Starfire Renewable Power Project – Phase II

Knott and Perry Counties, Kentucky

Water / Wetland Delineation Report

Submitted to:

STMO bn, LLC

c/o: Mr. Bob Roy

515 N Flagler Drive, Suite 250

West Palm Beach, FL 33401

Submittal Date:

September 24, 2026

September 2026
BFW Ref. #23526

September 24, 2026

Mr. Bob Roy
STMO bn, LLC
515 N Flagler Drive, Suite 250
West Palm Beach, FL 33401

RE: Water / Wetland Delineation Report
Starfire Renewable Power Project – Phase II
BFW Project No: 23526

Dear Mr. Roy:

Bacon Farmer Workman Engineering & Testing, Inc. (BFW) is pleased to submit our report documenting the findings of the Water/Wetland Delineation for Phase II of the Starfire Renewable Power Project. The study area for the project is located in Knott and Perry Counties, Kentucky, and it includes approximately 3,260 acres.

The purpose of the delineation was to gather sufficient information to render an independent professional opinion about whether jurisdictional waters and wetlands exist within the study area. The wetland delineation was conducted according to the guidelines set forth by the *1987 Corps of Engineers Manual* and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0).*

The United States Army Corps of Engineers (USACE) is the regulating authority of Section 404 of the Clean Water Act (CWA). This regulating entity must make the final decision with regards to the extent and jurisdictional status of any water/wetland features on this site.

We appreciate the opportunity to serve you and look forward to future association with you on this and other projects. If you have questions concerning this report or require further clarification of the findings, please call our office at (502) 526-3613.

Sincerely,

Christian Slone

Christian Slone, FP-A, WPIT
Environmental Scientist

Laura Darnell

Laura Darnell, PWS
Wetland Scientist / Ecologist

Attachment: Water / Wetland Delineation Report

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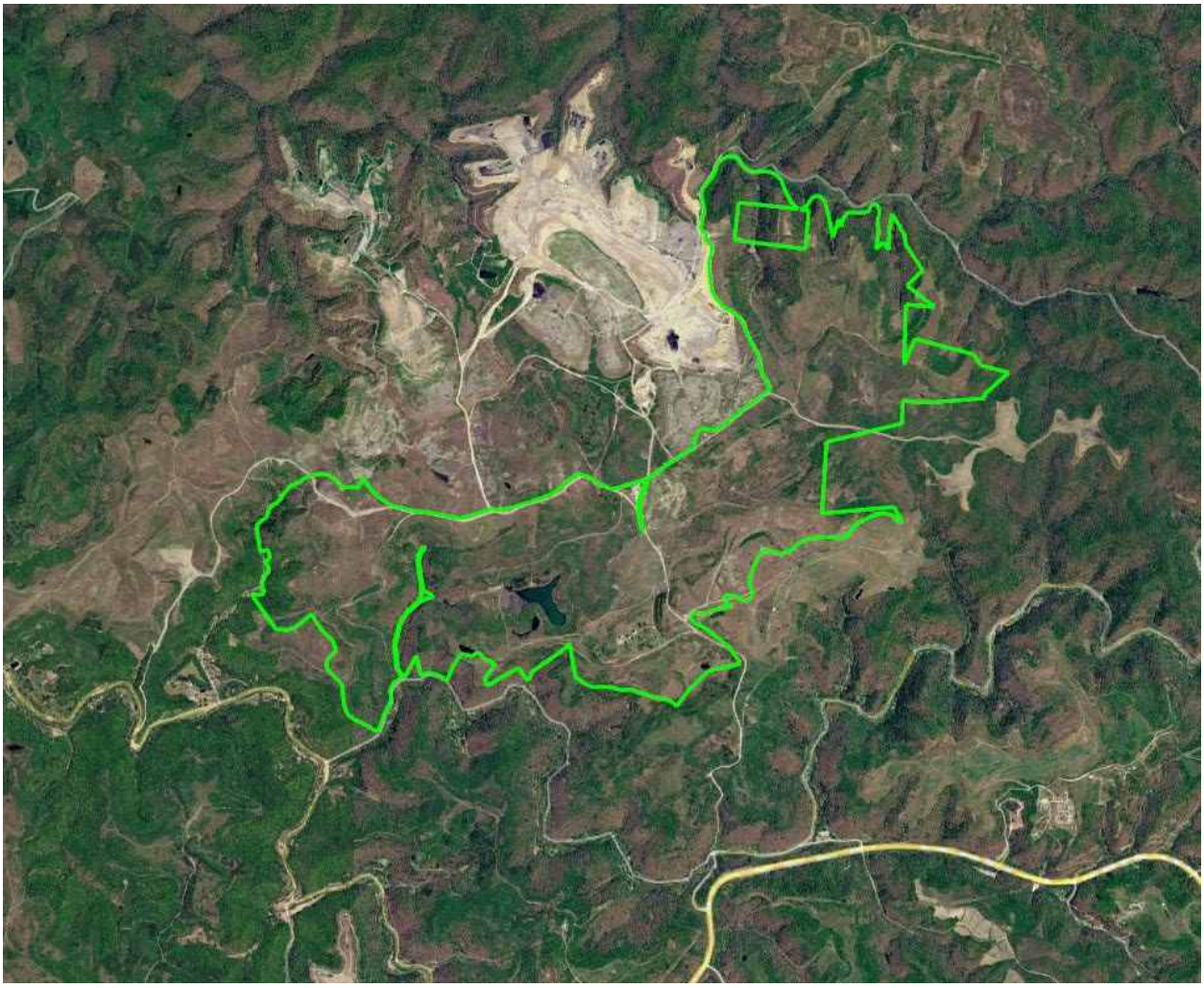
LIST OF ACRONYMS AND ABBREVIATIONS

APT	Antecedent Precipitation Tool
BFW	Bacon Farmer Workman Engineering & Testing, Inc.
CWA	Clean Water Act
DEM	Digital Elevation Model
EIU	Ecological Integrity Unit
EKSAP	Eastern Kentucky Stream Assessment Protocol
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FAC	Facultative
FACW	Facultative Wetland
FACU	Facultative Upland
FEMA	Federal Emergency Management Agency
GPS	Global Positioning System
KDFWR	Kentucky Department of Fish and Wildlife Resources
KDOW	Kentucky Division of Water
KPDES	Kentucky Pollutant Discharge Elimination System
µS	microsiemens
NHD	National Hydrography Dataset
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
NWP	Nationwide Permit
NWPL	National Wetland Plant List
OBL	Obligate Wetland
OHWM	Ordinary High Water Mark
OSRW	Outstanding State Resource Water
PEM	Palustrine Emergent
PFO	Palustrine Forested Wetland
PRM	Permittee-Responsible Mitigation
PSS	Palustrine Scrub-Shrub Wetland
PUB	Palustrine Unconsolidated Bottom (Pond)
RBP	Rapid Bioassessment Protocol
RPW	Relatively Permanent Water
SSURGO	Soil Survey Geographic Database
UPL	Obligate Upland
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WQC	Water Quality Certification

ABSTRACT

Bacon Farmer Workman Engineering & Testing, Inc. (BFW) performed a water/wetland delineation for Phase II of the Starfire Renewable Power Project. The study area for the project is located in Knott and Perry Counties, Kentucky, and it includes approximately 3,260 acres of reclaimed mine land and rugged wooded slopes. The project coordinates are 37.4020, -83.1143 and the graphic below shows the site location. The delineation was performed to determine the extent of wetlands, ponds, and/or streams within the study area in preparation for future development activities.

Field personnel identified 18 perennial streams totaling 20,515 linear feet, 22 intermittent streams totaling 8,020 linear feet, 31 ephemeral streams totaling 9,860 linear feet, 255 wetlands totaling 46.17 acres, and 18 ponds totaling 28.23 acres on the site. Tentative jurisdictional determinations have been presented based on the most current regulations as of the publication date of this report. It should be noted that the extent and jurisdictional status of water/wetland features on this site are subject to approval by the USACE for final determination. Due to the rapidly changing regulatory environment, re-visiting the tentative jurisdictional determinations is recommended prior to submitting the delineation to regulatory agencies or other outside entities if significant time elapses after the delineation report is received.



1. INTRODUCTION

Bacon Farmer Workman Engineering & Testing, Inc. (BFW) performed a water/wetland delineation for the Starfire Renewable Power Project – Phase II located in Knott and Perry Counties, Kentucky (**Figures 1** and **2**). The field work for this phase was completed on July 13 through 17 and July 27 through 30, 2026. Figures referenced in this text are included in **Appendix A**.

1.1 PURPOSE

The purpose of this study was to investigate the study area to document any areas which met the technical criteria for wetlands, assess other aquatic resources (e.g., streams, open water features), and classify these aquatic resources. This assessment will be the basis upon which regulated impacts to these resources will be determined for future project construction activities.

The water/wetland delineation was conducted according to the guidelines set forth by the 1987 Corps of Engineers Manual and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0).* The United States Army Corps of Engineers (USACE) is the regulating authority of Section 404 of the Clean Water Act (CWA). This regulating entity must make the final decision with regards to the extent, type, and jurisdictional status of any water/wetland features on this site.

Tentative jurisdictional determinations have been presented based on the most current regulations as of the publication date of this report. Due to the rapidly changing regulatory environment, re-visiting the tentative jurisdictional determinations is recommended prior to submitting the delineation to regulatory agencies or other outside entities if significant time elapses after the delineation report is received.

1.2 SITE DESCRIPTION

The study area for this report includes Phase II of the Starfire Renewable Power Project which measures approximately 3,260 acres. The project coordinates are 37.4020, -83.1143. Phase II is located south of Phase I and overlaps part of the Starfire generation-tie (gen-tie) corridor and the West Lick Road access corridor (**Figures 1** and **2**). Features in the gen-tie corridor and West Lick Road corridor that are overlapped by Phase II were delineated by BFW during site visits in March 2026 and are also featured in the delineation report developed for those areas (BFW 2026).

The study area contains a mix of reclaimed strip-mined land and rugged wooded terrain. Habitats within the reclaimed mined areas include open field, scrub-shrub habitat, and young forest. Habitats within unmined areas consist primarily of forest, but the species composition of the forest varies based on factors such as topographic position and management history.

The field assessment documented 81.27 acres of water/wetland features on site, including 18 perennial streams totaling 20,515 linear feet (5.47 acres), 22 intermittent streams totaling 8,020 linear feet (0.89 acres), 31 ephemeral streams totaling 9,860 linear feet (0.51 acres), 255 wetlands totaling 46.17 acres, and 18 ponds totaling 28.23 acres. These features are depicted on **Figure 3**. Several named streams are overlapped by the study area and include Williams Branch, Kitchen Fork, Lick Branch, Buckhorn Creek, Hurricane Branch, John Riley Branch, Squire Branch, and Emory Branch.

2. TECHNICAL DEFINITIONS

2.1 WETLANDS

Section 404 of the Clean Water Act defines Wetlands as:

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

The Environmental Protection Agency (EPA) and the USACE use the *1987 Corps of Engineers Wetlands Delineation Manua*l and its applicable Regional Supplements to identify and define wetlands for the CWA Section 404 permit program. Section 404 requires a permit from the USACE or authorized state for the discharge of dredged or fill material into the waters of the United States, including wetlands.

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

2.1.1 Hydrophytic Vegetation

Hydrophytic vegetation, due to morphological, physiological, and/or reproductive adaptation(s), has the ability to grow, effectively compete, reproduce, and/or persist in anaerobic soil conditions. Individual species have been assigned a wetland indicator status on the National Wetland Plant List provided by the USACE. Determinations of hydrophytic vegetation are based on the wetland indicator status of plant species within the sampling plot.

Table 2-1 – Vegetation Wetland Indicator Codes

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

The relative abundance of plant species in the plots and their wetland indicator statuses are used to determine whether the plant community qualifies as hydrophytic under the Rapid Test, Dominance Test, and/or Prevalence Test.

2.1.2 Hydric Soils

Hydric soils are present if they have been classified as hydric or when they possess characteristics associated with anaerobic soil conditions. Hydric soils are those that are determined to be gleyed or have a low chroma matrix (2 or less) with redoximorphic features, or a matrix chroma of 1 with or without redoximorphic feature in the upper 12 inches. These designations are made utilizing Munsell Soil Color Charts.

2.1.3 Hydrology

Hydrology in wetlands occurs in areas inundated permanently or periodically at mean water depths less than 18.8 feet, or if the soil is saturated to the surface for five percent (5%) of the prevalent vegetation's growing season. Indicators of wetland hydrology could be present above or below the surface.

Primary indicators of hydrology [a minimum of one is required] include, but are not limited to:

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

Secondary indicators of wetland hydrology [a minimum of two is required] include, but are not limited to:

- FAC neutral test
- a sparsely vegetated concave surface
- wetland drainage patterns
- crayfish burrows

2.2 STREAMS AND DRAINAGES

Stream classifications of perennial, intermittent, and ephemeral were applied based on definitions in publications created or endorsed by the Kentucky Energy and Environment Cabinet, Department for Environmental Protection (Kentucky Division of Water 2011 and Tetra Tech, Undated).

Perennial streams were characterized as having flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow.

Intermittent streams were characterized as having flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from precipitation is a supplemental source of water for stream flow.

Ephemeral streams were characterized as typically having flowing water only during rainfall events and for a short time afterward in a typical year. Ephemeral stream beds are located above the water table year-round, so groundwater is not a source of water for the stream. Runoff from precipitation is the primary source of water for stream flow.

Non-jurisdictional ditches were classified according to the definition presented by the EPA within the "Revised Definition of "Waters of the United States" issued on January 18, 2023. These features are defined as being ditches (including roadside ditches) excavated wholly in and draining only dry land and that do not carry a relatively permanent flow of water.

2.2.1 Ordinary High Water Mark (OHWM)

The jurisdictional extent of non-tidal waters typically extends to the Ordinary High Water Mark (OHWM). The OHWM was defined following USACE regulatory guidance (USACE 2005): "The

term ordinary high water mark means that 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."

2.3 STATE-DESIGNATED PRIORITY WATER RESOURCES

The Kentucky Division of Water (KDOW) has granted special status to some waters and waterbodies in Kentucky related to their goals for statewide water quality improvement. The KDOW requires Individual Water Quality Certification (WQC) when project activities occur within these designated waters.

KDOW special-status waters include the following categories:

- Waters and waterbodies designated as Outstanding State Resource Waters (OSRWs), National Resource Waters, Cold Water Aquatic Habitat, Exceptional Waters, or identified as candidate Outstanding State Resource Waters or candidate Exceptional Waters
- Waters and waterbodies classified as impaired for warm water or cold water aquatic habitat where the parameter or source of impairment is habitat-related
- Waters and waterbodies classified as Full Support for warm water or cold water aquatic habitat
- Perpetually-protected mitigation sites (can include streams, ponds, and wetlands)

The presence of KDOW special-status waters and waterbodies was evaluated using the KDOW's online map service (KDOW 2026).

3. DELINEATION METHODS AND GENERAL SITE CHARACTERISTICS

3.1 WETLAND DELINEATION

The wetland delineation was conducted according to the guidelines set forth by the *1987 Corps of Engineers Manual* and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0)*. An initial in-house review of available maps was used to locate potential streams and wetland areas. Maps consulted included United States Geological Survey (USGS) topographic maps, aerial photography, county soil survey maps and hydric soils lists, National Hydrography Dataset (NHD) maps, National Wetlands Inventory (NWI) maps, Federal Emergency Management Agency (FEMA) floodplain maps, and Digital Elevation Model (DEM) maps. During the field assessment, the locations of water and wetland features were recorded in the field using Global Positioning System (GPS) equipment with sub-meter accuracy.

A few areas of the site were not accessible during the delineation and water/wetland features in these areas were delineated using a desktop analysis. These areas are depicted in **Figure 3**.

3.1.1 Soils

Soils were observed to determine if hydric soil characteristics were present. Soils were examined at shallow test pits excavated with a drain spade and were observed at a depth necessary to confirm hydric soil characteristics. Typical soil profile depths are usually within 12-18 inches below ground surface to allow for: (1) observation of an adequate portion of the soil profile to determine presence/absence of hydric soil characteristics; (2) observation of hydrology including depth to the water table and saturated soils; and (3) identification of disturbances (e.g., buried horizon, plow line). Where site conditions preclude observing soil profile depths at the typical 12-18 inches below ground surface or where observed hydric soil indicators are documented above or below 12-18 inches below ground surface, justification is provided. Soil color determinations were assigned using Munsell Soil Color Charts.

Site soil characteristics were compared to those mapped and described in the Soil Survey Geographic (SSURGO) databases for the project counties (USDA 2026). Hydric soil characteristics were compared to those identified in the delineation regional supplement manual (USACE 2010) and the most recent version of the Natural Resources Conservation Service (NRCS) publication *Field Indicators of Hydric Soils in the United States, Version 9.2* (USDA 2025). Hydric Soil Category ratings (USDA 2025) were also reviewed for soils in the study area. Results were recorded on wetland determination data forms (**Appendix B**).

Numerous mapped soils types are present within the study area. The soil mapping has a marked transition in soil types at the Perry/Knott County line, but this change appears to arise primarily from different classifications in the two soil surveys and not from a change in the underlying soil characteristics. The reclaimed mine land is mapped as mainly Fiveblock, Kaymine, Fairpoint, and Bethsheda soils, with some areas mapped as Earthen Dam or Dumps (mine and tailings) complex. Most of these soils are mapped as stony or very stony. The rugged wooded ridges and valleys are mapped as mainly Shelocta-Cutshin-Gilpin complex, Shelocta-Highsplint-Gilpin complex, Handshoe-Fedscreek-Shelocta complex, Matewan-Gilpin-Marrowbone complex, and Cloverlick-Shelocta-Kimper complex. Most of these soils are mapped as very rocky or very stony. None of these soils are classified as hydric.

Some small low-lying areas along the larger creeks are mapped as Grisby fine sandy loam (frequently flooded) and Udorthents-Urban Land-Grisby complex. Grigsby fine sandy loam (frequently flooded) is listed as having hydric inclusions. A large area of Water is mapped at the dammed impoundment in the Lick Branch drainage (Pond 9) and some small areas of Water are mapped in drainages along the northern end of the site.

Mapped soils within the study area are depicted on **Figure 4**. Soils were examined at several locations including 175 data points, which are depicted on **Figure 3** and recorded on the data forms included in **Appendix B**. Hydric soil indicators that were observed included Depleted Below Dark Surface (A11), Sandy Redox (S5), Depleted Matrix (F3), Redox Dark Surface (F6), and Redox Depressions (F8).

3.1.2 Vegetation

Wetland plant species nomenclature follows the National Wetland Plant List (USACE 2023). Identification was aided, when necessary, with field guides for the region. Vegetation was sampled in plots:

- 30-ft radius for tree stratum
- 15-ft radius for sapling and shrub stratum
- 5-ft radius for herb stratum
- 30-ft radius for woody vines

Vegetation was classified using the USACE 2022 National Wetland Plant list (NWPL). Unless otherwise stated, aerial coverage dominance was determined using the 50/20 rule. Under the 50/20 rule, any plant species that equals or exceeds 20% of the aerial coverage of the plot is a dominant plant. In addition, the cumulative total of all dominant plants (OBL, FACW, or FAC) must be equal to or greater than 50% of the aerial coverage of the plot. If no plant species equals or exceeds 20% of the cumulative total aerial coverage of the plot, then the dominant plants are the plants that when ranked in decreasing order of abundance and summed, immediately exceed 50% of the plots aerial coverage when added together.

