Well
Description:	Not Reported	HUC:	05140206

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Not Reported	Formation Type:	Not Reported
Aquifer Type:	Not Reported	Construction Date:	19650804
Well Depth:	Not Reported	Well Depth Units:	Not Reported
Well Hole Depth:	137	Well Hole Depth Units:	ft

33
East
1/2 - 1 Mile
Higher

FED USGS **USGS40000380150**

Organization ID:	USGS-KY	Organization Name:	USGS Kentucky Water Science Center
Monitor Location:	I04B0719	Type:	Well
Description:	Not Reported	HUC:	05140206
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Not Reported	Formation Type:	Not Reported
Aquifer Type:	Not Reported	Construction Date:	19650804
Well Depth:	Not Reported	Well Depth Units:	Not Reported
Well Hole Depth:	52	Well Hole Depth Units:	ft

34
North
1/2 - 1 Mile
Lower

FED USGS **USGS40000380257**

Organization ID:	USGS-KY	Organization Name:	USGS Kentucky Water Science Center
Monitor Location:	I04B0707	Type:	Well
Description:	Not Reported	HUC:	05140206
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Not Reported	Formation Type:	Not Reported
Aquifer Type:	Not Reported	Construction Date:	1945
Well Depth:	49.7	Well Depth Units:	ft
Well Hole Depth:	Not Reported	Well Hole Depth Units:	Not Reported

Ground water levels,Number of Measurements:	1	Level reading date:	1964-04-03
Feet below surface:	35.82	Feet to sea level:	Not Reported
Note:	Not Reported		

J35
SSE
1/2 - 1 Mile
Higher

KY WELLS **KY6000000014881**

Fid:	14880	Akgwa:	21155
Altid:	Not Reported	Latdecimal:	37.10888889
Longdecima:	-88.85388889	County:	McCracken
Quadname:	Heath	Physiograp:	Jackson Purchase
Type:	W	Surfaceele:	430
Usage:	Not Reported	Enddate:	01-JAN-00
Site id:	KY6000000014881		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

Database	EDR ID Number
KY WELLS	**KY6000000014882**

J36
SSE
1/2 - 1 Mile
Higher

Fid:	14881	Akgwa:	21157
Altid:	Not Reported	Latdecimal:	37.10888889
Longdecima:	-88.85388889	County:	McCracken
Quadname:	Heath	Physiograp:	Jackson Purchase
Type:	W	Surfaceele:	430
Usage:	Not Reported	Enddate:	01-JAN-00
Site id:	KY6000000014882		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

State Database: KY Radon

Radon Test Results

Zip	Test Date	Test Result
42053	12/2/2003	2.50
42053	12/2/2003	2.10
42053	4/15/2002	1.86
42053	4/18/2002	0.80
42053	10/19/2002	0.70

Federal EPA Radon Zone for MCCRACKEN County: 3

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for Zip Code: 42053

Number of sites tested: 3

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.733 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	Not Reported	Not Reported	Not Reported	Not Reported

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

HYDROLOGIC INFORMATION

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetland Inventory
Source: Environmental & Public Protection Cabinet
Telephone: 502-564-6736

HYDROGEOLOGIC INFORMATION

AQUIFLOW^{R} Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Service, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Kentucky Water Well Records Database
Source: Kentucky Geological Survey
Telephone: 859-257-5500
Water Wells in Kentucky. Data from the Kentucky Ground Water Data Repository.

OTHER STATE DATABASE INFORMATION

Oil and Gas Well Locations
Source: Kentucky Geological Survey
Telephone: 859-257-5500
Oil and gas well locations in the state of Kentucky

RADON

State Database: KY Radon
Source: Department of Public Health
Telephone: 502-564-4856
Radon Test Results

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

Earthquake Fault Lines: The fault lines displayed on EDR's Topographic map are digitized quaternary faultlines, prepared in 1975 by the United State Geological Survey

PHYSICAL SETTING SOURCE RECORDS SEARCHED

STREET AND ADDRESS INFORMATION

Appendix D

KDEP Documentation

Jason Boston

From: Taylor, David M (EEC) <David.Taylor@ky.gov> on behalf of Taylor, David M (EEC)
Sent: Thursday, December 17, 2020 2:45 PM
To: Jason Boston
Subject: RE: Old Kentucky Ordnance Works Paducah
Attachments: -88.8370056152, 37.1053314209.jpg

The Energy and Environment Cabinet received your request; however, a search of our database has revealed that we have no listing (records) for the coordinates that you submitted. I have attached a site map of the surrounding area for your review. If you have any questions or concerns, please feel free to let me know at the contact information below.

Thank you, and have a terrific day.

** If you wish to appeal this decision, you may do so by filing a complaint with the Attorney General's Office, Open Records/Open Meetings Division, The Capitol, 700 Capitol Avenue, Suite 118, Frankfort, KY 40601, pursuant to KRS 61.880(2), or by filing an original civil action in the appropriate circuit court under KRS 61.882. If you first appeal to the Attorney General but are dissatisfied with the Attorney General's decision, you may further appeal to circuit court pursuant to KRS 61.880(5).

Mike Taylor
Public Records Branch - Open Records Section
Office of Administrative Services
Division of Information Services
Energy and Environment Cabinet
300 Sower Blvd – 1 SE WK #9
(502) 782-6461
EEC.KORA@ky.gov

From: Jason Boston [mailto:jboston@lfienv.com]
Sent: Thursday, December 17, 2020 1:51 PM
To: Taylor, David M (EEC) <David.Taylor@ky.gov>
Subject: FW: Old Kentucky Ordnance Works Paducah

Latitude: 37.1053314209
Longitude: -88.8370056152

Jason P. Boston
Linebach Funkhouser, Inc.
114 Fairfax Avenue
Louisville, Kentucky 40207
(502) 895-5009 Office
(502) 721-5706 Direct
jboston@lfienv.com
www.linebachfunkhouser.com

From: Jason Boston [mailto:jboston@lfienv.com]
Sent: Thursday, December 17, 2020 1:49 PM
To: 'Taylor, David M (EEC)' <David.Taylor@ky.gov>
Subject: FW: Old Kentucky Ordnance Works Paducah

My apologies. Not the diffusion plant. This facility would have had a Rice Springs Road or Acid Road address.

Jason P. Boston
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(502) 721-5706 Direct
jboston@lfienv.com
www.linebachfunkhouser.com

From: Jason Boston [mailto:jboston@lfienv.com]
Sent: Thursday, December 17, 2020 1:43 PM
To: 'Taylor, David M (EEC)' <David.Taylor@ky.gov>
Subject: RE: Old Kentucky Ordnance Works Paducah

Paducah Gaseous Diffusion Plant?

Jason P. Boston
Linebach Funkhouser, Inc.
114 Fairfax Avenue
Louisville, Kentucky 40207
(502) 895-5009 Office
(502) 721-5706 Direct
jboston@lfienv.com
www.linebachfunkhouser.com

From: Taylor, David M (EEC) [mailto:David.Taylor@ky.gov]
Sent: Thursday, December 17, 2020 1:19 PM
To: Jason Boston <jboston@lfienv.com>
Subject: RE: Old Kentucky Ordnance Works Paducah

KOW? Do you have an address for the site? Many times, the name we have for a location differs from what everyone else calls it.

Mike Taylor
Public Records Branch - Open Records Section
Office of Administrative Services
Division of Information Services
Energy and Environment Cabinet

300 Sower Blvd – 1 SE WK #9
(502) 782-6461
EEC.KORA@ky.gov

From: Jason Boston [mailto:jboston@lfienv.com]
Sent: Thursday, December 17, 2020 12:27 PM
To: Taylor, David M (EEC) <David.Taylor@ky.gov>
Subject: RE: Old Kentucky Ordnance Works Paducah

Anything for KOW? The Army Corps Louisville District is said to have conducted assessment for USTs and Gravel pit areas.

Thank you.

Jason P. Boston
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114 Fairfax Avenue
Louisville, Kentucky 40207
(502) 895-5009 Office
(502) 721-5706 Direct
jboston@lfienv.com
www.linebachfunkhouser.com

From: Taylor, David M (EEC) [mailto:David.Taylor@ky.gov]
Sent: Thursday, December 17, 2020 10:54 AM
To: Jason Boston <jboston@lfienv.com>
Subject: RE: Old Kentucky Ordnance Works Paducah

Jason,

The Energy and Environment Cabinet received your request; however, a search of our database has revealed that we have no listing (records) for any of the names that you submitted for Paducah, KY. If you have any questions or concerns, please feel free to let me know at the contact information below.

Thank you, and have a terrific day.

** If you wish to appeal this decision, you may do so by filing a complaint with the Attorney General's Office, Open Records/Open Meetings Division, The Capitol, 700 Capitol Avenue, Suite 118, Frankfort, KY 40601, pursuant to KRS 61.880(2), or by filing an original civil action in the appropriate circuit court under KRS 61.882. If you first appeal to the Attorney General but are dissatisfied with the Attorney General's decision, you may further appeal to circuit court pursuant to KRS 61.880(5).

Mike Taylor
Public Records Branch - Open Records Section
Office of Administrative Services
Division of Information Services
Energy and Environment Cabinet
300 Sower Blvd – 1 SE WK #9

(502) 782-6461
EEC.KORA@ky.gov

From: Jason Boston [mailto:jboston@lfienv.com]
Sent: Thursday, December 17, 2020 10:14 AM
To: EEC KORA <EEC.KORA@ky.gov>
Subject: Old Kentucky Ordnance Works Paducah

Good Morning,

Can you provide a closure report or corrective action associated with this site?

Thank you all.

Jason P. Boston
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Louisville, Kentucky 40207
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(502) 721-5706 Direct
jboston@lfienv.com
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Appendix E

User Provided Information

PHASE I ESA – AAI USER QUESTIONNAIRE (ASTM E1527-13)

Presented below is the User Questionnaire cited in Appendix X3 of ASTM E1527-13. In order to qualify for one of the Landowner Liability Protections (LLPs) offered by the Small Business Relief and Brownfield's Revitalization Act of 2001 (the "Brownfield's Amendments"), the User must provide the following information (if available) to the environmental professional. Failure to provide this information could result in a determination that "all appropriate inquiry" is not complete.

Subject Property: McCracken County Solar LLC LFI Project No: _____

1. Environmental Cleanup Liens

Are you aware of any environmental cleanup liens against the property that are filed or recorded under federal, state, tribal or local law?

☐ Yes ☑ No ☐ Unknown

2. Activity and Use Limitations (AULs)

Are you aware of any AULs, such as engineering controls, land use restrictions, or institutional controls that are in place at the site and/or have been filed or recorded in a registry under federal, state, tribal or local law?

☐ Yes ☑ No ☐ Unknown

3. Specialized Knowledge or Experience

Do you have any specialized knowledge or experience related to the subject property or surrounding properties? For example, are you involved in the same line of business as the current or former occupants of the subject property or an adjoining property so that you would have specialized knowledge of the chemicals and processes used by this type of business? Do you have documentation (e.g. – Phase I ESAs, Phase II subsurface investigations, tank removal/closure reports, remedial reports, asbestos & lead-based paint sampling and/or abatement reports, etc.) for the subject property that may be relevant to this Phase I ESA?

☐ Yes ☑ No ☐ Unknown

Comments:

4. Relationship of Purchase Price to Fair Market Value

Does the purchase price being paid for the subject property reasonably reflect the fair market value of the property?

☑ Yes ☐ No ☐ Unknown

If you conclude that there is a difference, have you considered whether the lower purchase price is because contamination is known or believed to be present at the property?

☐ Yes ☐ No

Comments:

The land agreement is a lease, not a purchase. The lease rate reasonably reflects the fair market value of the property.

5. Commonly Known or Reasonably Ascertainable Information

Are you aware of commonly known or reasonably ascertainable information about the subject property that would help the environmental professional to identify conditions indicative of releases or threatened releases? For example, as User:

a. Do you know the past uses of the property?
b. Do you know of specific chemicals that are present or once were present at the property?
c. Do you know of spills or other chemical releases that have taken place at the property?
d. Do you know of any environmental cleanups that have taken place at the property?

Comments:

No

6. Obvious Presence or Likely Presence of Contamination

As the User of this ESA, based on your knowledge and experience related to the subject property, are there any obvious indicators that point to the presence or likely presence of contamination at the subject property?

☐ Yes ☑ No ☐ Unknown

Comments:

Please be sure to attach copies of documentation, as available.

Completed by:

Chris Killenberg
Name

Regional Development Dir.
Title

Community Energy
Company Name

11-6-20
Date

919-360-9792
Phone Number

Linebach ▪ Funkhouser, Inc.
environmental compliance & consulting

Jason P. Boston
Staff Scientist

Mr. Boston has over 5 years of professional experience in environmental consulting managing field operations associated with site investigations and remedial action projects. In addition, Mr. Boston provides on-site supervision of Linebach Funkhouser projects. He has been involved with projects such as acquisition/divestiture property assessments, environmental site investigations, monitoring well installations, asbestos abatements, and air quality management. He has collected air, soil, and groundwater samples, conducted environmental reviews and investigations, and performed oversight activities for various environmental management and compliance activities.

Professional Experience:

* **Linebach Funkhouser, Inc.**
  Staff Geologist, February 2015 to present.

* **Lexington Legends Baseball Club**
  Sports Turf Manager, 2014

* **Louisville Bats Baseball Club**
  Assistant Sports Turf Manager, *2011-2013*

* **Bowling Green Hot Rods**
  Assistant Sports Turf Manager, *2009-2010*

Education & Certifications:

* *Western Kentucky University, Bachelor of Science, Agriculture, 2010*
* *OSHA 40-hour HAZWOPER Training, 2015*

Specialized Experience:

* *Phase I Environmental Site Assessments*
* *Phase II Environmental Site Assessments*
* *Environmental Site Investigations*

Representative Project Experience:

*** Phase I Environmental Site Assessments:**
Mr. Boston has conducted Phase I Environmental Site Assessments for due diligence and transactional screening processes. His experience includes site research, investigations, and assessments in accordance with ASTM and AAI standards.

*** Phase II Environmental Site Assessments:**
Mr. Boston has provided project management support for various sites, including oversight of UST remediation activities, installation and removal of monitoring wells, soil, and groundwater sampling, injection remediation, asbestos abatements, and supplemental reporting.

EXHIBIT 14
ATTACHMENT 14.3

cra
cultural resource analysts, inc.

January 8, 2021

Marty Marchaterre
Senior Environmental Planner
Copperhead Environmental Consulting, Inc.
151 Walton Avenue
Lexington, Kentucky 40508

RE: Cultural Historic Overview Study for the
McCracken County Solar Project in
McCracken County, Kentucky
CRA Project Number: K200012
CRA Publication Series: 20-507

Dear Mr. Marchaterre,

In November and December 2020, Cultural Resource Analysts, Inc. (CRA), personnel completed a cultural historic due diligence overview study for the proposed McCracken County Solar project in McCracken County, Kentucky. The cultural historic overview study examined the parcels within the project boundary and a 1,000 ft buffer (study area) surrounding the project boundary situated north-northeast of Woodville in McCracken County, Kentucky (Figures 1 and 2). The study area includes a portion of New Liberty Church Road (KY 725, extending in a general northeast–southwest direction along the western portion of the study area), southwest of Ogden Landing Road (KY 358) and northeast of Woodville Road (KY 725). The objective of the cultural historic overview study was to verify, to the extent possible from the existing public roadways, the locations and conditions of previously recorded cultural historic resources and to note the locations of any additional potentially significant properties that should be taken into consideration in project planning. These potentially significant properties may be eligible for listing in the National Register of Historic Places (NRHP) and were identified so that they may be taken into consideration as project plans develop. This letter report was prepared by architectural historian Tim Condo, MHP, of CRA. An archaeological study is being conducted by CRA in conjunction with the cultural historic component.

CRA personnel completed a records review at the Kentucky Heritage Council (KHC) on December 4, 2020. Geographic Information Systems (GIS) data provided by the KHC (FY21-4146) identified two previously identified resources within and adjacent to the study area. These resources (07300153 and 07300154) are coded historic properties in the KHC database, have not been given Kentucky Historic Property Survey Numbers, and do not have a Kentucky Historic Properties Survey Form. Neither of the previously identified coded properties have an NRHP status according to the KHC database.

A review of surveys and reports on file at the KHC resulted in no previous surveys or reports with sites located within or adjacent to the study area or with any additional resources that were not already included in the KHC's GIS database.

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The study area was subject to a windshield survey from the public right-of-way (ROW). John Dickerson and Alyssa Reynolds of CRA completed the windshield survey on December 3, 2020. To the extent possible, the fieldwork attempted to verify the location and condition of previously identified cultural historic sites and noted the locations of any additional potentially significant properties that should be taken into consideration during project planning. During the windshield survey, CRA staff verified the locations and conditions of the two previously identified cultural historic coded properties (07300153 and 07300154) within and adjacent to the study area. Coded properties 07300153 and 07300154 were visible from the ROW and were photographed in order to make preliminary assessments of each resource's potential eligibility for listing in the NRHP. No additional potentially significant properties or potential historic districts other than those mentioned in this report were identified during the windshield survey. All surveyed resources are identified on a topographic quadrangle and aerial image (see Figures 1 and 2). Photographs of the previously identified resources are located in Appendix A. The resources appear to be either vacant or under-maintained (see Appendix A).

No previously identified resources within the study area are listed in the NRHP according to the KHC GIS database. A search of the GIS database of the National Park Service (NPS) confirms that no NRHP-listed sites are located in or adjacent to the study area.

The resource associated with 07300154 is a one-and-one-half-story, three-bay (w/d/w), front-gable, frame building, which, according to a nearby property owner, may have been a residence before it was converted into a mop and broom shop. The building is now vacant. The building exhibits diminished integrity as it is missing its window sashes and has rolled-asphalt siding. Lacking integrity, the building does not appear eligible for listing in the NRHP. The resource associated with 07300153 is a gambrel-roof, gable-oriented, frame barn clad in vertical board siding and displaying shed-roof projections. As a common agricultural building, the barn does not appear to have the significance to merit listing in the NRHP. Therefore, CRA's preliminary recommendation for this overview study is that coded properties 07300153 and 07300154 appear to be not eligible for listing in the NRHP (Table 1).

Table 1. Surveyed Architectural Resources in and Adjacent to Study Area.

Site/Survey No.	Resource Name/Function	Address/Location	NRHP Status	Condition	Figure No.
07300153	Barn	NE side Jenkins No. 1 Road, approximately 0.2 mi west-northwest of its intersection with New Liberty Church Road.	Not indicated in KHC database; recommended not eligible based on CRA field observations	Common building form	A1
07300154	Building	SW side Jenkins No. 1 Road, approximately 0.19 mi west-northwest of its intersection with New Liberty Church Road.	Not indicated in KHC database; recommended not eligible based on CRA field observations	Common building form with diminished integrity	A2
CRA 1	Cemetery	SW side Helm Road, near intersection with New Liberty Church Road	Undetermined based on CRA field observations	Overgrown/under-maintained	A3–A4

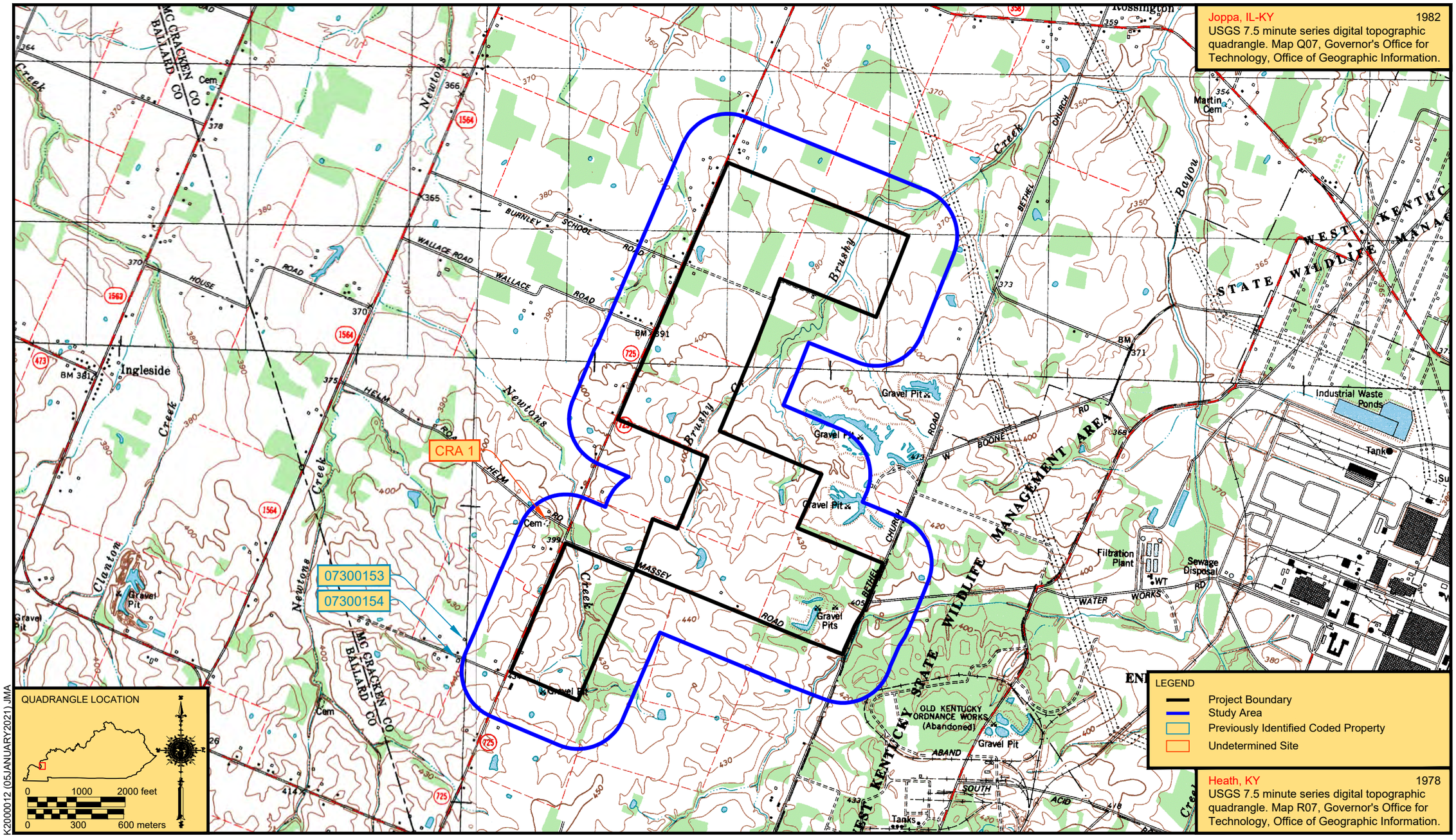

Figure 1. Topographic map depicting the study area, project boundary, and locations of resources within and adjacent to the study area.

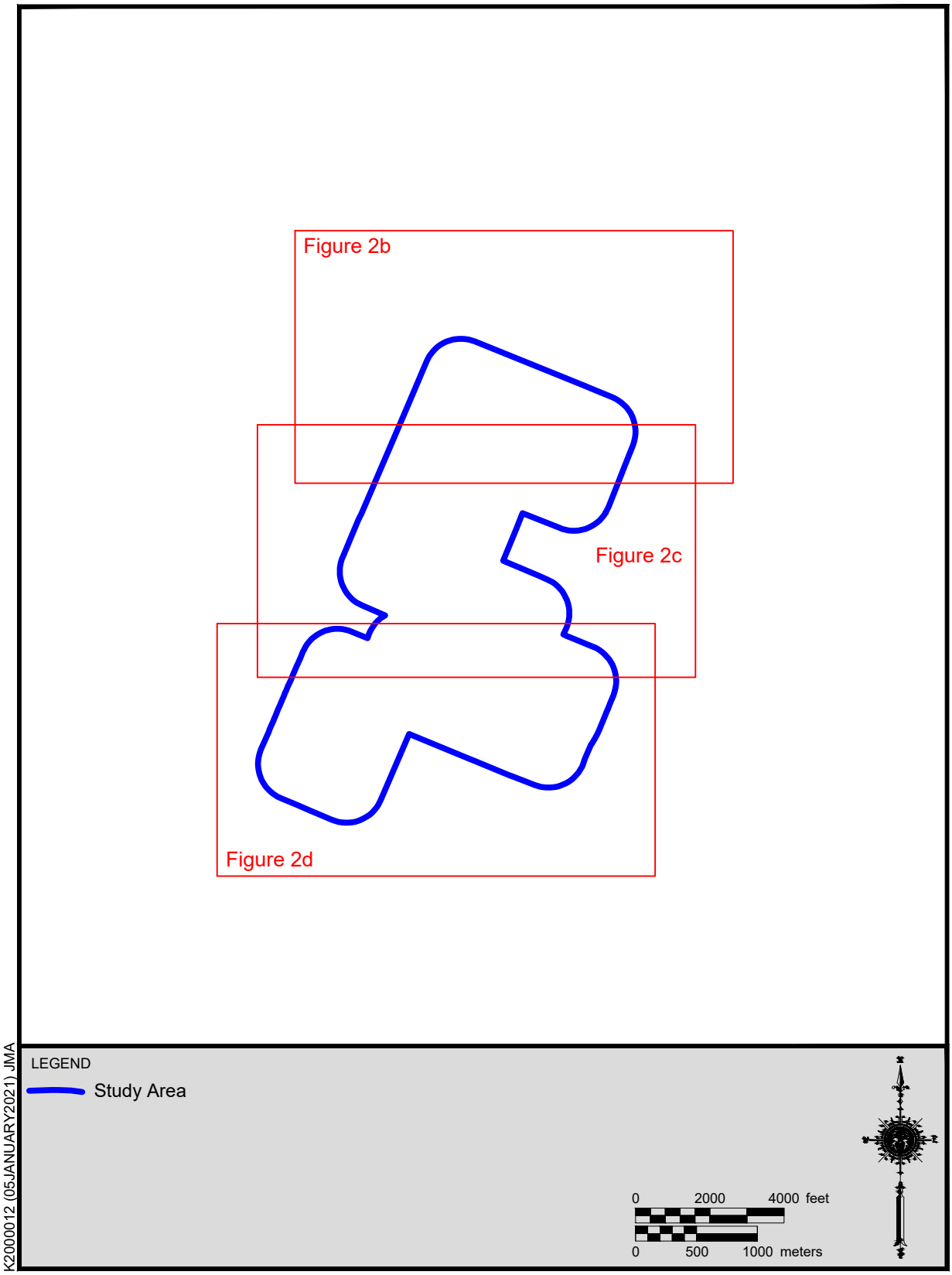

Figure 2a. Aerial photograph depicting the study area, project boundary, and locations of resources within and adjacent to the study area.