The project area contains a mix of reclaimed strip-mined land and rugged wooded terrain. Habitats within the reclaimed mined areas include open field, scrub-shrub habitat, and young forest. Habitats in unmined areas consist mainly of forest, but the species composition of the forest varies based on factors like topographic position and management history.

Reclaimed Open Field: The open fields on former mined lands were revegetated as part of site reclamation and a mixture of seeded and volunteer plant species are present. Common plant species in the reclaimed open fields included fescue (*Schedonorus arundinaceus*), Canada goldenrod (*Solidago canadensis*), tall goldenrod (*Solidago altissima*), broomsedge bluestem (*Andropogon virginicus*), Chinese lespedeza (*Lespedeza cuneata*), Chinese silvergrass (*Miscanthus sinensis*), Japanese honeysuckle (*Lonicera japonica*), and blackberry (*Rubus argutus*). These species are listed as facultative upland (FACU) on the 2022 NWPL.

Reclaimed Scrub-Shrub and Forest: These lands were revegetated in a similar manner as the upland field habitats, but natural succession has proceeded enough that planted and volunteer woody species have become established and developed canopy cover. The trees and shrubs are primarily fast-growing early-successional species. Common species include autumn olive (*Elaeagnus umbellata*), sycamore (*Platanus occidentalis*), tulip-poplar (*Liriodendron tulipifera*), eastern red cedar (*Juniperus virginiana*), Bradford pear (*Pyrus calleryana*), and sumacs (*Rhus* spp.). These species are listed as obligate upland (UPL), FACU, and facultative wetland (FACW) on the 2022 NWPL.

Upland Forest: The unmined forested land within the study area has varying plant communities based on drier conditions on the ridgetops, mesic conditions in the lower valleys, and intermediate conditions on the hillslopes. Common species on the ridgetops and upper hillslopes include chestnut oak (*Quercus prinus*), black oak (*Quercus velutina*), white oak (*Quercus alba*), red maple (*Acer rubrum*), sourwood (*Oxydendron arboreum*), tulip-poplar, pines (*Pinus spp.*), and greenbrier (*Smilax rotundifolia*). Common species in the mesic forests in valleys and on lower hillslopes included tulip-poplar, red maple, beech (*Fagus grandifolia*), hemlock (*Tsuga canadensis*), white

oak, and American elm (*Ulmus americana*). These species are listed as UPL, FACU, facultative (FAC), and FACW on the 2022 NWPL.

Emergent Wetlands: Many palustrine emergent (PEM) wetland habitats are scattered through the study area. The majority of the PEM wetlands measure less than 0.10 acres, but several larger PEM wetlands are also present. Common plant species in the emergent wetland habitats include black willow (*Salix nigra*), woolgrass (*Scirpus cyperinus*), broad-leaved cattail (*Typha latifolia*), narrow-leaved cattail (*Typha angustifolia*), green bulrush (*Scirpus atrovirens*), and sumpweed (*Iva annua*). These species are listed as FAC, FACW, and obligate wetland (OBL) on the 2022 NWPL.

Forested and Scrub-Shrub Wetlands: A few palustrine forested (PFO) and palustrine scrub-shrub (PSS) wetland habitats are scattered throughout the study area. Common plant species in the forested and scrub-shrub wetland habitats include black willow, sandbar willow (*Salix interior*), river birch (*Betula nigra*), sycamore, false nettle (*Boehmeria cylindrica*), stiltgrass (*Microstegium vimineum*), woolgrass, and sedges (*Carex* spp.). These species are listed as FAC, FACW, and OBL on the 2022 NWPL.

3.1.3 Hydrology

Hydrology within the study area was evaluated using available mapped data and field indicators. The main sources of hydrology for the study area included precipitation and surface runoff from adjacent properties. A few low-lying areas receive stream flow through Buckhorn Creek on the northeast and from tributaries to Williams Branch on the west. The position of the site in relation to local streams and watersheds is depicted in **Figures 1 and 7.**

The site includes four main drainage areas. The western edge of the site drains westward into several tributaries of Williams Branch, which flows southward and eventually drains into Balls Fork. The west-central section of the site (west of the main north-to-south haul road) drains into Lick Branch, which flows southward and drains into Balls Fork just outside the southern site boundary. The northeastern section of the site drains northward into several tributaries of Buckhorn Creek, which flows westward along the northeastern boundary of the site. Across much of the reclaimed mine land, surface water moves through ditches which were constructed during reclamation activities.

The east central section of the site does not have any major extant streams although many constructed ditches are present. Surface water in this area is largely retained in several wetlands, particularly in Wetland 170 which is located in a low spot just south of a haul road. Surface water in this area does not flow offsite into any nearby streams, although some water is assumed to move into nearby streams via subsurface flow. None of the study area is located within the FEMA 100-year floodplain, although some land along Balls Fork just outside the southwestern edge of the study area is located in the floodplain (**Figure 5**).

The NWI map (**Figure 6**) depicts several riverine features within the site in valleys of the named streams Williams Branch, Kitchen Fork, Lick Branch, Hurricane Branch, John Riley Branch, Squire Branch, and Emory Branch. The NWI-mapped streams include several stream segments on reclaimed land where permitted mining activities previously reshaped the land and stream channels are no longer present. The NWI map also depicts several ponds and a few wetlands across the site, but most of these appear to correspond to ponds that were temporarily present as part of mining activities and have since been removed. Several extant ponds on site, including the 21.7-acre Pond 9 in the Lick Branch drainage, do not have corresponding polygons on the NWI map. Therefore, it appears that the NWI does not accurately depict the current, post-mining conditions across the majority of the site.

Wetland hydrology indicators were observed in wetlands and some transitional zones. These indicators were recorded on the data forms (**Appendix B**). Hydrology indicators observed included surface water (A1), high water table (A2), saturation (A3), sediment deposits (B2),

inundation visible on aerial imagery (B7), oxidized rhizospheres (C3), drainage patterns (B10), geomorphic position (D2), and the FAC-neutral test (D5).

The USACE Antecedent Precipitation Tool (USACE-ERDC 2025) was reviewed for the project location at the time of the field assessment to determine if recent precipitation for the area was within normal ranges. The tool classified all of the days of the field delineation (July 13 through 17 and July 27 through 30, 2026), as Normal Conditions (13 or 14) although the 30-day interval prior to the first week of the delineation was classified as Wet due to several rain events in this period. The Antecedent Precipitation Tool (APT) output for the field delineation dates is included in **Appendix E** and depicts the 30-day rolling rainfall total in comparison to 30-year normal precipitation ranges.

3.2 STREAM ASSESSMENT

Onsite streams were delineated based on the presence of indicators of an OHWM, following USACE regulatory guidance (USACE 2005) as defined in **Section 2.2.1** above. Streams and drainages were classified as perennial, intermittent, or ephemeral streams, or as non-jurisdictional ditches based on the definitions in **Section 2.2** above. Field documentation of the on-site streams include photographs and notes of the location, typical dimensions, flow characteristics, and substrate material of the streams. Representative photographs are included in **Appendix D**. The field assessment was supplemented by in-house investigations, including a review of USGS topographic maps, NHD maps, NWI maps, and DEM maps. Stream lengths, channel location, limits, and flow regime were determined through a combination of field assessments and in-house mapping.

This project is located within the Eastern Kentucky Coalfield Region, where stream function is calculated through the Eastern Kentucky Stream Assessment Protocol (EKSAP). The EKSAP typically involves a Rapid Bioassessment Protocol (RBP) assessment and a water conductivity measurement, although additional data collection such as macroinvertebrate surveys may also be required. Therefore, water conductivity readings were collected on several of the delineated perennial and intermittent streams in the study area.

RBP high gradient field data sheets were completed for all of the perennial and intermittent streams within the study area, with the exception of Perennial Stream 18 (Emory Branch) and Intermittent Streams 12, 16, and 18, which were delineated via desktop review due to accessibility constraints (see **Tables 4-2 and 4-3**). The RBP method used to assess habitat quality is based on key physical characteristics of the stream and surrounding land. Habitat is defined as the quality of in-stream and riparian habitat that influences the structure and function of the aquatic community in a stream. Habitat parameters evaluated are related to overall aquatic life and are a potential source of limitation to aquatic biota (Barbour, et al. 1999).

No formal RBP assessments were conducted for ephemeral streams because it appears that these features have been classified as non-jurisdictional, non-relatively permanent waters under the new delineation standards established following the recent *Sackett vs. EPA* Supreme Court ruling.

The stream determinations presented in this delineation are tentative, and the final determination of stream type, extent, quality, and jurisdiction will be decided by the USACE.

3.3 STATE-DESIGNATED WATER RESOURCES IN STUDY AREA

A list of the types of state-designated special-status waters that trigger a requirement for an Individual WQC is presented above in **Section 2.3**. A review of the KDOW's online map database indicates that none of the streams within the Phase II delineation boundary have a special status designation by the KDOW (**Figure 7**). However, several high quality streams in the vicinity of the project have been given special status designations. Some of these streams have been

designated by the U.S. Fish and Wildlife Service (USFWS) as critical habitat for the Kentucky arrow darter (*Etheostoma spilotum*).

One stream just outside the eastern edge of the project boundary (an unnamed tributary to Prince Fork) is designated as an OSRW. This stream is part of a small watershed of streams which have the OSRW designation due to records of Kentucky arrow darter. One stream segment in the group (upper Buckhorn Creek and Prince Fork) is designated as Unit 1 of Kentucky arrow darter critical habitat. The reach of Buckhorn Creek within the delineation boundary lies approximately 1.75 stream miles downstream of Unit 1. Although the section of Buckhorn Creek within the delineation boundary does not have a special status, activities that could impact water quality in this stream may need to be evaluated for potential impacts to the Kentucky arrow darter.

4. WATERS / WETLANDS SUMMARY AND DESCRIPTIONS

This delineation documented a total of 81.27 acres of water/wetland features within the study area, including 18 perennial streams, 22 intermittent streams, 31 ephemeral streams, 255 wetlands, and 18 ponds (**Figure 3**). Please note that the extent and jurisdictional status of waters and wetlands presented in this report are tentative; the USACE is the regulating authority of Section 404 of the CWA and must make the final decision with regards to the extent and jurisdictional status of any water/wetland features on this site.

All associated wetland data forms for this delineation can be found in **Appendix B**. Stream data forms are included in **Appendix C**. Photographs of the study area, including the onsite waters and wetlands, can be found in **Appendix D.**

4.1 STREAMS AND DRAINAGES

This assessment documented 18 perennial streams, 22 intermittent streams, and 31 ephemeral streams within the study area. Several ditches are also present, particularly in areas of reclaimed mine land. These features are depicted on **Figure 3** and summarized in **Table 4-1** below. A description of the streams are provided in this section, although the stream determinations are assigned pending final USACE verifications.

Under the recent interpretations of CWA jurisdiction established by the *Sackett vs. Environmental Protection Agency* Supreme Court decision, it appears that the CWA (and therefore USACE jurisdiction) applies only to waters with a relatively permanent flow (Waters of the United States), referenced as Relatively Permanent Waters (RPWs). The generally accepted standard for RPWs is “tributaries that have flowing or standing water year-round or continuously during certain times of year” (typically three months), noting that “relatively permanent waters do not include tributaries with flowing or standing water for only a short duration in direct response to precipitation” (USACE and EPA 2008 and 2023). Perennial streams and intermittent streams are typically interpreted as RPWs (jurisdictional), while ephemeral streams are typically interpreted as non-RPWs (non-jurisdictional).

Table 4-1 – Streams Within the Study Area

Name	Length (feet)	Average Width (feet)	Acreage	Classification*	Status**
Perennial Stream 1	20	1.5	0.001	R3UB1	Jurisdictional
Perennial 2 (Williams Branch)	2,145	7	0.345	R3UB1	Jurisdictional
Perennial Stream 3	720	6	0.099	R3UB1	Jurisdictional
Perennial Stream 4	280	3.5	0.022	R3UB1	Jurisdictional
Perennial Stream 5	30	1.5	0.001	R3UB1	Jurisdictional
Perennial Stream 6	40	6	0.006	R3UB1	Jurisdictional
Perennial 7 (Kitchen Fork)	885	8	0.163	R3UB1	Jurisdictional
Perennial 8 (Lick Branch)	4,950	15	1.705	R3UB1	Jurisdictional
Perennial Stream 9	1,160	4	0.107	R3UB1	Jurisdictional
Perennial Stream 10	65	4	0.006	R3UB1	Jurisdictional
Perennial Stream 11	1,105	5	0.127	R3UB1	Jurisdictional
Perennial 12 (Buckhorn Creek)	1,250	40	1.148	R5UB1	Jurisdictional
Perennial 13 (Hurricane Branch)	2,550	8	0.468	R3UB1	Jurisdictional
Perennial Stream 14	1,100	7.5	0.189	R3UB1	Jurisdictional
Perennial Stream 15	490	5	0.056	R3UB1	Jurisdictional
Perennial 16 (John Riley Branch)	560	12	0.154	R3UB1	Jurisdictional
Perennial 17 (Squire Branch)	3,115	12	0.858	R3UB1	Jurisdictional
Perennial 18 (Emory Branch)	50	8	0.009	R3UB1	Jurisdictional
Perennial Stream Total	**20,515**	**---**	**5.47**	---	---
Jurisdictional Perennial Stream Total	**20,515**	**---**	**5.47**	---	---
Intermittent 1 (Williams Branch)	40	3	0.003	R4SB3	Jurisdictional
Intermittent Stream 2	505	2.5	0.029	R4SB3	Jurisdictional
Intermittent Stream 3	100	1.5	0.003	R4SB3	Jurisdictional
Intermittent Stream 4	540	4.5	0.056	R4SB3	Jurisdictional
Intermittent Stream 5	605	2	0.028	R4SB3	Jurisdictional
Intermittent Stream 6	475	4	0.044	R4SB3	Non-Jurisdictional
Intermittent Stream 7	345	2	0.016	R4SB3	Non-Jurisdictional
Intermittent Stream 8	475	7	0.076	R4SB3	Jurisdictional
Intermittent Stream 9	50	3.5	0.004	R4SB3	Non-Jurisdictional
Intermittent Stream 10	70	4	0.006	R4SB3	Non-Jurisdictional
Intermittent Stream 11	890	5	0.102	R4SB3	Jurisdictional
Intermittent Stream 12	815	7	0.131	R4SB3	Jurisdictional
Intermittent Stream 13	25	3.5	0.002	R4SB3	Non-Jurisdictional
Intermittent Stream 14	85	3	0.006	R4SB3	Jurisdictional
Intermittent Stream 15	615	5	0.071	R4SB3	Jurisdictional
Intermittent Stream 16	980	5	0.112	R4SB3	Jurisdictional
Intermittent Stream 17	210	1.5	0.007	R4SB3	Jurisdictional

Name	Length (feet)	Average Width (feet)	Acreage	Classification*	Status**
Intermittent Stream 18	90	4	0.008	R4SB3	Jurisdictional
Intermittent Stream 19	430	8	0.079	R4SB3	Jurisdictional
Intermittent Stream 20	475	8	0.087	R4SB3	Jurisdictional
Intermittent Stream 21	160	5	0.018	R4SB3	Non-Jurisdictional
Intermittent Stream 22	40	2	0.002	R4SB3	Non-Jurisdictional
Intermittent Stream Total	**8,020**	**---**	**0.89**		**---**
Jurisdictional Intermittent Stream Total	**6,855**	**---**	**0.80**		
Ephemeral Stream 1	320	1.5	0.011	R6	Non-Jurisdictional
Ephemeral Stream 2	45	1.5	0.002	R6	Non-Jurisdictional
Ephemeral Stream 3	455	1.5	0.016	R6	Non-Jurisdictional
Ephemeral Stream 4	340	3.5	0.027	R6	Non-Jurisdictional
Ephemeral Stream 5	290	3.5	0.023	R6	Non-Jurisdictional
Ephemeral Stream 6	315	1.5	0.011	R6	Non-Jurisdictional
Ephemeral Stream 7	115	2.5	0.007	R6	Non-Jurisdictional
Ephemeral Stream 8	160	2.5	0.009	R6	Non-Jurisdictional
Ephemeral Stream 9	890	3.5	0.072	R6	Non-Jurisdictional
Ephemeral Stream 10	220	1.5	0.008	R6	Non-Jurisdictional
Ephemeral Stream 11	545	1.5	0.019	R6	Non-Jurisdictional
Ephemeral Stream 12	235	2	0.011	R6	Non-Jurisdictional
Ephemeral Stream 13	170	2.5	0.010	R6	Non-Jurisdictional
Ephemeral Stream 14	495	2	0.023	R6	Non-Jurisdictional
Ephemeral Stream 15	205	3	0.014	R6	Non-Jurisdictional
Ephemeral Stream 16	65	2	0.003	R6	Non-Jurisdictional
Ephemeral Stream 17	315	3.5	0.025	R6	Non-Jurisdictional
Ephemeral Stream 18	105	2	0.005	R6	Non-Jurisdictional
Ephemeral Stream 19	220	2	0.010	R6	Non-Jurisdictional
Ephemeral Stream 20	330	4	0.030	R6	Non-Jurisdictional
Ephemeral Stream 21	350	3.5	0.028	R6	Non-Jurisdictional
Ephemeral Stream 22	255	3	0.018	R6	Non-Jurisdictional
Ephemeral Stream 23	5	2	<0.001	R6	Non-Jurisdictional
Ephemeral Stream 24	1,060	1.5	0.037	R6	Non-Jurisdictional
Ephemeral Stream 25	190	1.5	0.007	R6	Non-Jurisdictional
Ephemeral Stream 26	475	3	0.033	R6	Non-Jurisdictional
Ephemeral Stream 27	525	1	0.012	R6	Non-Jurisdictional
Ephemeral Stream 28	155	2	0.007	R6	Non-Jurisdictional
Ephemeral Stream 29	355	1	0.008	R6	Non-Jurisdictional
Ephemeral Stream 30	505	1.5	0.017	R6	Non-Jurisdictional
Ephemeral Stream 31	150	2	0.007	R6	Non-Jurisdictional

Name	Length (feet)	Average Width (feet)	Acreage	Classification*	Status**
Ephemeral Stream Total	**9,860**	**---**	**0.51**	---	---
Jurisdictional Ephemeral Stream Total	**0**	**---**	**0**		

*USFWS habitat classifications from Cowardin, 1979. **R3** = Riverine Upper Perennial; **R4** = Riverine Intermittent; **R5** = Riverine Unknown Perennial; **R6** = Riverine Ephemeral; **UB1** = Unconsolidated Bottom, Cobble/Gravel; **SB3** = Streambed, Cobble-Gravel

**Jurisdictional/Isolated determination is provisional, and final designations would be assigned by the USACE during their project review.

4.1.1 Perennial Streams

The study area contains 18 perennial streams totaling 20,515 linear feet (5.46 acres). The streams are scattered throughout the study area and generally flow through wooded valleys. The majority of the perennial streams ranged from one to twelve feet wide at the OHWM with bank heights of six inches to four feet. Buckhorn Creek, a larger stream with a watershed of 8.5 square miles at the study area, ranged from 25 to 45 feet wide at the OHWM with bank heights of two to five feet. The perennial streams had substrates dominated by silt, sand, and gravel with some cobble and boulders. During the field visits, the perennial streams generally contained flowing water from an inch deep in riffles to two feet or more in pools.

Water specific conductivity in several of the perennial streams was measured in microsiemens (µS) using handheld water quality testing units. **Table 4-2** summarizes data for the perennial streams, including RBP scores for high gradient streams of the Mountain bioregion.

Table 4-2 – Perennial Stream Data

Name	Length (feet)	Average OHWM Width (feet)	RBP Score	Conductivity (µS)	Connection Comments
Perennial Stream 1	20	1.5	101	---	Tributary to Williams Branch
Perennial Stream 2 (Williams Branch)	2,145	7	123	---	Tributary to Troublesome Creek
Perennial Stream 3	720	6	95	---	Tributary to Williams Branch
Perennial Stream 4	280	3.5	75	>1,990*	Tributary to Kitchen Fork
Perennial Stream 5	30	1.5	69	---	Tributary to Kitchen Fork
Perennial Stream 6	40	6	73	---	Tributary to Kitchen Fork
Perennial Stream 7 (Kitchen Fork)	885	8	140	---	Tributary to Lick Branch
Perennial Stream 8 (Lick Branch)	4,950	15	135, 154	2,700	Tributary to Balls Fork
Perennial Stream 9	1,160	4	150	---	Tributary to Lick Branch
Perennial Stream 10	65	4	147	740	Tributary to Lick Branch
Perennial Stream 11	1,105	5	159	1,760	Tributary to Buckhorn Creek

Name	Length (feet)	Average OHWM Width (feet)	RBP Score	Conductivity (µS)	Connection Comments
Perennial Stream 12 (Buckhorn Creek)	1,250	40	130	700	Tributary to Troublesome Creek
Perennial Stream 13 (Hurricane Branch)	2,550	8	108, 145	---	Tributary to Buckhorn Creek
Perennial Stream 14	1,100	7.5	106	---	Tributary to Hurricane Branch
Perennial Stream 15	490	5	136	---	Tributary to Hurricane Branch
Perennial Stream 16 (John Riley Branch)	560	12	129	2,150	Tributary to Buckhorn Creek
Perennial Stream 17 (Squire Branch)	3,115	12	122	1,795	Tributary to Buckhorn Creek
Perennial Stream 18 (Emory Branch)**	50	8	---	---	Tributary to Buckhorn Creek

*Stream tested with a low-range water quality measuring unit that presents values over 1,990 µS as out of range.

**Due to accessibility issues, Emory Branch was delineated with a desktop review.

4.1.2 Intermittent Streams

The study area contains 22 intermittent streams totaling 8,020 linear feet (0.89 acres). The streams are scattered throughout the study area and generally flow through wooded valleys. The intermittent streams generally ranged from one to eight feet wide at the OHWM and had stream substrates dominated by silt, sand, and gravel with some cobble and boulders. During the field visits, the intermittent streams generally contained pooled or flowing water from an inch deep in riffle to six inches deep in pools. **Table 4-3** summarizes data for the intermittent streams, including RBP scores for high gradient streams of the Mountain bioregion.

Table 4-3 – Intermittent Stream Data

Name	Length (feet)	Average OHWM Width (feet)	RBP Score	Conductivity (µS)	Connection Comments
Intermittent Stream 1 (Williams Branch)	40	3	92	---	Intermittent upper reach of Williams Branch
Intermittent Stream 2	505	2.5	124	---	Tributary to Williams Branch
Intermittent Stream 3	100	1.5	93	---	Tributary to Kitchen Fork
Intermittent Stream 4	540	4.5	127	---	Tributary to Kitchen Fork
Intermittent Stream 5	605	2	128	---	Tributary to Kitchen Fork
Intermittent Stream 6	475	4	102	---	Drains to modified ditched valley, break in continuous surface connection
Intermittent Stream 7	345	2	109	---	Break in continuous surface connection
Intermittent Stream 8	475	7	120	---	Tributary to Balls Fork
Intermittent Stream 9	50	3.5	95	---	Drains to ditch, break in continuous surface connection
Intermittent Stream 10	70	4	132	410	Channel changes to Ephemeral 11; relatively permanent flow ceases
Intermittent Stream 11	890	5	155	---	Tributary to Lick Branch
Intermittent Stream 12*	815	7	---	---	Tributary to Balls Fork
Intermittent Stream 13	25	3.5	60	---	Drains to ditch, break in continuous surface connection
Intermittent Stream 14	85	3	154	---	Tributary to Buckhorn Creek
Intermittent Stream 15	615	5	124	---	Tributary to Hurricane Branch
Intermittent Stream 16*	980	5	---	---	Tributary to Hurricane Branch
Intermittent Stream 17	210	1.5	83	---	Tributary to Hurricane Branch
Intermittent Stream 18*	90	4	---	---	Tributary to Buckhorn Creek
Intermittent Stream 19	430	8	98	199	Tributary to Squire Branch
Intermittent Stream 20	475	8	90	1,106	Tributary to Squire Branch
Intermittent Stream 21	160	5	---	---	Drains to Wetland 236 which holds water
Intermittent Stream 22	40	2	116	---	Drains to Wetland 177 which holds water

*Water conductivity was measured in microsiemens (µS).

**Due to accessibility issues, Intermittent Streams 12, 16, and 18 were delineated with a desktop review.

4.1.3 Ephemeral Streams

The delineation documented 31 ephemeral streams within the study area totaling 9,860 linear feet (0.51 acres). These streams are scattered throughout the study area and generally flow through wooded valleys or areas of reclaimed mine lands. Most of the ephemeral streams ranged from six inches to four feet wide at the OHWM with bank heights of six inches to 2.5 feet. During the field visits, the ephemeral streams were generally dry or contained water in small pools. The ephemeral stream substrates were generally dominated by silt with some gravel present.

The majority of the ephemeral streams have a direct connection to downstream RPWs. However, under the new definitions of CWA jurisdiction established by the Sackett vs. EPA Supreme Court decision, it appears that the CWA (and therefore USACE jurisdiction) applies only to RPWs. Therefore, because the ephemeral streams generally flow only following rain events, it appears that all of the ephemeral streams within the study area would be interpreted as non-jurisdictional. No RBPs or other stream quality assessments were conducted on the ephemeral streams.

4.2 WETLANDS

The field assessment documented 255 wetlands totaling 46.17 acres within the study area, which are depicted on **Figure 3** and summarized in **Table 4-4** below. A description of the wetlands are provided in this section, although the wetland determination is assigned pending final USACE verification.

Under the recent interpretations of CWA jurisdiction established by the *Sackett vs. Environmental Protection Agency* Supreme Court decision, the CWA extends only to wetlands that are “as a practical matter indistinguishable from Waters of the United States.” This requires the party asserting jurisdiction to establish “first, that the adjacent [body of water constitutes] . . . ‘Water[s] of the United States’ (i.e., a relatively permanent body of water connected to traditional interstate navigable waters); and second, that the wetland has a continuous surface connection with that water, making it difficult to determine where the ‘water’ ends, and the ‘wetland’ begins.”

Table 4-4 – Wetlands Within the Study Area

Name	Acreage	Classification*	Status**
Wetland 1	0.028	PEM	Non-Jurisdictional
Wetland 2	0.019	PEM	Jurisdictional
Wetland 3	0.019	PEM	Jurisdictional
Wetland 4	0.095	PEM	Jurisdictional
Wetland 5	0.091	PEM	Non-Jurisdictional
Wetland 6	0.438	PEM	Non-Jurisdictional
Wetland 7	0.027	PEM	Non-Jurisdictional
Wetland 8	0.017	PEM	Non-Jurisdictional
Wetland 9	0.613	PEM	Jurisdictional
Wetland 10	0.006	PEM	Jurisdictional
Wetland 11	0.035	PEM	Non-Jurisdictional
Wetland 12	0.025	PEM	Non-Jurisdictional
Wetland 13	0.036	PEM	Non-Jurisdictional
Wetland 14	0.047	PEM	Non-Jurisdictional
Wetland 15	0.010	PEM	Non-Jurisdictional
Wetland 16	0.048	PEM	Non-Jurisdictional
Wetland 17	0.021	PEM	Non-Jurisdictional
Wetland 18	0.075	PEM	Non-Jurisdictional
Wetland 19	0.058	PEM	Non-Jurisdictional
Wetland 20	0.025	PEM	Non-Jurisdictional
Wetland 21	0.075	PEM	Non-Jurisdictional
Wetland 22	0.036	PEM	Non-Jurisdictional
Wetland 23	0.016	PFO	Non-Jurisdictional
Wetland 24	0.316	PFO	Non-Jurisdictional
Wetland 25	0.014	PEM	Non-Jurisdictional
Wetland 26	2.482	PEM	Jurisdictional
Wetland 27	0.005	PEM	Jurisdictional
Wetland 28	0.294	PEM	Jurisdictional
Wetland 29	0.074	PEM	Jurisdictional
Wetland 30	0.107	PEM	Non-Jurisdictional
Wetland 31	0.203	PEM	Non-Jurisdictional
Wetland 32	0.033	PEM	Non-Jurisdictional
Wetland 33	0.354	PEM	Non-Jurisdictional
Wetland 34	0.105	PEM	Non-Jurisdictional
Wetland 35	0.142	PEM	Non-Jurisdictional
Wetland 36	0.045	PEM	Non-Jurisdictional
Wetland 37	0.274	PEM	Non-Jurisdictional

Name	Acreage	Classification*	Status**
Wetland 38	0.452	PSS	Jurisdictional
Wetland 39	0.639	PSS	Jurisdictional
Wetland 40	0.008	PEM	Non-Jurisdictional
Wetland 41	2.415	PFO/PSS/PEM	Non-Jurisdictional
Wetland 42	0.242	PEM	Non-Jurisdictional
Wetland 43	0.292	PFO/PEM	Jurisdictional
Wetland 44	1.693	PEM	Non-Jurisdictional
Wetland 45	0.091	PEM	Non-Jurisdictional
Wetland 46	0.007	PEM	Non-Jurisdictional
Wetland 47	0.069	PEM	Non-Jurisdictional
Wetland 48	0.090	PEM	Non-Jurisdictional
Wetland 49	0.035	PEM	Non-Jurisdictional
Wetland 50	0.025	PEM	Non-Jurisdictional
Wetland 51	0.014	PEM	Non-Jurisdictional
Wetland 52	0.404	PEM	Jurisdictional
Wetland 53	2.331	PEM	Jurisdictional
Wetland 54	0.236	PSS	Non-Jurisdictional
Wetland 55	1.325	PEM	Non-Jurisdictional
Wetland 56	0.014	PEM	Non-Jurisdictional
Wetland 57	0.035	PEM	Non-Jurisdictional
Wetland 58	0.016	PEM	Non-Jurisdictional
Wetland 59	0.052	PEM	Non-Jurisdictional
Wetland 60	0.012	PEM	Non-Jurisdictional
Wetland 61	0.176	PEM	Non-Jurisdictional
Wetland 62	0.226	PEM	Non-Jurisdictional
Wetland 63	0.055	PEM	Non-Jurisdictional
Wetland 64	0.034	PEM	Non-Jurisdictional
Wetland 65	0.017	PEM	Non-Jurisdictional
Wetland 66	0.005	PEM	Non-Jurisdictional
Wetland 67	0.221	PEM	Non-Jurisdictional
Wetland 68	0.028	PEM	Non-Jurisdictional
Wetland 69	0.149	PEM	Non-Jurisdictional
Wetland 70	0.021	PEM	Non-Jurisdictional
Wetland 71	0.148	PEM	Non-Jurisdictional
Wetland 72	0.067	PEM	Non-Jurisdictional
Wetland 73	0.099	PEM	Non-Jurisdictional
Wetland 74	0.023	PEM	Non-Jurisdictional
Wetland 75	0.015	PEM	Non-Jurisdictional

Name	Acreage	Classification*	Status**
Wetland 76	0.643	PEM	Non-Jurisdictional
Wetland 77	0.127	PEM	Non-Jurisdictional
Wetland 78	0.428	PEM	Non-Jurisdictional
Wetland 79	0.216	PEM	Non-Jurisdictional
Wetland 80	0.268	PEM	Non-Jurisdictional
Wetland 81	0.266	PEM	Non-Jurisdictional
Wetland 82	0.020	PEM	Non-Jurisdictional
Wetland 83	0.041	PEM	Non-Jurisdictional
Wetland 84	0.033	PEM	Non-Jurisdictional
Wetland 85	0.017	PEM	Non-Jurisdictional
Wetland 86	0.050	PEM	Non-Jurisdictional
Wetland 87	0.030	PEM	Non-Jurisdictional
Wetland 88	0.013	PEM	Non-Jurisdictional
Wetland 89	0.034	PEM	Non-Jurisdictional
Wetland 90	0.006	PEM	Non-Jurisdictional
Wetland 91	0.041	PEM	Non-Jurisdictional
Wetland 92	0.978	PFO/PEM	Non-Jurisdictional
Wetland 93	0.153	PEM	Non-Jurisdictional
Wetland 94	0.017	PEM	Non-Jurisdictional
Wetland 95	0.199	PEM	Non-Jurisdictional
Wetland 96	0.054	PEM	Non-Jurisdictional
Wetland 97	0.028	PEM	Non-Jurisdictional
Wetland 98	0.029	PEM	Non-Jurisdictional
Wetland 99	0.016	PEM	Non-Jurisdictional
Wetland 100	0.109	PEM	Non-Jurisdictional
Wetland 101	0.021	PEM	Non-Jurisdictional
Wetland 102	0.014	PEM	Non-Jurisdictional
Wetland 103	0.255	PEM	Non-Jurisdictional
Wetland 104	0.322	PEM	Non-Jurisdictional
Wetland 105	0.052	PEM	Non-Jurisdictional
Wetland 106	0.060	PEM	Non-Jurisdictional
Wetland 107	0.016	PEM	Non-Jurisdictional
Wetland 108	1.238	PEM	Non-Jurisdictional
Wetland 109	0.064	PEM	Non-Jurisdictional
Wetland 110	0.161	PEM	Non-Jurisdictional
Wetland 111	0.030	PEM	Non-Jurisdictional
Wetland 112	0.026	PEM	Non-Jurisdictional
Wetland 113	0.029	PEM	Non-Jurisdictional

Name	Acreage	Classification*	Status**
Wetland 114	0.051	PEM	Non-Jurisdictional
Wetland 115	0.063	PEM	Non-Jurisdictional
Wetland 116	0.254	PEM	Non-Jurisdictional
Wetland 117	0.035	PEM	Non-Jurisdictional
Wetland 118	0.079	PEM	Non-Jurisdictional
Wetland 119	0.569	PEM	Non-Jurisdictional
Wetland 120	0.666	PEM	Non-Jurisdictional
Wetland 121	0.160	PEM	Non-Jurisdictional
Wetland 122	0.038	PEM	Non-Jurisdictional
Wetland 123	0.014	PEM	Non-Jurisdictional
Wetland 124	0.087	PEM	Non-Jurisdictional
Wetland 125	0.082	PEM	Non-Jurisdictional
Wetland 126	0.117	PEM	Non-Jurisdictional
Wetland 127	0.064	PEM	Non-Jurisdictional
Wetland 128	0.117	PEM	Non-Jurisdictional
Wetland 129	0.021	PEM	Non-Jurisdictional
Wetland 130	0.015	PEM	Non-Jurisdictional
Wetland 131	0.217	PEM	Non-Jurisdictional
Wetland 132	0.008	PEM	Non-Jurisdictional
Wetland 133	0.022	PEM	Non-Jurisdictional
Wetland 134	0.731	PEM	Non-Jurisdictional
Wetland 135	0.051	PEM	Non-Jurisdictional
Wetland 136	0.070	PEM	Non-Jurisdictional
Wetland 137	0.189	PEM	Non-Jurisdictional
Wetland 138	0.115	PEM	Non-Jurisdictional
Wetland 139	0.027	PEM	Non-Jurisdictional
Wetland 140	0.171	PEM	Non-Jurisdictional
Wetland 141	0.037	PEM	Non-Jurisdictional
Wetland 142	0.052	PEM	Non-Jurisdictional
Wetland 143	0.038	PEM	Non-Jurisdictional
Wetland 144	0.037	PEM	Non-Jurisdictional
Wetland 145	0.062	PEM	Non-Jurisdictional
Wetland 146	0.035	PEM	Non-Jurisdictional
Wetland 147	0.038	PEM	Non-Jurisdictional
Wetland 148	0.039	PEM	Non-Jurisdictional
Wetland 149	0.008	PEM	Non-Jurisdictional
Wetland 150	0.004	PEM	Non-Jurisdictional
Wetland 151	0.004	PEM	Non-Jurisdictional

Name	Acreage	Classification*	Status**
Wetland 152	0.175	PEM	Non-Jurisdictional
Wetland 153	0.031	PEM	Non-Jurisdictional
Wetland 154	0.018	PEM	Non-Jurisdictional
Wetland 155	0.007	PEM	Non-Jurisdictional
Wetland 156	0.005	PEM	Non-Jurisdictional
Wetland 157	0.022	PEM	Non-Jurisdictional
Wetland 158	0.048	PEM	Non-Jurisdictional
Wetland 159	0.068	PEM	Non-Jurisdictional
Wetland 160	0.059	PEM	Non-Jurisdictional
Wetland 161	0.452	PEM	Non-Jurisdictional
Wetland 162	0.034	PEM	Non-Jurisdictional
Wetland 163	0.034	PEM	Non-Jurisdictional
Wetland 164	0.018	PEM	Non-Jurisdictional
Wetland 165	0.180	PEM	Non-Jurisdictional
Wetland 166	0.271	PEM	Non-Jurisdictional
Wetland 167	0.016	PEM	Non-Jurisdictional
Wetland 168	0.038	PEM	Non-Jurisdictional
Wetland 169	0.033	PEM	Non-Jurisdictional
Wetland 170	3.641	PEM	Non-Jurisdictional
Wetland 171	0.920	PEM	Non-Jurisdictional
Wetland 172	0.121	PEM	Non-Jurisdictional
Wetland 173	0.367	PEM	Non-Jurisdictional
Wetland 174	0.020	PEM	Non-Jurisdictional
Wetland 175	0.030	PEM	Non-Jurisdictional
Wetland 176	0.136	PEM	Non-Jurisdictional
Wetland 177	0.369	PFO/PEM	Non-Jurisdictional
Wetland 178	0.019	PEM	Non-Jurisdictional
Wetland 179	0.796	PFO/PEM	Non-Jurisdictional
Wetland 180	0.009	PEM	Non-Jurisdictional
Wetland 181	0.011	PEM	Non-Jurisdictional
Wetland 182	0.040	PEM	Non-Jurisdictional
Wetland 183	0.146	PEM	Non-Jurisdictional
Wetland 184	0.037	PEM	Non-Jurisdictional
Wetland 185	0.462	PEM	Jurisdictional
Wetland 186	1.494	PEM	Jurisdictional
Wetland 187	1.524	PEM	Jurisdictional
Wetland 188	0.027	PEM	Non-Jurisdictional
Wetland 189	0.535	PEM	Jurisdictional