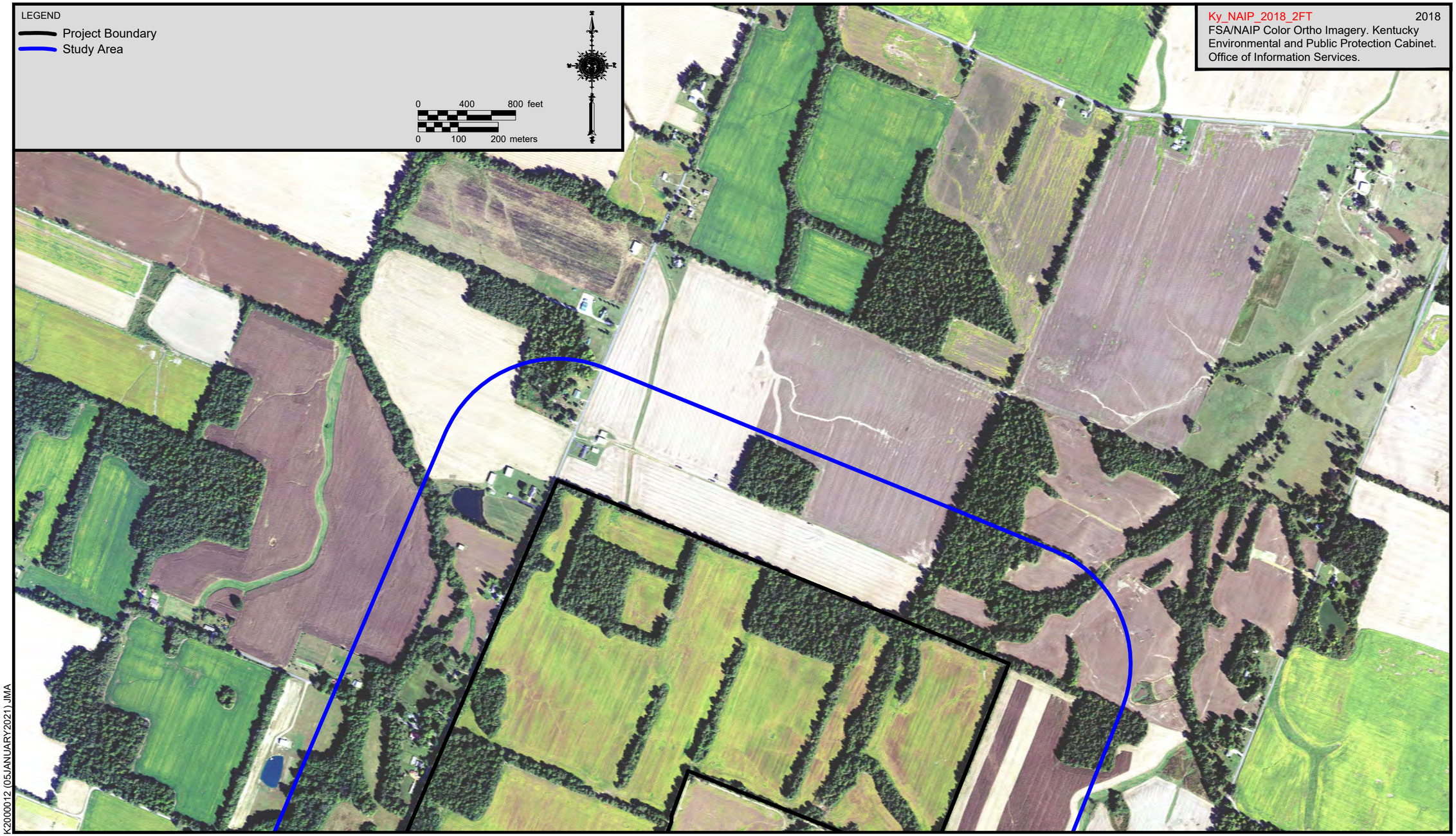

Figure 2b. Aerial photograph depicting the study area, project boundary, and locations of resources within and adjacent to the study area.

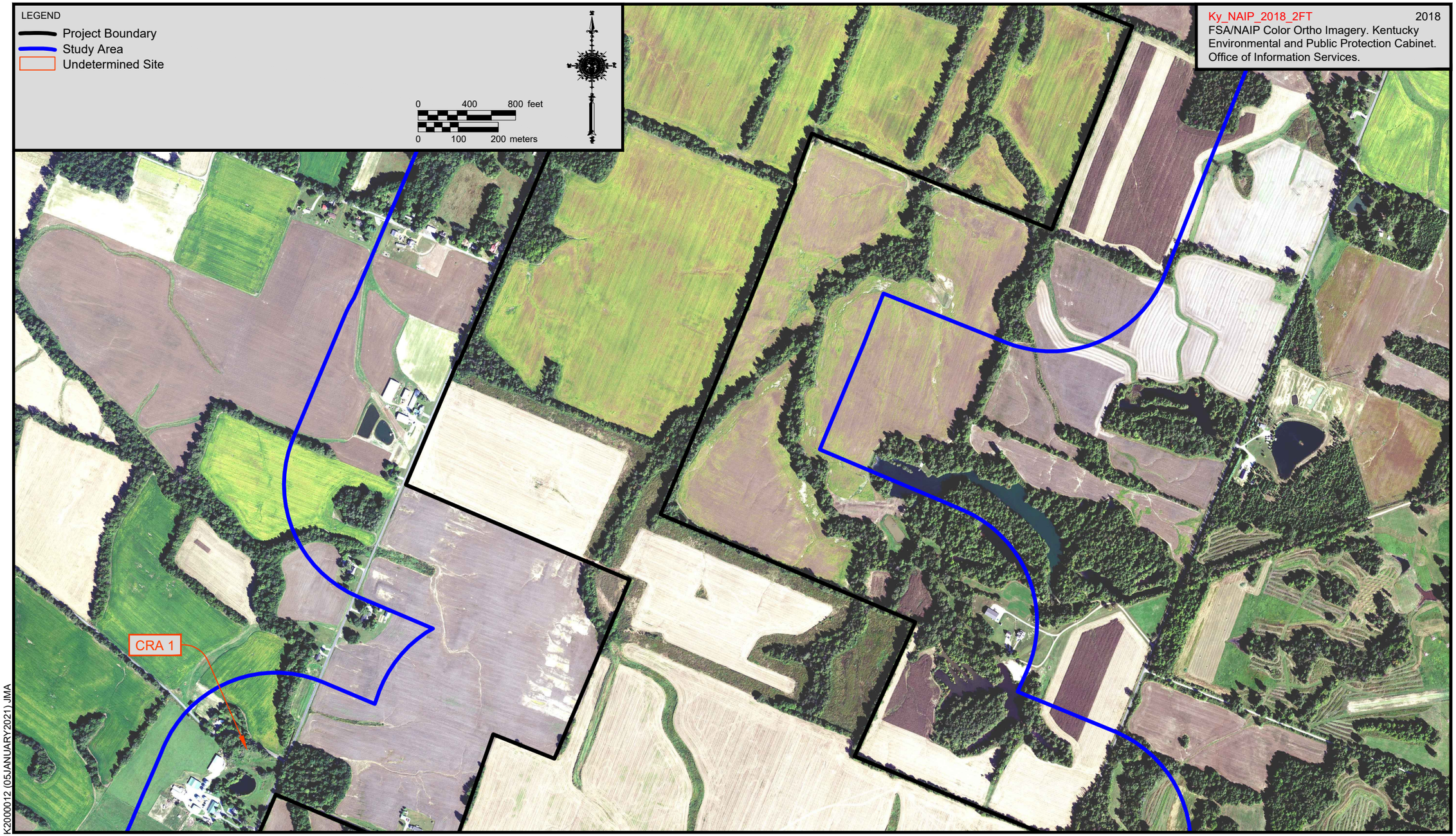

Figure 2c. Aerial photograph depicting the study area, project boundary, and locations of resources within and adjacent to the study area.

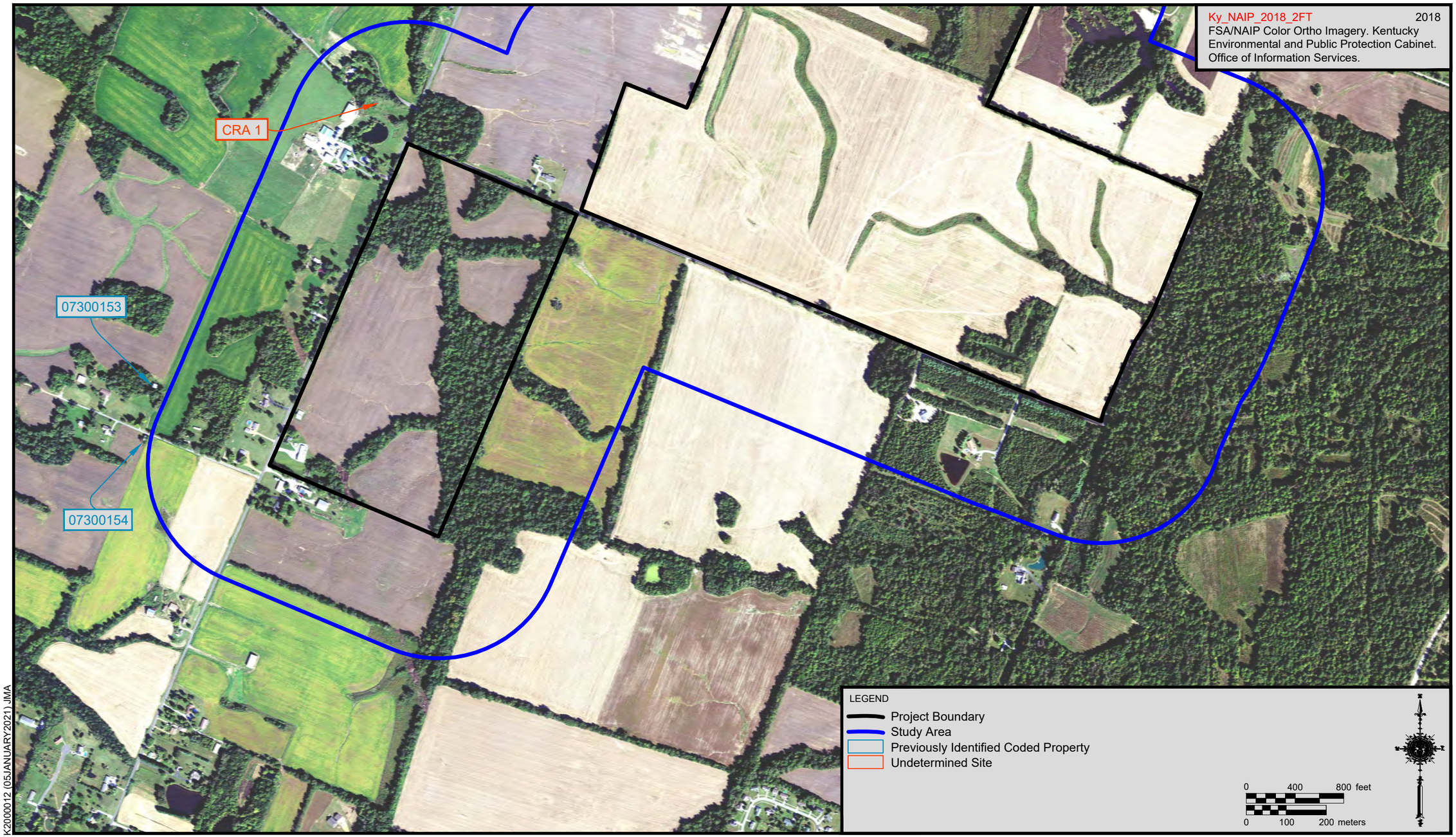

Figure 2d. Aerial photograph depicting the study area, project boundary, and locations of resources within and adjacent to the study area.

One newly identified resource (CRA 1), a cemetery, was identified during the survey and is depicted on the 1954 Heath, Kentucky, 7.5-minute series topographic quadrangle (United States Geological Survey [USGS] 1954). The cemetery is overgrown with vegetation, obscuring any burial markers that may be present. The cemetery was not able to be intensively surveyed from the ROW; thus, the cemetery would require further examination to determine its NRHP eligibility under Criterion A, B, or C and Criteria Consideration D. Therefore, the NRHP eligibility of CRA 1 is recommended undetermined for this overview study.

In summary, two previously identified coded resources lack either significance and/or integrity and appear to be not eligible for listing in the NRHP. One newly recorded resource, a cemetery, was not accessible from the ROW and should be further investigated for its potential eligibility for listing in the NRHP. Additionally, further investigation may be required to ascertain the NRHP eligibility of any resources that may be located within the study area but are not visible from the ROW and were not identified in this survey.

If you have any questions, please do not hesitate to contact me at your convenience.

Sincerely,

Trent Spurlock, MHP
Architectural Historian, Principal Investigator

References Cited

United States Geological Survey
1954 Heath, Kentucky, 7.5-minute series topographical quadrangle. United States Department of the Interior, Washington, DC.

APPENDIX A. PHOTOGRAPHS OF SURVEYED RESOURCES

Figure A-1. Resource 07300153. Southwest elevation of the barn, looking north-northeast.

Figure A-2. Resource 07300154. Façade and northwest elevation of the building, looking south-southeast.

Figure A3. Resource CRA 1. Overview of the cemetery, looking southwest.

Figure A4. Resource CRA 1. Overview of the cemetery, looking southwest.

W. Trent Spurlock, MHP	Architectural Historian	
National Park Service Professional Qualification: • Architectural Historian • Historian **Email:** wtspurlock@crai-ky.com	**Specific Duties:** • Architectural historian • Archival research and field documentation • Report preparation	**Education and Training:** • MHP, University of Kentucky, Lexington, Kentucky • B.S., accounting, Western Kentucky University, Bowling Green, Kentucky

Experience Summary Information		
Architectural Historian Cultural Resource Analysts, Inc. May 2002 – present	**Historic Preservation R.A.** Center for Historic Architectural Preservation, University of Kentucky, August 2002 – May 2003	**Loan Officer/Assistant Vice-President** Southern Deposit Bank/AREA Bank Russellville Branch September 1987 – August 2001

W. Trent Spurlock, MHP. Mr. Spurlock has a Masters in Historic Preservation and over ten years of experience as an architectural historian and field supervisor at Cultural Resource Analysts, Inc. Trent's responsibilities at CRA include researching and documenting historic properties by conducting archival research and field surveys, evaluating the significance of historic properties, and preparing written reports that provide summary findings and recommendations for various types of cultural historic projects. Mr. Spurlock has experience surveying various types of projects for Section 106 compliance including cellular telecommunication towers, highway improvement/reconstruction projects, electric transmission corridors, and United States Army Corps of Engineers jurisdictional boundary projects. He also has experience evaluating the potential effects such projects have on sites listed in or determined eligible for listing in the National Register of Historic Places. Mr. Spurlock has the training to conduct professional archival research on historic properties and to compile written reports synthesizing various types of information.

Professional Affiliations:

- Vernacular Architecture Forum
- National Trust for Historic Preservation
- Pioneer America Society: Association for the Preservation of Artifacts and Landscapes

Additional Training:

- Innovative Approaches to Section 106 Mitigation Training, Advisory Council on Historic Preservation, web based training, 2013
- Introduction to NEPA and Transportation Decisionmaking Training, National Highway Institute, web based training, 2012
- Revisions to the National Register Form and Redacting Information Webinar, National Park Service, web based training, 2012
- Section 106 Training, Ohio Department of Transportation, Columbus, OH, 2012
- Identifying and Evaluating Properties of the Recent Past Workshop, Ohio State Historic Preservation Office, 2011
- Bloodborne Pathogens/Adult First Aid, CPR, and AED, December 2012
- OSHA 10-hour Construction Industry Outreach Training Program, 2010
- Department of Defense, Anti-terrorism Level 1 Awareness Training, 2010
- Vernacular Architecture Forum Annual Conference, Washington D.C., 2010
- The Advisory Council on Historic Preservation's Section 106 Advanced Seminar, Kansas City, MO, 2008
- Department of Defense Historic Buildings Conference, Kansas City, MO, 2008
- The National Park Service's American Battlefield Protection Program Battlefield Preservation Seminar, Charleston, WV, 2006
- Section 106 and National Register Eligibility Training, Ohio Department of Transportation, Columbus, OH, 2003

Sample Projects:

- **Cultural Resource Survey for the Proposed HealthFirst Bluegrass, Inc., Construction Project on Southland Drive in Lexington, Fayette County, Kentucky (HRSA Grant C8ACS21362).** Architectural Historian/Historian tasked with identifying historic properties within the project's visual APE, evaluating eligibility and effect, and co-authoring the final report. Prepared for HealthFirst Bluegrass, Inc. and Department of Health and Human Services. 2013.
- **Cultural Historic Resource Survey for the Proposed Wewoka/West Park Hazard Mitigation Grant Program Grant Application Project in West Louisville, Jefferson County, Kentucky.** Architectural Historian/Historian tasked with identifying historic properties within the project APE, evaluating eligibility and effect, and co-authoring the final report. Prepared for Louisville and Jefferson County Metropolitan Sewer District. 2012.
- **Historic Documentation of Site JF-2384 Residence Located at 2111 South Park Road, Louisville, Jefferson County, Kentucky (12-301).** Architectural Historian/Historian tasked with conducting a documentation of the historic bridge and coauthoring the final report. Prepared for Redwing Ecological Services, Inc. 2012.
- **Cultural Historic Resource Survey for the Proposed Mercer County Industrial Park-Van Arsdell 69 KV Transmission Line Project in Mercer County, Kentucky (12-174).** Architectural Historian/Historian tasked with identifying historic properties within the project APE, evaluating eligibility and effect, and co-authoring the final report. Prepared for East Kentucky Power Cooperative. 2012.
- **Cultural Historic Determination of Eligibility Study for the Proposed New Circle Road (KY 4) Re-hab and Widening from Versailles Road Interchange to Near the Georgetown Road Interchange in Fayette County, Kentucky (Item Number 7-113.00).** Architectural Historian/Historian tasked with identifying historic properties within the project APE, evaluating eligibility, and co-authoring the final report. Prepared for HDR Engineering, Inc. 2012.
- **Cultural Historic Baseline Survey for the Proposed Replacement of the KY 152 Kennedy Bridge Over Herrington Lake in Mercer and Garrard Counties, Kentucky (Item Number 7-1116.00).** Architectural Historian/Historian tasked with identifying historic properties within the project APE, evaluating eligibility and effect, and co-authoring the final report. Prepared for WMB, Inc. 2012.
- **A Cultural Resource Survey for the Proposed Construction of the New Southside Elementary School in Shelby County, Kentucky (12-105).** Architectural Historian/Historian tasked with identifying historic properties within the project APE, evaluating eligibility and effect, and co-authoring the final report. Prepared for Redwing Ecological Services, Inc. 2012.
- **Montrose Veterans Administration Hospital National Register of Historic Places Nomination (Montrose, Westchester County, New York).** Architectural Historian/Historian co-author tasked with writing and editing individual NRHP nomination. Prepared for the United States Department of Veterans Affairs. 2011 (status pending).
- **Bath Veterans Administration Hospital National Register of Historic Places Nomination (Bath, Steuben County, New York).** Architectural Historian/Historian co-author tasked with writing and editing individual NRHP nomination. Prepared for the United States Department of Veterans Affairs. Listed 2013.
- **Edward Hines, Jr., Veterans Administration Hospital National Register of Historic Places Nomination (Hines, Cook County, Illinois).** Architectural Historian/Historian co-author tasked with writing and editing individual NRHP nomination. Prepared for the United States Department of Veterans Affairs. 2011 (status pending).
- **Lebanon Veterans Administration Hospital National Register of Historic Places Nomination (Lebanon, Lebanon County, Pennsylvania).** Architectural Historian/Historian co-author tasked with writing and editing individual NRHP nomination. Prepared for the United States Department of Veterans Affairs. 2011 (status pending).
- **Alexandria Veterans Administration Hospital Additional Documentation (and Boundary Increase) National Register of Historic Places Nomination (Pineville, Rapides County, Louisiana).** Architectural Historian/Historian co-author tasked with writing and editing individual NRHP nomination. Prepared for the United States Department of Veterans Affairs. Listed 2012.

EXHIBIT 14
ATTACHMENT 14.4

cra
cultural resource analysts, inc.

January 8, 2021

Marty Marchaterre
Senior Environmental Planner
Copperhead Environmental Consulting, Inc.
151 Walton Avenue
Lexington, Kentucky 40508

RE: An Archaeological Records Review and Site Reconnaissance to Evaluate Archaeological Resource Potential for the McCracken County Solar LLC - Solar Project
CRA Project No.: K200013
Contract Publication Series: 20-508

Dear Mr. Marchaterre,

On December 2, 2020, Cultural Resource Analysts, Inc. (CRA), personnel conducted an inspection of the proposed Solar Project in McCracken County, Kentucky, which totaled approximately 289 ha (714 acres). The purpose of the inspection was to identify locations that had a high probability for archaeological materials, particularly areas with mapped structures on historic maps. These areas were mostly subjected to limited pedestrian survey. Systematic shovel testing was beyond the scope of this study; however, some shovel test probes were excavated to investigate the potential for the presence of subsurface archaeological artifacts in high probability areas. No archaeological materials were recovered from these probes.

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Prior to the pedestrian survey, Office of State Archaeology (OSA) Geographic Information Systems (GIS) data were requested to review previous archaeological surveys and sites within a 2 km radius of the current proposed project area. The proposed McCracken County Solar Farm project consists of open and partially wooded agricultural fields approximately 7 km west of Grahamville, Kentucky. The proposed project area is located along New Liberty Church Road (Figures 1–9).

In the current study, no previously recorded sites were present within the study area. In addition, seven historic maps were inspected for any mapped structures present within the study area. Fifteen mapped structure locations were noted and visited during the pedestrian survey to assess whether there was any potential for associated historic archaeological sites. Singular shovel tests were performed in four separate high probability locations to investigate intact subsurface archaeological deposits due to the presence of artifacts on the ground surface, burned brick, or poured concrete steps in these areas. The following sections discuss previously recorded archaeological sites and surveys documented near the proposed study area, the soils in the study area, and the results of the pedestrian survey.

Previous Archaeological Surveys

A review of OSA records revealed that a total of two previous professional archaeological surveys have been conducted within a 2 km radius of the study. However, no archaeological sites have been recorded in this area. Neither of the previous surveys intersect with the current study area. The 2 km radius included areas within the Joppa and Heath quadrangles (United States Geological Survey [USGS] 1978 and 1982).

The records returned from the OSA database may include discrepancies; these discrepancies are typically identified and documented during research visits to the OSA library. Due to the COVID-19 pandemic, however, the OSA library closed on March 17, 2020 and reopened on June 22, 2020. Since reopening, public access has been limited and additional information about the records returned is by digital request. As a result, research for the current study is limited by these health and safety restrictions.

A search of the NRHP records indicated that no archaeological sites listed in the NRHP were situated within the current study area or within a 2 km radius of the study area (United States Department of the Interior, National Park Service 2020).

Between April 2 and June 4, 1993, Geo-Marine, Inc., personnel, under contract with the Department of the Army, conducted an archaeological survey at and around the Paducah Gaseous Diffusion Plant in McCracken County, Kentucky, for the Department of Energy (Briuer 1994). The survey included 669 ha as part of a larger project designed to identify and document environmentally sensitive resources at the facility. Field methods consisted of pedestrian survey and screened shovel testing. One previously recorded site (15McN37), 10 previously unrecorded sites (15McN94–15McN103), and 12 non-site localities (no site numbers assigned) were documented during the course of the survey. None of the sites documented are located within 2 km of the current study area.

Between September 5 and November 13, 2006, University of Kentucky's Program for Archaeological Research conducted an archaeological survey on behalf of Kentucky Department of Fish and Wildlife Resources (Byron 2007). The survey was conducted to assess the impact of proposed construction and environmental rehabilitation projects on select tracts within the Western Kentucky Wildlife Management Area in McCracken County, Kentucky. Of the nine total areas impacted, only four totaling 16.8 ha, were investigated for archaeological resources and subjected to pedestrian survey and screened shovel testing. One site (15McN134) was identified as a result of the survey. This site is not within the search radius of the current project area.

Map Data

Prior to the site visit, CRA conducted a review of historic maps to determine if any of the maps showed mapped structures (MS) within the study area. The following maps were reviewed.

1928 La Center, Kentucky-Illinois, 15-minute topographic quadrangle (USGS)

1932 La Center, Kentucky-Illinois, 15-minute topographic quadrangle (USGS)

1937 Highway and Transportation Map of McCracken County (Kentucky Department of Highways [KDOH])

1950 General Highway Map of McCracken County (Kentucky State Highway Department [KSHD])

1954a Heath, Kentucky, 7.5-minute topographic quadrangle (USGS)

1954b Joppa, Illinois-Kentucky, 7.5-minute topographic quadrangle (USGS)

1956 General Highway Map of McCracken County (KDOH)

All of these maps showed mapped structures within, or directly adjacent to, the current study area. MS 1–MS 8 were originally identified on the 1928 La Center, Kentucky-Illinois, map (Figure 10) (USGS). The same structures were also present on the 1932 La Center, Kentucky-Illinois, map (Figure 11) (USGS); no additional structures were present on the 1932 map.

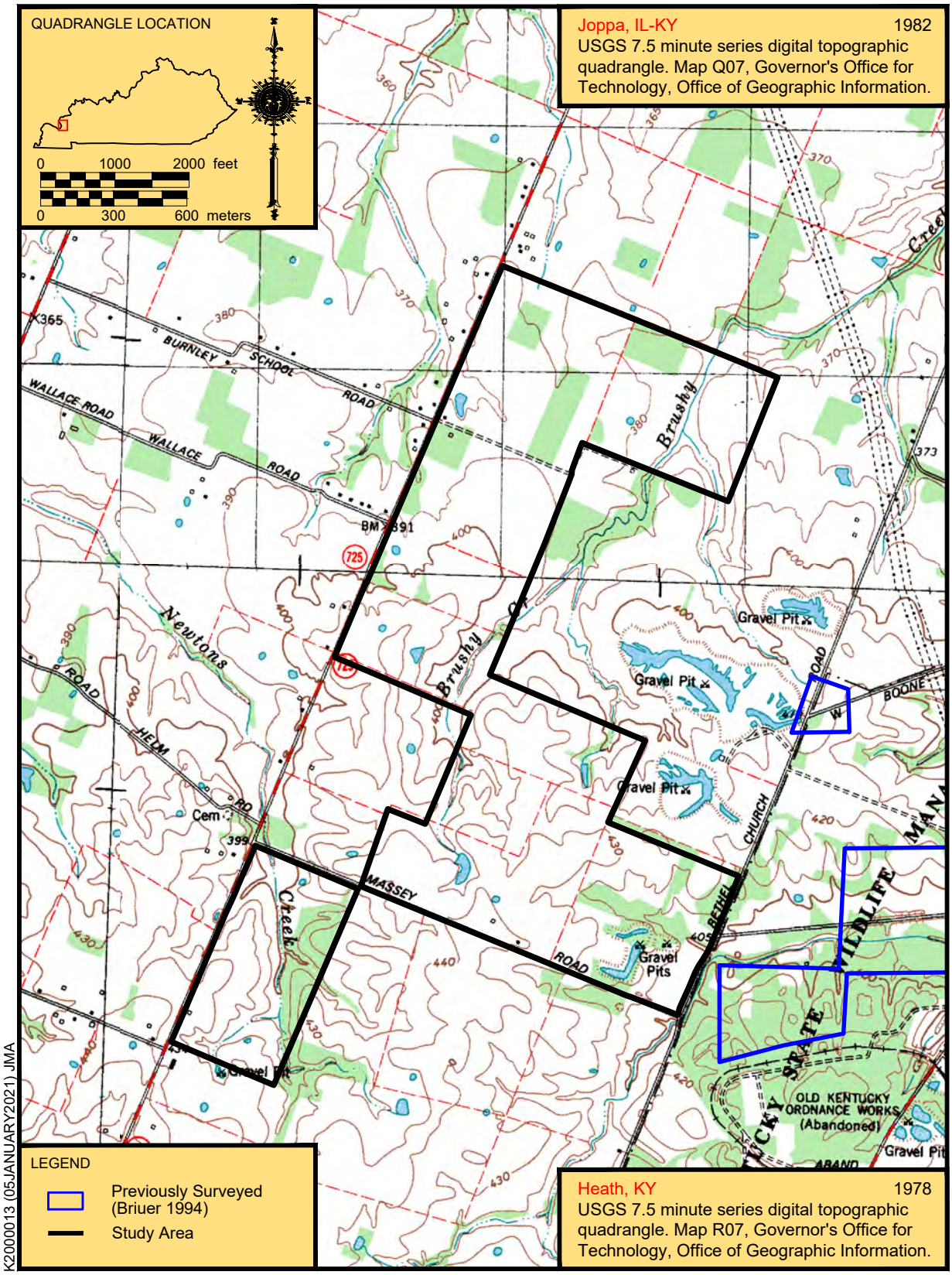

Figure 1. Topographic map depicting the location of the study area (USGS 1978 and 1982).

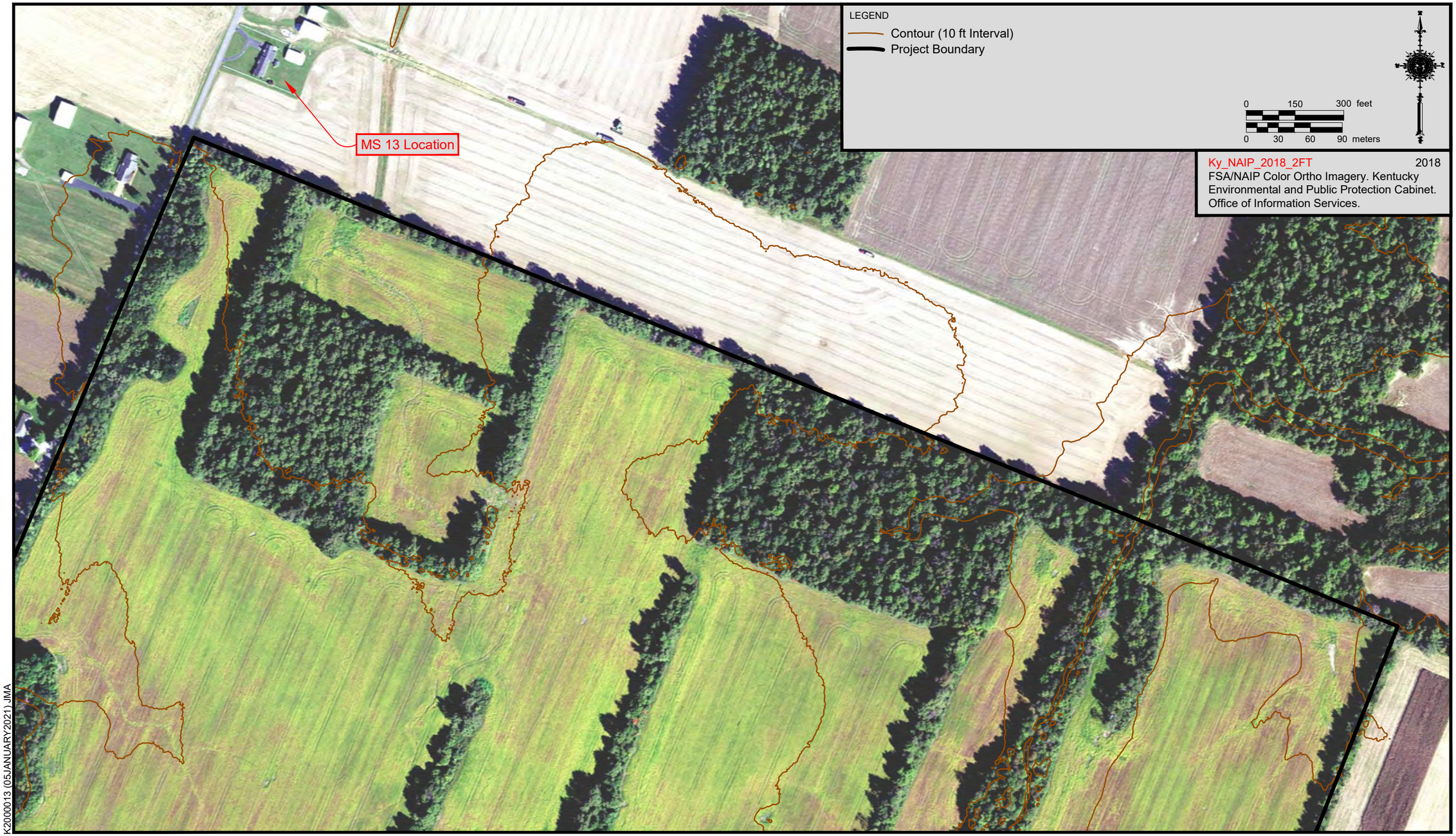

Figure 2. Aerial photograph depicting the location of the study area, showing the location of MS 13.

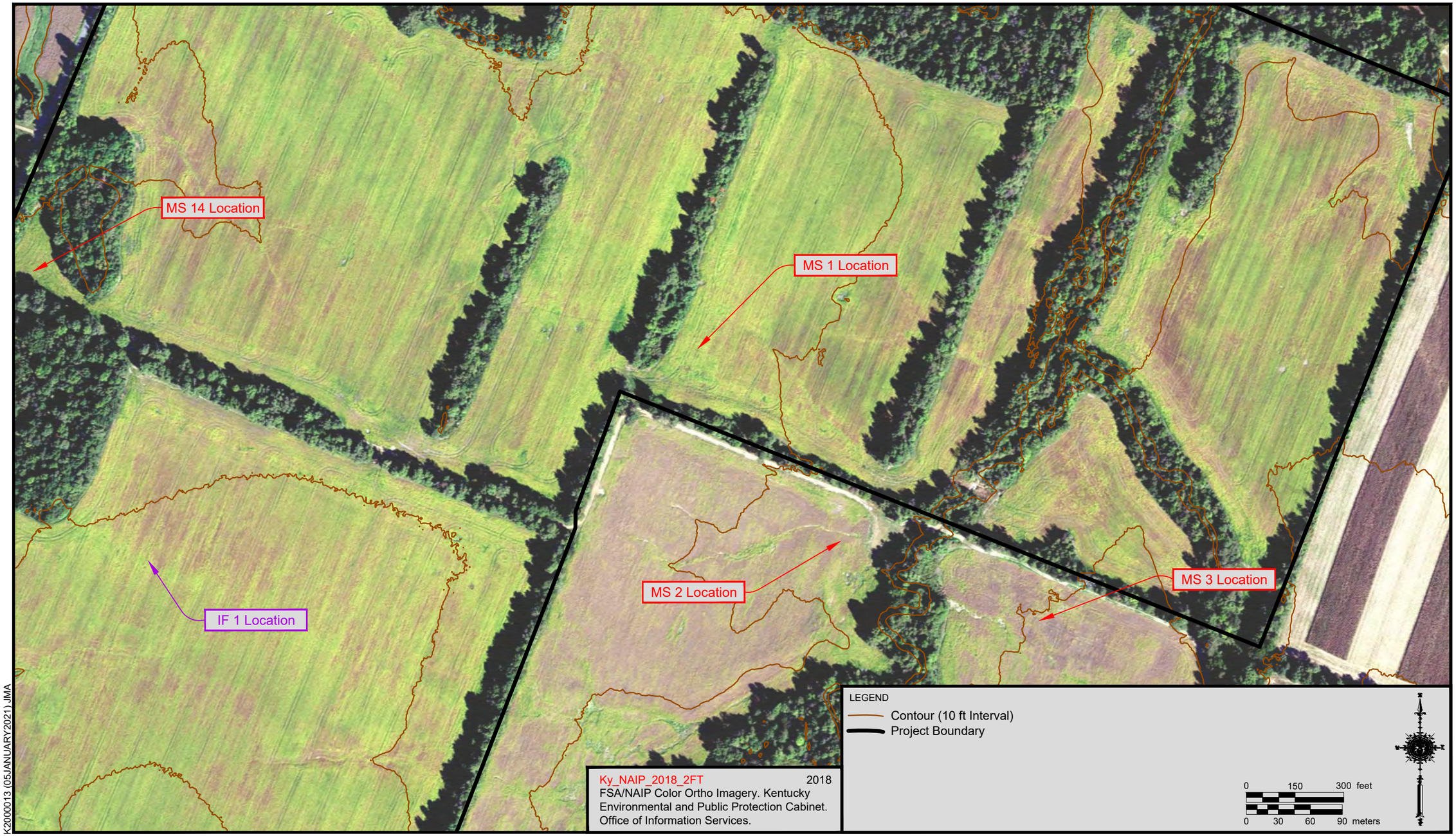

Figure 3. Aerial photograph depicting the location of the study area, showing the locations of IF 1, MS 1–MS 3, and MS 14.

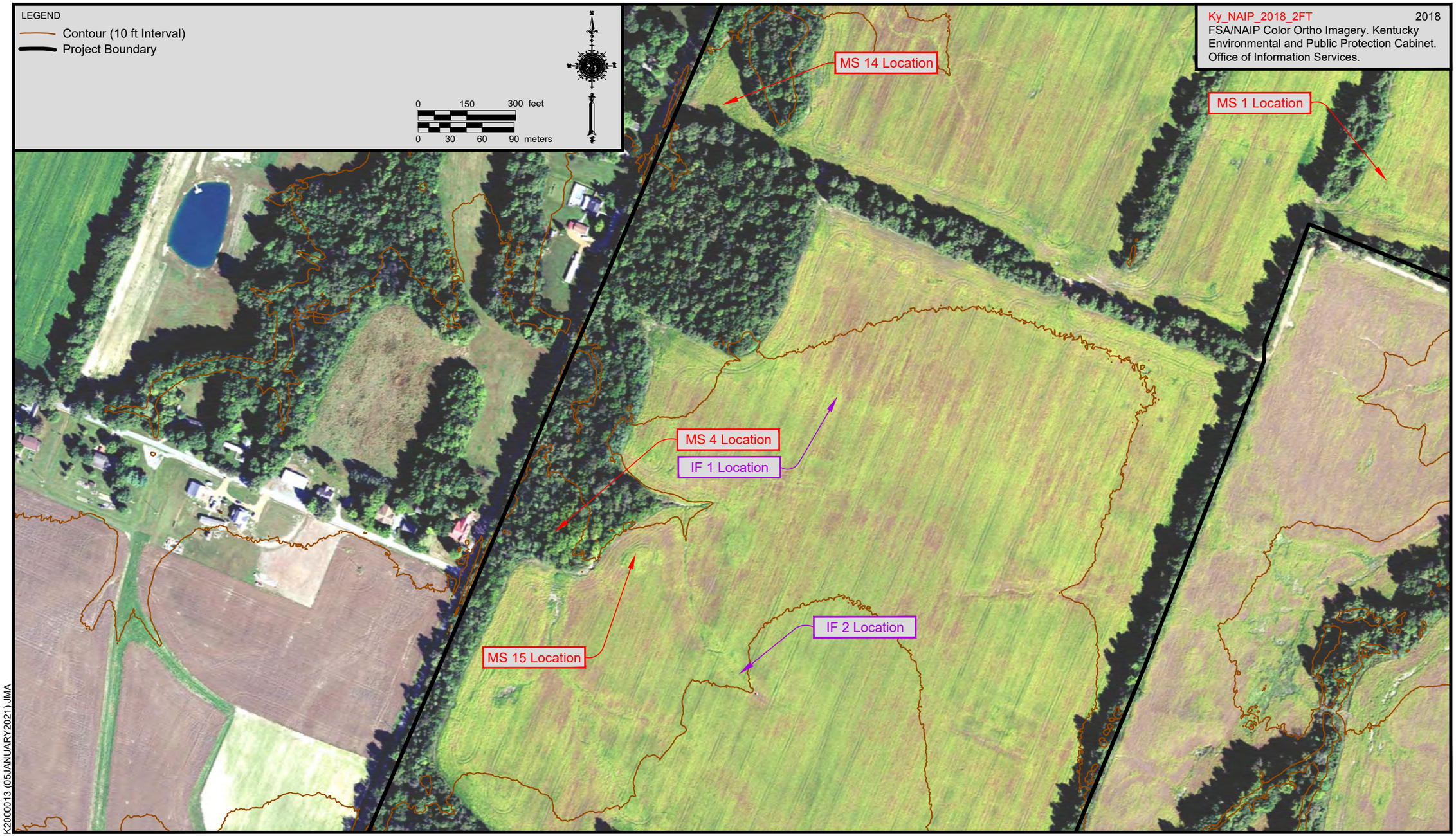

Figure 4. Aerial photograph depicting the location of the study area, showing the locations of IF 1, IF 2, MS 1, MS 4, MS 14, and MS 15.

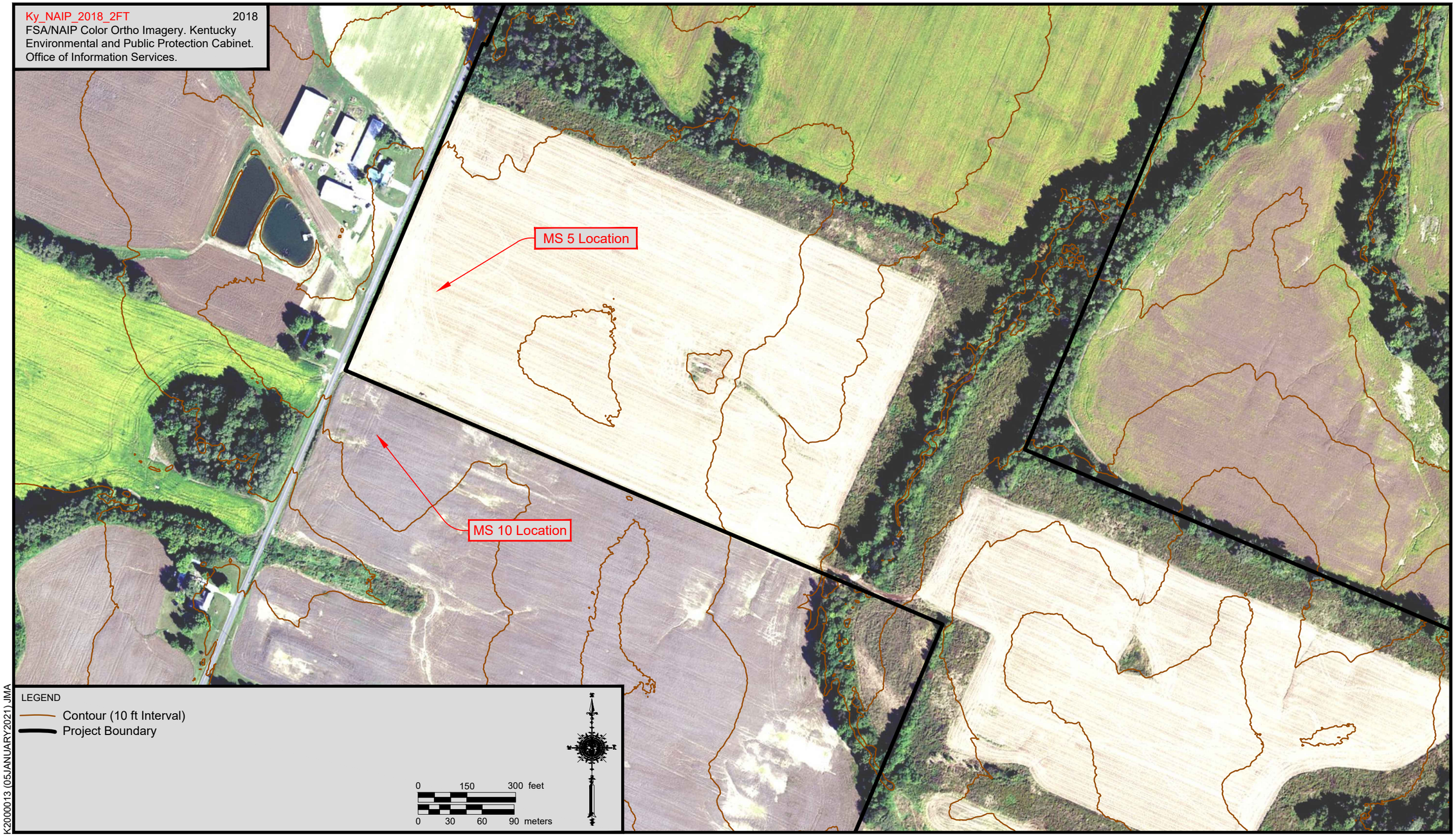

Figure 5. Aerial photograph depicting the location of the study area, showing the locations of MS 5 and MS 10.

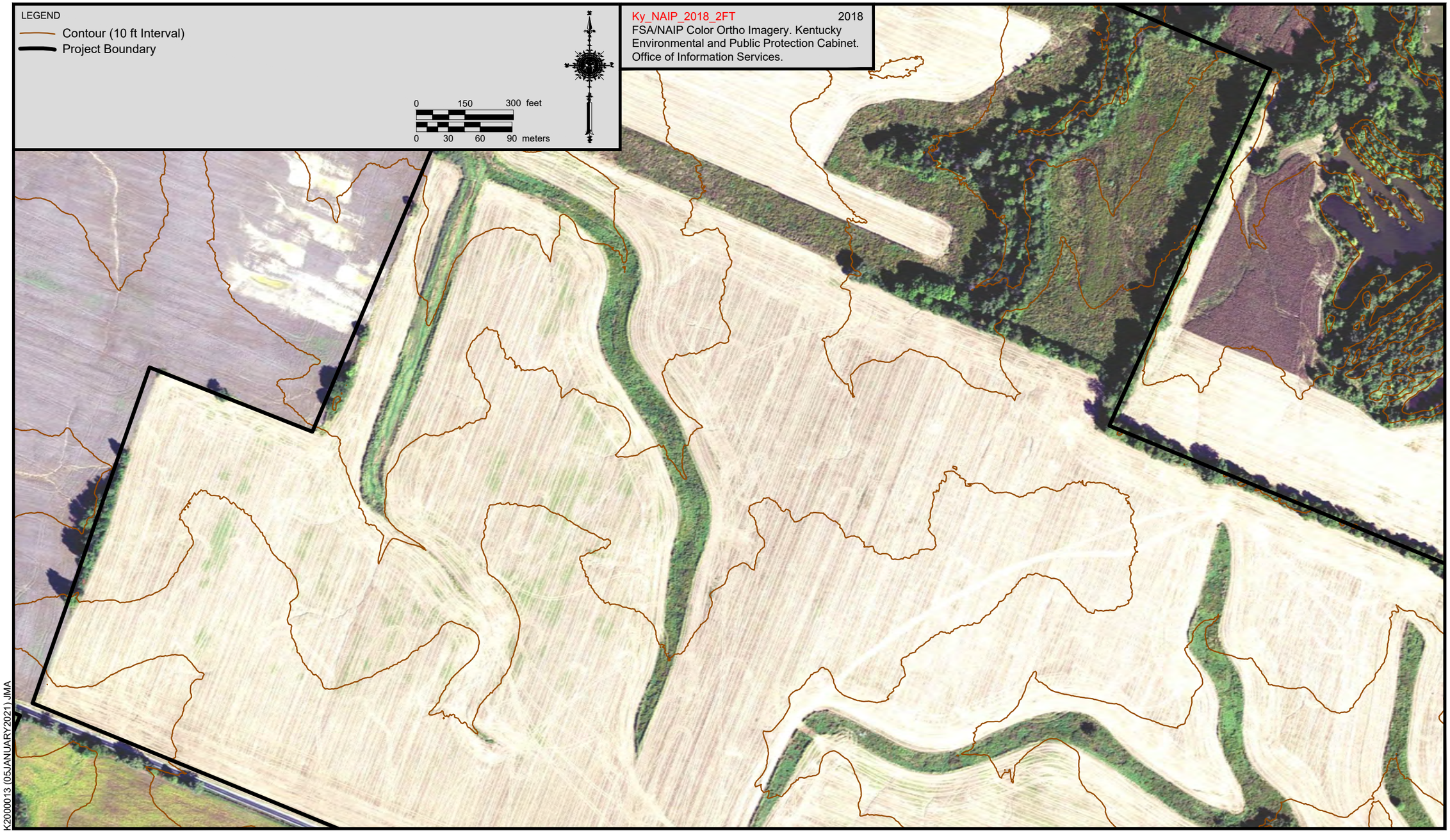

Figure 6. Aerial photograph depicting the location of the study area.

Figure 7. Aerial photograph depicting the location of the study area.

Figure 8. Aerial photograph depicting the location of the study area, showing the locations of MS 6, MS 9, and MS 11.