Name	Acreage	Classification*	Status**
Wetland 190	0.010	PEM	Non-Jurisdictional
Wetland 191	0.073	PEM	Jurisdictional
Wetland 192	0.057	PEM	Jurisdictional
Wetland 193	0.777	PEM	Non-Jurisdictional
Wetland 194	0.028	PEM	Non-Jurisdictional
Wetland 195	0.087	PEM	Non-Jurisdictional
Wetland 196	0.039	PEM	Non-Jurisdictional
Wetland 197	0.046	PEM	Non-Jurisdictional
Wetland 198	0.045	PEM	Non-Jurisdictional
Wetland 199	0.495	PEM	Jurisdictional
Wetland 200***	0.646	PEM	Non-Jurisdictional
Wetland 201***	0.424	PEM	Non-Jurisdictional
Wetland 202	0.021	PEM	Non-Jurisdictional
Wetland 203	0.057	PEM	Non-Jurisdictional
Wetland 204	0.053	PEM	Non-Jurisdictional
Wetland 205	0.025	PEM	Non-Jurisdictional
Wetland 206	0.030	PEM	Non-Jurisdictional
Wetland 207	0.015	PEM	Non-Jurisdictional
Wetland 208	0.021	PEM	Non-Jurisdictional
Wetland 209	0.123	PEM	Non-Jurisdictional
Wetland 210	0.043	PEM	Non-Jurisdictional
Wetland 211	0.080	PEM	Non-Jurisdictional
Wetland 212	0.016	PEM	Non-Jurisdictional
Wetland 213	0.059	PEM	Non-Jurisdictional
Wetland 214	0.021	PEM	Non-Jurisdictional
Wetland 215	0.032	PEM	Non-Jurisdictional
Wetland 216	0.027	PEM	Non-Jurisdictional
Wetland 217	0.007	PEM	Non-Jurisdictional
Wetland 218	0.031	PEM	Non-Jurisdictional
Wetland 219	0.018	PEM	Non-Jurisdictional
Wetland 220	0.104	PEM	Non-Jurisdictional
Wetland 221	0.066	PEM	Non-Jurisdictional
Wetland 222	0.033	PEM	Non-Jurisdictional
Wetland 223	0.012	PEM	Non-Jurisdictional
Wetland 224	0.023	PEM	Non-Jurisdictional
Wetland 225	0.055	PEM	Non-Jurisdictional
Wetland 226	0.041	PEM	Non-Jurisdictional
Wetland 227	0.039	PEM	Non-Jurisdictional

Name	Acreage	Classification*	Status**
Wetland 228	0.136	PEM	Non-Jurisdictional
Wetland 229	0.186	PEM	Non-Jurisdictional
Wetland 230	0.127	PEM	Non-Jurisdictional
Wetland 231	0.053	PEM	Non-Jurisdictional
Wetland 232	0.082	PEM	Non-Jurisdictional
Wetland 233	0.263	PEM	Non-Jurisdictional
Wetland 234	0.083	PEM	Non-Jurisdictional
Wetland 235	0.014	PEM	Non-Jurisdictional
Wetland 236	0.012	PEM	Non-Jurisdictional
Wetland 237	0.025	PEM	Non-Jurisdictional
Wetland 238	0.021	PEM	Non-Jurisdictional
Wetland 239	0.023	PEM	Non-Jurisdictional
Wetland 240	0.034	PEM	Non-Jurisdictional
Wetland 241	0.026	PEM	Non-Jurisdictional
Wetland 242	0.012	PEM	Non-Jurisdictional
Wetland 243	0.003	PEM	Non-Jurisdictional
Wetland 244	0.003	PEM	Non-Jurisdictional
Wetland 245	0.003	PEM	Non-Jurisdictional
Wetland 246	0.005	PEM	Non-Jurisdictional
Wetland 247	0.084	PEM	Non-Jurisdictional
Wetland 248	0.041	PEM	Non-Jurisdictional
Wetland 249	0.051	PEM	Non-Jurisdictional
Wetland 250	0.025	PEM	Non-Jurisdictional
Wetland 251	0.014	PEM	Non-Jurisdictional
Wetland 252	0.080	PEM	Non-Jurisdictional
Wetland 253	0.147	PEM	Non-Jurisdictional
Wetland 254	0.008	PEM	Non-Jurisdictional
Wetland 255	0.040	PEM	Non-Jurisdictional
Wetland Total	**46.173**	---	---
Jurisdictional Wetland Total**	**12.365**	---	---

* USFWS habitat classifications from Cowardin, 1979. PFO = Palustrine Forested; PSS = Palustrine Scrub-Shrub; PEM = Palustrine Emergent.

** Jurisdictional/Isolated determination is provisional, and final designations would be assigned by the U.S. Army Corps of Engineers during their project review.

***Due to accessibility issues, Wetlands 200 and 201 were delineated with a desktop review.

The majority of the wetlands are small emergent (PEM) wetlands located in isolated low spots. Of the 255 delineated wetlands, 132 wetlands are less than 0.05 acre, and 177 wetlands are less than 0.10 acre. A few of the major wetlands are discussed below.

Wetland 41 (2.415 acres) is located on a flat hilltop in the southwestern section of the study area and is fed by seepage from the adjacent land. It contains a mix of PEM, PSS, and PFO habitat. Wetland 41 drains to Intermittent Stream 10 on its northern side. Intermittent Stream 10 transitions to Ephemeral Stream 11 after a short distance. Due to the lack of a continuous surface connection to downstream waters, Wetland 41 is expected to be interpreted as non-jurisdictional.

Wetland 44 (1.693 acres) is an emergent wetland fringe around Pond 7 in the southwestern section of the study area. A raised berm with an access road was constructed on the western (downslope) side of the pond basin in 2019 and no surface flow or culvert was observed to carry water across the berm. Therefore, under the current conditions, it appears that water is retained in Wetland 44 and Pond 7 without a continuous surface connection to downstream waters. Wetland 44 and Pond 7 are expected to be interpreted as non-jurisdictional.

Wetland 55 (1.325 acres) is an emergent wetland fringe around Pond 10 in the southwestern section of the study area. Although a ditch is present to the west of Wetland 55, it is separated from the wetland by higher ground. A search of the northeastern end of Pond 10 did not find any culverts that transfer flow down the hillslope to the northeast. Due to the lack of a continuous surface connection to downstream waters, Wetland 55 is expected to be interpreted as non-jurisdictional.

Wetland 170 (3.641 acres) is an emergent wetland located in a low spot south of a haul road in the eastern section of the site. Although the wetland has narrow arms that extend westward and eastward next to the haul road, these arms lie on higher ground than the middle part of Wetland 170 and drain toward the middle of the wetland. Water is retained in Wetland 170 and it appears that the wetland varies from mostly flooded to mostly dry depending on the season. Due to the lack of a continuous surface connection to downstream waters, Wetland 170 is expected to be interpreted as non-jurisdictional.

4.3 OPEN WATERS

The assessment documented 18 open-water ponds totaling 28.23 acres within the study area. The locations of the ponds are shown on **Figure 3** and summarized in **Table 4-5** below. Descriptions of the ponds are provided below, although the pond determinations are assigned pending final USACE verifications.

Table 4-5 – Open Waters Within the Study Area

Name	Acreage	Classification*	Status**
Pond 1	0.257	PUB	Jurisdictional
Pond 2	0.077	PUB	Jurisdictional
Pond 3	0.375	PUB	Jurisdictional
Pond 4	0.254	PUB	Jurisdictional
Pond 5	0.030	PUB	Non-Jurisdictional
Pond 6	0.008	PUB	Non-Jurisdictional
Pond 7	0.660	PUB	Non-Jurisdictional
Pond 8	0.116	PUB	Non-Jurisdictional
Pond 9	21.725	PUB	Jurisdictional
Pond 10	2.484	PUB	Non-Jurisdictional
Pond 11	0.011	PUB	Non-Jurisdictional
Pond 12	0.681	PUB	Non-Jurisdictional
Pond 13	0.308	PUB	Non-Jurisdictional
Pond 14	0.215	PUB	Non-Jurisdictional
Pond 15	0.363	PUB	Jurisdictional
Pond 16	0.449	PUB	Jurisdictional
Pond 17	0.091	PUB	Non-Jurisdictional
Pond 18	0.129	PUB	Non-Jurisdictional
Pond Total	**28.233**	---	---
Jurisdictional Pond Total**	**23.500**	---	---

* USFWS habitat classifications from Cowardin, 1979. PUB = Palustrine Unconsolidated Bottom.

** Jurisdictional/Isolated determination is provisional, and final designations would be assigned by the U.S. Army Corps of Engineers during their project review.

Pond 9 (21.725 acres) is the largest pond within the study area and consists of an impoundment of Lick Branch. It drains to Wetland 53 and Lick Branch (Perennial Stream 8) on its western side. Due to the connection to downstream waters via Lick Branch, Pond 9 is expected to be considered jurisdictional by the USACE.

Ponds 1, 2, 3, 4, 15, and 16 consist of impounded reaches of perennial streams within the study area. They are connected to downstream waters via culverts and are expected to be considered jurisdictional by the USACE. Ponds 5, 6, 7, 8, 10, 11, 12, 13, 14, 17, and 18 are located in isolated low spots and are expected to be interpreted as non-jurisdictional.

Some ponds in the study area may have active or inactive permits through the Kentucky Pollutant Discharge Elimination System (KPDES) or other state or federal regulatory systems.

5. DISCUSSION

The water and wetland delineation documented a total of 81.27 acres of water/wetland features within the study area, including 18 perennial streams, 22 intermittent streams, 31 ephemeral streams, 255 wetlands, and 18 ponds. Of these delineated features, the perennial streams, 15 intermittent streams, 21 wetlands, and seven ponds are expected to be classified as being under the jurisdiction of the USACE.

Tentative jurisdictional determinations have been made in accordance with the most current regulations in effect as of the date of this report. Due to the rapidly changing regulatory environment, revisiting the tentative jurisdictional determinations is recommended prior to submitting the delineation to regulatory agencies or other outside entities if significant time has elapsed since the delineation report was completed.

The USACE is the regulating authority of Section 404 of the CWA. Therefore, the USACE must make the final decision with regards to the type, extent, and jurisdictional status of any water/wetland features on this site. Section 404 of the CWA requires that all federal, state, public, and private entities obtain a permit from the USACE before placing dredged or fill materials into Waters of the United States.

Impacts to jurisdictional streams, wetlands, and open waters in Kentucky are regulated by the USACE and KDOW. Project impacts totaling over 0.5 acres of jurisdictional waters/wetlands require an application for an Individual Permit from the USACE. Project impacts of up to 0.5 acres of jurisdictional waters/wetlands may be able to be permitted under various Nationwide Permits (NWPs) if the proposed project meets certain conditions.

Project impacts totaling over 0.5 acres of jurisdictional waters/wetlands or over 300 linear feet of perennial and intermittent streams require an application for an Individual WQC from the KDOW. Projects that have impacts under these thresholds may be able to be permitted under a general WQC provided that the project meets certain conditions.

One stream just outside the eastern edge of the project boundary (an unnamed tributary to Prince Fork) is designated as an OSRW. This stream is part of a small watershed of streams which have the OSRW designation due to records of Kentucky arrow darter. One stream segment in the group (upper Buckhorn Creek and Prince Fork) is designated as Unit 1 of Kentucky arrow darter critical habitat. The reach of Buckhorn Creek within the delineation boundary lies approximately 1.75 stream miles downstream of Unit 1. Although the section of Buckhorn Creek within the delineation boundary does not have a special status, activities that could impact water quality in this stream may need to be evaluated for potential impacts to the Kentucky arrow darter.

The USACE and KDOW typically require compensatory mitigation for projects with water/wetland impacts that exceed thresholds of 0.1 acres of wetlands and/or ponds, or 0.03 acres of streams. Required mitigation amounts for wetlands are generally calculated based on the acreage of the impact multiplied by a value ranging from 1 to 4, with an additional 1.2 temporal loss multiplier applied if mitigation credits are obtained from an in-lieu fee program or permittee-responsible mitigation (PRM) project. The rationale for the temporal loss ratio is because it requires several years for habitats funded by the in-lieu fee program or PRM project to be constructed and the streams and wetlands are not generating ecological benefits during that time. This project lies within the Upper Kentucky River service area, which has a cost of $133,000 per wetland credit from the Kentucky Department of Fish and Wildlife Resources (KDFWR) in-lieu fee program. Mitigation credits may also be available from an established mitigation bank, and these would not incur the temporal loss premium.

Required mitigation amounts for streams are generally calculated based on the type of stream and the geographic location of the project. Stream type and quality determinations in this report are tentative and the USACE would issue the final determinations on the type and quality of the streams within the study area. This project is located within the Eastern Kentucky Coalfield

Region, where stream function is calculated through the EKSAP. The EKSAP typically involves an RBP assessment and a water conductivity measurement, although additional data collection such as macroinvertebrate surveys may also be required. The output of the EKSAP calculation is an Ecological Integrity Unit (EIU) value for the assessed stream. This project lies within the Upper Kentucky River service area, which has a cost of $1,215 per EIU from the KDFWR in-lieu fee program. Mitigation credits may also be available from an established mitigation bank, and these would not incur the temporal loss premium.

Section 7 of the Endangered Species Act (ESA) requires consultation with the USFWS for projects that receive a federal permit, federal funding, or federal oversight, and Section 10 of the ESA applies to many activities that may affect listed species and their habitats, even without a federal nexus. Consultation with the USFWS should be conducted once final design plans are completed and it is determined which activities have the potential to affect protected species. BFW has prepared a separate report for the site to address these issues.

Consultation through the USACE or other federal agencies and potentially the State Historic Preservation Office is required for projects that receive a federal permit, federal funding, or federal oversight in order to ensure that the project will not impact properties listed on or eligible for the National Register of Historic Places. This consultation may require surveys for archaeological or cultural-historic resources within the project area.

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Starfire Renewable Power Project – Gen-Tie and Access Road

Knott and Perry Counties, Kentucky

Water / Wetland Delineation Report

Submitted to:

STMO bn, LLC

c/o: Mr. Bob Roy

515 N Flagler Drive, Suite 250

West Palm Beach, FL 33401

Submittal Date:

July 13, 2026

July 2026
BFW Ref. #23526

July 13, 2026

Mr. Bob Roy
STMO bn, LLC
515 N Flagler Drive, Suite 250
West Palm Beach, FL 33401

RE: Water / Wetland Delineation Report
Starfire Renewable Power Project – Gen-Tie and Access Road
BFW Project No: 23526

Dear Mr. Roy:

Bacon Farmer Workman Engineering & Testing, Inc. (BFW) is pleased to submit our report documenting the findings of the Water/Wetland Delineation for the Starfire Renewable Power Project – Gen-Tie and Access Road. The study area for the project is located in Knott and Perry Counties, Kentucky, and it includes approximately 5.5 miles of gen-tie corridor, approximately 32 acres of associated point-of-interconnect land, and approximately 1.5 miles of the West Lick Road access corridor.

The purpose of the delineation was to gather sufficient information to render an independent professional opinion about whether jurisdictional waters and wetlands exist within the study area. The wetland delineation was conducted according to the guidelines set forth by the *1987 Corps of Engineers Manual* and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0)*.

The United States Army Corps of Engineers (USACE) is the regulating authority of Section 404 of the Clean Water Act (CWA). This regulating entity must make the final decision with regards to the extent and jurisdictional status of any water/wetland features on this site.

We appreciate the opportunity to serve you and look forward to future association with you on this and other projects. If you have questions concerning this report or require further clarification of the findings, please call our office at (502) 526-3613.

Sincerely,

Christian Slone

Christian Slone, FP-A, WPIT
Environmental Scientist

Laura Darnell

Laura Darnell, PWS
Wetland Scientist / Ecologist

Attachment: Water / Wetland Delineation Report

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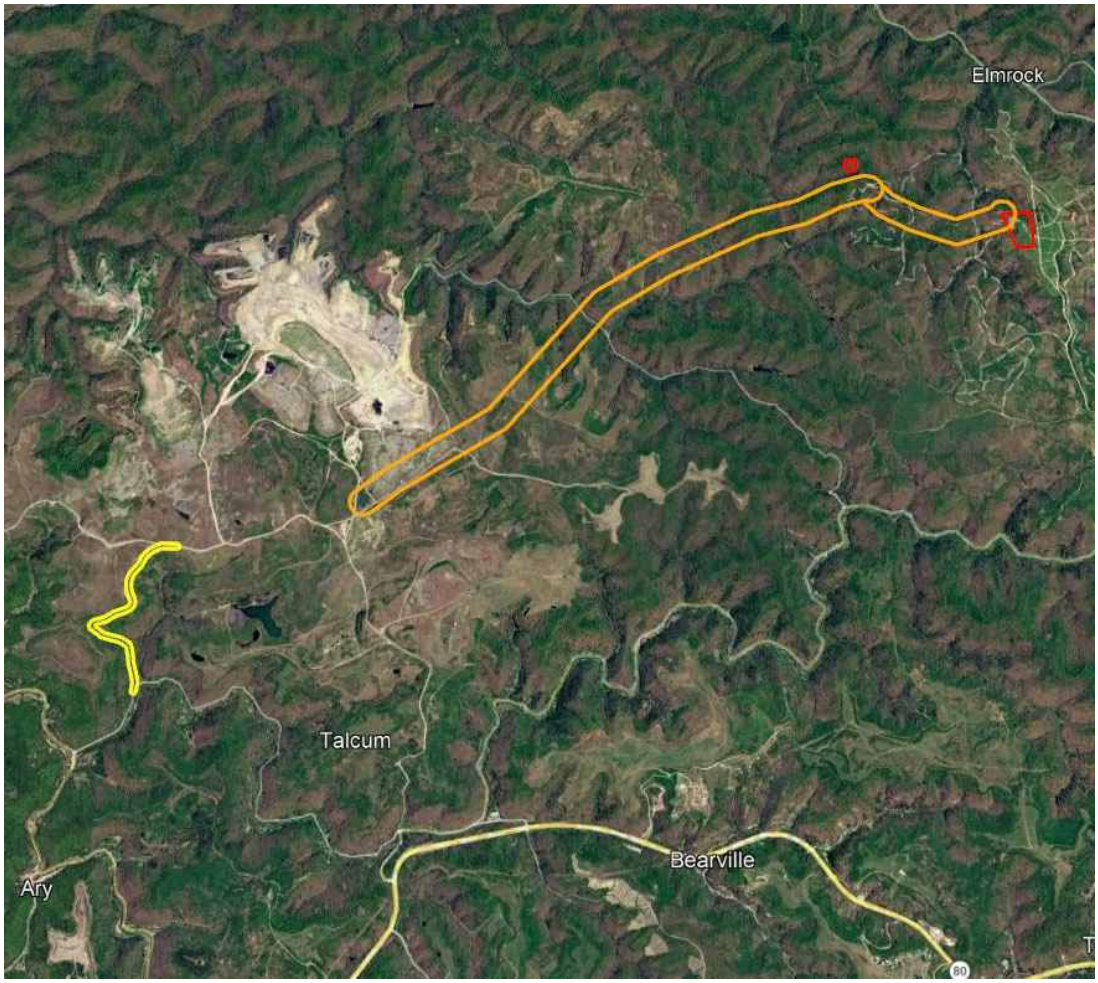
LIST OF ACRONYMS AND ABBREVIATIONS

APT	Antecedent Precipitation Tool
BFW	Bacon Farmer Workman Engineering & Testing, Inc.
CWA	Clean Water Act
DEM	Digital Elevation Model
EIU	Ecological Integrity Unit
EKSAP	Eastern Kentucky Stream Assessment Protocol
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FAC	Facultative
FACW	Facultative Wetland
FACU	Facultative Upland
FEMA	Federal Emergency Management Agency
GPS	Global Positioning System
KDFWR	Kentucky Department of Fish and Wildlife Resources
KDOW	Kentucky Division of Water
µS	microsiemens
NHD	National Hydrography Dataset
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
NWP	Nationwide Permit
NWPL	National Wetland Plant List
OBL	Obligate Wetland
OHWM	Ordinary High Water Mark
OSRW	Outstanding State Resource Water
PEM	Palustrine Emergent
PFO	Palustrine Forested Wetland
PRM	Permittee-Responsible Mitigation
PUB	Palustrine Unconsolidated Bottom (Pond)
RBP	Rapid Bioassessment Protocol
RPW	Relatively Permanent Water
SSURGO	Soil Survey Geographic Database
UPL	Obligate Upland
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WQC	Water Quality Certification

ABSTRACT

Bacon Farmer Workman Engineering & Testing, Inc. (BFW) performed a water/wetland delineation for the Starfire Renewable Power Solar Project – Gen-Tie and Access Road. The study area for the project is located in Knott and Perry Counties, Kentucky, and it includes approximately 5.5 miles of gen-tie corridor, approximately 32 acres of associated point-of-interconnect land, and approximately 1.5 miles of the West Lick Road access corridor. The project coordinates are 37.4248, -83.0829 and the graphic below shows the site location. The delineation was performed to determine the extent of wetlands, ponds, and/or streams within the study area in preparation for future development activities.