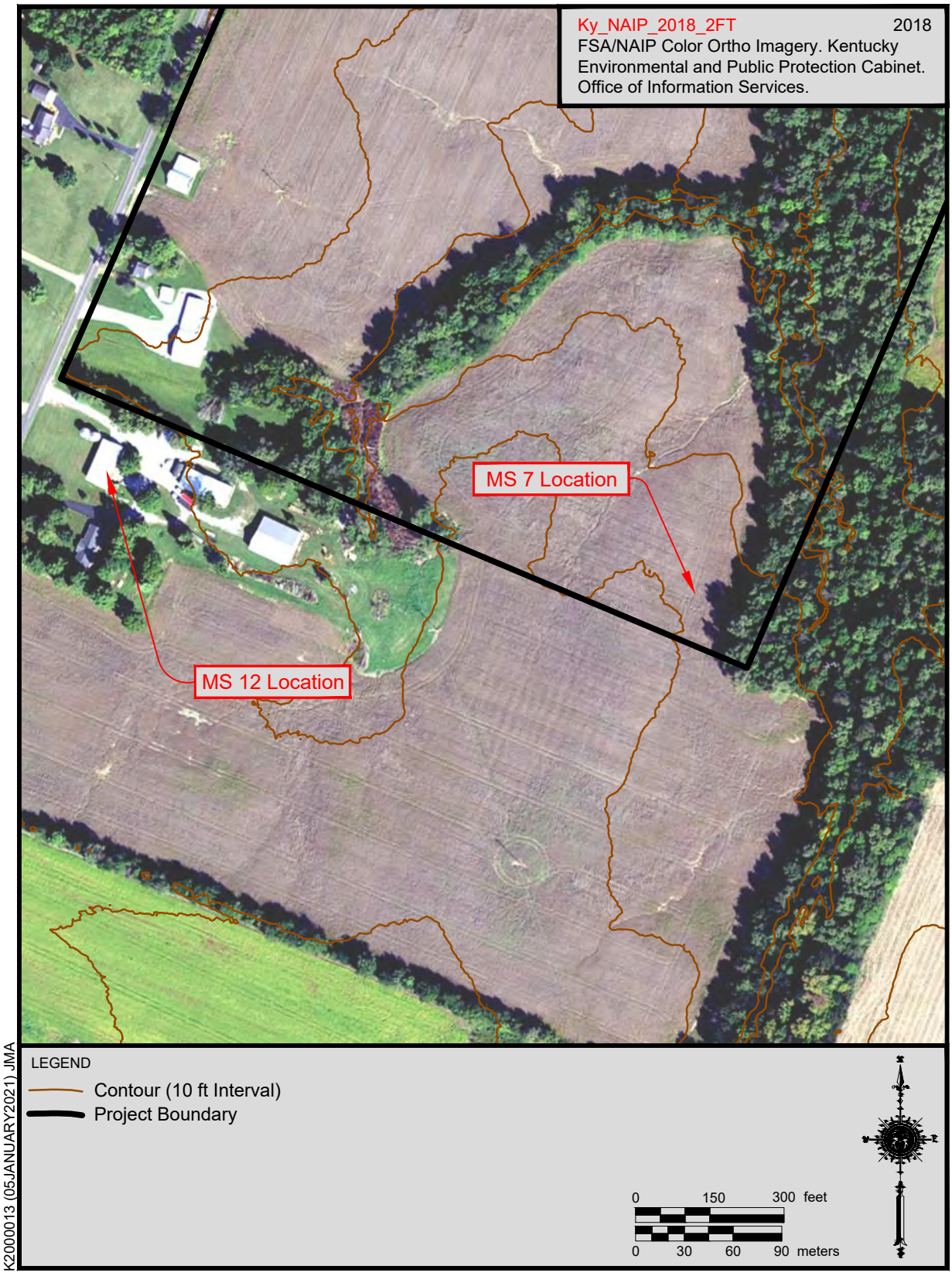

Figure 9. Aerial photograph depicting the location of the study area, showing the locations of MS 7 and MS 12.

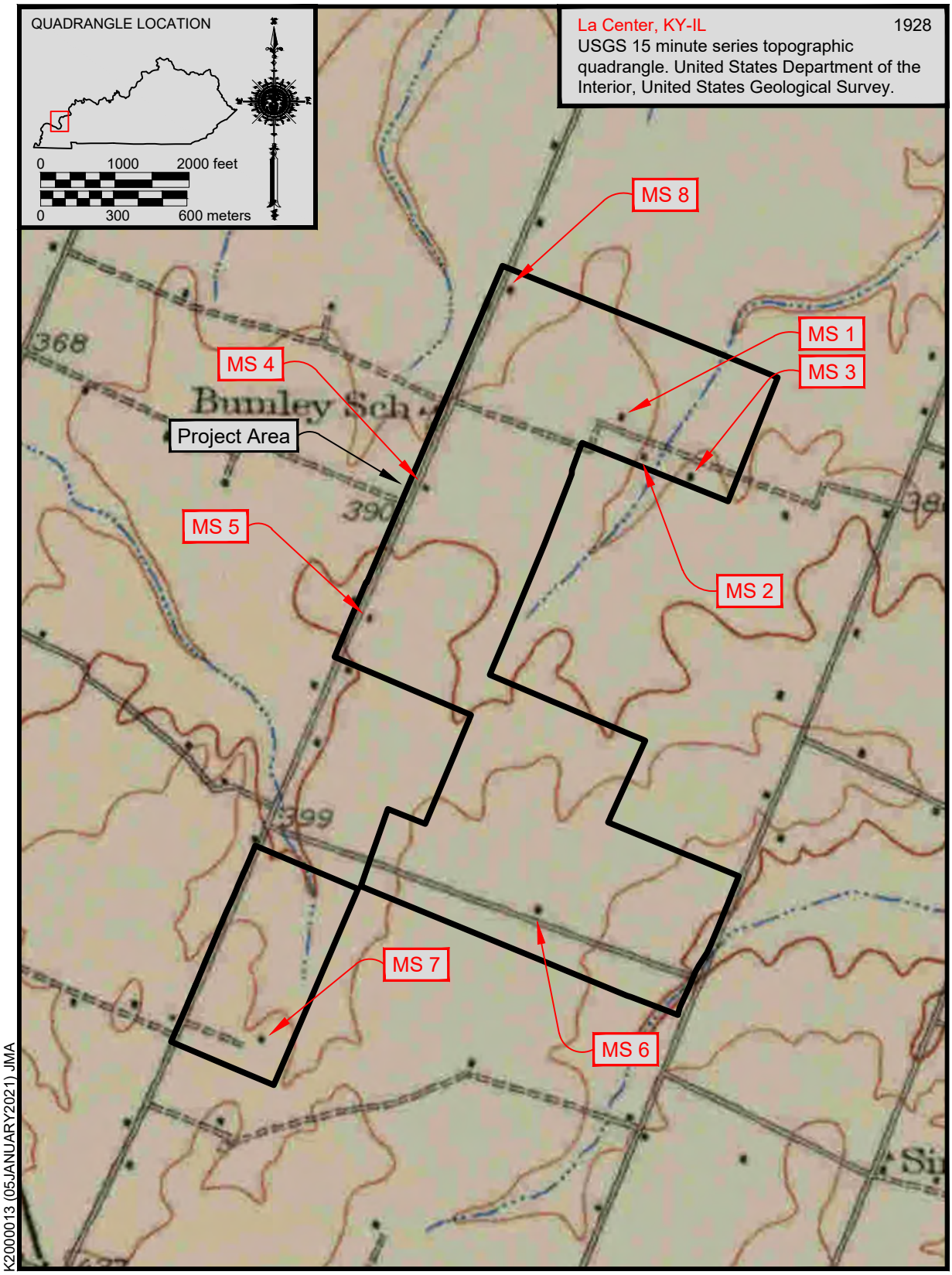

Figure 10. 1928 La Center topographic quadrangle depicting the locations of MS 1–MS 8 (USGS).

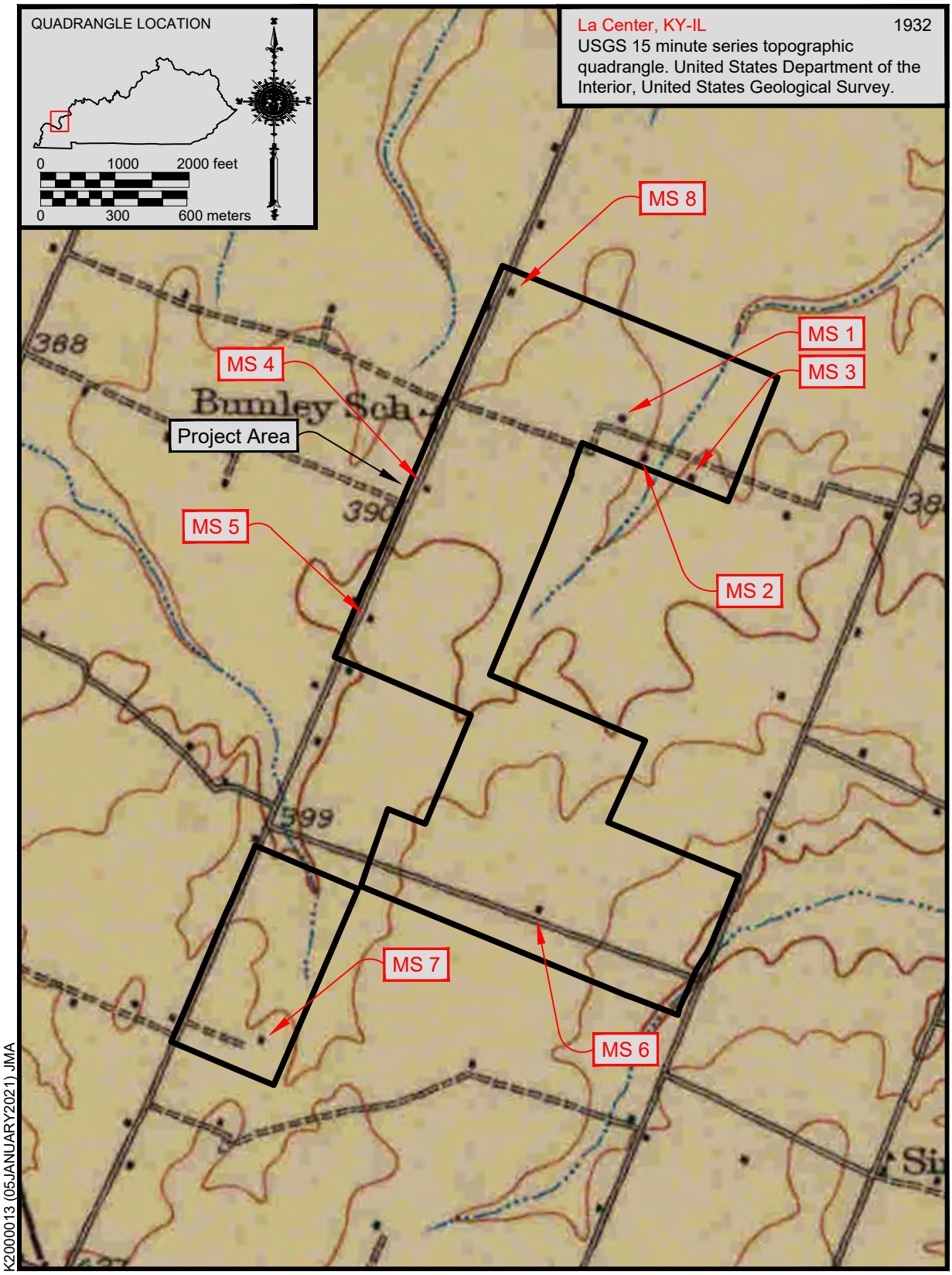

Figure 11. 1932 La Center topographic quadrangle depicting the locations of MS 1–MS 8 (USGS).

MS 1, MS 3, MS 5, MS 6, and MS 8 were also present on the 1937 Highway and Transportation Map (Figure 12) (KDOH); however, MS 2, MS 4, and MS 7 were not present. It should be noted that on this map, MS 8 is no longer inside of the study area. Five additional mapped structures (MS 9–MS 13) were also first identified on the 1937 highway map. It is likely that MS 2, MS 4, and MS 7 were razed or demolished by 1937; however, due to the smaller scale of the highway maps compared to the USGS maps, their absence may also be due to mapping accuracy issues.

On the 1950 general highway map, MS 6 and MS 12 are still present (Figure 13) (KSHD). MS 1–MS 5, MS 7–MS 11, and MS 13 are not present on this map; like the 1937 highway map, their absence could be due to demolition, razing, or map accuracy issues.

On the 1954 USGS maps of Heath and Joppa, MS 6 and MS 12 are present (Figure 14) (USGS 1954a and 1954b). A new structure, MS 14, is present on the Joppa map. None of the other structures are present. This is likely due to demolition or razing of the structures some time before 1954.

On the last map, the 1956 general highway map, MS 6 and MS 14 are visible (Figure 15) (KDOH). A new structure, MS 15, is also present. No other structures are present on this map. As previously stated for the 1936 and 1950 highway maps, due to the smaller scale, this map may contain accuracy issues. This may explain why MS 12 is no longer present. However, since MS 1–MS 5 and MS 7–MS 11 were not present on the 1954 USGS map, it is more likely that these structures were demolished by the time the 1956 highway map was created.

Soils Data

The soils mapped within the study area were also reviewed in order to define areas that may contain intact cultural deposits. Three soil series (Calloway, Grenada, and Routon) and one soil complex (Falaya-Collins) were mapped for the study area (Soil Survey Staff 2020). The Calloway, Grenada, and Routon series soils are Alfisols, which are generally found on landforms that formed during the late Pleistocene or earlier (Soil Survey Staff 1999:163–165). Archaeological deposits would only be found on or very near the ground surface on landforms mapped with Alfisols. The Falaya-Collins complex is classified as Entisols. Entisols formed very recently in unconsolidated parent material, such as sandy or recent water-deposited sediments or disturbed soil and rock material, and have not been in place long enough for pedogenic processes to form distinctive horizons except an A horizon (Soil Survey Staff 1999:389–391). Because of their recent age, Entisols rarely have buried and intact prehistoric archaeological deposits. In summary, archaeological materials within the current study area would likely only be found on or very near the ground surface.

Observations and Results

The locations of the mapped structures observed on historic maps were visited during field reconnaissance, since they were considered high probability areas for archaeological resources. As stated previously, no previously recorded archaeological sites were located within the current study area.

Upon the start of the field reconnaissance, it was clear that MS 2, MS 3, and MS 12 were actually located outside of the current study area. These locations were not photographed, nor were shovel test probes performed at their locations.

In the locations of MS 5 and MS 8–MS 11, no structures were present. All of these locations were within open agricultural fields similar to the location of MS 11 with ground surface visibility of approximately 30–50 percent (Figure 16). In the locations of MS 7 and MS 13, active farmsteads were present; both resembled the location of MS 7 (Figure 17). As far as archaeological artifacts, there was a single whiteware fragment observed in the location of MS 8, and brick clear glass fragments were observed in the location of MS 5. No artifacts were observed on the ground surface within the locations of MS 4, MS 7, MS 9–MS 11, and MS 13. Given the limited amount of artifacts observed overall, there

is a low probability that any archaeological sites would be present in any of these locations. It is likely that the structures in the locations of MS 4, MS 5, MS 8, and MS 9–MS 11 were previously razed. It is unknown at this point whether the active farmsteads in the locations of MS 7 and MS 13 is the same structure represented in the historic maps.

Archaeological sites are likely in the locations of MS 1, MS 4, MS 6, MS 14, and MS 15 due to the features present, amount and types of archaeological materials present on the ground surface during the field reconnaissance, or the presence of artifacts within a shovel test excavated in the location. Since MS 1, MS 4, and MS 6 were on the oldest historic maps observed, they may have the most significance.

In the location of MS 1, there was a moderate density scatter of cobalt glass, stoneware, whiteware, clear flat glass, and brick fragments present on the ground surface in an area that measured approximately 20 m northeast to southwest by 40 m northwest to southeast (Figure 18). A shovel test probe was excavated to investigate the presence of subsurface archaeological deposits; brick, glass, and charcoal fragments were present.

The location of MS 4 was a wooded area that also had multiple yucca plants and a cistern (Figures 19 and 20). No archaeological materials were observed on the surface; however, this location is considered likely to be an archaeological site based on the presence of historic surface features (the yucca plants and the cistern). No shovel tests were excavated in this location during the current study so it is ultimately unknown at this time whether subsurface archaeological artifacts were present.

In the location of MS 6, there were poured concrete steps observed in a small wooded area (Figure 21). A shovel test was excavated to investigate the presence of subsurface archaeological deposits; brick, glass, and whiteware were observed. No artifacts were observed on the ground surface within the adjacent open agricultural field.

In the location of MS 14 was a collapsed shed and a low density scatter of milk glass and whiteware on the ground surface that measured approximately 15 m northeast to southwest, and 10 m northwest to southeast (Figures 22 and 23). According to the landowner of the property, MS 14 was a house that burned down; based on the historic maps, MS 14 must have burned down at some point in the mid- to late twentieth century. The landowner also divulged that the house had a well on the property, but CRA personnel were unable to locate a well during the field reconnaissance. Due to the small size and diversity of artifacts and absence of burned brick debris, CRA personnel did not excavate any shovel test probes in this area.

A moderately dense scatter consisting of cobalt glass, handmade brick, and whiteware fragments that measured approximately 40 m north to south and 40 m east to west was observed in the location of MS 15 (Figure 24). A shovel test was excavated to investigate the presence of subsurface archaeological deposits; brick fragments were observed. In addition to this potential archaeological site, two prehistoric isolated finds (IF) were found near the location of MS 15 on the ground surface (see Figure 3). IF 1 was a burned flake, and IF 2 was a biface tip (Figures 25 and 26, respectively). This biface tip is considered undiagnostic at this time. These artifacts were photographed and discarded; no other artifacts were observed near these isolated finds. Shovel test probes were not excavated in the locations of the isolated finds.

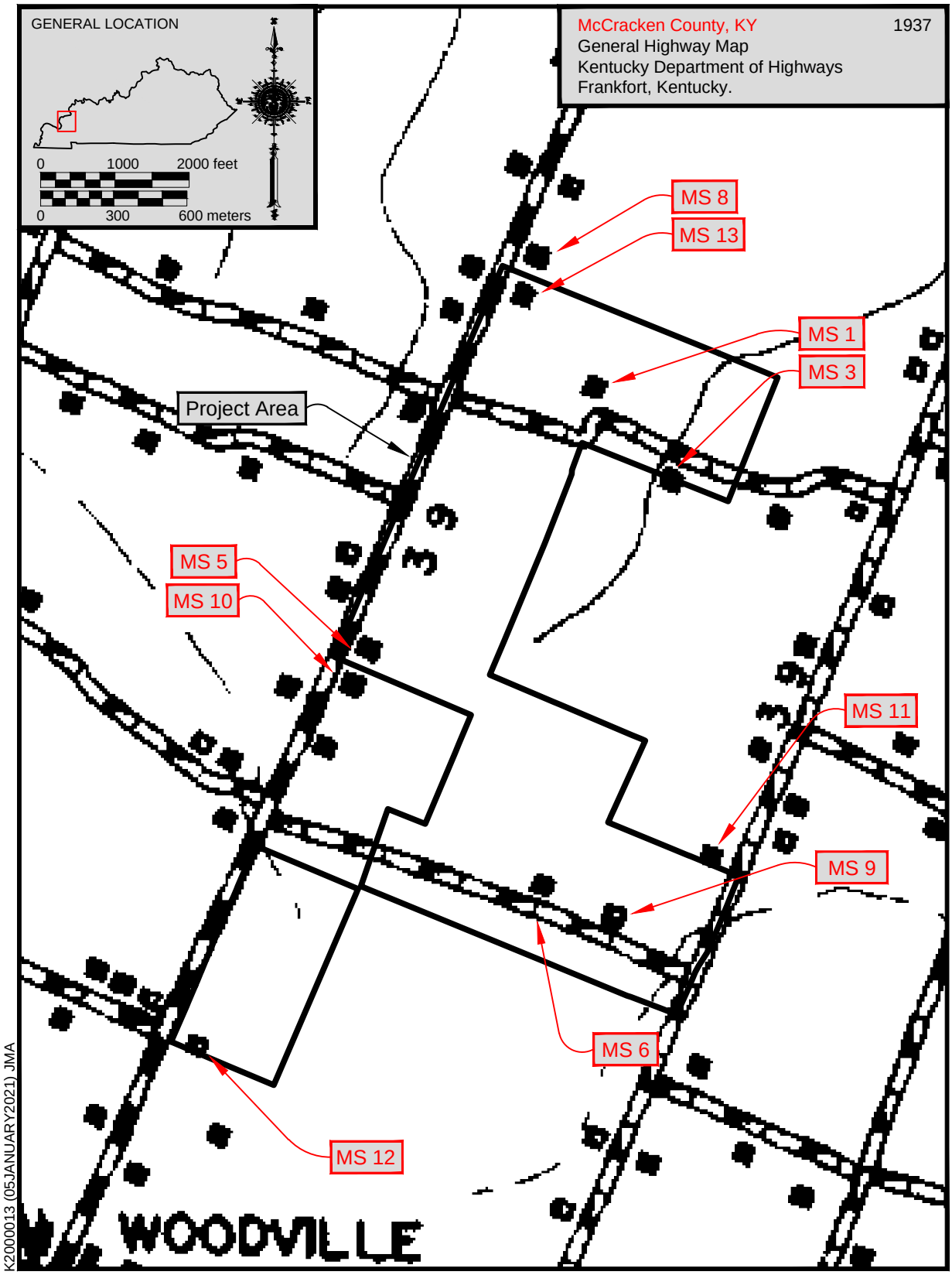

Figure 12. 1937 McCracken County Highway map depicting the locations of MS 1, MS 3, MS 5, MS 6, and MS 8–MS 13 (KDOH).

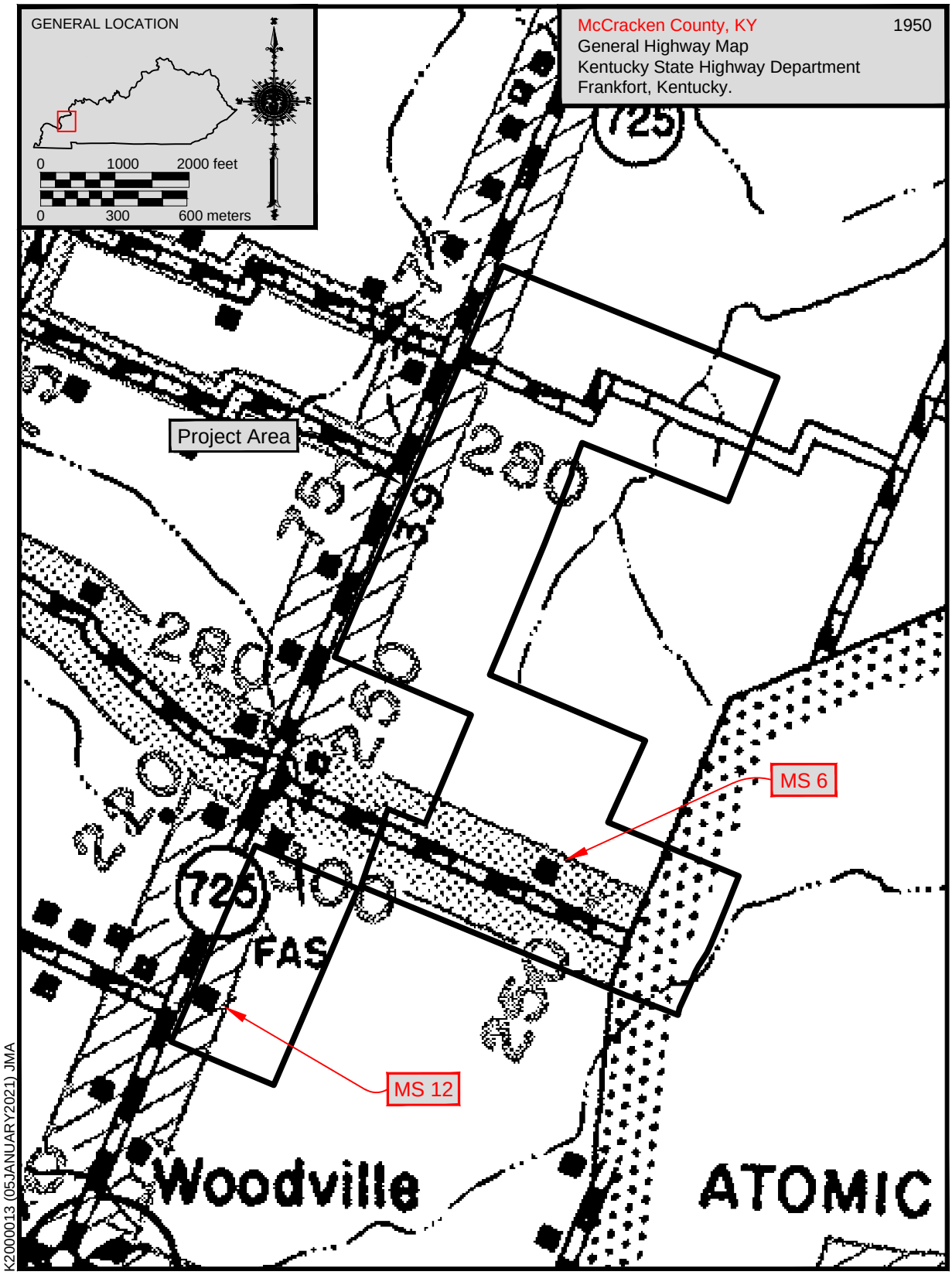

Figure 13. 1950 McCracken County Highway map depicting the locations of MS 6 and MS 12 (KSHD).

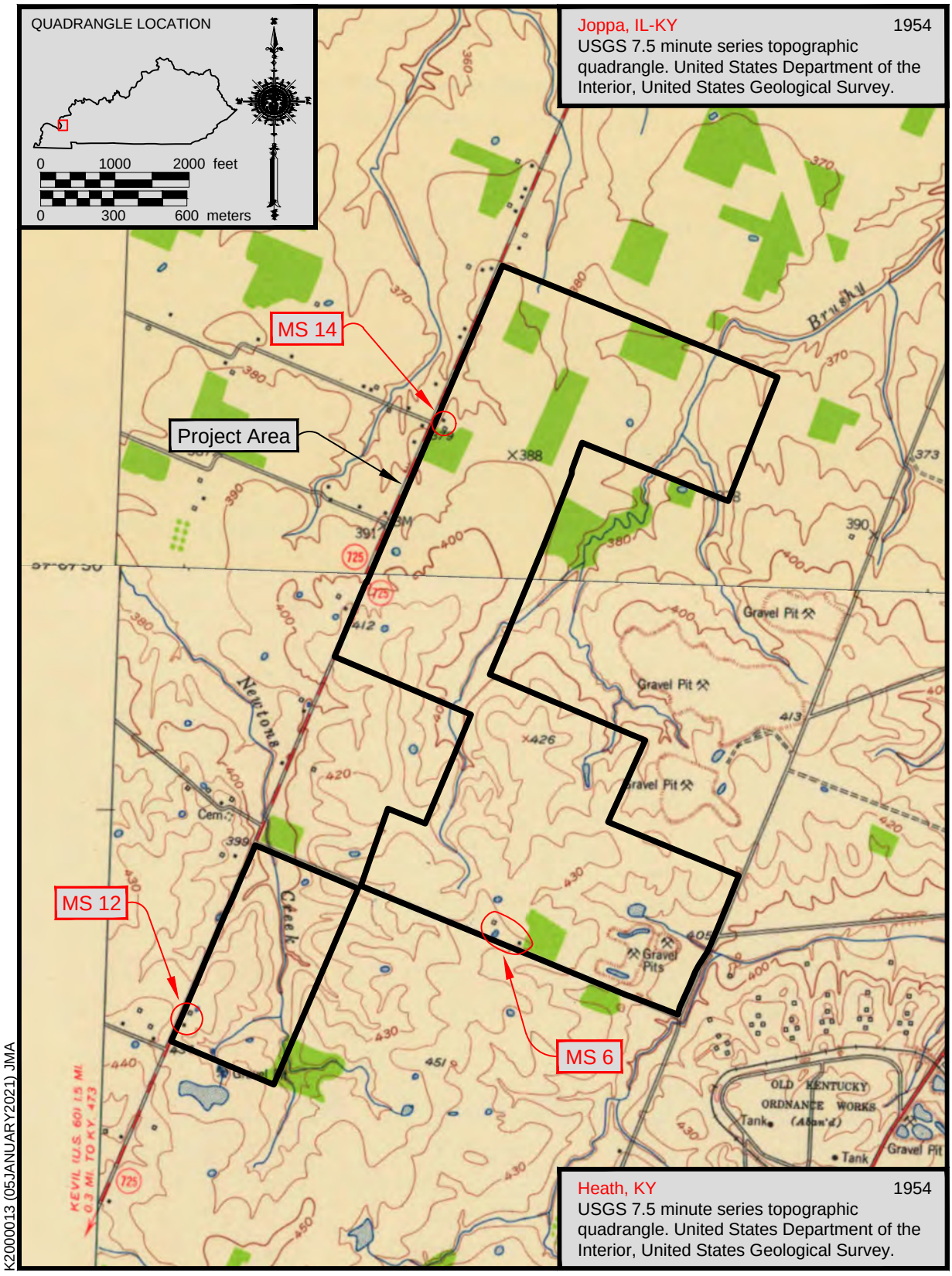

Figure 14. 1954 Heath and Joppa topographic quadrangles depicting the locations of MS 6, MS 12, and MS 14 (USGS).

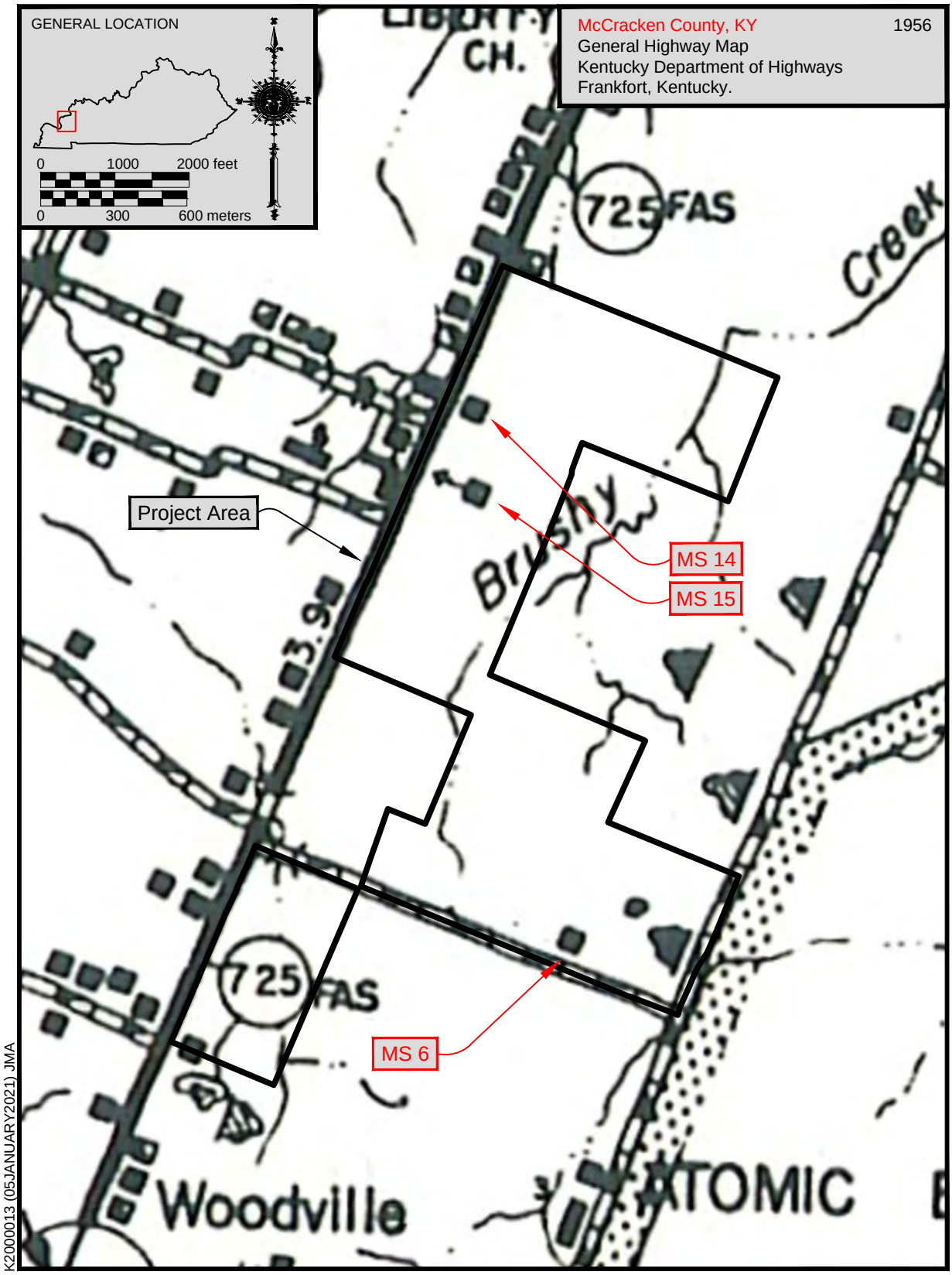

Figure 15. 1956 McCracken County Highway map depicting the locations of MS 6, MS 14, and MS 15 (KDOH).

Figure 16. Open agricultural field in the location of MS 11, facing north.

Figure 17. Active farmstead in the location of MS 7, facing east.

Figure 18. Overview of the location of MS 1, facing east.

Figure 19. Wooded area with yucca plants in the location of MS 4, facing northeast.

Figure 20. Cistern near the location of MS 4, facing east.

Figure 21. Concrete steps in the location of MS 6, facing northwest.

Figure 22. Collapsed shed near the location of MS 14, facing southwest.

Figure 23. Overview of the location of MS 14, facing east.

Figure 24. Overview of the location of MS 15, facing north.

Figure 25. IF 1 near the location of MS 15.

Figure 26. IF 2 near the location of MS 15.

Implications

Archaeological materials were encountered in six locations considered to have high probability for the presence of archaeological sites within the current study area, specifically where mapped structures were located. Of these six locations, four of them had a significant amount of artifacts and are thus likely to be archaeological sites. In addition to these four locations with significant amounts of archaeological artifacts, an additional location (MS 4) had historic surface features and was also considered to have high probability for the presence of an archaeological site. In short, five locations total have high potential for archaeological sites to be present within the study area.

Ground surface visibility overall ranged between 30 and 50 percent within the study area at this time. As previously noted, it was beyond the scope of this study to perform systematic shovel testing; however, a singular shovel test was performed in four separate high probability locations to investigate intact subsurface archaeological deposits due to the presence of artifacts on the ground surface, burned brick, or poured concrete steps. All shovel test probes contained archaeological materials.

At this time, it is understood that an archaeological survey of the study area is not required. However, a survey may be required at a later date if this project becomes federally funded or requires any type of federal permit and is therefore considered an undertaking subject to Section 106 of the National Historic Preservation Act. If an archaeological survey takes place, the overall study area, including areas with mapped structures may yield additional archaeological materials. Archaeological site numbers will likely be assigned to the locations of MS 1, MS 4, MS 6, MS 14, and MS 15 as well as any additional new sites identified. Significance for eligibility for inclusion in the NRHP for all sites identified may, or may not, be able to be assessed as a result of the survey. If significance cannot be assessed and identified sites cannot be avoided, further work in the form of evaluating the sites for listing in the NRHP may be recommended.

Sincerely,

Charles M. Niquette, RPA 10710
President

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Availability: Immediate **Email:** cmniquette@crai-ky.com **RPA Registration ID:** 10710	**Specific Duties:** • Oversee and administer contract • Overall quality control • Coordination with client and consulting parties	**Education and Training:** • M.A. anthropology, University of Arkansas, Fayetteville, Arkansas • B.A. history and anthropology, Catawba College, Salisbury, North Carolina

Experience Summary Information		
President/CEO, Principal Investigator Cultural Resource Analysts, Inc. 1983 – present	**Staff Archeologist** Advisory Council on Historic Preservation 1980 - 1981.	**Archaeological Intern** National Park Service 1979 – 1980

Mr. Niquette (RPA #10710) is the President and Chief Executive Officer of Cultural Resource Analysts, Inc. He has served as Principal Investigator, Project Manager, or Contract Administrator for thousands of projects undertaken by Cultural Resource Analysts. Between 1977 and the present, Mr. Niquette has conducted archeological field work in Kentucky, Tennessee, North Carolina, West Virginia, Ohio, Missouri, Indiana, Virginia, Arkansas, and Colorado. This experience included inventory surveys, National Register evaluations, and major excavations. His experience is not limited to prehistoric archeology, but also includes standing structure evaluations, historic archeological studies, and archival research on historic sites. Mr. Niquette's prior experience as an employee of the **National Park Service** and the **Advisory Council on Historic Preservation** affords him a unique and valuable perspective regarding federally mandated historic preservation studies. This perspective remains an invaluable asset to his clients because he thoroughly understands the legal requirements to be met as well as the needs of state and federal reviewers and project managers.

Professional Awards and Achievements:

2017: McGimsey Davis Award. Register of Professional Archaeologists.
2008: Presidential Recognition Award. Register of Professional Archaeologists.
2003: *Henry Brainerd McClellan Award* presented by the Sayre School, Lexington, Kentucky, for a significant service contribution to the student body. Award made in recognition of the long-term and significant contribution to the students and the school's educational program represented by the Waterwild archaeological investigation.
2002: Chosen as a 2002 *Distinguished Alumnus of the J. William Fulbright College of Arts and Sciences* at the University of Arkansas. Mr. Niquette was nominated by the Department of Anthropology for his achievements in the field of archeology and outstanding contribution to the profession.
1994: Recipient of the *Sigfus Olafson Award of Merit* for outstanding contributions to West Virginia archaeology by the West Virginia Archaeological Society
1993: *Service to Preservation Award*. Presented by the Ida Lee Willis Memorial Foundation in

recognition of the significant contribution toward the preservation of Kentucky's resources.
1992: *Special Achievement Award*. Presented by the Society of Professional Archaeologists
1990: Commissioned a Kentucky Colonel. Wallace G. Wilkinson, Governor of Kentucky.
1987: Governor's appointee as a Member of the *Task Force on Permitting of Surface Coal Mining* Operations. Issued by Martha Layne Collins, Governor, Commonwealth of Kentucky.

Professional Activities:

2018-2020. Board Member, Leaders in Energy and Preservation.
2018-2019. Nomination Committee Member, Register of Professional Archaeologists.
2017 – Present. Member of the Advisor Council on Historic Preservation's "Infrastructure and Section 106 Reviews Working Group."
2017-2018: Secretary Treasurer. Register of Professional Archeologists
2017-2020: Member. Society for American Archaeology's Government Affairs Committee.
2015: Governor Wolf's Pennsylvania Pipeline Infrastructure Taskforce. Member of the "historical, cultural, tribal" workgroup.
2014: Nominating Committee Member, Society for American Archaeology.
2013-2018: Chairman, Gas and Preservation Partnership (GAPP), later renamed Leaders in Energy and Preservation (LEAP).
2013-2014: Secretary Treasurer. Register of Professional Archeologists
2010-Present. President, C&M Realty.
2009–2016: Board of Directors, SRI Foundation. Rio Rancho, New Mexico.
2007–Present: Editorial Board, Heritage Management (Journal), Left Coast Press.
2007–Present: Advisory Director, Bank of Lexington, Lexington, Kentucky.
2005–2008: Member of the Editorial Board, Society for American Archaeology Press.
2007: Member, Nominations Committee. Society for American Archaeology.
2006: National Science Foundation grant reviewer.
2006: Member-Practicing Advisory Work Group. American Anthropological Association.
2006-Present. President, Niquette Real Estate Management.
2004-Present. Manager, Niquette Farms LLC.
2004–2005: President, Register of Professional Archaeologists
2003–2004: Member, Society for American Archaeology's Government Affairs Committee
2002–2003: President-elect, Register of Professional Archeologists
1999–2000: Secretary Treasurer. Register of Professional Archeologists
1995–1998: Member, Society for American Archeology's Cultural Resource Management Committee
1995–1997: President. American Cultural Resources Association
1987–1989: Board Member. Society of Professional Archeologists.
1984–1997: Member of the Society for American Archeology's Governmental Affairs Committee.

Affiliations:

Member of the American Cultural Resources Association
Member of the Register of Professional Archeologists (1999-present)
Certified as a Professional Archeologist by the Society of Professional Archeologists (1984-1999)
Member of the Society for American Archeology
Member of the Council for West Virginia Archeology
Member of the West Virginia Archeological Society
Member of the Kentucky Organization of Professional Archeologists
Member of the Tennessee Anthropological Society

Publications:

Niquette, Charles M.:

2002 Reviewer: Dangerous Places: Health, Safety, and Archaeology. David A. Poirier and Kenneth L. Feder, editors. *Journal of Middle Atlantic Archaeology*, Volume 18.

2001 "Evaluating Archaeologists - The Business of Archaeology." Co-organizer of half-day session with Dr. Jerry Wait (U.K.) followed by another half-day roundtable discussion on same topic. *7th Annual Meeting of the European Association of Archaeologists*, Essingen am Neckar, Germany.

2000a EAA Conference Review *SAA Bulletin Volume 17* (5).

2000b Europe, Archaeology and Professionalism: A Transatlantic View. *The Archaeologist (Journal of the Institute of Field Archaeologists)*.

2000c Archaeology, Professionalism and Business: The Need for a European Professional Order of Archaeologists. *ERA - Arqueologia*. Vol. 1 (No. 2) Lisbon, Portugal.

2000d Archaeological Services are not a Professional Activity in West Virginia: Beware the Revenuer! RPA Notes Vol. 1 (No. 1) (*Newsletter of the Register of Professional Archaeologists*)

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1997 Hard Hat Archaeology. *Society for American Archaeology* Bulletin 15(3).

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1996c ACRA plans regional OSHA workshops. *ACRA Edition* 2(10):5.

1996d Class Dimensions of Contemporary Archaeology. Paper presented at the Annual Meeting of the Society for American Archeology, New Orleans, Louisiana.

1996e New Perspectives on Political Activism in Archeology. Paper included in a symposium, "The Politics of Archeology: How its works and how to influence it," Annual Meeting of the Society for American Archeology, New Orleans, Louisiana.

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Annually: Adult CPR, First Aid and Blood borne Pathogen
2014: Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Training provided by Lesley T. Cusick, Restoration Services, Inc. April 15, 2014.
2013: Debriefings in Federal Procurement: Key Rules and Strategies. January 31, 2013 webinar.L2 Federal Resources.
2012: USACOE Permits and Associated water quality certifications: Regulatory changes pursuant to Sections 401 and 404 of the federal Clean Water Act. NAEP Webinar September 19, 2012
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2009: Southern Gas Association – Environmental/Safety & Health/HR Training, Dallas, Texas.
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2007: Section 106: Principles & Practice. A continuing professional education in cultural resource management, workshop on NEPA/106/4(f) from the SRI Foundation in conjunction with Indiana Department of Transportation, Indianapolis, Indiana.
2003: Thinking Beyond the Pavement: A Workshop on Context Sensitive Design. Presented by the Kentucky Transportation Center in cooperation with the Kentucky Transportation Cabinet and the Federal Highway Administration, May 12-13, 2003.
2003: "Section 106/National Register Eligibility Training." Ohio Department of Transportation, Columbus. January 29th, 2003.
2002: OSHA Health and Safety Compliance Training (20 hrs)
2002: OSHA Competent Person: Excavation, Trenching and Shoring (8 hrs)
2002: Section 106: Principles & Practice. A continuing professional education in cultural resource management, workshop on NEPA/106/4(f) from the SRI Foundation in conjunction with

Cultural Resource Analysts, Inc. Lexington, Kentucky.

1998: Occupational Health and Safety Meeting. Course offered by Woodward-Clyde, in conjunction with the American Cultural Resource Association, May 19-21, 1998.

1999: Section 106 in the New Millennium. Instructed by Thomas F. King in conjunction with Cultural Resource Analysts, Inc., Lexington, Kentucky.

1996: Consulting with Native Americans about Traditional Cultural Places: A training Course. Instructed by Thomas F. King and Reba Fuller. Sacramento, California. Course offered by CEHP, Inc., in conjunction with the American Cultural Resource Association.

EXHIBIT 14
ATTACHMENT 14.5

COPPERHEAD
ENVIRONMENTAL CONSULTING

Threatened and Endangered Species Assessment for Proposed McCracken County Solar LLC Project McCracken County, Kentucky

Prepared for:

McCracken County Solar LLC

26 April 2021

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April 30, 2021

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Introduction

McCracken County Solar LLC, contracted Copperhead Environmental Consulting, Inc. (Copperhead) to conduct a record search and site reconnaissance focused on threatened and endangered species for the McCracken County Solar LLC Project (Project) near Kevil in McCracken County, Kentucky. The Project Study Area (PSA) consists of approximately 714 acres, and has reference coordinates of 37.12683° N, 88.85978° W. The PSA is within the Bayou Creek-Ohio River sub watershed, which drains to the Ohio River.

The Project is a proposed solar farm that will generate electricity through the use of photovoltaic solar panels. Land use in the PSA currently consists of farmland, agricultural fields, and residential properties. Historically, the PSA has been primarily used for agricultural land use. The primary landcover types are agricultural fields, grassed fields, wooded land, and residential land. Narrow strips of trees exist along some fence rows and streams. According to the Wetland and Stream Delineation Report, the PSA contains several wetlands and streams. The PSA contains approximately 6 structures, including a residence, barns, and structures associated with agriculture. Land uses on adjacent properties include agricultural lands, scattered wood lots, and rural residences. Photographs of the habitat encountered within the PSA are included in Appendix A.

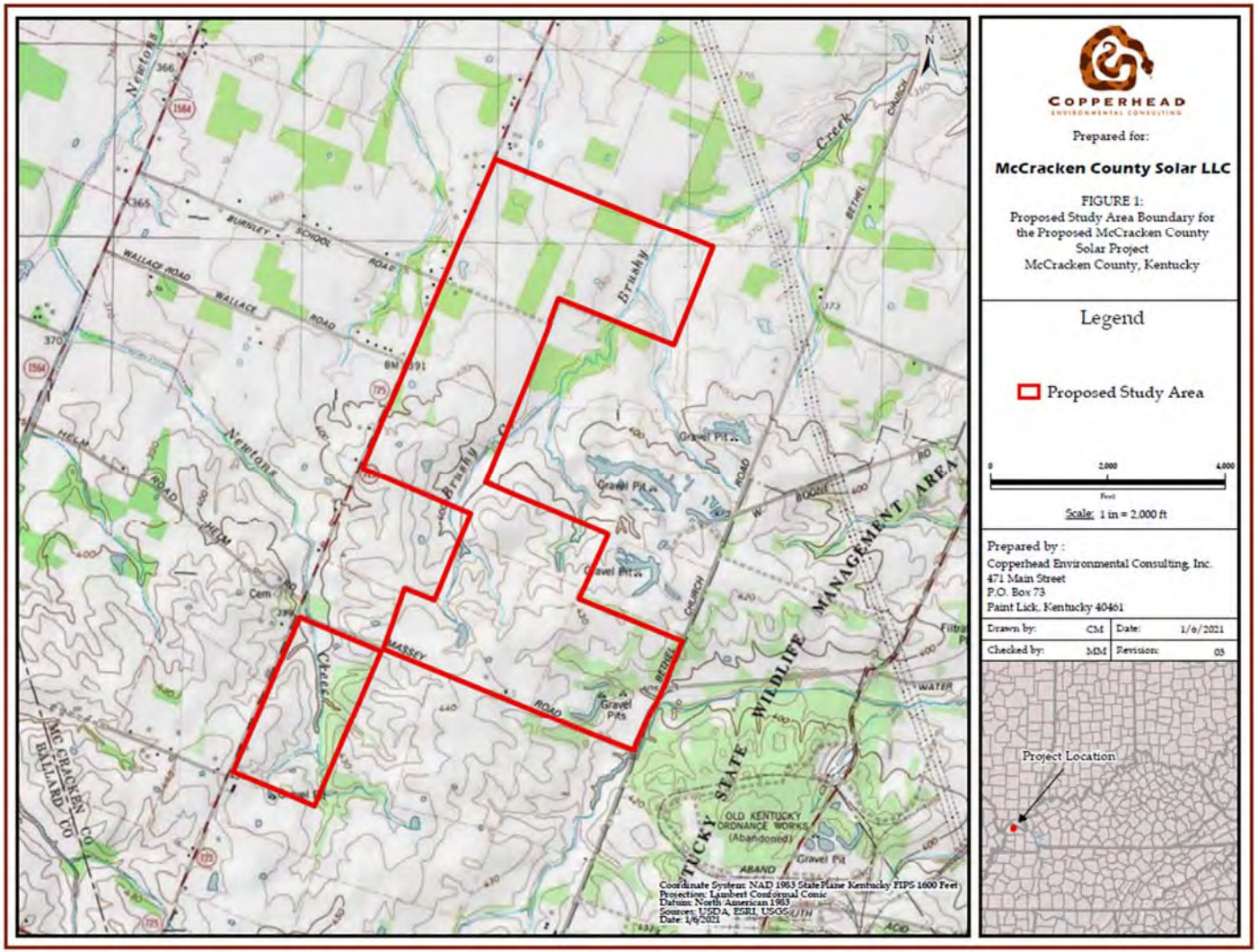

Figure 1. Project location

Federally Listed Threatened and Endangered Species

Copperhead's review of the United States Fish and Wildlife Service's (USFWS) online Information for Planning and Consultation (IPaC) tool identified fifteen federally listed threatened or endangered species that could potentially occur within the PSA (Table 1 and Appendix B). Additionally, occurrence records were obtained from the Office of Kentucky Nature Preserves (KNP) Natural Heritage Program Database using the Kentucky Biological Assessment Tool (KYBAT). No federally listed species occurrence records were identified within 1 mile of the PSA (Appendix B).

Table 1. Federally listed species with potential to occur within the Project Study Area.

Common Name	Scientific Name	Federal Status
Class Aves (Birds)		
Least Tern	*Sterna antillarum*	Endangered
Class Bivalvia (Mussels)		
Clubshell	*Pleurobema clava*	Endangered
Fanshell	*Cyprogenia stegaria*	Endangered
Fat Pocketbook	*Potamilus capax*	Endangered
Northern Riffleshell	*Epioblasma torulosa rangiana*	Endangered
Orange Pimpleback (pearlymussel)	*Plethobasus cooperianus*	Endangered
Pink Mucket (pearlymussel)	*Lampsilis abrupta*	Endangered
Rabbitsfoot	*Quadrula cylindrica cylindrica*	Threatened
Ring Pink (mussel)	*Obovaria retusa*	Endangered

Common Name	Scientific Name	Federal Status
Rough Pigtoe	*Pleurobema plenum*	Endangered
Sheepnose Mussel	*Plethobasus cyphyus*	Endangered
Spectaclecase (mussel)	*Cumberlandia monodonta*	Endangered
Class Mammalia (Mammals)		
Gray Bat	*Myotis grisescens*	Endangered
Indiana Bat	*Myotis sodalis*	Endangered
Northern Long-Eared Bat	*Myotis septentrionalis*	Threatened

Source: USFWS 2020

The following sections provide a brief overview of each species.

Class Aves (Birds)

Least Tern

The interior least tern (*Sternula antillarum*) was listed as an endangered species on May 28, 1985. The Interior Least turn is a migratory bird that can be found along freshwater river channels throughout the Great Plans and the lower Mississippi Valleys. In Kentucky, they can be found along the Ohio and Mississippi rivers during the nesting season. As a colonial breeder, multiple birds will build their nests on the ground near water in sparsely vegetated areas (USFWS 1990). They generally nest on the ground in river channels, reservoirs, sand and gravel mines, and even on top of manmade structures near bodies of water. Typical prey items include small fish, crustaceans, and insects which can be captured by foraging or diving into the water.

The interior least tern is one of the smallest terns at approximately 9 inches in length. Breeding adults have yellow legs with white bodies with a gray back and wings that have a black edge on the outer flight feathers. They also have a black crown that comes down over the eyes on each side of the head, leaving a white patch above their bright yellow beak. Immature birds have a black beak and dark yellow legs and are colored with a white body with a mottled gray back, and a black patch behind the eye.