Field personnel identified seven perennial streams totaling 6,925 linear feet, 17 intermittent streams totaling 7,020 linear feet, 14 ephemeral streams totaling 4,065 linear feet, eight wetlands totaling 0.292 acres, and two ponds totaling 0.657 acres on the site. Tentative jurisdictional determinations have been presented based on the most current regulations as of the publication date of this report. It should be noted that the extent and jurisdictional status of water/wetland features on this site are subject to approval by the USACE for final determination. Due to the rapidly changing regulatory environment, re-visiting the tentative jurisdictional determinations is recommended prior to submitting the delineation to regulatory agencies or other outside entities if significant time elapses after the delineation report is received.



1. INTRODUCTION

Bacon Farmer Workman Engineering & Testing, Inc. (BFW) performed a water/wetland delineation for the Starfire Renewable Power Solar Project – Gen-Tie and Access Road located in Knott and Perry Counties, Kentucky (**Figures 1** and **2**). The field work was completed on March 23 through 26, 2026. Figures referenced in this text are included in **Appendix A**.

1.1 PURPOSE

The purpose of this study was to investigate the study area to document any areas which met the technical criteria for wetlands, assess other aquatic resources (e.g., streams, open water features), and classify these aquatic resources. This assessment will be the basis upon which regulated impacts to these resources will be determined for future project construction activities.

The water/wetland delineation was conducted according to the guidelines set forth by the 1987 Corps of Engineers Manual and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0).* The United States Army Corps of Engineers (USACE) is the regulating authority of Section 404 of the Clean Water Act (CWA). This regulating entity must make the final decision with regards to the extent, type, and jurisdictional status of any water/wetland features on this site.

Tentative jurisdictional determinations have been presented based on the most current regulations as of the publication date of this report. Due to the rapidly changing regulatory environment, re-visiting the tentative jurisdictional determinations is recommended prior to submitting the delineation to regulatory agencies or other outside entities if significant time elapses after the delineation report is received.

1.2 SITE DESCRIPTION

The study area for this report includes approximately 5.5 miles of gen-tie corridor, approximately 32 acres of associated point-of-interconnect land, and approximately 1.5 miles of the West Lick Road access corridor (**Figures 1** and **2**). The site coordinates are 37.4248, -83.0829. The study area contains a mix of reclaimed strip-mined land and rugged wooded terrain. Habitats within the reclaimed mined areas include open field, scrub-shrub habitat, and young forests. Habitats within unmined areas consist primarily of forest, but the species composition of the forest varies based on factors such as topographic position and management history. The section of the gen-tie located north of the Starfire Haul Road within the Starfire Phase 1 boundary was previously delineated and is not included in this report.

The field assessment documented 3.955 acres of water/wetland features on site, including seven perennial streams totaling 6,925 linear feet (2.284 acres), 17 intermittent streams totaling 7,020 linear feet (0.614 acres), 14 ephemeral streams totaling 4,065 linear feet (0.108 acres), eight wetlands totaling 0.292 acres, and two ponds totaling 0.657 acres. These features are depicted on **Figure 3**. Several named streams are overlapped by the study area and include Hurricane Branch, Squire Branch, Buckhorn Creek, Schoolhouse Branch, Upper Garden Branch, Eli Fork, and Baker Branch.

Please note that waters/wetland features in the gen-tie corridor were assigned numbers but features in the West Lick Road corridor were assigned letters.

2. TECHNICAL DEFINITIONS

2.1 WETLANDS

Section 404 of the Clean Water Act defines Wetlands as:

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

The Environmental Protection Agency (EPA) and the USACE use the *1987 Corps of Engineers Wetlands Delineation Manua*l and its applicable Regional Supplements to identify and define wetlands for the CWA Section 404 permit program. Section 404 requires a permit from the USACE or authorized state for the discharge of dredged or fill material into the waters of the United States, including wetlands.

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

2.1.1 Hydrophytic Vegetation

Hydrophytic vegetation, due to morphological, physiological, and/or reproductive adaptation(s), has the ability to grow, effectively compete, reproduce, and/or persist in anaerobic soil conditions. Individual species have been assigned a wetland indicator status on the National Wetland Plant List provided by the USACE. Determinations of hydrophytic vegetation are based on the wetland indicator status of plant species within the sampling plot.

Table 2-1 – Vegetation Wetland Indicator Codes

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

The relative abundance of plant species in the plots and their wetland indicator statuses are used to determine whether the plant community qualifies as hydrophytic under the Rapid Test, Dominance Test, and/or Prevalence Test.

2.1.2 Hydric Soils

Hydric soils are present if they have been classified as hydric or when they possess characteristics associated with anaerobic soil conditions. Hydric soils are those that are determined to be gleyed or have a low chroma matrix (2 or less) with redoximorphic features, or a matrix chroma of 1 with or without redoximorphic feature in the upper 12 inches. These designations are made utilizing Munsell Soil Color Charts.

2.1.3 Hydrology

Hydrology in wetlands occurs in areas inundated permanently or periodically at mean water depths less than 18.8 feet, or if the soil is saturated to the surface for five percent (5%) of the prevalent vegetation's growing season. Indicators of wetland hydrology could be present above or below the surface.

Primary indicators of hydrology [a minimum of one is required] include, but are not limited to:

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

Secondary indicators of wetland hydrology [a minimum of two is required] include, but are not limited to:

- FAC neutral test
- a sparsely vegetated concave surface
- wetland drainage patterns
- crayfish burrows

2.2 STREAMS AND DRAINAGES

Stream classifications of perennial, intermittent, and ephemeral were applied based on definitions in publications created or endorsed by the Kentucky Energy and Environment Cabinet, Department for Environmental Protection (Kentucky Division of Water 2011 and Tetra Tech, Undated).

Perennial streams were characterized as having flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow.

Intermittent streams were characterized as having flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from precipitation is a supplemental source of water for stream flow.

Ephemeral streams were characterized as typically having flowing water only during rainfall events and for a short time afterward in a typical year. Ephemeral stream beds are located above the water table year-round, so groundwater is not a source of water for the stream. Runoff from precipitation is the primary source of water for stream flow.

Non-jurisdictional ditches were classified according to the definition presented by the EPA within the "Revised Definition of "Waters of the United States" issued on January 18, 2023. These features are defined as being ditches (including roadside ditches) excavated wholly in and draining only dry land and that do not carry a relatively permanent flow of water.

2.2.1 Ordinary High Water Mark (OHWM)

The jurisdictional extent of non-tidal waters typically extends to the Ordinary High Water Mark (OHWM). The OHWM was defined following USACE regulatory guidance (USACE 2005): "The

term ordinary high water mark means that 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."

2.3 STATE-DESIGNATED PRIORITY WATER RESOURCES

The Kentucky Division of Water (KDOW) has granted special status to some waters and waterbodies in Kentucky related to their goals for statewide water quality improvement. The KDOW requires Individual Water Quality Certification (WQC) when project activities occur within these designated waters.

KDOW special-status waters include the following categories:

- Waters and waterbodies designated as Outstanding State Resource Waters, National Resource Waters, Cold Water Aquatic Habitat, Exceptional Waters, or identified as candidate Outstanding State Resource Waters or candidate Exceptional Waters
- Waters and waterbodies classified as impaired for warm water or cold water aquatic habitat where the parameter or source of impairment is habitat-related
- Waters and waterbodies classified as Full Support for warm water or cold water aquatic habitat
- Perpetually-protected mitigation sites (can include streams, ponds, and wetlands)

The presence of KDOW special-status waters and waterbodies was evaluated using the KDOW's online map service (KDOW 2026).

3. DELINEATION METHODS AND GENERAL SITE CHARACTERISTICS

3.1 WETLAND DELINEATION

The wetland delineation was conducted according to the guidelines set forth by the *1987 Corps of Engineers Manual* and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0)*. An initial in-house review of available maps was used to locate potential streams and wetland areas. Maps consulted included United States Geological Survey (USGS) topographic maps, aerial photography, county soil survey maps and hydric soils lists, National Hydrography Dataset (NHD) maps, National Wetlands Inventory (NWI) maps, Federal Emergency Management Agency (FEMA) floodplain maps, and Digital Elevation Model (DEM) maps. During the field assessment, the locations of water and wetland features were recorded in the field using Global Positioning System (GPS) equipment with sub-meter accuracy.

3.1.1 Soils

Soils were observed to determine if hydric soil characteristics were present. Soils were examined at shallow test pits excavated with a drain spade and were observed at a depth necessary to confirm hydric soil characteristics. Typical soil profile depths are usually within 12-18 inches below ground surface to allow for: (1) observation of an adequate portion of the soil profile to determine presence/absence of hydric soil characteristics; (2) observation of hydrology including depth to the water table and saturated soils; and (3) identification of disturbances (e.g., buried horizon, plow line). Where site conditions preclude observing soil profile depths at the typical 12-18 inches below ground surface or where observed hydric soil indicators are documented above or below 12-18 inches below ground surface, justification is provided. Soil color determinations were assigned using Munsell Soil Color Charts.

Site soil characteristics were compared to those mapped and described in the Soil Survey Geographic (SSURGO) databases for the project counties (USDA 2026). Hydric soil characteristics were compared to those identified in the delineation regional supplement manual (USACE 2010) and the most recent version of the Natural Resources Conservation Service (NRCS) publication *Field Indicators of Hydric Soils in the United States, Version 9.2* (USDA 2025). Hydric Soil Category ratings (USDA 2025) were also reviewed for soils in the study area. Results were recorded on wetland determination data forms (**Appendix B**).

Numerous mapped soils types are present within the study area. The reclaimed mine land is mapped as mainly Fiveblock, Kaymine, Fairpoint, and Bethsheda soils with some Cloverlick-Cutshin-Gilpin complex. Most of these soils are mapped as stony or very stony. The rugged wooded ridges and valleys along the gen-tie are mapped as mainly Handshoe-Fedscreek-Shelocta complex, Matewan-Gilpin-Marrowbone complex, Cloverlick-Cutshin-Gilpin complex Fiveblock and Kaymine soils. Most of these soils are mapped as very rocky or very stony. None of these soils are classified as hydric. A small amount of Grigsby fine sandy loam (frequently flooded), which is listed as having hydric inclusions, is mapped beside Buckhorn Creek. A small area of Water is mapped at the southern end of the West Lick Road corridor where the project boundary is adjacent to the perennial stream Balls Fork.

Mapped soils within the study area are depicted on **Figure 4**. Soils were examined at several locations including 15 data points, which are depicted on **Figure 3** and recorded on the data forms included in **Appendix B**. Hydric soil indicators that were observed included Depleted Below Dark Surface (A11), Sandy Redox (S5), Depleted Matrix (F3), Redox Dark Surface (F6), and Redox Depressions (F8).

3.1.2 Vegetation

Wetland plant species nomenclature follows the National Wetland Plant List (USACE 2023). Identification was aided, when necessary, with field guides for the region. Vegetation was sampled in plots:

- 30-ft radius for tree stratum
- 15-ft radius for sapling and shrub stratum
- 5-ft radius for herb stratum
- 30-ft radius for woody vines

Vegetation was classified using the USACE 2022 National Wetland Plant list (NWPL). Unless otherwise stated, aerial coverage dominance was determined using the 50/20 rule. Under the 50/20 rule, any plant species that equals or exceeds 20% of the aerial coverage of the plot is a dominant plant. In addition, the cumulative total of all dominant plants (OBL, FACW, or FAC) must be equal to or greater than 50% of the aerial coverage of the plot. If no plant species equals or exceeds 20% of the cumulative total aerial coverage of the plot, then the dominant plants are the plants that when ranked in decreasing order of abundance and summed, immediately exceed 50% of the plots aerial coverage when added together.

The project area contains a mix of reclaimed strip-mined land and rugged wooded terrain. Habitats within the reclaimed mined areas include open field, scrub-shrub habitat, and young forest. Habitats in unmined areas consist mainly of forest, but the species composition of the forest varies based on factors like topographic position and management history.

Reclaimed Open Field: The open fields on former mined lands were revegetated as part of site reclamation and a mixture of seeded and volunteer plant species are present. Common plant species in the reclaimed open fields included fescue (*Schedonorus arundinaceus*), Canada goldenrod (*Solidago canadensis*), broomsedge (*Andropogon virginicus*), Chinese lespedeza (*Lespedeza cuneata*), Chinese silvergrass (*Miscanthus sinensis*), Japanese honeysuckle (*Lonicera japonica*), and blackberry (*Rubus argutus*). These species are listed as facultative upland (FACU) on the 2022 NWPL.

Reclaimed Scrub-Shrub and Forest: These lands were revegetated in a similar manner as the upland field habitats but natural succession has proceeded enough that planted and volunteer woody species have become established and developed canopy cover. The trees and shrubs are primarily fast-growing early-successional species. Common species include autumn olive (*Elaeagnus umbellata*), sycamore (*Platanus occidentalis*), tulip-poplar (*Liriodendron tulipifera*), eastern red cedar (*Juniperus virginiana*), Bradford pear (*Pyrus calleryana*), and sumacs (*Rhus* spp.). These species are listed as obligate upland (UPL), FACU, and facultative wetland (FACW) on the 2022 NWPL.

Upland Forest: The unmined forested land within the study area has varying plant communities based on drier conditions on the ridgetops, mesic conditions in the lower valleys, and intermediate conditions on the hillslopes. Common species on the ridgetops and upper hillslopes include chestnut oak (*Quercus prinus*), black oak (*Quercus velutina*), white oak (*Quercus alba*), red maple (*Acer rubrum*), sourwood (*Oxydendron arboreum*), tulip-poplar, pines (*Pinus spp.*), and greenbrier (*Smilax rotundifolia*). Common species in the mesic forests in valleys and on lower hillslopes included tulip-poplar, red maple, beech (*Fagus grandifolia*), hemlock (*Tsuga canadensis*), white oak, American elm (*Ulmus americana*). These species are listed as UPL, FACU, facultative (FAC), and FACW on the 2022 NWPL.

Wetlands: A few small palustrine forested (PFO) and palustrine emergent (PEM) wetland habitats are scattered through the study area. Most of these are located in ditches or swales that were constructed to manage stormwater flow on reclaimed mine lands. A few wetlands consist of small seeps on hillsides. Common plant species in the wetland habitats include sandbar willow (*Salix*

interior), sycamore, spicebush (*Lindera benzoin*), green bulrush (*Sciprus atrovirens*), and fringed sedge (*Carex crinita*). These species are listed as FACW and obligate wetland (OBL) on the 2022 NWPL.

3.1.3 Hydrology

Hydrology within the study area was evaluated using available mapped data and field indicators. Sources of hydrology for the study area included precipitation, surface runoff from adjacent properties, and stream flow through several streams which cross the study area. The position of the site in relation to local streams and watersheds is depicted in **Figures 1 and 7.** The majority of the gen-tie corridor (including Hurricane Branch, Squire Branch, Schoolhouse Branch, Upper Garden Branch, and Eli Fork) drains to Buckhorn Creek. A high point is present in the eastern section of the gen-tie corridor, and east of the high point the land drains into Baker Branch which flows northward into Laurel Fork of Quicksand Creek. The West Lick Road corridor drains to Lick Branch which is a tributary of Balls Fork. Much of the reclaimed mine land is drained by ditches which were constructed during reclamation activities.

None of the study area is located within the FEMA 100-year floodplain, although some land along Balls Fork just outside the study area at the southern end of West Lick Road is located in the floodplain (**Figure 5**). The NWI map (**Figure 6**) depicts several riverine features within stream valleys overlapped by the project; however, it does not depict any wetlands or open water areas within the study area.

Wetland hydrology indicators were observed in wetlands and some transitional zones. These indicators were recorded on the data forms (**Appendix B**). Hydrology indicators observed included surface water (A1), high water table (A2), saturation (A3), sediment deposits (B2), aquatic fauna (B13), oxidized rhizospheres (C3), sparsely vegetated concave surface (B8), drainage patterns (B10), and the FAC-neutral test (D5).

The USACE Antecedent Precipitation Tool (USACE-ERDC 2025) was reviewed for the project location at the time of the field assessment to determine if recent precipitation for the area was within normal ranges. The tool classified all of the days of the field delineation (March 23 through 26, 2026), as Wet Season and Drier Than Normal (6). The Antecedent Precipitation Tool (APT) output for these dates is included in **Appendix E** and depicts the 30-day rolling rainfall total in comparison to 30-year normal precipitation ranges.

3.2 STREAM ASSESSMENT

Onsite streams were delineated based on the presence of indicators of an OHWM, following USACE regulatory guidance (USACE 2005) as defined in **Section 2.2.1** above. Streams and drainages were classified as perennial, intermittent, or ephemeral streams, or as non-jurisdictional ditches based on the definitions in **Section 2.2** above. Field documentation of the on-site streams include photographs and notes of the location, typical dimensions, flow characteristics, and substrate material of the streams. Representative photographs are included in **Appendix D**. The field assessment was supplemented by in-house investigations, including a review of USGS topographic maps, NHD maps, NWI maps, and DEM maps. Stream lengths, channel location, limits, and flow regime were determined through a combination of field assessments and in-house mapping.

This project is located within the Eastern Kentucky Coalfield Region, where stream function is calculated through the Eastern Kentucky Stream Assessment Protocol (EKSAP). The EKSAP typically involves a Rapid Bioassessment Protocol (RBP) assessment and a water conductivity measurement, although additional data collection such as macroinvertebrate surveys may also be required. Therefore, water conductivity readings were collected on all the delineated perennial and intermittent streams in the study area.