Historical causes of population decline are attributed to plume hunting, human use and development of nesting habitat, and predation from other animals.

There have been numerous sightings of the interior least tern within 10 miles of the project area (Sullivan et al 2009); however, based on a record search and site reconnaissance, the PSA does not appear to have suitable nesting habitat for the Interior Least Tern.

Class Bivalvia (Mussels)

Clubshell

The clubshell mussel (*Pleurobema clava*) was listed as an endangered species on January 22, 1993. This species occurs in a variety of habitats in small streams to large rivers but does not penetrate far into the headwaters (Haag and Cicerello 2016). It is most common just downstream of riffles and islands in clean, coarse sand where cobble mixes with the current. It may live several inches beneath the surface, but it cannot tolerate mud or slack-water conditions and is very susceptible to siltation. The clubshell inhabits the Ohio River and most of its major drainages including the Green River, Licking River, Kentucky River, Salt River, Tennessee River, and Cumberland River; however, but it is absent from the lowland habitats in western Kentucky (Hagg and Cicerello 2016). No critical habitat has been designated for this species. Based on a record search and site reconnaissance, the PSA does not appear to contain suitable habitat for this mussel species.

Fanshell

The fanshell mussel (*Cyprogenia stegaria*) was listed as endangered in 1990. These mussels are most often associated with stable substrates of sand, gravel, and cobble. They are usually found at depths of less than three feet in strongly flowing water in medium-sized to large streams. In Kentucky, historic records are known from the Ohio, Salt, Licking, Big Sandy (doubtful record), Tygarts, Kentucky, Red, Cumberland, Tennessee, Green, Barren, and Clarks River systems. They are fairly ubiquitous statewide, but most accounts are archaeological records. Only three populations remain in Kentucky (apart from a reintroduction in the Tennessee River) which include a short stretch of the Rolling Fork River and likely the two largest populations of this species on earth, the Green River and Licking River (Haag and Cicerello 2016). No critical habitat has been designated for this species. Based on a record search and site reconnaissance, the PSA does not appear to contain suitable habitat for this mussel species.

Fat Pocketbook

The Fat Pocketbook (*Potamilus capax*) was listed as a federally endangered species on June 14, 1976. It has a large, inflated shell that can range from yellow to tan in color. They can grow to five inches in length. Currently, the Fat Pocketbook is only found in three rivers, the Ohio, the lower Wabash, and the lower Cumberland rivers (USFWS 1997). It can be found in fine gravel, sand, or mud riverbed substrates in flowing waters often near riverbanks (Cumming et al. 1990). The largest threat to this species is river alteration. Alterations such as dredging, and impounding have negatively affected the population over the years. Though siltation and sedimentation can affect other species of mussels negatively, the fat pocketbook has been found to be able to tolerate higher sedimentation rates that would be generally unfavorable to other species of mussels

(Miller and Payne 2005). No critical habitat has been designated for this species. Based on a record search and site reconnaissance, the PSA does not appear to contain suitable habitat for this mussel species.

Northern Riffleshell

The northern riffleshell mussel (*Epioblasma rangiana*) was listed as endangered on January 22, 1993. The mussel can be found in small to medium-sized streams. The species is most commonly found in riffles and swift running water with clean substrate bottoms that consist of both firmly packed sand and fine to coarse gravel. Typically, the species is found in shallow water, although individuals have been found as deep as six feet. In Kentucky, the northern riffleshell was historically in the Ohio river drainage including the Green, Kentucky, Licking, and Salt, and their associated tributaries. The northern riffleshell mussel has declined dramatically across its range, and all natural populations in Kentucky appear to be extinct (Haag and Cicerello 2016). No critical habitat has been designated for this species. Based on a record search and site reconnaissance, the PSA does not appear to contain suitable habitat for this mussel species.

Orangefoot Pimpleback

The orangefoot pimpleback (*Plethobasus cooperianus*) was listed as endangered in 1976. Habitat for this mussel is restricted to main-channel habits of large rivers in sand and gravel substrates with flowing water. The species is minimally tolerant of impoundment, and because almost none of its historical range remains free flowing, it is highly endangered (Haag and Cicerello 2016). The orangefoot pimpleback historical range in Kentucky includes the Cumberland, Green, Tennessee, and Ohio River systems. Currently populations only known to exist in short stretches of the Ohio and Tennessee Rivers. No critical habitat has been designated for this species. Based on a record search and site reconnaissance, the PSA does not appear to contain suitable habitat for this mussel species.

Pink Mucket

The pink mucket (*Lampsilis abrupta*) was listed as endangered on June 14, 1976. Habitat for this species is restricted to main-channel habitats of medium-sized to large streams in gravel and sand substrates. In Kentucky, historical range of the pink mucket include the Ohio, Green, Cumberland, Licking, Salt, Tennessee, and Big Sandy River. Small isolated populations survive in free flowing sections of the Barren and Green rivers below antiquated navigation dams and in the longer, unimpounded sections of the Upper Green (Haag and Cicerello 2016). Propagated individuals have been released into the lower Tennessee, Green River, and four sites on the Licking River. No critical habitat has been designated for this species. Based on a record search and site reconnaissance, the PSA does not appear to contain suitable habitat for this mussel species.

Rabbitsfoot

The rabbitsfoot mussel (*Theliderma cylindrica*) was listed as threatened on September 17, 2013. Rabbitsfoot is primarily an inhabitant of medium-sized to large streams. It usually occurs in shallow water areas along the bank and adjacent runs and shoals with reduced water velocity. Specimens also occupy deep water runs, having been reported in 9 to 12 feet of water. Bottom substrates generally include gravel and sand, but individuals often lie completely unburied on the stream bottom. Its historical range in Kentucky includes Ohio River and most major tributaries. It is generally distributed to occasional in the upper Green and Barren Rivers (Haag and Cicerello 2016). Critical habitat does exist for this species, but the PSA is not in critical habitat. Based on a record search and site reconnaissance, the PSA does not appear to contain suitable habitat for this mussel species.

Ring Pink

The ring pink (*Obovaria retusa*) was listed as endangered on September 29, 1989. It is restricted to main-channel habitats of medium-sized to large streams in gravel and sandy substrates. In Kentucky specifically, the ring pink is associated with the Ohio, Green, Kentucky, Barren, Cumberland, and Tennessee River systems. The ring pink was likely once a common characteristic member of large-stream mussel assemblages but most of its habitat has been drastically altered by impoundments. Perhaps the only remaining population on earth resides in the upper Green River with only single individuals found sporadically over many years and no evidence of recruitment (Haag and Cicerello 2016). All propagation efforts for this species to date have been unsuccessful but ongoing efforts are perhaps the only hope for the species survival. No critical habitat has been designated for this species. Based on a record search and site reconnaissance, the PSA does not appear to contain suitable habitat for this mussel species.

Rough Pigtoe

Rough Pigtoe (*Pleurobema plenum*) was listed as endangered in 1976. Although the rough pigtoe may become established in small rivers or headwater stretches of rivers, it is a species most typical of large rivers. It occurs in a stable substrate consisting of muddy to coarse sand, cobble, and gravel. The rough pigtoe is still considered to potentially be in the Ohio, Licking, Kentucky, Cumberland, Green, and Barren River systems. No critical habitat has been designated for this species. Based on a record search and site reconnaissance, the PSA does not appear to contain suitable habitat for this mussel species.

Sheepnose Mussel

The sheepnose mussel (*Plethobasus cyphus*) was listed as endangered in 2012. The sheepnose is restricted to man-channel habitats of medium-sized to large streams in sand, mud, and gravel. The species is characteristic of mussel beds in larger streams but never a dominant species. The sheepnose occurs nearly statewide, but sporadically with the largest populations in Kentucky in the riverine sections of the Ohio River and upper Green River. The species is only moderately

tolerant of impoundments which has effected most of its historical range but its decline can also be attributed to its host fish, riverine minnows and sauger, which have also been negatively affected by impoundments (Haag and Cicerello 2016). No critical habitat has been designated for this species. Based on a record search and site reconnaissance, the PSA does not appear to contain suitable habitat for this mussel species.

Spectaclecase

The spectaclecase (*Margaritifera monodonta*) was listed as endangered on March 13, 2012. The spectaclecase is restricted to large streams often in deep water sheltered from the main force of the current. It occurs in substrates from mud and sand to gravel, cobble, and boulders in quiet water very near the interface with swift currents. Specimens have been reported in tree stumps, in root masses, and in beds of rooted vegetation where it can be locally abundant. Historically, it may have been overlooked by conventional survey methods but currently it is considered to have the potential to occur in the Cumberland, Green, Tennessee, and parts of the Ohio and Licking Rivers (Haag and Cicerello 2016). No critical habitat has been designated for this species. Based on a record search and site reconnaissance, the PSA does not appear to contain suitable habitat for this mussel species.

Class Mammalia (Mammals)

Gray Bat

The gray bat (*Myotis grisescens*) is listed as endangered under the Endangered Species Act (ESA). In Kentucky, the gray bat is considered to occur statewide, with higher concentrations in the western and central portions of the state and fewer occurrences in eastern counties (USFWS 2019b). No critical habitat has been designated or is currently proposed for this species.

The gray bat typically roosts in caves year-round and is often found in large numbers, with colonies in excess of one million individuals reported (Brady et al. 1982). Habitat requirements for roosts are highly specific, with fewer than 5 percent of caves representing suitable habitat (Tuttle 1979). The gray bat utilizes varying types of caves during different times of the year, including caves with deep vertical shafts that provide a cold air trap during winter (hibernacula) and caves with domed ceilings that trap warm air during summer for maternity colonies. Other caves, known as dispersal caves, are used as roosting sites during migration from maternity caves to hibernacula. Gray bats are also known to use bridges as roosting habitat during the spring, summer, and fall.

Gray bats usually forage for insects in riparian areas or over open water bodies such as rivers, streams, lakes, or reservoirs. Commuting habitat for the gray bat primarily consists of wooded corridors used to travel between roosting and foraging habitat.

Copperhead's desktop analysis and field reconnaissance did not identify any caves or mine openings in the PSA.

Indiana Bat

The Indiana bat (*Myotis sodalis*) was listed as an endangered species on March 11, 1967 under the Endangered Species Preservation Act of 1966. Critical habitat was designated for the species on September 24, 1976 and includes 11 caves and three mines in six states. In Kentucky, the Indiana bat may occur statewide (USFWS 2019c). The majority of occurrence records are associated with maternity colonies scattered throughout central and eastern Kentucky and along the Ohio River in the western part of the state.

During the winter months, Indiana bats are restricted to suitable underground hibernacula typically consisting of caves located in karst areas of the east-central United States; however, this species also hibernates in cave-like locations, including abandoned mines (USFWS 2007a). Hibernacula are concentrated in the karst areas of the state. Indiana bats have been documented in over 100 caves in Kentucky, and extant winter populations are currently known in 96 of these caves (USFWS 2016).

During the spring, summer, and fall, the Indiana bat uses a variety of forested habitats used for roosting, foraging, and commuting. These habitats include forest blocks and woodlots, as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Isolated trees may provide suitable roosting habitat if they exhibit the characteristics of a suitable roost tree and are located within 1,000 feet of other suitable habitat. Suitable roosting habitat consists of live or dead trees and snags with a diameter at breast height (dbh) of five inches or greater that possess any or all of the following characteristics: exfoliating bark; cavities, crevices, or cracks; or dead or dying trunk/branches. Roost trees are typically located within canopy gaps, along a fencerow, or along a wooded edge.

Maternity colonies are typically found in dead or dying trees with larger dbh (at least nine inches) that receive direct sunlight for more than half the day (USFWS 2016). Maternity roosts have been documented in riparian zones, bottomland and floodplain habitats, wooded wetlands, and upland communities (USFWS 2007a).

Foraging habitat for the Indiana bat includes closed to semi-open forested habitats, where bats forage along forest edges and above the tree canopy (Humphrey et al. 1977, LaVal et al. 1977, Brack 1983). Commuting habitat includes forested blocks and corridors that connect roosting and foraging areas.

Copperhead's desktop analysis identified approximately 93.6 acres of wooded land as well as stream corridors that could potentially provide suitable Indiana bat roosting and foraging habitat (see Figure 2). The PSA is located within a USFWS Indiana bat maternity colony buffer.

Northern Long-Eared Bat

The northern long-eared bat (*Myotis septentrionalis*) was listed as threatened under the ESA on April 2, 2015, with a rule under authority of Section 4(d) of the ESA finalized on January 14, 2016 (USFWS 2016b). No critical habitat is currently designated or proposed by the USFWS for this species.

In Kentucky, the northern long-eared bat has been recorded throughout most of the state and likely occurs statewide. Summer occurrences have been recorded in approximately three-quarters of the counties in the state, with reproductive records (i.e., captures of juveniles or pregnant, lactating, or post-lactating females) in approximately half of the counties. This species has been found in the majority of Kentucky hibernacula known to harbor bats (USFWS 2015). The northern long-eared bat utilizes different habitats during the summer and winter months. Hibernacula, used in winter, vary from large caves and abandoned mines with large entrances and passages to smaller features. Preferred features have relatively constant, cool temperatures (0 to 9° C), high humidity, and minimal air currents (Raesly and Gates 1987, Caceres and Pybus 1997). This species typically roosts in small crevices and cracks in walls and ceilings; however, individuals have also been observed roosting in the open, although less frequently (Barbour and Davis 1969, Caceres and Pybus 1997, Whitaker and Mumford 2009). In addition to mines, northern long-eared bats have been found hibernating in other cave-like, man-made structures (USFWS 2015).

During the spring, summer, and fall, the northern long-eared bat uses a variety of forested habitats for roosting, foraging, and commuting, including forest blocks and woodlots, as well as linear features such as fencerows, riparian forests, and other wooded corridors. These forested areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Suitable roosting habitat consists of live or dead trees and snags with a dbh of three inches or greater that exhibit any of the following characteristics: exfoliating bark, crevices, cavities, or cracks (USFWS 2016). This species is more likely to roost in crevices, cracks, and cavities than other *Myotis* species (Carter and Feldhamer 2005, Lacki et al. 2009) and is more opportunistic when selecting a roost tree, often utilizing shorter trees with smaller dbh and tree stumps.

Foraging habitat includes mature upland forests along hillsides and ridges (LaVal et al. 1977, Brack and Whitaker 2001). This species may also forage in more open areas, such as forest clearings, over open water, and along roads (van Zyll de Jong 1985); however, it is less likely to forage in riparian areas (LaVal et al. 1977, Brack and Whitaker 2001). Commuting habitat is used to travel between roosting and foraging areas and typically includes forest edges and linear features, such as riparian corridors and fencerows (USFWS 2015).

Copperhead's desktop analysis identified approximately 93.6 acres of wooded land as well as stream corridors that could potentially provide suitable northern long-eared bat roosting and foraging habitat (see Figure 2). Northern long-eared bats could also use farm structures including barns, sheds, and silos as roosting habitat. The PSA is not near any known northern long-eared bat maternity roosts or USFWS northern long-eared bat buffers. The PSA is not near an area with known northern long-eared bat roost trees.

Potential Considerations

Currently no federal nexus (e.g., federal funding, permit approvals, etc.) is associated with the project. As such, consultation with USFWS under Section 7(a)(2) of the ESA would not be required. Should a federal nexus emerge, it would trigger Section 7(a)(2) consultation with USFWS and a determination of effects for each species would be made. The ESA determinations would depend on the presence or absence of the species and whether habitat would be adversely impacted during project construction or operation.

Based on a records search and site reconnaissance, the PSA does not appear to contain suitable habitat for the bird and mussel species identified by IPaC. Potential habitat for the three listed bat species exists within the PSA. Additional surveys would help determine the effects of the project on these species should USFWS consultation be required for the project.

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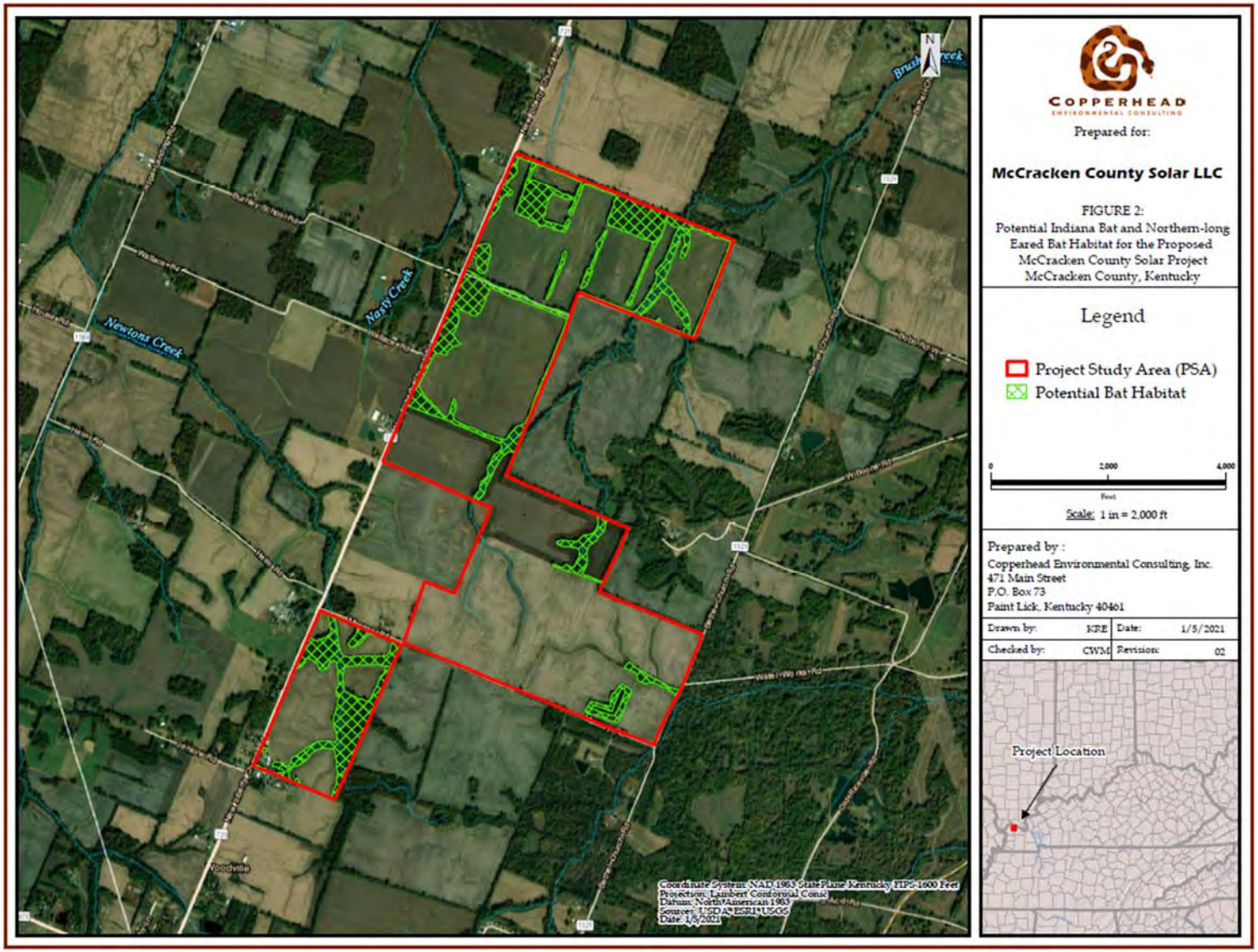

Figure 2. Potential Indiana Bat and Northern-long Eared Bat Habitat

State Listed Threatened and Endangered Species

Forty-seven state-listed species have been identified through the state Wildlife Action Plan (SWAP; Kentucky's Comprehensive Wildlife Conservation Strategy, 2013) as sensitive or at-risk species of greatest conservation need potentially occurring within the PSA. The following list identifies species identified by the Kentucky Department of Fish and Wildlife Resources (KDFWR) (Table 2).

Table 2. State listed species with potential to occur within the Project Study Area from the Kentucky Department of Fish and Wildlife Resources.

Common Name	Scientific Name	State Status
Class Actinopterygii (Fish)		
Alligator Gar	*Atractosteus spatula*	Endangered
Black Buffalo	*Ictiobus niger*	Sensitive
Blacktail Shiner	*Cyprinella venusta*	Sensitive
Chain Pickerel	*Esox niger*	Sensitive
Cypress Minnow	*Hybognathus hayi*	Endangered
Lake Chubsucker	*Erimyzon sucetta*	Threatened
Mississippi Silverside	*Menidia audens*	Threatened
Northern Madtom	*Noturus stigmosus*	Sensitive
Redspotted Sunfish	*Lepomis miniatus*	Threatened
Spottail Shiner	*Notropis hudsonius*	Sensitive
Taillight Shiner	*Notropis maculatus*	Threatened
Class Amphibia (Amphibians)		
Eastern Hellbender	*Cryptobranchus alleganiensis*	Endangered

Common Name	Scientific Name	State Status
Northern Crawfish Frog	*Lithobates areolata circulosa*	Sensitive
Class Aves (Birds)		
Bald Eagle	*Haliaeetus leucocephalus*	Threatened
Barn Owl	*Tyto alba*	Sensitive
Bell's Vireo	*Vireo bellii*	Sensitive
Blue-winged Teal	*Spatula discors*	Threatened
Bobolink	*Dolichonyx oryzivorus*	Sensitive
Dark-eyed Junco	*Junco hyemalis*	Sensitive
Double-crested Cormorant	*Phalacrocorax auritus*	Threatened
Fish Crow	*Corvus ossifragus*	Sensitive
Great Egret	*Ardea alba*	Threatened
Hooded Merganser	*Lophodytes cucullatus*	Threatened
Interior Least Tern	*Sternula antillarum athalassos*	Endangered
Northern Harrier	*Circus hudsonius*	Threatened
Osprey	*Pandion haliaetus*	Sensitive
Sedge Wren	*Cistothorus platensis*	Sensitive
Yellow-crowned Night-heron	*Nyctanassa violacea*	Threatened

Common Name	Scientific Name	State Status
Class Bivalvia (Mussels)		
Bleufer	*Potamilus purpuratus*	Endangered
Fat Pocketbook	*Potamilus capax*	Endangered
Orangefoot Pimpleback	*Plethobasus cooperianus*	Endangered
Pink Mucket	*Lampsilis abrupta*	Endangered
Pocketbook	*Lampsillis ovata*	Endangered
Rabbitsfoot	*Thelideerma cylindrica*	Threatened
Sheepnose	*Plethobasus cyphyus*	Endangered
Class Cephalaspidomorphi (Lampreys)		
Chestnut Lamprey	*Ichthyomyzon castaneus*	Sensitive
Class Gastropoda (Snails and Slugs)		
Armored Rocksnail	*Lithasia armigera*	Sensitive
Onyx Rocksnail	*Leptoxis praerosa*	Sensitive
Varicose Rocksnail	*Lithasia verrucosa*	Sensitive
Class Malacostraca (Crayfish)		
Ohio Shrimp	*Macrobrachium ohione*	Endangered
Shrimp Crayfish	*Faxonius lancifer*	Endangered
Class Mammalia (Mammals)		

Common Name	Scientific Name	State Status
Evening Bat	*Nycticeius humeralis*	Sensitive
Indiana Bat	*Myotis sodalis*	Endangered
Northern Myotis	*Myotis septentrionalis*	Endangered
Southeastern Myotis	*Myotis austroriparius*	Endangered
Class Reptilia (Reptiles)		
Midland Smooth Softshell	*Apalone mutica mutica*	Sensitive
Western Mud Snake	*Farancia abacura reinwardtii*	Sensitive

Source: KDFWR, Heath and Joppa Quadrangles, 2020.

The following sections provide a brief overview of each state-listed species and the potential risk associated with the Project.

Although state-listed species in Kentucky are not protected by legislation or regulation, the Project is not likely to significantly effect these state-listed species.

Class Actinopterygii (Fish)

Alligator Gar

The alligator gar (*Atractosteus spatula*) is a large predatory fish that tends to inhabit slow moving waters of large rivers, bayous, lakes, and swamps. They have been recorded in brackish waters as well (Page and Burr 2011). They feed on mostly fish, crabs, turtles, waterfowl, other small birds, as well as small mammals. Alligator gar begin spawning when water temperatures reach approximately 23 degrees Celsius. The alligator gar is an endangered species in Kentucky. Based on a record search and site reconnaissance, the PSA does appear to contain suitable habitat for this fish species.

Black Buffalo

The black buffalo (*Ictiobus niger*) is considered a sensitive fish species in Kentucky. It is a medium sized fish in the sucker family, that can grow between 24 to 36 inches in length. They inhabit pool and backwaters of small to larger rivers that often carry strong currents (Page and Burr 2011, Lee et al. 1980). This species tends to spawn in shallow waters during spring. Their prey includes

bottom dwelling organisms such as insects, mollusks, and even vegetation. Based on a record search and site reconnaissance, the PSA does appear to contain suitable habitat for this fish species.

Blacktail Shiner

The blacktail shiner (*Cyprinella venusta*) is a smaller fish that has a yellow/olive color back along with silver sides and a noticeable black dot on the base of its tail. The blacktail shiner can be commonly found in pools of clear, sandy, small to medium rivers. These rivers usually have sparse vegetation. They have also been found in creeks that have a gravel or rubble bottom (Page and Burr 2011, Lee et al. 1980). They tend to spawn in the spring, where they tend to lay their eggs in small cracks and crevices. The blacktail shiner is considered a sensitive species in Kentucky. Based on a record search and site reconnaissance, the PSA does appear to contain suitable habitat for this fish species.

Chain Pickerel

The chain pickerel (*Esox niger*) is classified as a sensitive species in Kentucky. They tend to live in vegetated lakes, and swamps, as well as slow pools in creeks and small to medium rivers (Page and Burr 2011). They can be found in warmer waters and had been known to enter brackish waters. The chain pickerel spawns in late winter to early spring. They lay their eggs higher in the water and allow them to sink to the bottom where they can attach to vegetation. These fish are olive/green to a yellow/brown color along with a distinct dark banding or webbing along the body. They can grow anywhere from one and a half to two feet in length. Based on a record search and site reconnaissance, the PSA does appear to contain suitable habitat for this fish species.

Cypress Minnow

The cypress minnow (*Hybognathus hayi*) has been designated as an endangered species in Kentucky. The cypress minnow is a smaller fish that have an olive/yellow back with a greenish stripe along the sides and a pale silver ventral side. They can range between 3-6 inches in length. They tend to live in slower pools and backwaters of streams, oxbow lakes, and cypress lakes. They occur in waters with sand bottoms that are covered in mud. During spring spawning, they scatter their eggs over the bottom of the waterbody to be fertilized (Warren and Burr 1989). Based on a record search and site reconnaissance, the PSA does appear to contain suitable habitat for this fish species.

Lake Chubsucker

The lake chubsucker (*Erimyzon oblongus*) is a fish that inhabits ponds, lakes, swamps, slow pools in creeks and rivers. They like clear waters with little to no flow, and sandy, silty bottoms. They tend to live in areas that contain aquatic vegetation (Lee et al. 1980, Page and Burr 1991). The lake chubsucker spawns in late spring to early summer. They lay their eggs over gravel beds or over vegetation. The lake chubsucker can be light to dark brown back, with five to six dark vertical

bars. The ventral side is a light tan to cream color, along with tan/gray fins. The lake chubsucker is designated as an endangered species in Kentucky. Based on a record search and site reconnaissance, the PSA does appear to contain suitable habitat for this fish species.

Mississippi Silverside

The Mississippi silverside (*Menidia audens*) is a small fish, that only reaches about four inches long. They have a slim body, with a semi translucent skin, with a yellow/green tint to it and a silvery band on each of the sides. They tend to inhabit shallow, warmwater lakes, reservoirs, and estuaries. They usually appear at the surface over sand or gravel bottoms (Page and Burr 2011). Spawning can occur between spring and late summer when females will lay eggs on the bed in aquatic vegetation. The Mississippi silverside is considered a threatened species in Kentucky. Based on a record search and site reconnaissance, the PSA does appear to contain suitable habitat for this fish species.

Northern Madtom

The Northern madtom is a sensitive fish species in Kentucky. It is a smaller fish that can grow between four and five inches in length. They have a tan to brown body along with dark saddles, dark mottling above and a lighter pale ventral side, and barbels on around their mouth. Their habitat includes larger creeks and small rivers that have clear to turbid waters and a moderate current (Lee et al. 1980). They prefer a bottom that has mud and sand as well as rocky bottoms (Cincotta et al. 1986). The Northern madtom spawns from spring to summer. Based on a record search and site reconnaissance, the PSA does appear to contain suitable habitat for this fish species.

Redspotted Sunfish

The redspotted sunfish (*Lepomis miniatus*) is a smaller fish within the sunfish family. They can grow up to seven inches in length. The redspotted sunfish has a darker dorsal side with green/gray sides with flecks of orange and light blue in the scales. They also have an orange patch above their opercular flap and a light yellow/orange ventral side. They inhabit swamps, sloughs, lakes, creeks, and small to medium rivers. They have also been documented in brackish areas of estuaries. They like slow to moderate flowing waters with muddy or sandy bottoms. The redspotted sunfish spawns in spring to summer, often in shallow waters (Ross 2001). The redspotted sunfish is considered a threatened species in Kentucky. Based on a record search and site reconnaissance, the PSA does appear to contain suitable habitat for this fish species.

Spottail Shiner

The spottail shiner is considered a sensitive fish species in Kentucky. They tend to inhabit a variety of habitats including large slow flowing rivers, rapid flowing streams, and lakes (Lee et al. 1980). They tend to reside over sandy or rocky beds in shallow water. The spottail shiner spawns in spring into early summer (Becker 1983). They cast their eggs over gravel substrate,

where they stay until hatching occurs. The spottail shiner is a smaller fish that grows to two to five inches in length. They have silvery sides with a blueish tint and a pale olive back. They have a noticeable black spot on the base of their body where the tail meets the fin. Based on a record search and site reconnaissance, the PSA does appear to contain suitable habitat for this fish species.

Taillight Shiner

The taillight shiner (*Notropis maculatus*) is a threatened species of fish in the state if Kentucky. This fish is a smaller fish that can reach up to approximately 3 inches in length. They have a green/brown colored back and a light-colored ventral side. The sides and dorsal side have a red tint that covers the body. They have a black lateral line that extends from the nose, through the eye and extends back to the tail where it meets a black spot where the body and fin meet. The fins have a red tint to them, and a darker hue where they meet the body. They inhabit slower moving rivers and streams, as well as ponds, lakes and swamps. They lean toward water bodies that have a mud bottom and aquatic vegetation (Page and Burr 1991, Lee et al. 1980). Spawning of this species occurs from spring to summer. Based on a record search and site reconnaissance, the PSA does appear to contain suitable habitat for this fish species.

Class Amphibia (Amphibians)

Eastern Hellbender

The Eastern Hellbender (*Cryptobranchus alleganiensis alleganiensis*) is considered threatened in Kentucky. It occurs throughout the state in 73 out of 120 counties. The eastern hellbender is typically found in clear, rocky streams with a fast current and an abundance of large boulders. They tend to avoid wide streams with slow-moving waters with muddy banks and slab rock bottoms, heavily polluted or silted waters, as well waters warmer than 20ºC (Peterson et al. 1988). They lay their eggs in late summer through fall and males will guard developing eggs for approximately 1.5-3 months until the larvae hatch. Juvenile hellbenders lose their gills about 18 months and will become sexually mature in about 5-8 years (Minton 1972). Based on a record search and site reconnaissance, the PSA does not appear to have good habitat for the eastern hellbender.

Northern Crawfish Frog

The Northern Crawfish Frog (*Lithobates areolatus*, formerly *Rana areolatus*) is considered a sensitive species in Kentucky. They are typically around 4 inches long and have a coloration pattern of dark circles outlined in white or gray. Northern Crawfish Frogs can be usually found in or around crayfish burrows in open grasslands, pastures, or fields. They only occur in Kentucky in the Jackson Purchase and Western Coal Field region, which includes McCracken county. Based on a record search and site reconnaissance, there is suitable habitat for the Northern Crawfish Frog in the PSA. Three occurrence records for the Northern Crawfish Frog from 1991 exist within 1 mile of the PSA (Kentucky Nature Preserves 2021).

Class Aves (Birds)

Bald Eagle

The Bald Eagle (*Haliaeetus leucocephalus*) is a threatened species in Kentucky. The Bald Eagle is a large raptor that tends to inhabit areas such as streams, rivers, ponds, lakes, and coastal areas that contain adequate food sources. Bald Eagles nest in the tops of large trees near these water resources. A pair of Eagles may reuse this nest or have alternate nesting sites. Juveniles have brown bodies with white mottling throughout, along with a dark beak. Mottling will occur in subsequently until adulthood where they obtain the white head and tail. As well as a dark brown body and yellow beak.

Based on a record search and site reconnaissance, the PSA may contain suitable habitat for the Bald Eagle. The nearest sighting of a Bald Eagle was less than a mile from the PSA (Sullivan et al 2009).

Barn Owl

The Barn Owl (*Tyto alba*) is considered a sensitive species in Kentucky. They are medium sized owls with round heads and no ear tufts. Barn owls have a white face with a mix of gray, brown and black colored wings, head, and back. They tend to nest and roost in manmade structures such as buildings and barns as well as in tree cavities. These owls forage over open habitats such as fields primarily for small rodents. Based on a record search and site reconnaissance, the PSA does appear to contain suitable habitat for the barn owl; however, the nearest sighting of a Barn owl was approximately 6 miles north-west of the PSA (Sullivan et al. 2009).

Bell's Vireo

Bell's vireo (*Vireo bellii*) is a small songbird that can be a variety of colors. They can vary between a brownish-gray to a yellow-gray back, usually both with a gray head. The underside can be a pale white/cream to a vibrant yellow underbelly with a yellow tint on the sides under the wings. They also have a dark stripe that runs through the eye towards the beak. The Bell's vireo is a migrant bird. They leave their overwinter habitat in South America and reach their breeding ground in May. During the breeding season they can be found in dense brush, streamside thickets, oak scrubs, and in dryer regions near water (AOU 1998, Kus and Miner 1989). In late July through September they start to migrate back southward. In Kentucky, Bell's vireo is considered a sensitive species. Though the nearest sighting of a Bell's Vireo was at the West Kentucky State Wildlife Management Area approximately one mile south east of the PSA, this Project is unlikely to impact this species (Sullivan et al. 2009).

Blue-winged Teal

The Blue-winged Teal (*Spatula discors*) is considered a threatened species in Kentucky. It is a small duck with chalky-blue patches on the upper wing. Breeding males have a white crescent in front of eye. Females are patterned, cold brown, and show a hint of the male's white crescent on face. Black bill. Forages by dabbling and tipping-up in shallow wetlands. Forages in shallow water by dabbling, reaching underwater to grab aquatic vegetation, seeds, and midge larvae. The nearest sighting of a Blue-winged Teal was at the West Kentucky State Wildlife Management Area approximately one mile south east of the PSA (Sullivan et al. 2009). Based on a record search and site reconnaissance, the Project is unlikely to significantly impact the blue-winged teal.

Bobolink

The Bobolink (*Dolichonyx oryzivorus*) is a migratory bird that is typically found in grassy habitats including hayfields, pastures, and infrequently mowed fields. They prefer vegetation that is not too thick but also not mowed frequently (Palmer-Ball 1996). During migration they stop in similar fields as well as marshes and rice fields. Breeding male bobolinks are black below and black and white on top. The wings have mix of black, white, and yellow coloring, as well as a bright yellow patch on the back of the head. Female and non-breeding birds are a mixture of brown and yellow on the bottom and brown, black, and white on the back. They also have a lighter colored beak and dark stripes on the crown. The Bobolink is considered a sensitive species in Kentucky. Based on a record search and site reconnaissance, the PSA may contain suitable habitat for the Bobolink. The nearest sighting of a Bobolink to the PSA was approximately 2.5 miles to the north-west (Sullivan et al. 2009).

Dark-eyed Junco

Medium-sized sparrow with round head, long tail, and small pale bill. All juncos have prominent white outer tail feathers. Dark-eyed juncos are birds of the ground. They hop around the bases of trees and shrubs in forests or venture out onto lawns looking for fallen seeds. They generate high chip notes while foraging or intensifying as they take short, low flights through cover. Dark-eyed juncos breed in coniferous or mixed-coniferous forests in the Appalachians. During winter, they can be found in open woodlands, fields, parks, roadsides, and backyards. In Kentucky, the dark-eyed junco is listed as sensitive. Based on a record search and site reconnaissance, the PSA does appear to contain suitable habitat for the dark-eyed junco. The nearest sighting of a Dark-eyed Junco was less than a half mile east from the PSA (Sullivan et al. 2009).

Double-crested Cormorant

The Double-crested Cormorant (*Phalacrocorax auratus*) is a threatened species in Kentucky. Double-crested Cormorants live in both fresh and saltwater environments, where they will nest either on the ground, in trees, or on cliffs. Double-crested cormorants are large waterbirds with long tails and necks. Breeding and non-breeding adults are both generally dark birds with orange around the base of the bill. Breeding adults will also have tufts of feathers that come off the side

of their head. Juvenile birds have a paler neck and breast than that of the adults. Though the nearest sighting of a Double-crested Cormorant was at the West Kentucky State Wildlife Management Area approximately one mile south east of the PSA, this Project is unlikely to impact this species (Sullivan et al. 2009).

Fish Crow

The fish crow (*Corvus ossifragus*) is considered a sensitive species in Kentucky. The fish crow is a non-migrant bird and can found on beaches, bays inlets, swamps, marshes, major waterbodies, and dumps. They can even less frequently be found in woodlands (Mcnair 1982). Like the American crow (*Corvus brachyrhynchos*), the fish crow is an all-black bird with a black beak and black legs. The fish crow however, is smaller in comparison to the American crow and had a more nasally call. The fish crow often has a small hook on the upper bill, that an American crow does not. Based on a record search and site reconnaissance, the PSA may contain suitable habitat for the fish crow. The nearest sighting of a fish crow was less than three-quarters of a mile from the PSA (Sullivan et al. 2009).

Great Egret

The Great Egret (*Ardea alba*) is large white bird, with long black legs and a bright orange beak. Great Egrets like to wade in shallow water where they can hunt for prey. They live in both fresh and saltwater environments. They primarily nest in tall trees with other colonial water birds. The Great Egret is considered a threatened species in Kentucky. Though the nearest sighting of a Great Egret was at the West Kentucky State Wildlife Management Area approximately one mile south east of the PSA, this Project is unlikely to impact this species (Sullivan et al. 2009).

Hooded Merganser

The Hooded Merganser (*Lophodytes cucullatus*) is a species of migratory bird that typically can be found in streams swamps, marshes, and estuaries. They often nest in tree cavities often near water and have also been seen successfully using nesting boxes (Zicus 1990). They typically migrate north in February to May and returning to their wintering grounds From September to December. Hooded Mergansers are a small duck with a slender bill and a crest, that can be lowered. Breeding males have a black head and back, with a white crest and chest, with brown sides. Non-breeding males have a brown head and bodies with a darker brown back, and a reddish-brown crest. Female Mergansers are brown with a reddish-brown crest and a lighter bill than the males. Though the nearest sighting of a Hooded Merganser was at the West Kentucky State Wildlife Management Area approximately one mile south east of the PSA, this Project is unlikely to impact this species (Sullivan et al. 2009).

Interior Least Tern

The Interior Least Tern is state-listed as endangered and was previously discussed in the federally listed species section.

Northern Harrier

The Northern Harrier (*Circus hudsonius*) is considered a threatened species in Kentucky. These birds typically inhabit undisturbed wetlands, fields, and grasslands with thick, low lying vegetation. They breed in a variety of habitats such as freshwater and brackish marshes, grazed meadows, upland prairies, and riverbank habitat. Adult males have a grayish dorsal side with a dark edge on the wings along with pale underside and black tipped wingtips and secondary feathers. Adult females have a darker brown back with a light underside along with brown streaking. Both male and female adults have a noticeable white rump patch and dark banding on the underside of the tail. Immature birds have a darker head along with a reddish-brown wash on their bodies and their wings and tail are banded as well. Based on record searches and a site reconnaissance, the site does appear to contain suitable habitat for the Northern Harrier. The nearest record of a Northern Harrier was at the West Kentucky State Wildlife Management Area approximately one mile south east of the PSA (Sullivan et al. 2009).

Osprey

The Osprey (*Pandion haliaetus*) is a very distinctive large hawk-like bird. It has a dark brown on their backs with a white/brown speckled underside. Along with a white and brown crown, it had a distinctive dark eye stripe along with yellow eyes. The Osprey can be typically found along rivers, lakes, and coastal areas. They build nests using large sticks, and nest on top of large living or dead trees, or manmade structures. The Osprey is a migratory bird that arrives in breeding territory in spring and begin their migration South in August. In Kentucky, the Osprey is considered a sensitive species. Though the nearest sighting of an osprey was at the West Kentucky State Wildlife Management Area approximately one mile south east of the PSA, this Project is unlikely to impact this species (Sullivan et al. 2009).

Sedge Wren

The Sedge Wren (*Cistothorus platensis*) is considered a sensitive species in Kentucky. The sedge wren is a buffy colored bird, with smaller streaks on its crown and larger streaks on its back. It also has a shorter tail that it often holds in an upright position. This species is typically found in moist grasslands and savannahs. Though nesting areas may change between years as habitat conditions change, sedge wrens are presumed to overwinter in similar breeding habitat but may also migrate to brushy grasslands (AOU 1983). Though the nearest sighting of a sedge wren was at the West Kentucky State Wildlife Management Area approximately one mile south east of the PSA, this Project is unlikely to impact this species (Sullivan et al. 2009).

Yellow-crowned Night-heron

The Yellow-crowned Night-heron is a stocky bird compared to other herons. Adult birds have a grey under body and neck, with grey and black wings. They have a black chin and black eye bars that are interrupted in between by a white cheek patch. On the top of their head they have their "crown, which is made up of long yellow and white feathers, some that stretch back over the

head and down onto the back. They have a thick black beak and yellow legs. Juvenile birds start out brown with white streaks and as they age, they lose the white streaks and gain the cheek patch and crown. The Yellow-crowned Night heron is a non-migrant bird. It tends to inhabit marshes, swamps, and lakes. They can even be found in mangroves and cypress swamps along the coast. Based on a record search and site reconnaissance, the PSA may contain suitable habitat for the yellow-crowned night heron. The nearest siting of a Yellow-crowned Night-heron was less than three-quarters of a mile from the PSA (Sullivan et al. 2009).

Class Bivalvia (Mussels)

Bleufer

The Bleufer mussel is state-listed as endangered in Kentucky. Also known as purple shell, this mussel is found in small streams to large rivers and backwater areas in the lower Ohio and Mississippi river drainage systems (Cicerello and Schuster 2003). In Kentucky, they are primarily found in the lower Obion Creek and Mississippi River oxbows and slack water in the western portion of the state. Typical substrates include a mix of silt, mud, sand, and gravel. Based on a record search and site reconnaissance, the PSA does not appear to contain suitable habitat for this mussel species.

Fat Pocketbook

The Fat Pocketbook mussel is state-listed as endangered and was previously discussed in the federally listed species section.

Orangefoot Pimpleback

The Orangefoot Pimpleback mussel is state-listed as endangered and was previously discussed in the federally listed species section.

Pink Mucket

The Pink Mucket mussel is state-listed as endangered and was previously discussed in the federally listed species section.

Pocketbook

The pocketbook mussel (*Lampsilis ovata*) is adapted to both impoundment situations as well as free-flowing, shallow rivers. It may be found in big rivers (reservoirs) at depths of 15 to 20 feet and in small streams in less than two feet of water. Although usually found in moderate to strong current, it can survive in standing water. The most suitable substrate consists of a mixture of gravel and coarse sand mixed with some silt or mud. The pocketbook mussel is state-listed as endangered. Based on a record search and site reconnaissance, the PSA does not appear to contain suitable habitat for this mussel species.

Rabbitsfoot

The Rabbitsfoot mussel is state-listed as threatened and was previously discussed in the federally listed species section.

Sheepnose

The Sheepnose mussel is state-listed as endangered and was previously discussed in the federally listed species section.

Class Cephalaspidomorphi (Lampreys)

Chestnut Lamprey

The Chestnut Lamprey (*Ichthyomyzon castaneus*) is a parasitic lamprey that is the largest lamprey found in the state at approximately 10-12 inches in length. Adults are chestnut colored and typically occur in large streams and small rivers of the Mississippi River system or in large reservoirs (Missouri Department of Conservation). Larval lamprey feed on algae and detritus for 5-7 years before they metamorphose and become sexually mature. As adults, they typically live for 2 years and feed by attaching to the sides of fish where they consume the blood and body fluids of the host fish. The species is widespread throughout the northeastern United States and Canada. In Kentucky, it is found the Middle Green River, Rough River, Red River, Lower Cumberland, Lower Ohio, and Lower Mississippi watersheds. A large population also occurs in the spring below the Kentucky Lake Dam. Based on a record search and site reconnaissance, the PSA does appear to have suitable habitat for the Chestnut Lamprey.

Class Gastropoda (Snails and Slugs)

Armored Rocksnail

The Armored Rocksnail (*Lithasia armigera*) is a freshwater snail that is endemic to the Ohio, Cumberland, and Tennessee river drainage systems. They typically inhabit sandy gravel areas, cobble rip-rap, or woody debris (Tiemann et al. 2013). Based on a record search and site reconnaissance, the PSA does not appear to contain suitable habitat for this gastropod species.

Onyx Rocksnail

The Onyx Rocksnail (*Leptoxis praerosa*) is a freshwater snail found in the Ohio, Cumberland, Duck, and Tennessee river drainage systems. These snails are primarily found on algae covered rocks in strong currents (Goodrich and van der Schalie, 1944). Based on a record search and site reconnaissance, the PSA does not appear to contain suitable habitat for this gastropod species.

Varicose Rocksnail

The Varicose Rocksnail (*Lithasia verrucosa*) is a freshwater snail that is endemic to the Ohio, Tennessee, and Black river drainage systems. Similar to the Armored Rocksnail, they also typically inhabit sandy gravel areas, cobble rip-rap, or woody debris (Tiemann et al. 2013). Based

on a record search and site reconnaissance, the PSA does not appear to contain suitable habitat for this gastropod species.

Class Malacostraca (Crayfish)

Ohio Shrimp

The Ohio Shrimp (*Macrobrachium ohione*) is considered an endangered species in the state of Kentucky. It occurs widespread throughout the Eastern United States particularly through the Mississippi River drainage system. These shrimps prefer low velocity water and can be found on the flooded edges, or open side channels, of the main river channel where there is an abundance of plant and animal material available in the water for both food and cover from predators (Conaway and Hrabik 1997; Truesdale and Mermilliod 1979; Barko and Herzog 2003). Based on a record search and site reconnaissance, the PSA does not appear to contain suitable habitat for this crayfish species.

Shrimp Crayfish

The Shrimp Crayfish (Faxonius lancifer) is considered an endangered species in the state of Kentucky. It occurs widespread throughout the Eastern United States in freshwater streams, lakes, oxbows, bayous, and ditches (Taylor et al. 2004). These shrimps are generally opportunistic feeders but primarily feed on detritus in deep, still sections of water where they encountered. Based on a record search and site reconnaissance, the PSA does not appear to contain suitable habitat for this crayfish species.

Class Mammalia (Mammals)

Evening Bat

The evening bat (*Nycticeius humeralis*) is considered state threatened in Kentucky. These bats are the smaller version of a big brown bat (*Eptesicus fuscus*) with brown fur and a black to dark brown muzzle. They are a migratory bat who summers throughout at least the western third of the state and winters in the south. They primarily roost in hollow trees and/or exfoliating bark but have also been documented using manmade structures such as houses and sheds. Typical prey items include beetles, moths, and flies.

Copperhead's desktop analysis identified approximately 93.6 acres of wooded land as well as stream corridors that could potentially provide suitable evening bat roosting and foraging habitat (see Figure 2). Evening bats could also use farm structures including barns, sheds, and silos as roosting habitat.

Indiana Bat

The Indiana bat is state-listed as endangered and was previously discussed in the federally listed species section.

Northern Long-eared Bat

The northern long-eared bat is state-listed as endangered and was previously discussed in the federally listed species section.

Southeastern Myotis

The southeastern Myotis (*Myotis austroriparius*) is considered state endangered in Kentucky. Similar to other bats of the genus *Myotis*, these bats weigh 5-8 grams and have a wingspan of up to 27 centimeters. Coloration varies from bright orange to a dull brown. They primarily roost in caves and hollow trees near bottomland habitats in the summers but have also been documented roosting in abandoned buildings. In the winter they hibernate in caves often with other species of hibernating bats such as the Indiana bat. These bats occur locally throughout the southeastern United States and are found in Kentucky in the western half of the state.

Copperhead's desktop analysis identified approximately 93.6 acres of wooded land as well as stream corridors that could potentially provide suitable evening bat roosting and foraging habitat (see Figure 2). Evening bats could also use farm structures including barns, sheds, and silos as roosting habitat.

Class Reptilia (Reptiles)

Midland Smooth Softshell

The Midland Smooth Softshell (Apalone mutica mutica) is a softshell turtle that's upper shell lacks any bumps or spines. Shell color varies with age and sex; however, males will typically have an olive-gray or brown upper shell and females have a mottled shell of browns, grays, and olives (MDC 2020). These turtles occur in the south-central and midwestern United States and is found in Kentucky in counties bordering the Mississippi, Ohio, Tennessee, and Cumberland rivers as well as Lake Barkley and Kentucky Lake. Prey items include fish, crayfish, salamanders, tadpoles, frogs, snails, and insects. The Midland Smooth Softshell is considered a sensitive species in Kentucky.

Western Mud Snake

The Western Mud Snake (Farancia abacura reinwardtii) is considered a sensitive species in Kentucky. It is a non-venomous snake that is typically a shiny black color with pink or red belly bars that extend onto the sides (UK Office for Environmental Programs Outreach Services, 2020). These snakes occur from the Gulf Coast drainage system northward into lowland habitats to western Kentucky. In Kentucky they occur primarily in the Jackson Purchase region, which includes Ballard, Carlisle, Fulton, Graves, Hickman, Marshall, and McCracken counties; however, they can occur in a few isolated areas of the Western Coal Fields region. The Western Mud Snake can usually be found in slow moving streams, bayous, and oxbows where there are clear water areas with emergent vegetation and large amounts of detritus or organic debris. Based

on a key habitat listed in the WAP, a record search, and site reconnaissance, the PSA does appear to have suitable habitat for the Western Mud Snake.

Conclusions

Copperhead conducted a threatened and endangered species habitat assessment and evaluation for the PSA. The PSA consists of agricultural land and residential use. Surrounding properties are primarily agricultural in nature as well.

Should USFWS consultation be required, the federally listed gray bat, Indiana bat, and northern long-eared bat would likely need further evaluation and consideration. Potential effects to these species can be mitigated for through project-specific conservation and mitigation methods (i.e., tree cutting avoidance or time of year restrictions). Additionally, surveys can be conducted from to determine the potential presence/probable absence of the bat species within the PSA. Although state-listed species in Kentucky are not protected by legislation or regulation, the project is not likely to significantly effect these species.