RBP high gradient field data sheets were completed for all of the perennial and intermittent streams within the study area. The RBP method used to assess habitat quality is based on key physical characteristics of the stream and surrounding land. Habitat is defined as the quality of in-stream and riparian habitat that influences the structure and function of the aquatic community in a stream. Habitat parameters evaluated are related to overall aquatic life and are a potential source of limitation to aquatic biota (Barbour, et al. 1999).

No formal RBP assessments were conducted for ephemeral streams because it appears that these features have been classified as non-jurisdictional, non-relatively permanent waters under the new delineation standards established following the recent *Sackett vs. EPA* Supreme Court ruling.

The stream determinations presented in this delineation are tentative, and the final determination of stream type, extent, quality, and jurisdiction will be decided by the USACE.

3.3 STATE-DESIGNATED WATER RESOURCES IN STUDY AREA

A list of the types of state-designated special-status waters that trigger a requirement for an Individual WQC is presented above in **Section 2.3**. A review of the KDOW's online map database indicates that several high quality streams in the vicinity of the project have been given special status designations by the KDOW. Some of these streams have been designated by the U.S. Fish and Wildlife Service (USFWS) as critical habitat for the Kentucky arrow darter (*Etheostoma spilotum*).

Streams with special status within the delineation boundary are limited to Eli Fork (Perennial Stream 6), which has an Outstanding State Resource Water (OSRW) designation. This stream is designated as Unit 2 of Kentucky arrow darter critical habitat. Therefore, activities that would impact Eli Fork would trigger a requirement for an Individual WQC from the KDOW and would likely require consultation with the USFWS.

The reach of Buckhorn Creek within the delineation boundary lies approximately 0.35 miles downstream of Kentucky arrow darter Critical Habitat Unit 1 (upper Buckhorn Creek and Prince Fork). Although this stream does not have a special status, activities that could impact water quality in this stream may need to be evaluated for potential impacts to the Kentucky arrow darter.

4. WATERS / WETLANDS SUMMARY AND DESCRIPTIONS

This delineation documented a total of 3.955 acres of water/wetland features within the study area, including seven perennial streams, 17 intermittent streams, 14 ephemeral streams, four wetlands, and two ponds (**Figure 3**). Please note that the extent and jurisdictional status of waters and wetlands presented in this report are tentative; the USACE is the regulating authority of Section 404 of the CWA and must make the final decision with regards to the extent and jurisdictional status of any water/wetland features on this site.

All associated wetland data forms for this delineation can be found in **Appendix B**. Stream data forms are included in **Appendix C**. Photographs of the study area, including the onsite waters and wetlands, can be found in **Appendix D.**

4.1 STREAMS AND DRAINAGES

This assessment documented seven perennial streams, 17 intermittent streams, and 14 ephemeral streams within the study area. Several ditches are also present, particularly in areas of reclaimed mine land. These features are depicted on **Figure 3** and summarized in **Table 4-1** below. A description of the streams are provided in this section, although the stream determinations are assigned pending final USACE verifications.

Under the recent interpretations of CWA jurisdiction established by the *Sackett vs. Environmental Protection Agency* Supreme Court decision, it appears that the CWA (and therefore USACE jurisdiction) applies only to waters with a relatively permanent flow (Waters of the United States), referenced as Relatively Permanent Waters (RPWs). The generally accepted standard for RPWs is “tributaries that have flowing or standing water year-round or continuously during certain times of year” (typically three months), noting that “relatively permanent waters do not include tributaries with flowing or standing water for only a short duration in direct response to precipitation” (USACE and EPA 2008 and 2023).

Perennial streams are typically interpreted as RPWs (jurisdictional), while ephemeral streams are typically interpreted as non-RPWs (non-jurisdictional). Intermittent streams may be interpreted as either RPWs or non-RPWs.

Table 4-1 – Streams Within the Study Area

Name	Length (feet)	Average Width (feet)	Acreage	Classification*	Status**
Perennial 1 (Squire Branch)	1,540	15	0.530	R3UB1	Jurisdictional
Perennial 2 (Buckhorn Creek)	1,070	30	0.737	R3UB1	Jurisdictional
Perennial Stream 3	700	4.5	0.072	R3UB1	Jurisdictional
Perennial Stream 4	200	3	0.014	R3UB1	Jurisdictional
Perennial 5 (Upper Garden Branch)	1,100	10	0.253	R3UB1	Jurisdictional
Perennial 6 (Eil Fork)	1,040	10	0.239	R3UB1	Jurisdictional
Perennial 7 (Baker Branch)	1,275	15	0.439	R3UB1	Jurisdictional
Perennial Stream Total	**6,925**	**---**	**2.284**	---	---
Jurisdictional Perennial Stream Total	**6,925**	**---**	**2.284**	---	---
Intermittent 1 (Hurricane Branch)	375	2	0.017	R4SB3	Jurisdictional
Intermittent Stream 2	460	8	0.084	R4SB3	Jurisdictional
Intermittent Stream 3	230	8	0.042	R4SB3	Jurisdictional
Intermittent Stream 4	300	4	0.028	R4SB3	Jurisdictional
Intermittent Stream 5	315	3	0.022	R4SB3	Jurisdictional
Intermittent Stream 6	255	5	0.029	R4SB3	Jurisdictional
Intermittent Stream 7	600	5	0.069	R4SB3	Jurisdictional
Intermittent Stream 8	400	4	0.037	R4SB3	Jurisdictional
Intermittent Stream 9	20	3	0.001	R4SB3	Jurisdictional
Intermittent Stream 10	125	2.5	0.007	R4SB3	Jurisdictional
Intermittent Stream 11	180	4	0.017	R4SB3	Jurisdictional
Intermittent Stream 12	295	3	0.02	R4SB3	Jurisdictional
Intermittent Stream 13	1,290	3	0.089	R4SB3	Jurisdictional
Intermittent Stream 14	1,150	3	0.079	R4SB3	Jurisdictional
Intermittent Stream 15	320	3	0.022	R4SB3	Jurisdictional
Intermittent Stream A	415	4	0.038	R4SB3	Non-Jurisdictional
Intermittent Stream B	290	2	0.013	R4SB3	Non-Jurisdictional
Intermittent Stream Total	**7,020**	**---**	**0.614**		**---**
Jurisdictional Intermittent Stream Total	**6,315**	**---**	**0.563**		
Ephemeral Stream 1	160	2	0.007	R6	Non-Jurisdictional
Ephemeral Stream 2	365	1	0.008	R6	Non-Jurisdictional
Ephemeral Stream 3	600	1	0.014	R6	Non-Jurisdictional
Ephemeral Stream 4	210	1.5	0.007	R6	Non-Jurisdictional
Ephemeral Stream 5	125	1.5	0.004	R6	Non-Jurisdictional
Ephemeral Stream 6	350	1.5	0.012	R6	Non-Jurisdictional
Ephemeral Stream 7	615	1.5	0.021	R6	Non-Jurisdictional
Ephemeral Stream 8	485	0.5	0.006	R6	Non-Jurisdictional
Ephemeral Stream 9	315	1.5	0.011	R6	Non-Jurisdictional

Name	Length (feet)	Average Width (feet)	Acreage	Classification*	Status**
Ephemeral Stream 10	230	1	0.005	R6	Non-Jurisdictional
Ephemeral Stream 11	300	0.5	0.003	R6	Non-Jurisdictional
Ephemeral Stream 12	75	1	0.002	R6	Non-Jurisdictional
Ephemeral Stream 13	145	0.5	0.002	R6	Non-Jurisdictional
Ephemeral Stream A	90	3	0.006	R6	Non-Jurisdictional
Ephemeral Stream Total	**4,065**	**---**	**0.108**	---	---
Jurisdictional Ephemeral Stream Total	**0**	**---**	**0**		

*USFWS habitat classifications from Cowardin, 1979. **R3** = Riverine Upper Perennial; **R4** = Riverine Intermittent; **R6** = Riverine Ephemeral; **UB1** = Unconsolidated Bottom, Cobble/Gravel; **SB3** = Streambed, Cobble-Gravel

**Jurisdictional/Isolated determination is provisional, and final designations would be assigned by the USACE during their project review.

4.1.1 Perennial Streams

Squire Branch (Perennial 1): This perennial stream ranges approximately 15 feet wide at the OHWM and has a stream substrate of silt, sand, gravel, and cobble, with some boulders and bedrock. During the field visit, this stream contained flowing water from an inch to a few inches deep. The assessment on Squire Branch generated an RBP score of 127 and a conductivity rating for a water sample in the stream was 1,356 microsiemens (µS).

Buckhorn Creek (Perennial 2): Buckhorn Creek is a large perennial stream with a watershed of approximately 5.25 square miles at the project location. Its watershed includes Schoolhouse Branch, Upper Garden Branch, and Eli Fork. Squire Branch also empties into Buckhorn Creek northwest and downstream of the study area. Within the study area, Buckhorn Creek has an OHWM approximately 25 to 40 feet wide. During the field visits, Buckhorn Creek contained flowing water with depths ranging from a few inches in riffles to 18 inches or more in pools. The stream substrate consists of silt, sand, gravel, and cobble. The assessment on this stream generated an RBP score of 136 and a conductivity rating of 576µS.

Schoolhouse Branch (Perennial 3) and Tributary (Perennial 4): Schoolhouse Branch and a perennial tributary are located in a valley below a large area of reclaimed mine land. The natural form of the stream channel was altered through the construction of a dam and open water pond (Pond 1) sometime before 1995. These were likely constructed to improve water quality in a valley that receives mined land runoff and groundwater seepage. The streams range from four to eight feet wide at the OHWM and have a substrate of silt, sand, gravel, cobble, and some boulders. The water in these streams had a strong red tint and high specific conductivity levels during the field visit which may be due to the use of chemicals added to the water to meet water quality standards. Although Pond 1 is expected to be considered non-jurisdictional, the reach of Schoolhouse Branch inundated by the pond could be considered jurisdictional by the USACE.

The assessment on Schoolhouse Branch generated an RBP score of 90 and a conductivity rating of 2,700µS. The assessment on Perennial Stream 4 generated an RBP score of 85 and a conductivity rating of 2,700 µS.

Upper Garden Branch (Perennial 5): This perennial stream ranges from eight to ten feet wide at the OHWM and has a stream substrate of silt, sand, gravel, and cobble, with some bedrock. During the field visit, this stream contained flowing water from two inches to a few inches deep. The assessment on this stream generated an RBP score of 130 and a conductivity rating of 1,090µS.

Eli Fork (Perennial 6): This stream lies within a minimally disturbed forested watershed in the east-central section of the project corridor. This stream is designated as Unit 2 of Kentucky arrow darter critical habitat. In the study area, Eli Fork has an OHWM approximately 10 to 15 feet wide. During the field visit, it contained flowing water with depths ranging from a few inches in riffles to two feet or more in pools. The stream substrate consists of silt, sand, gravel, and cobble. Eli Fork scored very high on in-stream habitat metrics and appears to have relatively stable flow levels fed by groundwater seepage. The assessment on this stream generated an RBP score of 183 and a conductivity rating of 32 µS.

As noted in **Section 3.3**, Eli Fork has an OSRW classification due to being designated as Unit 2 of Kentucky arrow darter critical habitat. Therefore, activities that would impact Eli Fork would trigger a requirement for an Individual WQC from the KDOW and would likely require consultation with the USFWS.

Baker Branch (Perennial 7): This perennial stream ranges from 10 to 15 feet wide at the OHWM and has a stream substrate of silt, sand, gravel, and cobble. During the field visit, this stream contained flowing water from two inches to a few inches deep. The assessment on this stream generated an RBP score of 103 and a conductivity rating of 1,668µS.

4.1.2 Intermittent Streams

The study area contains 17 intermittent streams totaling 7,020 linear feet (0.614 acres). The streams are scattered throughout the study area and generally flow through wooded valleys. Some of the intermittent streams flow through areas of reclaimed mine lands. The intermittent streams generally ranged from three to twelve feet wide at the OHWM and had stream substrates dominated by silt, sand, and gravel with some cobble and boulders. During the field visits, the intermittent streams generally contained pooled or flowing water from an inch deep in riffle to six inches deep in pools. Specific conductivity values varied widely, from 30 to 3450. **Table 4-2** summarizes data for the intermittent streams, including RBP scores for headwater streams of the Mountain bioregion collected on a subset of the intermittent streams.

Intermittent Stream A is located in the middle section of the West Lick Road corridor. Downslope of the road, the drainage changes from a stream bed to a steep valley filled with large boulders, which is assumed to have been created during mine reclamation work. This drainage below Intermittent Stream A carries intermittent flow but was classified as a ditch. The ditch transitions back to a stream outside the delineation boundary and flow was observed emptying from the channel into a perennial stream located approximately 700 feet east of the culvert. However, some of the intermittent stream and ditch lacks a stream bed and bank and/or lacks surface flow. Based on the lack of a continuous surface connection and the past impacts/reshaping of the stream channel, Intermittent Stream A is not expected to be considered jurisdictional by the USACE. However, the final determination can only be made by the USACE.

Intermittent Stream B is located in the southern section of the West Lick Road corridor. It flows eastward across the road and loses surface flow temporarily downslope of the corridor, changing to an ephemeral channel. Downslope of the dry section, stream flow resumes at a headcut and eventually empties into a perennial stream approximately 250 feet east of the road. Based on the lack of a continuous surface connection, Intermittent Stream B is not expected to be considered jurisdictional by the USACE. However, the final determination can only be made by the USACE.

Table 4-2 – Intermittent Stream Data

Name	Length (feet)	Average OHWM Width (feet)	RBP Score	Conductivity (µS)	Connection Comments
Intermittent Stream 1 (Hurricane Branch)	375	2	88	N/A	Tributary to Buckhorn Creek
Intermittent Stream 2	460	8	98	199	Tributary to Squire Branch
Intermittent Stream 3	230	8	90	1,106	Tributary to Squire Branch
Intermittent Stream 4	300	4	130	270	Tributary to Buckhorn Creek
Intermittent Stream 5	315	3	144	2,380	Tributary to Buckhorn Creek
Intermittent Stream 6	255	5	124	440	Tributary to Boughcamp Branch
Intermittent Stream 7	600	5	149	33	Tributary to Upper Garden Branch
Intermittent Stream 8	400	4	128	32	Tributary to Upper Garden Branch
Intermittent Stream 9	20	3	137	29	Tributary to Elisha Fork
Intermittent Stream 10	125	2.5	133	34	Tributary to Elisha Fork
Intermittent Stream 11	180	4	144	27	Tributary to Elisha Fork
Intermittent Stream 12	295	3	147	30	Tributary to Elisha Fork
Intermittent Stream 13	1,290	3	144	40	Tributary to Baker Branch
Intermittent Stream 14	1,150	3	118	2,720	Tributary to Baker Branch
Intermittent Stream 15	320	3	120	3,450	Tributary to Baker Branch
Intermittent Stream A	415	4	102	N/A	Drains to modified ditched valley, break in continuous surface connection
Intermittent Stream B	290	2	109	N/A	Break in continuous surface connection

4.1.3 Ephemeral Streams

The delineation documented 14 ephemeral streams within the study area totaling 4,065 linear feet (0.108 acre). These streams are scattered throughout the study area and generally flow through wooded valleys or areas of reclaimed mine lands. Most of the ephemeral streams ranged from one to four feet wide at the OHWM with bank heights of six inches to 2.5 feet. During the field visits, the ephemeral streams were generally dry or contained water in small pools. The ephemeral stream substrates were generally dominated by silt with some gravel present.

The majority of the ephemeral streams have a direct connection to downstream RPWs. However, under the new definitions of CWA jurisdiction established by the Sackett vs. EPA Supreme Court decision, it appears that the CWA (and therefore USACE jurisdiction) applies only to RPWs. Therefore, because the ephemeral streams generally flow only following rain events, it appears that all of the ephemeral streams within the study area would be interpreted as non-jurisdictional. No RBPs or other stream quality assessments were conducted on the ephemeral streams.

4.2 WETLANDS

The field assessment documented eight wetlands within the study area which are depicted on **Figure 3** and summarized in **Table 4-3** below. A description of the wetlands are provided in this section, although the wetland determination is assigned pending final USACE verification.

Under the recent interpretations of CWA jurisdiction established by the *Sackett vs. Environmental Protection Agency* Supreme Court decision, the CWA extends only to wetlands that are "as a practical matter indistinguishable from Waters of the United States." This requires the party asserting jurisdiction to establish "first, that the adjacent [body of water constitutes] . . . 'Water[s] of the United States' (i.e., a relatively permanent body of water connected to traditional interstate navigable waters); and second, that the wetland has a continuous surface connection with that water, making it difficult to determine where the 'water' ends, and the 'wetland' begins."

Table 4-3 – Wetlands Within the Study Area

Name	Acreage	Classification*	Status**
Wetland 1	0.016	PEM	Non-Jurisdictional
Wetland 2	0.016	PFO	Jurisdictional
Wetland 3	0.073	PEM	Non-Jurisdictional
Wetland 4	0.065	PEM	Jurisdictional
Wetland A	0.058	PEM	Non-Jurisdictional
Wetland B	0.004	PEM	Non-Jurisdictional
Wetland C	0.016	PFO	Non-Jurisdictional
Wetland D	0.044	PFO	Non-Jurisdictional
Wetland Total	**0.292**	---	---
Jurisdictional Wetland Total**	**0.016**	---	---

* USFWS habitat classifications from Cowardin, 1979. PFO = Palustrine Forested; PEM = Palustrine Emergent.
** Jurisdictional/Isolated determination is provisional, and final designations would be assigned by the U.S. Army Corps of Engineers during their project review.

Wetland 1 (0.016 acres) is a small, emergent wetland located in a depression on reclaimed mine land in the western section of the gen-tie corridor. Wetland 1 is surrounded by uplands and does not have a defined outlet that provides a continuous surface connection to downstream RPWs. Therefore, it appears that Wetland 1 would be interpreted as non-jurisdictional.

Wetland 2 (0.016 acres) is a forested wetland located in an inactive former channel of Buckhorn Creek. It receives overflow from Buckhorn Creek during high water events. Due to the direct connection to Buckhorn Creek, Wetland 2 is assumed to be connected to downstream RPWs and is assumed to be under the jurisdiction of the USACE.

Wetland 3 (0.073 acres) is a fringe wetland around Pond 2, which drains to Ephemeral Stream 5 on its southern side. Because Ephemeral Stream 5 does not provide a continuous surface connection to downstream RPWs, it appears that Wetland 1 would be interpreted as non-jurisdictional.

Wetland 4 (0.065 acres) is an emergent wetland located beside Eli Fork. It receives water from a few seeps and drains into Eil Fork. Due to the direct connection to Eli Fork, Wetland 4 is

considered to be connected to downstream RPWs and is therefore presumed to be under the jurisdiction of the USACE.

Wetland A (0.058 acres) and Wetland C (0.016 acres) are emergent wetlands located within depressions along the West Lick Road corridor. These wetlands drain into ditches following large rain events, but it does not appear that the ditches provide a continuous surface connection to downstream RPWs. Therefore, it appears that Wetlands A and C would be interpreted as non-jurisdictional.

Wetland B (0.004 acres) is a small, emergent wetland located in a depression along the West Lick Road corridor. Wetland B is surrounded by uplands and does not have a defined outlet that provides a continuous surface connection to downstream RPWs. Therefore, it appears that Wetland B would be interpreted as non-jurisdictional.

Wetland D (0.044 acres) is located along the West Lick Road corridor on a seepy hillside that extends downslope to a low-lying area adjacent to Intermittent Stream A. Downslope of the road, the drainage feature changes from a stream bed to a steep valley filled with large boulders, which is presumed to have been created during mine reclamation work. Based on the lack of a continuous surface-water connection and the past impacts/reshaping of a channel downslope of Intermittent Stream A, Wetland D is not expected to be considered jurisdictional by the USACE.

4.3 OPEN WATERS

The assessment documented two open-water ponds within the study area. The locations of the ponds are shown on **Figure 3** and summarized in **Table 4-4** below. Descriptions of the ponds are provided below, although the pond determinations are assigned pending final USACE verifications.

Table 4-4 – Open Waters Within the Study Area

Name	Acreage	Classification*	Status**
Pond 1	0.529	PUB	Non-Jurisdictional
Pond 2	0.128	PUB	Non-Jurisdictional
Open Water Total	**0.021**	---	---
Jurisdictional Open Water Total**	**0**	---	---

** Jurisdictional/Isolated determination is provisional, and final designations would be assigned by the U.S. Army Corps of Engineers during their project review.
** USFWS habitat classifications from Cowardin, 1979. PUB = Palustrine Unconsolidated Bottom.

Pond 1 (0.529 acre) is located in the central section of the gen-tie corridor and consists of a ponded section of Schoolhouse Branch (Perennial Stream 3), which has been created through the construction of a dam. It drains to Perennial Stream 3 through a culvert on its southern side. Pond 1 appears to be associated with KDPES permit, Outfall ID# KY0112798-148. This permit is held by Liberty Management LLC and refers to 860-0563 Dam 9. As a result, this pond may qualify for an exemption from CWA jurisdiction under CWA Section 328.3(b)(1), which excludes “waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of the Clean Water Act.” It appears that Pond 2 would be interpreted as non-jurisdictional. However, the reach of Schoolhouse Branch (Perennial Stream 3) that flows through Pond 1 may still be considered jurisdictional by the USACE.

Pond 2 (0.128 acres) is located in the central section of the gen-tie corridor and consists of a basin which appears to have been constructed in reclaimed mine land. It drains to Ephemeral Stream 5 on its southern side, which does not provide a continuous surface connection to downstream RPWs. It appears that Pond 2 has a KDPES permit with Outfall ID# KY0112798-

152. This permit is held by Liberty Management LLC and has an identifier of 860-0563 BB 3. Therefore, this pond may qualify for an exemption from CWA jurisdiction under CWA Section 328.3(b)(1) for “waste treatment systems.” It appears that Pond 2 would be interpreted as non-jurisdictional.

5. DISCUSSION

The water and wetland delineation documented a total of 3.955 acres of water/wetland features within the study area, including seven perennial streams, 17 intermittent streams, 14 ephemeral streams, eight wetlands, and two ponds. Of these delineated features, the perennial streams, 15 intermittent streams, and two wetlands are expected to be classified as being under the jurisdiction of the USACE.

Tentative jurisdictional determinations have been made in accordance with the most current regulations in effect as of the date of this report. Due to the rapidly changing regulatory environment, revisiting the tentative jurisdictional determinations is recommended prior to submitting the delineation to regulatory agencies or other outside entities if significant time has elapsed since the delineation report was completed.

The USACE is the regulating authority of Section 404 of the CWA. Therefore, the USACE must make the final decision with regards to the type, extent, and jurisdictional status of any water/wetland features on this site. Section 404 of the CWA requires that all federal, state, public, and private entities obtain a permit from the USACE before placing dredged or fill materials into Waters of the United States.

Impacts to jurisdictional streams, wetlands, and open waters in Kentucky are regulated by the USACE and KDOW. Project impacts totaling over 0.5 acres of jurisdictional waters/wetlands require an application for an Individual Permit from the USACE. Project impacts of up to 0.5 acres of jurisdictional waters/wetlands may be able to be permitted under various Nationwide Permits (NWPs) if the proposed project meets certain conditions.

Project impacts totaling over 0.5 acres of jurisdictional waters/wetlands or over 300 linear feet of perennial and intermittent streams require an application for an Individual WQC from the KDOW. Projects that have impacts under these thresholds may be able to be permitted under a general WQC provided that the project meets certain conditions. Eli Fork has an OSRW classification due to being designated as Unit 2 of Kentucky arrow darter critical habitat. Therefore, activities that would impact Eli Fork would trigger a requirement for an Individual WQC from the KDOW and would likely require consultation with the USFWS.

The reach of Buckhorn Creek within the delineation boundary lies approximately 0.35 miles downstream of Kentucky arrow darter Critical Habitat Unit 1 (upper Buckhorn Creek and Prince Fork). Although this stream does not have a special status, activities that could impact water quality in this stream may need to be evaluated for potential impacts to the Kentucky arrow darter.

The USACE and KDOW typically require compensatory mitigation for projects with water/wetland impacts that exceed thresholds of 0.1 acres of wetlands and/or ponds, or 0.03 acres of stream. Required mitigation amounts for wetlands are generally calculated based on the acreage of the impact multiplied by a value ranging from 1 to 4, with an additional 1.2 temporal loss multiplier applied if mitigation credits are obtained from an in-lieu fee program or permittee-responsible mitigation (PRM) project. The rationale for the temporal loss ratio is because it requires several years for habitats funded by the in-lieu fee program or PRM project to be constructed and the streams and wetlands are not generating ecological benefits during that time. This project lies within the Upper Kentucky River service area, which has a cost of $133,000 per wetland credit from the Kentucky Department of Fish and Wildlife Resources (KDFWR) in-lieu fee program. Mitigation credits may also be available from an established mitigation bank, and these would not incur the temporal loss premium.

Required mitigation amounts for streams are generally calculated based on the type of stream and the geographic location of the project. Stream type and quality determinations in this report are tentative and the USACE would issue the final determinations on the type and quality of the streams within the study area. This project is located within the Eastern Kentucky Coalfield Region, where stream function is calculated through the Eastern Kentucky Stream Assessment

Protocol (EKSAP). The EKSAP typically involves an RBP assessment and a water conductivity measurement, although additional data collection such as macroinvertebrate surveys may also be required. The output of the EKSAP calculation is an Ecological Integrity Unit (EIU) value for the assessed stream. This project lies within the Upper Kentucky River service area, which has a cost of $1,215 per EIU from the KDFWR in-lieu fee program. Mitigation credits may also be available from an established mitigation bank, and these would not incur the temporal loss premium.

Section 7 of the Endangered Species Act (ESA) requires consultation with the USFWS for projects that receive a federal permit, federal funding, or federal oversight, and Section 10 of the ESA applies to many activities that may affect listed species and their habitats, even without a federal nexus. Consultation with the USFWS should be conducted once final design plans are completed and it is determined which activities have the potential to affect protected species. BFW has prepared a separate report for the site to address these issues.

Consultation through the USACE or other federal agencies and potentially the State Historic Preservation Office is required for projects that receive a federal permit, federal funding, or federal oversight in order to ensure that the project will not impact properties listed on or eligible for the National Register of Historic Places. This consultation may require surveys for archaeological or cultural-historic resources within the project area.

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Appendix A

Figures

Appendix B

Wetland Determination Data Forms

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-12-9; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Starfire Renewable Power Project City/County: Perry Sampling Date: 3/23/26

Applicant/Owner: STMO bn, LLC State: KY Sampling Point: DP 1

Investigator(s): L. Darnell, C. Slone Section, Township, Range:

Landform (hillside, terrace, etc.): Terrace Local relief (concave, convex, none): None Slope (%): < 1

Subregion (LRR or MLRA): LRR N, MLRA 125 Lat: 37.39622437 Long: -83.14168566 Datum:

Soil Map Unit Name: FaB - Fairpoint soils, undulating NWI classification: N/A

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

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

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

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

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

Remarks:
Upland point to Wetland A

The Antecedent Precipitation Tool rates this date as Wet Season, Drier than Normal (6).

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 in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ 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 X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

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

Remarks:

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

Sampling Point: DP 1

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Platanus occidentalis*	5	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	5	=Total Cover	
50% of total cover: 3		20% of total cover:	1
Sapling/Shrub Stratum (Plot size:)			
1. *Platanus occidentalis*	7	Yes	FACW
2. *Elaeagnus umbellata*	5	Yes	UPL
3. *Rubus argutus*	5	Yes	FACU
4. *Juniperus virginiana*	2	No	FACU
5.			
6.			
7.			
8.			
9.			
	19	=Total Cover	
50% of total cover: 10		20% of total cover:	4
Herb Stratum (Plot size:)			
1. *Symphyotrichum sp*	15	Yes	
2. *Lotus corniculatus*	10	Yes	FACU
3. *Erigeron philadelphicus*	10	Yes	FACU
4. *Andropogon virginicus*	2	No	FACU
5. *Rumex crispus*	2	No	FAC
6. *Cirsium sp.*	1	No	
7.			
8.			
9.			
10.			
11.			
	40	=Total Cover	
50% of total cover: 20		20% of total cover:	8
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
		=Total Cover	
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

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

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 28.6% (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)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

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

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

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

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

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

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

SOIL

Sampling Point: DP 1

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	2.5Y 3/1	100					Loamy/Clayey	

[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)
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ 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 Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: Refusal

Depth (inches): 4

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

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-12-9; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Starfire Renewable Power Project City/County: Perry Sampling Date: 3/23/26

Applicant/Owner: STMO bn, LLC State: KY Sampling Point: DP 2

Investigator(s): L. Darnell, C. Slone Section, Township, Range:

Landform (hillside, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): < 1

Subregion (LRR or MLRA): LRR N, MLRA 125 Lat: 37.39579705 Long: -83.14159026 Datum:

Soil Map Unit Name: FaB - Fairpoint soils, undulating NWI classification: N/A

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

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

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

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

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

Remarks:
Point within Wetland A

The Antecedent Precipitation Tool rates this date as Wet Season, Drier than Normal (6).

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)
- X 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 in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- X Surface Soil Cracks (B6)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

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

Wetland Hydrology Present? **Yes** X **No** ____

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: DP 2

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size:)			
1. *Echinochloa muricata*	70	Yes	FACW
2. *Andropogon virginicus*	10	No	FACU
3. *Bidens sp.*	2	No	
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	82 =Total Cover		
50% of total cover: 41	20% of total cover: 17		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

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

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	70	x 2 =	140
FAC species	0	x 3 =	0
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column Totals:	80 (A)		180 (B)

Prevalence Index = B/A = 2.25

Hydrophytic Vegetation Indicators:

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

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

Definitions of Four Vegetation Strata:

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

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

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

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

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

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

SOIL

Sampling Point: DP 2

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	2.5Y 4/1	73	2.5Y 4/2	20	C	M	Loamy/Clayey	
			2.5Y 5/4	7	C	PL/M		

[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)
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ 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 Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- X Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

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

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-12-9; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Starfire Renewable Power Project City/County: Perry Sampling Date: 3/23/26

Applicant/Owner: STMO bn, LLC State: KY Sampling Point: DP 3

Investigator(s): L. Darnell, C. Slone Section, Township, Range:

Landform (hillside, terrace, etc.): Hillslope Local relief (concave, convex, none): None Slope (%): <1

Subregion (LRR or MLRA): LRR N, MLRA 125 Lat: 37.39243492 Long: -83.14617026 Datum:

Soil Map Unit Name: FaF - Fairpoint and Bethesda soils, 2 to 70 percent slopes, benched, stony NWI classification: N/A

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

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

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

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

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

Remarks:

The Antecedent Precipitation Tool rates this date as Wet Season, Drier than Normal (6).

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 in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ 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)
- X FAC-Neutral Test (D5)

Field Observations:

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

Wetland Hydrology Present? **Yes** X **No** ____

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: DP 3

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Salix interior*	10	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	10 =Total Cover		
50% of total cover: 5	20% of total cover: 2		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Salix interior*	60	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	60 =Total Cover		
50% of total cover: 30	20% of total cover: 12		
Herb Stratum (Plot size: 5)			
1. *Schedonorus arundinaceus*	10	Yes	FACU
2. *Symphyotrichum sp.*	8	Yes	
3. *Lonicera maackii*	3	No	UPL
4. *Rumex crispus*	2	No	FAC
5. *Geum sp.*	2	No	
6. *Clematis virginiana*	2	No	FAC
7. *Elaeagnus umbellata*	1	No	UPL
8. *Daucus carota*	1	No	UPL
9.			
10.			
11.			
	29 =Total Cover		
50% of total cover: 15	20% of total cover: 6		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	70	x 2 =	140
FAC species	4	x 3 =	12
FACU species	10	x 4 =	40
UPL species	5	x 5 =	25
Column Totals:	89 (A)		217 (B)

Prevalence Index = B/A = 2.44

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)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

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

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

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

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

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

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

SOIL

Sampling Point: DP 3

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 5/3	80	10YR 6/2	10	D	M	Sandy	Rock fragments present
			10YR 4/3	10	C	M		

[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)
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ 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 Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ 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** X

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-12-9; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Starfire Renewable Power Project City/County: Perry Sampling Date: 3/23/26

Applicant/Owner: STMO bn, LLC State: KY Sampling Point: DP 4

Investigator(s): L. Darnell, C. Slone Section, Township, Range:

Landform (hillside, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): < 1

Subregion (LRR or MLRA): LRR N, MLRA 125 Lat: 37.3914663 Long: -83.144925 Datum:

Soil Map Unit Name: FaF - Fairpoint and Bethesda soils, 2 to 70 percent slopes NWI classification: N/A

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

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

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

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

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

Remarks:
Point within Wetland C

The Antecedent Precipitation Tool rates this date as Wet Season, Drier than Normal (6).

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)
- X 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 in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- X Sparsely Vegetated Concave Surface (B8)
- X Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ 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)
- X FAC-Neutral Test (D5)

Field Observations:

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

Wetland Hydrology Present? **Yes** X **No** ____

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: DP 4

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Salix interior*	10	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	10 =Total Cover		
50% of total cover: 5	20% of total cover: 2		
Sapling/Shrub Stratum (Plot size:)			
1. *Salix interior*	60	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	60 =Total Cover		
50% of total cover: 30	20% of total cover: 12		
Herb Stratum (Plot size:)			
1. *Scirpus atrovirens*	3	Yes	OBL
2. *Rumex crispus*	2	Yes	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	5 =Total Cover		
50% of total cover: 3	20% of total cover: 1		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	3	x 1 =	3
FACW species	70	x 2 =	140
FAC species	2	x 3 =	6
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	75 (A)		149 (B)

Prevalence Index = B/A = 1.99

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

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

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

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

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

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

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

SOIL

Sampling Point: DP 4

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	2.5YR 3/1	70	2.5Y 5/2	20	C	M	Loamy/Clayey	Prominent redox concentrations
			2.5Y 5/4	10	C	M		Prominent redox concentrations
2-14	2.5Y 5/1	80	2.5Y 5/4	10	C	M	Loamy/Clayey	Distinct redox concentrations
			2.5Y 5/6	10	C	PL/M		Prominent redox concentrations

[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)**
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ 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 Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- X Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

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

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-12-9; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Starfire Renewable Power Project City/County: Perry Sampling Date: 3/23/26

Applicant/Owner: STMO bn, LLC State: KY Sampling Point: DP 5

Investigator(s): L. Darnell, C. Slone Section, Township, Range:

Landform (hillside, terrace, etc.): Hillslope Local relief (concave, convex, none): None Slope (%): 1

Subregion (LRR or MLRA): LRR N, MLRA 125 Lat: 37.39147575 Long: -83.1449171 Datum:

Soil Map Unit Name: FaF - Fairpoint and Bethesda soils, 2 to 70 percent slopes NWI classification: N/A

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

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

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

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

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

Remarks:
Upland point to Wetland C

The Antecedent Precipitation Tool rates this date as Wet Season, Drier than Normal (6).

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 in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ 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 X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: DP 5

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Salix interior*	10	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	10 =Total Cover		
50% of total cover: 5	20% of total cover: 2		
Sapling/Shrub Stratum (Plot size:)			
1. *Salix interior*	40	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	40 =Total Cover		
50% of total cover: 20	20% of total cover: 8		
Herb Stratum (Plot size:)			
1. *Schedonorus arundinaceus*	20	Yes	FACU
2. *Microstegium vimineum*	20	Yes	FAC
3. *Symphyotrichum sp.*	5	No	
4. *Geum sp.*	1	No	
5. *Prunella vulgaris*	2	No	FACU
6.			
7.			
8.			
9.			
10.			
11.			
	48 =Total Cover		
50% of total cover: 24	20% of total cover: 10		
Woody Vine Stratum (Plot size:)			
1. *Lonicera japonica*	15	Yes	FACU
2.			
3.			
4.			
5.			
	15 =Total Cover		
50% of total cover: 8	20% of total cover: 3		

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 60.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	50	x 2 =	100
FAC species	20	x 3 =	60
FACU species	37	x 4 =	148
UPL species	0	x 5 =	0
Column Totals:	107 (A)		308 (B)

Prevalence Index = B/A = 2.88

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)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

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

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

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

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

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

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

SOIL

Sampling Point: DP 5

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 5/3	80	10YR 4/2	10	D	M	Sandy	Faint redox concentrations
			10YR 6/2	10	D	M		Faint redox concentrations

[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)
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ 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 Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ 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** X

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-12-9; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Starfire Renewable Power Project City/County: Perry Sampling Date: 3/23/26
Applicant/Owner: STMO bn, LLC State: KY Sampling Point: DP 6
Investigator(s): L. Darnell, C. Slone Section, Township, Range:
Landform (hillside, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 30
Subregion (LRR or MLRA): LRR N, MLRA 125 Lat: 37.39101237 Long: -83.14278967 Datum:
Soil Map Unit Name: SCF - Shelocta-Cutshin-Gilpin complex, 20 to 75 percent slopes NWI classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks:
Point within Wetland D

The Antecedent Precipitation Tool rates this date as Wet Season, Drier than Normal (6).