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Appendix A

Representative Photographic Record

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar Project Representative Photographic Record	
Project No.: 1013	**County, State:** McCracken County, KY	**Client:** McCracken County Solar, LLC

COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar Project Representative Photographic Record	
Project No.: 1013	**County, State:** McCracken County, KY	**Client:** McCracken County Solar, LLC

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COPPERHEAD ENVIRONMENTAL CONSULTING	McCracken County Solar Project Representative Photographic Record	
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COPPERHEAD
ENVIRONMENTAL CONSULTING

McCracken County Solar Project
Representative Photographic Record

Project No.:	County, State:	Client:
1013	McCracken County, KY	McCracken County Solar, LLC

Appendix B:

USFWS Official IPaC Species List

United States Department of the Interior

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

In Reply Refer To:
Consultation Code: 04EK1000-2021-SLI-0314
Event Code: 04EK1000-2021-E-01106
Project Name: McCracken Solar

January 05, 2021

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

To Whom It May Concern:

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

The Information in Your Species List:

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

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

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

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

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

ESA Obligations for Federal Projects:

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

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

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). Recommended contents of a Biological Assessment are described at 50 CFR 402.12. For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat.

ESA Obligations for Non-federal Projects:

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

Additional Species-specific Information:

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

Next Steps:

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

Attachment(s):

- Official Species List

Official Species List

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

This species list is provided by:

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

Project Summary

Consultation Code: 04EK1000-2021-SLI-0314
Event Code: 04EK1000-2021-E-01106
Project Name: McCracken Solar
Project Type: DEVELOPMENT
Project Description: solar energy
Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@37.122813300000004,-88.8608065867896,14z

Counties: McCracken County, Kentucky

Endangered Species Act Species

There is a total of 15 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 15 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

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

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

Mammals

NAME	STATUS

Gray Bat *Myotis grisescens* — Endangered

No critical habitat has been designated for this species.

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

- The project area includes potential gray bat habitat.

Species profile: https://ecos.fws.gov/ecp/species/6329

General project design guidelines:
https://ecos.fws.gov/docs/tess/ipac_project_design_guidelines/doc6422.pdf

Indiana Bat *Myotis sodalis* — Endangered

There is **final** critical habitat for this species. The location of the critical habitat is not available.

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

- The project area includes 'potential' habitat. All activities in this location should consider possible effects to this species.
- The project area includes known 'summer 1 (outer-tier)' habitat.

Species profile: https://ecos.fws.gov/ecp/species/5949

General project design guidelines:
https://ecos.fws.gov/docs/tess/ipac_project_design_guidelines/doc6422.pdf

Northern Long-eared Bat *Myotis septentrionalis* — Threatened

No critical habitat has been designated for this species.

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

- The specified area includes areas in which incidental take would not be prohibited under the 4(d) rule. For reporting purposes, please use the "streamlined consultation form," linked to in the "general project design guidelines" for the species.

Species profile: https://ecos.fws.gov/ecp/species/9045

General project design guidelines:
https://ecos.fws.gov/docs/tess/ipac_project_design_guidelines/doc6422.pdf

Birds

NAME	STATUS

Least Tern *Sterna antillarum* — Endangered

Population: interior pop.

No critical habitat has been designated for this species.

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

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

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

Clams

NAME STATUS

Clubshell *Pleurobema clava* Endangered

Population: Wherever found; Except where listed as Experimental Populations
No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact the Ohio River.

Species profile: https://ecos.fws.gov/ecp/species/3789
General project design guidelines:
https://ecos.fws.gov/docs/tess/ipac_project_design_guidelines/doc5639.pdf

Fanshell *Cyprogenia stegaria* Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact the Ohio River.

Species profile: https://ecos.fws.gov/ecp/species/4822
General project design guidelines:
https://ecos.fws.gov/docs/tess/ipac_project_design_guidelines/doc5639.pdf

Fat Pocketbook *Potamilus capax* Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Clarks, Cumberland, Green, Mississippi, Ohio, Tradewater, or Tennessee.

Species profile: https://ecos.fws.gov/ecp/species/2780
General project design guidelines:
https://ecos.fws.gov/docs/tess/ipac_project_design_guidelines/doc5639.pdf

Northern Riffleshell *Epioblasma torulosa rangiana* Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Green, Licking, or Ohio.

Species profile: https://ecos.fws.gov/ecp/species/527
General project design guidelines:
https://ecos.fws.gov/docs/tess/ipac_project_design_guidelines/doc5639.pdf

Orangefoot Pimpleback (pearlymussel) *Plethobasus cooperianus* Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact the Ohio River.

Species profile: https://ecos.fws.gov/ecp/species/1132
General project design guidelines:
https://ecos.fws.gov/docs/tess/ipac_project_design_guidelines/doc5639.pdf

Pink Mucket (pearlymussel) *Lampsilis abrupta* Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact the Ohio River.

Species profile: https://ecos.fws.gov/ecp/species/7829
General project design guidelines:
https://ecos.fws.gov/docs/tess/ipac_project_design_guidelines/doc5639.pdf

NAME	STATUS

Rabbitsfoot *Quadrula cylindrica cylindrica* — Threatened

There is **final** critical habitat for this species. The location of the critical habitat is not available.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact the Ohio River.

Species profile: https://ecos.fws.gov/ecp/species/5165
General project design guidelines:
https://ecos.fws.gov/docs/tess/ipac_project_design_guidelines/doc5639.pdf

Ring Pink (mussel) *Obovaria retusa* — Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact the Ohio River.

Species profile: https://ecos.fws.gov/ecp/species/4128
General project design guidelines:
https://ecos.fws.gov/docs/tess/ipac_project_design_guidelines/doc5639.pdf

Rough Pigtoe *Pleurobema plenum* — Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact the Ohio River.

Species profile: https://ecos.fws.gov/ecp/species/6894
General project design guidelines:
https://ecos.fws.gov/docs/tess/ipac_project_design_guidelines/doc5639.pdf

Sheepnose Mussel *Plethobasus cyphyus* — Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact the Ohio River.

Species profile: https://ecos.fws.gov/ecp/species/6903
General project design guidelines:
https://ecos.fws.gov/docs/tess/ipac_project_design_guidelines/doc5639.pdf

Spectaclecase (mussel) *Cumberlandia monodonta* — Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact the Ohio River.

Species profile: https://ecos.fws.gov/ecp/species/7867
General project design guidelines:
https://ecos.fws.gov/docs/tess/ipac_project_design_guidelines/doc5639.pdf

Critical habitats

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

COPPERHEAD
ENVIRONMENTAL CONSULTING

KELSIE R. ESHLER
BIOLOGIST

Survey Experience

- Bat presence/absence surveys
- Bat habitat assessments
- Radio telemetry
- White-nose Syndrome assessments
- Acoustic monitoring
- NEPA Analysis
- GIS Mapping and Spatial Analysis
- Environmental Site Assessments
- Air Quality Assessments

Professional Experience

Copperhead Environmental Consulting, Inc., Biological Technician/Biologist, May 2017 – Present

Intertek – PSI: Professional Service Industries, Project Scientist, January 2016 – May 2017

Education

B.A. Environmental Earth Science and Sustainability, 2015, Miami University, Oxford OH

Certifications/Trainings

- Federally permitted under TE 94849B-0
- OSHA 30 hour, 2018
- OSHA 10 hour, 2020
- First Aid CPR / AED, 2020

Affiliations

- Ohio Bat Working Group
- Alabama Bat Working Group

Qualifications and Background

Miss Eshler is a wildlife biologist with multiple years in the consulting business completing wildlife surveys, habitat assessments, NEPA analyses, and environmental site assessments. She has over five years of consulting experience, with four years of survey experience dealing with eastern bat species. Her field experience has given her the opportunity to handle and identify sixteen different species of bats, including the federally endangered Indiana bat, Gray bat, and Virginia Big-Eared bat as well as the federally threatened Northern Long-Eared bat. Additionally, Miss Eshler has tracked to and identified roost trees and rock features for six different species of bats in nine different states. She is permitted under federal permit number TE 94849B-0.

Selected Project Experience

QK4 Portal Trapping. Whitely County, Kentucky. 2020. Working with permitted biologists; deployed harp traps, applied exclusion netting, removed bats from nets, obtained morphometric measurements from bats, and deployed AnaBat Swift acoustic detectors. Supervised by S. Nikki Davis and Ray Eaton.

KYDFWR White-nose Syndrome and Hibernacula Trapping. Pulaski and Estill Counties, Kentucky. 2020. Working with permitted biologists; deployed harp traps, applied exclusion netting, removed bats from nets, obtained morphometric measurements from bats, and deployed AnaBat Swift acoustic detectors. Species identified and handled: Indiana bat (*Myotis sodalis*), Little brown bat (*Myotis sodalis*), Tri-colored bat (*Perimyotis subflavus*), and Virginia Big-Eared bat (*Corynorhinus townsendii virginianus*). Supervised by Gregg Janos and Price Sewell.

Mountain Valley Pipeline SEIS. 2020. Public Comment analysis team lead, resource author for Socioeconomics and Environmental Justice.

Davy Crockett National Forest EA. 2020. Resource author for Fuels and Vegetation.

Radio telemetry study of an Indiana bat maternity colony on Fort Knox, KY. 2020. Captured Indiana bats, tracked bats to diurnal roosts, and conducted emergence counts. Species handled and identified: Indiana bat.

BrandenBark™ Structure Monitoring. Lawrence County, PA. 2020. Worked as a team lead, used a telescoping endoscope to check previously installed bat boxes for signs of occupancy.

Bat Box Occupancy Checks. Brooke and Ohio Counties, WV. 2020. Worked as team lead, used a telescoping endoscope to check previously installed bat boxes for signs of occupancy. Species identified: Big brown bat (*Eptesicus fuscus*).

Indiana bat monitoring of a maternity colony on Fort Knox, KY. 2020. Deployed nets around BrandenBark™ structures, removed bats, and obtained morphometric measurements from bats. Banded and applied radio transmitters to Indiana bats. Species handled, radio-tagged, and identified: Indiana bat, Little brown bat.

Indiana bat monitoring of a maternity colony on Fort Knox, KY. 2020. Deployed nets around BrandenBark™ structures, removed bats, and obtained morphometric measurements from bats. Banded and applied radio transmitters to Indiana bats. Species handled, radio-tagged, and identified: Indiana bat.

Indiana bat and Guano Collection on Fort Knox, KY. 2020. Weekly monitored the usage of BrandenBark™ structures of two Indiana bat maternity colonies located on Ft. Knox and took guano pellet samples from BrandenBark™ structures for further laboratory dietary analysis.

Indiana and Northern Myotis Acoustic presence/absence survey, Lucas County, OH. 2020. Worked as a team leader, chose acoustic monitoring sites, set up AnaBat Swift acoustic devises, and downloaded data.

Indiana and Northern Myotis Acoustic presence/absence survey, Brown County, OH. 2020. Worked as a team leader, chose acoustic monitoring sites, set up AnaBat Swift acoustic devises, and downloaded data.

Indiana and Northern Myotis Acoustic presence/absence survey, Warren County, OH. 2020. Worked as a team leader, chose acoustic monitoring sites, set up AnaBat Swift acoustic devises, and downloaded data.

Mark Twain Disturbance EA. 2020. Resource author for transportation.

NEPA Administrative Record. 2020. Filed and maintained database for a Forest Service EIS and updated plan.

Migration study of an Indiana bat starting near Mountain View, AR. 2020. Captured Indiana bats from cave, tracked bats to diurnal roosts, and conducted emergence counts. Species handled and identified: Indiana bat.

Aerial raptor survey in Ohio and Minnesota. 2020. Using binoculars flew transects searching for eagle and raptor nests, photographed, and documented any usage of nests.

Shortleaf Pine Initiative EA, Tennessee Valley Authority. Alabama and Tennessee. 2019. Resource author for Public Health and Safety for an EA analyzing restoration of more than 6,000 acres of shortleaf pine ecosystem in Alabama and Tennessee.

Kingston Wastewater Treatment EA, Tennessee Valley Authority. Tennessee. 2019. Resource author for Solid and Hazardous Waste and Public Health and Safety for an EA analyzing construction and operation of a new wastewater treatment facility at TVA's Kingston Fossil Plant in Roane County, Tennessee.

Kingston Borrow Site No. 3 Environmental Assessment, Tennessee Valley Authority. Tennessee. 2019. Helped out with an EA analyzing construction and operation of a borrow site at TVA's Kingston Fossil Plant in Roane County, Tennessee.

KYDFWR Cave Surveys. 2020. Worked with permitted biologist; identified bats and recorded any signs of white nose syndrome. Species identified: Rafinesque's big-eared bat (*Corynorhinus rafinesquii*), Indiana bat, Little brown bat, big brown bat, tri-colored bat. Supervised by Gregg Janos.

KYDFWR White-nose Syndrome and Hibernacula Trapping. Estill County, Kentucky. 2019. Working with permitted biologists; deployed harp traps, applied exclusion netting, removed bats from nets, obtained morphometric measurements from bats, and deployed AnaBat Swift acoustic detectors. Species identified and handled: Indiana bat, little brown bat, small-footed bat (*Myotis leibii*), and Virginia Big-Eared bat. Supervised by HMB biologist Todd McDaniel and Zack Couch.

Kentucky Bat Working Group Bat Blitz. 2019. Worked as a permitted biologist; Choose mist net site locations, deployed nets, removed bats, and obtained morphometric measurements from bats. Species handled and identified: Small-footed bat, eastern red bat (*Lasiurus borealis*), big brown bat, tricolored bat.

Migration study of Northern Myotis and Indiana bat throughout south-west Iowa. 2019. Worked as permitted biologist; Choose mist net site locations, deployed nets, removed bats, and obtained morphometric measurements from bats. Tracked Indiana bat to diurnal roosts and at night to their hibernacula.

NCDOT Bats in Bridges. 2019. Performed 25+ bridge habitat assessments for bats and potential bat roosting habitat. Worked with license drone operators for bridge assessments deemed too high or difficult for researchers access to determine UAV capabilities on bridge surveys for bats.

Indiana bat and Northern Myotis presence/absence survey. Lawrence County, OH. 2019. Worked as a permitted biologist and site leader; chose mist-net site locations, set up nets, removed bats from nets, and obtained morphometric measurements from bats. Species identified: big brown bat.

Radio telemetry study of an Indiana bat maternity colony on Fort Knox, KY. 2019. Captured Indiana bats, tracked bats to diurnal roosts, and conducted emergence counts. Species handled and identified: Indiana bats, little brown bats, evening bats (*Nycticeius humeralis*).

Indiana bat and Northern Myotis presence/absence on Redstone Arsenal, AL. 2019. Worked as a permitted biologist and site leader; chose mist-net site locations, set up nets, removed bats from nets, obtained morphometric measurements from bats, and banded *Myotis* species bats. Species identified: gray bat (*Myotis grisescens*), eastern red bat, seminole bat (*Lasiurus seminolus*), evening bat, and big brown bat

Indiana bat and Northern Myotis presence/absence survey. Cheatham County, TN. 2019. Worked as a permitted biologist and site leader; chose mist-net site locations, set up nets, removed bats from nets, obtained morphometric measurements from bats, and banded *Myotis* species bats. Species identified: gray bat, eastern red bat and big brown bat.

Indiana bat Spring Migration Mist-Netting and Tracking at Shirey Bay Rainey Brake, Arkansas. 2019. Worked as a permitted biologist and tracking lead. Tracked bats to diurnal roosts and performed emergence counts.

Indiana bat and Northern long-eared bat Presence/Absence Survey. Delaware County, OH. 2019. Worked as a permitted biologist and site leader; chose mist-net site locations, set up nets, removed bats from nets, and obtained morphometric measurements from bats. Species identified: Eastern red bat and big brown bat.

Indiana bat and Northern long-eared bat Presence/Absence Survey. Fairfield County, OH. 2019. Worked as a permitted biologist and site leader; chose mist-net site locations, set up nets, removed bats from nets, and obtained morphometric measurements from bats. Species identified: Eastern red bat and big brown bat.

Indiana bat Spring Migration Mist-Netting at the Oakmulgee Ranger District, AL. 2019. Worked as a permitted biologist and site leader; choose mist-net site locations, set up nets, removed bats from nets, obtained morphometric measurements from bats, banded and radio-tagged Myotis species. Species identified and handled: Southeastern Myotis (*Myotis austroriparius*), silver-haired bat (*Lasionycteris noctivagans*), hoary bat (*Lasiurus cinerus*), red bat, seminole bat, tri-colored bat, evening bat, and big brown bat.

Indiana bat, Northern Myotis, and Eastern Massasauga rattlesnake (*Sistrurus catenatus***) habitat assessment in Pratt County, IL. 2018.** Performed desktop analysis and a field habitat assessment of Pratt County to identify and later determine potential bat or Massasauga habitat suitability.

Kentucky Endangered Species Bridge Program. 2019-2020. Performed 25+ bridge and water quality habitat assessments, for the potential of listed species including but not limited to the Kentucky Arrow Darter, Snuffbox mussel, Virginia Big-Eared Bats, and Big Sandy Crayfish underneath bridges throughout Kentucky. Supervised by Marty Marchaterre, Price Sewell, and Theresa Wetzel.

Fall Portal/Cave Surveys near Charleston, WV. 2018. Working with permitted biologists; deployed harp traps, applied exclusion netting, removed bats from nets, obtained morphometric measurements from bats, and deployed AnaBat Swift acoustic detectors for a project in Boone and Kanawha Counties in West Virginia. Species identified and handled: Tri-colored bat. Supervised by Taylor Culbertson and Rob Stinson.

Kentucky Bat Working Group Bat Blitz. 2018. Working with permitted biologist; Choose mist net site locations, deployed nets, removed bats, and obtained morphometric measurements from bats. Species handled and identified: Gray bat, little Brown bat, big brown bat, and red bat. Supervised by Rob Stinson.

Timber Stand Improvement near Fort Knox, KY. 2018. Working with foresters, improved the quality and species of multiple tree stands on base at Fort Knox. Supervised by Matt Hinds.

Indiana bat and Northern Myotis presence/absence and Acoustic survey on Fort McClellan, AL. 2018. Working with permitted biologists; Chose mist net sites, deployed nets, removed bats from nets, obtained morphometric measurements from bats, and deployed AnaBat Swift acoustic detectors for a project on

Fort McClellan in AL. Species identified and handled: Gray bat, big Brown bat, red bat, evening bat, tri-colored bat, seminole bat, and Mexican Free-tailed bat (*Tadarida brasiliensis*). Supervised by Mark Gumbert and Piper Roby.

Radio telemetry study of an Indiana bat bridge bachelor colony near Fort Knox, KY. 2018. Tracked Indiana bats from a bridge colony to other diurnal roosts, conducted bridge bat survey counts, and conducted emergence counts. Supervised by Piper Roby.

Kentucky Endangered Species Bridge Program. 2018. Performed 200+ preliminary desktop habitat assessments, including the use of GIS, for the potential of listed species including but not limited to the Kentucky Arrow Darter, Snuffbox mussel, Virginia Big-Eared Bats, and Big Sandy Crayfish underneath bridges throughout Kentucky. Supervised by Marty Marchaterre.

Non-native Invasive Species (NNIS) Removal near Hoosier National Forest, IN. 2018. Working with foresters, improved the quality and species of approximately 40 acres of land using backpack sprayers. Supervised by Matt Hinds.

Indiana bat and Guano Collection on Fort Knox, KY. 2018. Biweekly monitored the usage of BrandenBark™ structures by an Indiana bat maternity colony located on Ft. Knox and took guano pellet samples from seven of the BrandenBark™ structures per visit for further laboratory dietary analysis.

Radio telemetry study of an Indiana bat maternity colony on Fort Knox, KY. 2018. Captured Indiana bats, tracked bats to diurnal roosts, and conducted emergence counts. Species handled and identified: Indiana bats, Little Brown bats. Supervised by Piper Roby.

Indiana bat monitoring of a maternity colony on Fort Knox, KY. 2018. Deployed nets around BrandenBark™ structures, removed bats, and obtained morphometric measurements from bats. Banded and applied radio transmitters to Indiana bats. Species handled and identified: Indiana bat. Supervised by Piper Roby.

Indiana bat monitoring of a maternity colony on Fort Knox, KY. 2018. Deployed nets around BrandenBark™ structures, removed bats, and obtained morphometric measurements from bats. Banded and applied radio transmitters to Indiana bats. Species handled and identified: Indiana bat, Little Brown bat, Evening bat. Supervised by Piper Roby.

Gray Bat roost and foraging telemetry study on Arnold Air Force Base, TN. 2018. Working with permitted biologist; Choose mist net site locations, deployed nets, removed bats, and obtained morphometric measurements from bats on Arnold Air Force Base in TN. Actively applied radio transmitters to Gray bats, and tracked them to their diurnal roosts and conducted emergence counts. Species handled and identified: Gray bat, Red bat, Evening bat, Little Brown bat, and Hoary bat. Supervised by Steve Samoray.

Indiana bat and Northern Myotis presence/absence survey near Pikeville, TN. 2018. Working with permitted biologists; Choose mist net sites, deployed nets, removed bats from nets and obtained morphometric measurements from bats for a project near Pikeville, TN. Species identified and handled: Gray bat, Big Brown bat, Red bat, Evening bat. Supervised by Steve Samoray.

Migration study of a Tri-Colored Bat starting near Dechard, TN. 2018. Captured Tri-Colored bats, tracked bats to diurnal roosts, and conducted emergence counts. Species handled and identified: Tri-Colored bats, Gray Bats. Supervised by Piper Roby.

Migration study of an Indiana bat starting near Mountain View, AR. 2018. Captured Indiana bats from cave, tracked bats to diurnal roosts, and conducted emergence counts. Species handled and identified: Indiana bats. Supervised by Piper Roby.

Winter behavior of Northern Myotis at Alligator River National Wildlife Refuge, NC. Fall 2017 through Winter 2018.
Working with permitted biologist; Choose mist net site locations, deployed nets, removed bats, and obtained morphometric measurements from bats. Actively applied radio transmitters to Northern Myotis bats and tracked them to their diurnal roosts and conducted emergence counts. Also conducted wing punch biopsy sampling, WNS swabbing, hair sampling, and guano collection on all Myotis species. Species handled and identified: Northern Myotis (*Myotis septentrionalis*), Rafinesque's Big-Eared bat, Seminole bat, Evening bat, Big Brown bat, Red bat, Tri-colored bat. Supervised by Theresa Wetzel.

Migration study of Northern Myotis throughout central-northern Iowa. 2017. Working with permitted biologist; Choose mist net site locations, deployed nets, removed bats, and obtained morphometric measurements from bats. Deployed acoustic lures at net sites to attract Northern Myotis. Applied radio transmitters to Northern Myotis bats and Little Brown bats and tracked them to their diurnal roosts and conducted emergence counts. Additionally, conducted WNS swabbing, dog scent swabbing, hair sampling, and guano collection on all Myotis species. Species handled and identified: Northern Myotis, Little Brown bat, Big Brown bat, Red bat, Hoary bat, Silver-haired bat, and Evening bats. Supervised by Piper Roby.

Kentucky Bat Working Group Bat Blitz. 2017. Working with permitted biologist; Choose mist net site locations, deployed nets, removed bats, and obtained morphometric measurements from bats. Species handled and identified: Indiana bats, Evening bats, Big Brown bats, and Red bats. Supervised by Theresa Wetzel.

Indiana bat and Northern Myotis presence/absence survey on Fort Knox, KY. 2017. Working with permitted biologists; Deployed nets, removed bats from nets and obtained morphometric measurements from bats for a project on Fort Knox, KY. Also tracked a radio tagged Indiana bat to a new bridge colony. Species handled: Red bat, and Tri-colored bat. Supervised by Piper Roby.

Non-native Invasive Species (NNIS) Removal near Terrapin Barrens, KY. 2017. Working with foresters, improved the quality and species of a power line right of way using backpack sprayers. Supervised by Matt Hinds.

Indiana bat presence/absence and acoustic survey near Hot Springs, AR. 2017. Working with permitted biologists; Deployed nets, removed bats from nets, obtained morphometric measurements from bats, and deployed SD2 AnaBat units for a project in Hot Springs, AR. Species handled: Big Brown bat, Red bat, Evening bat, Little Brown bat. Supervised by Theresa Wetzel.

Indiana bat and Northern Myotis presence/absence survey in northwest Ohio. 2017. Working with permitted biologists; Deployed nets, removed bats from nets and obtained morphometric measurements from bats for a project in NW Ohio. Also gained experience tracking Indiana bats the ground. Species handled: Big Brown bat, Red bat, and Hoary bat. Supervised by Zack Baer.

Selected Technical Reports and Presentations

Eshler. K., P. Roby. 2020. Statewide Mitigation and Monitoring for Indiana Bats: Arkansas DOT Job 001799. Report prepared for Kayti Ewing Arkansas Department of Transportation, Little Rock, AR.

Eshler. K., G. Janos. 2020. Diet Analysis of an Indiana Bat (Myotis sodalis) Maternity Colony at Fort Knox, Kentucky. Presentation for the Ohio Bat Working Group 2020.

Eshler. K., P. Roby. 2019. Spring Migration of Female Indiana Bats (Myotis sodalis) from Sauta Cave in Sauta Cave National Wildlife Refuge, Alabama AND Spring Maternity Colony Monitoring of the Oakmulgee Ranger District of the Talladega National Forest, Alabama. Report prepared for Nicholas Sharp (ADCNR) and Shannon Holbrook (USFWS).

Eshler. K., P. Roby, W. Seiter. 2018. Threated and Endangered Bat Monitoring Cundiff Lake and the South End, Fort Knox, KY. Report prepared for Lee Andrews and Mike Armstrong USFWS, Frankfort, KY.