HYDROLOGY

Wetland Hydrology Indicators:

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

- X Surface Water (A1)
- X High Water Table (A2)
- X 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 in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ 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)
- X FAC-Neutral Test (D5)

Field Observations:

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

Wetland Hydrology Present? **Yes** X **No** ____

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

Remarks:
Seep wetland: water flowing downhill slope

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: DP 6

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Platanus occidentalis*	10	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	10 =Total Cover		
50% of total cover: 5	20% of total cover: 2		
Sapling/Shrub Stratum (Plot size:)			
1. *Salix nigra*	5	Yes	OBL
2. *Rosa multiflora*	2	Yes	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	7 =Total Cover		
50% of total cover: 4	20% of total cover: 2		
Herb Stratum (Plot size:)			
1. *Agrostis hyemalis*	15	Yes	FAC
2. *Microstegium vimineum*	10	Yes	FAC
3. *Typha latifolia*	10	Yes	OBL
4. *Symphyotrichum sp*	5	No	
5. *Tussilago farfara*	5	No	FACU
6. *Carex vulpinoidea*	5	No	OBL
7.			
8.			
9.			
10.			
11.			
	50 =Total Cover		
50% of total cover: 25	20% of total cover: 10		
Woody Vine Stratum (Plot size:)			
1. *Lonicera japonica*	5	Yes	FACU
2.			
3.			
4.			
5.			
	5 =Total Cover		
50% of total cover: 3	20% of total cover: 1		

Dominance Test worksheet:

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

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 71.4% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	20	x 1 =	20
FACW species	10	x 2 =	20
FAC species	25	x 3 =	75
FACU species	12	x 4 =	48
UPL species	0	x 5 =	0
Column Totals:	67 (A)		163 (B)

Prevalence Index = B/A = 2.43

Hydrophytic Vegetation Indicators:

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

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

Definitions of Four Vegetation Strata:

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

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

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

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

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

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

SOIL

Sampling Point: DP 6

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	2.5Y 4/1	73	2.5Y 5/2	7	C	M	Loamy/Clayey	
			2.5Y 5/4	10	C	M		
			N 2.5/	10	C	M		

[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)
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ 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 Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

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

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-12-9; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Starfire Renewable Power Project City/County: Perry Sampling Date: 3/23/26

Applicant/Owner: STMO bn, LLC State: KY Sampling Point: DP 7

Investigator(s): L. Darnell, C. Slone Section, Township, Range:

Landform (hillside, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 30

Subregion (LRR or MLRA): LRR N, MLRA 125 Lat: 37.39099853 Long: -83.14271895 Datum:

Soil Map Unit Name: SCF - Shelocta-Cutshin-Gilpin complex, 20 to 75 percent slopes NWI classification: N/A

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

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

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

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

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

Remarks:
Upland point to Wetland D

The Antecedent Precipitation Tool rates this date as Wet Season, Drier than Normal (6).

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 in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ 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 X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: DP 7

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Platanus occidentalis*	10	Yes	FACW
2. *Liriodendron tulipifera*	10	Yes	FACU
3.			
4.			
5.			
6.			
7.			
	20	=Total Cover	
50% of total cover: 10		20% of total cover: 4	
Sapling/Shrub Stratum (Plot size:)			
1. *Elaeagnus umbellata*	5	Yes	UPL
2. *Liquidambar styraciflua*	2	Yes	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	7	=Total Cover	
50% of total cover: 4		20% of total cover: 2	
Herb Stratum (Plot size:)			
1. *Miscanthus sinensis*	30	Yes	FACU
2. *Lespedeza cuneata*	10	Yes	FACU
3. *Schedonorus arundinaceus*	10	Yes	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	50	=Total Cover	
50% of total cover: 25		20% of total cover: 10	
Woody Vine Stratum (Plot size:)			
1. *Lonicera japonica*	3	No	FACU
2.			
3.			
4.			
5.			
	3	=Total Cover	
50% of total cover: 2		20% of total cover: 1	

Dominance Test worksheet:

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

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 28.6% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	10	x 2 =	20
FAC species	2	x 3 =	6
FACU species	63	x 4 =	252
UPL species	5	x 5 =	25
Column Totals:	80 (A)		303 (B)

Prevalence Index = B/A = 3.79

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)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

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

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

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

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

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

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

SOIL

Sampling Point: DP 7

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	2.5YR 3/1	75	2.5Y 3/3	15	C	M	Loamy/Clayey	
			2.5Y 4/2	10	C	M		

[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)
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ 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 Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

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

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-12-9; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Starfire Renewable Power Project City/County: Knott Sampling Date: 3/26/26

Applicant/Owner: STMO bn, LLC State: KY Sampling Point: DP 8

Investigator(s): L. Darnell, C. Slone Section, Township, Range:

Landform (hillside, terrace, etc.): Hillslope Local relief (concave, convex, none): Slope (%):

Subregion (LRR or MLRA): LRR N, MLRA 125 Lat: 37.41302463 Long: -83.09903796 Datum:

Soil Map Unit Name: FkE - Fiveblock and Kaymine soils, 0 to 30 percent slopes NWI classification: N/A

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

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

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

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

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

Remarks:
Upland point to Wetland 1

The Antecedent Precipitation Tool rates this date as Wet Season, Drier than Normal (6).

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 in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ 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 X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: DP 8

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Elaeagnus umbellata*	10	Yes	UPL
2.			
3.			
4.			
5.			
6.			
7.			
	10	=Total Cover	
50% of total cover: 5		20% of total cover:	2
Sapling/Shrub Stratum (Plot size:)			
1. *Elaeagnus umbellata*	10	Yes	UPL
2. *Rubus argutus*	10	Yes	FACU
3. *Juniperus virginiana*	2	No	FACU
4.			
5.			
6.			
7.			
8.			
9.			
	22	=Total Cover	
50% of total cover: 11		20% of total cover:	5
Herb Stratum (Plot size:)			
1. *Cerastium sp.*	30	Yes	
2. *Veronica arvensis*	20	Yes	UPL
3. *Cirsium discolor*	15	No	UPL
4. *Bromus inermis*	15	No	
5. *Solidago canadensis*	10	No	FACU
6. *Cardamine hirsuta*	3	No	FACU
7.			
8.			
9.			
10.			
11.			
	93	=Total Cover	
50% of total cover: 47		20% of total cover:	19
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
		=Total Cover	
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (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)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

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

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

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

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

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

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

SOIL

Sampling Point: DP 8

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	2.5Y 3/2	50	2.5Y 3/3	35	C	M	Sandy	Gravel present
			10YR 5/6	15	C	M		

[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)
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ 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 Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: Refusal

Depth (inches): 6

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

Remarks:

Appears to be fill

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-12-9; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Starfire Renewable Power Project City/County: Knott Sampling Date: 3/26/26

Applicant/Owner: STMO bn, LLC State: KY Sampling Point: DP 9

Investigator(s): L. Darnell, C. Slone Section, Township, Range:

Landform (hillside, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): < 1

Subregion (LRR or MLRA): LRR N, MLRA 125 Lat: 37.41306879 Long: -83.09902649 Datum:

Soil Map Unit Name: FkE - Fiveblock and Kaymine soils, 0 to 30 percent slopes NWI classification: N/A

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

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

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

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

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

Remarks:
Point within Wetland 1

The Antecedent Precipitation Tool rates this date as Wet Season, Drier than Normal (6).

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X 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 in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

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

Wetland Hydrology Present? **Yes** X **No** ____

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: DP 9

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size:)			
1. *Scirpus cyperinus*	65	Yes	FACW
2. *Typha latifolia*	5	No	OBL
3. *Solidago gigantea*	5	No	FACW
4. *Ludwigia alternifolia*	3	No	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	78 =Total Cover		
50% of total cover: 39	20% of total cover: 16		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

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

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5	x 1 =	5
FACW species	73	x 2 =	146
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	78 (A)		151 (B)

Prevalence Index = B/A = 1.94

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

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

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

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

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

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

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

SOIL

Sampling Point: DP 9

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	2.5Y 4/1	84	2.5Y 5/3	10	C	M	Sandy	Distinct redox concentrations
			2.5Y 5/6	5	C	M		Prominent redox concentrations
			2.5Y 2.5/1	1	C			

[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)
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- X Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: Refusal

Depth (inches): 6

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

Remarks:

6-inch refusal

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-12-9; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Starfire Renewable Power Project City/County: Knott Sampling Date: 3/23/26

Applicant/Owner: STMO bn, LLC State: KY Sampling Point: DP 10

Investigator(s): J. Robinson, M. Boller Section, Township, Range:

Landform (hillside, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR N, MLRA 125 Lat: 37.43167 Long: -83.06678 Datum: NAD83

Soil Map Unit Name: uMgmF - Matewan-Gilpin-Marrowbone complex, 12-80 percent slopes NWI classification: N/A

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

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

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

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

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

Remarks:
Point within Wetland 3

The Antecedent Precipitation Tool rates this date as Wet Season, Drier than Normal (6).

HYDROLOGY

Wetland Hydrology Indicators:

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

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- X Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- X Water-Stained Leaves (B9)
- X 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 in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No ___	Depth (inches): 1
Water Table Present?	Yes X	No ___	Depth (inches): 3
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): 3

Wetland Hydrology Present? **Yes** X **No** ___

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

Remarks:
Hydrology was artificially established by mine bench pond construction. The pond (Pond 2) has a fringe and part of an approaching roadway that maintains hydrology and has developed into a wetland feature. This hydrology is maintained by precipitation. The pond spillway has created a discontinuous ephemeral channel below.

B13: frogs

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: DP 10

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 5 ft)			
1. *Typha angustifolia*	100	Yes	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 =Total Cover		
50% of total cover: 50	20% of total cover: 20		
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

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

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	100	x 1 =	100
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		100 (B)

Prevalence Index = B/A = 1.00

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

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

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

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

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

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

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

SOIL

Sampling Point: DP 10

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 5/1	80	10YR 5/8	20	C	M	Loamy/Clayey	Prominent redox concentrations

[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)
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ 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 Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: Bedrock

Depth (inches): 10

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

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-12-9; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Starfire Renewable Power Project City/County: Knott Sampling Date: 3/24/26

Applicant/Owner: STMO bn, LLC State: KY Sampling Point: DP 11

Investigator(s): L. Darnell, C. Slone Section, Township, Range:

Landform (hillside, terrace, etc.): Terrace Local relief (concave, convex, none): None Slope (%): 1

Subregion (LRR or MLRA): LRR N, MLRA 125 Lat: 37.42410178 Long: -83.08168711 Datum:

Soil Map Unit Name: uCskF - Cloverlick-Shelocta-Kimper complex, 20 to 80 percent slopes NWI classification: N/A

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

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

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

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

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

Remarks:
Upland point to Wetland 2

The Antecedent Precipitation Tool rates this date as Wet Season, Drier than Normal (6).

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 in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

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

Wetland Hydrology Present? **Yes** ____ **No** X

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: DP 11

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Platanus occidentalis*	60	Yes	FACW
2. *Ulmus americana*	10	No	FACW
3.			
4.			
5.			
6.			
7.			
	70	=Total Cover	
50% of total cover: 35		20% of total cover: 14	
Sapling/Shrub Stratum (Plot size:)			
1. *Sambucus nigra*	2	No	FAC
2. *Acer negundo*	2	No	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	4	=Total Cover	
50% of total cover: 2		20% of total cover: 1	
Herb Stratum (Plot size:)			
1. *Impatiens capensis*	10	Yes	FACW
2. *Symphyotrichum*	5	Yes	
3. *Carex blanda*	3	No	FAC
4. *Elymus virginicus*	3	No	FACW
5. *Erythronium americanum*	2	No	UPL
6. *Polygonum cuspidatum*	2	No	FACU
7.			
8.			
9.			
10.			
11.			
	25	=Total Cover	
50% of total cover: 13		20% of total cover: 5	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
		=Total Cover	
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	83	x 2 =	166
FAC species	7	x 3 =	21
FACU species	2	x 4 =	8
UPL species	2	x 5 =	10
Column Totals:	94 (A)		205 (B)

Prevalence Index = B/A = 2.18

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)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

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

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

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

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

Hydrophytic Vegetation Present? **Yes** ___ **No** ___

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

SOIL

Sampling Point: DP 11

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/3	80	10YR 4/2	10	D	M	Sandy	
			10YR 4/4	10	C	M		Faint redox concentrations

[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)
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ 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 Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ 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** X

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-12-9; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Starfire Renewable Power Project City/County: Knott Sampling Date: 3/24/26

Applicant/Owner: STMO bn, LLC State: KY Sampling Point: DP12

Investigator(s): L. Darnell, C. Slone Section, Township, Range:

Landform (hillside, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): < 1

Subregion (LRR or MLRA): LRR N, MLRA 125 Lat: 37.42409717 Long: -83.08162867 Datum:

Soil Map Unit Name: uCskF - Cloverlick-Shelocta-Kimper complex, 20 to 80 percent slopes NWI classification: N/A

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

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

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

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

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

Remarks:
Point within Wetland 2

The Antecedent Precipitation Tool rates this date as Wet Season, Drier than Normal (6).

HYDROLOGY

Wetland Hydrology Indicators:

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

- ____ Surface Water (A1)
- X High Water Table (A2)
- X 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)
- X 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 in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- X Sparsely Vegetated Concave Surface (B8)
- X Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ 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)
- X FAC-Neutral Test (D5)

Field Observations:

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

Wetland Hydrology Present? **Yes** X **No** ____

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

Remarks:
B13: damselfly/mayfly/stonefly larva, salamander eggs

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: DP12

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Platanus occidentalis*	10	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	10	=Total Cover	
50% of total cover: 5		20% of total cover: 2	
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
		=Total Cover	
50% of total cover:		20% of total cover:	
Herb Stratum (Plot size:)			
1. *Glyceria striata*	10	Yes	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	10	=Total Cover	
50% of total cover: 5		20% of total cover: 2	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
		=Total Cover	
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

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

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	10	x 1 =	10
FACW species	10	x 2 =	20
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	20 (A)		30 (B)

Prevalence Index = B/A = 1.50

Hydrophytic Vegetation Indicators:

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

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

Definitions of Four Vegetation Strata:

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

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

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

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

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

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

SOIL

Sampling Point: DP12

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 4/3	100					Loamy/Clayey	
2-4	10YR 4/2	85	10YR 4/6	15	C	M	Sandy	Prominent redox concentrations
4-9	2.5YR 4/2	85	2.5YR 4/4	15	C	M	Sandy	Distinct redox concentrations

[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)
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- X Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: Refusal

Depth (inches): 9

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

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-12-9; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Starfire Renewable Power Project City/County: Knott Sampling Date: 3/23/26

Applicant/Owner: STMO bn, LLC State: KY Sampling Point: DP 13

Investigator(s): J. Robinson, M. Boller Section, Township, Range:

Landform (hillside, terrace, etc.): Slope Local relief (concave, convex, none): Convex Slope (%): 25-50

Subregion (LRR or MLRA): LRR N, MLRA 125 Lat: 37.43160 Long: -83.06674 Datum: NAD83

Soil Map Unit Name: uMgmF - Matewan-Gilpin-Marrowbone complex (uMgmF), 12-80 percent slopes, very rocky NWI classification: N/A

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

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

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

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

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

Remarks:
Upland point to Wetland 3

The Antecedent Precipitation Tool rates this date as Wet Season, Drier than Normal (6).

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 in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ 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 X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: DP 13

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. *Acer rubrum*	70	Yes	FAC
2. *Fagus grandifolia*	25	Yes	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	95 =Total Cover		
50% of total cover: 48	20% of total cover: 19		
Herb Stratum (Plot size: 5 ft)			
1. *Andropogon virginicus*	15	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	15 =Total Cover		
50% of total cover: 8	20% of total cover: 3		
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

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

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 33.3% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	70	x 3 =	210
FACU species	40	x 4 =	160
UPL species	0	x 5 =	0
Column Totals:	110 (A)		370 (B)

Prevalence Index = B/A = 3.36

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)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

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

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

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

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

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

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

SOIL

Sampling Point: DP 13

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 5/4	100					Loamy/Clayey	
5-12	10YR 3/2	100					Loamy/Clayey	Black shale parent material

[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)
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ 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 Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ 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** X

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-12-9; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Starfire Renewable Power Project City/County: Knott Sampling Date: 3/24/26

Applicant/Owner: STMO bn, LLC State: KY Sampling Point: DP 14

Investigator(s): L. Darnell, C. Slone Section, Township, Range:

Landform (hillside, terrace, etc.): Terrace Local relief (concave, convex, none): Convex Slope (%): 2

Subregion (LRR or MLRA): LRR N, MLRA 125 Lat: 37.43566561 Long: -83.05731052 Datum:

Soil Map Unit Name: uCskF - Cloverlick-Shelocta-Kimper complex, 20 to 80 percent slopes NWI classification: N/A

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

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

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

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

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

Remarks:
Point within Wetland 4

The Antecedent Precipitation Tool rates this date as Wet Season, Drier than Normal (6).

HYDROLOGY

Wetland Hydrology Indicators:

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

- ____ Surface Water (A1)
- X High Water Table (A2)
- X 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)
- X Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ 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 X	Depth (inches): ____
Water Table Present?	Yes X	No ____	Depth (inches): 3
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ____

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

Remarks:
Seep wetland

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: DP 14

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Carpinus caroliniana*	10	Yes	FAC
2. *Fagus grandifolia*	10	Yes	FACU
3.			
4.			
5.			
6.			
7.			
	20	=Total Cover	
50% of total cover: 10		20% of total cover: 4	

Sapling/Shrub Stratum (Plot size:)			
1. *Fagus grandifolia*	2	No	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	2	=Total Cover	
50% of total cover: 1		20% of total cover: 1	

Herb Stratum (Plot size:)			
1. *Carex crinita*	40	Yes	OBL
2. *Packera sp.*	2	No	
3. *Euonymus sp.*	1	No	
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	43	=Total Cover	
50% of total cover: 22		20% of total cover: 9	

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
		=Total Cover	
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	40	x 1 =	40
FACW species	0	x 2 =	0
FAC species	10	x 3 =	30
FACU species	12	x 4 =	48
UPL species	0	x 5 =	0
Column Totals:	62 (A)		118 (B)

Prevalence Index = B/A = 1.90

Hydrophytic Vegetation Indicators:

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

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

Definitions of Four Vegetation Strata:

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

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

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

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

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

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

SOIL

Sampling Point: DP 14

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	2.5Y 5/1	93	10YR 5/8	7	C	PL/M	Sandy	Prominent redox concentrations

[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)
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- X Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

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

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-12-9; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Starfire Renewable Power Project City/County: Knott Sampling Date: 3/24/26
Applicant/Owner: STMO bn, LLC State: KY Sampling Point: DP 15
Investigator(s): L. Darnell, C. Slone Section, Township, Range:
Landform (hillside, terrace, etc.): Terrace Local relief (concave, convex, none): Convex Slope (%): 2
Subregion (LRR or MLRA): LRR N, MLRA 125 Lat: 37.4355303 Long: -83.05735076 Datum:
Soil Map Unit Name: uCskF - Cloverlick-Shelocta-Kimper complex, 20 to 80 percent slopes NWI classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ___ No X (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks:
Upland point to Wetland 4

The Antecedent Precipitation Tool rates this date as Wet Season, Drier than Normal (6).

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X 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 in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ 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 X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): 8

Wetland Hydrology Present? **Yes** X **No** ___

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: DP 15

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Fagus grandifolia*	25	Yes	FACU
2. *Tsuga canadensis*	25	Yes	FACU
3. *Carpinus caroliniana*	25	Yes	FAC
4. *Acer rubrum*	20	No	FAC
5. *Liriodendron tulipifera*	15	No	FACU
6.			
7.			
	110	=Total Cover	
50% of total cover: 55		20% of total cover: 22	
Sapling/Shrub Stratum (Plot size:)			
1. *Fagus grandifolia*	5	Yes	FACU
2. *Prunus sp.*	2	Yes	
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	7	=Total Cover	
50% of total cover: 4		20% of total cover: 2	
Herb Stratum (Plot size:)			
1. *Polystichum acrostichoides*	3	Yes	FACU
2. *Dentaria diphylla*	2	Yes	FACU
3. *Packera sp.*	1	No	
4. *Polygonum cuspidatum*	1	No	FACU
5. *Luzula acuminata*	1	No	FAC
6.			
7.			
8.			
9.			
10.			
11.			
	8	=Total Cover	
50% of total cover: 4		20% of total cover: 2	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
		=Total Cover	
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

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

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 14.3% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	46	x 3 =	138
FACU species	76	x 4 =	304
UPL species	0	x 5 =	0
Column Totals:	122 (A)		442 (B)

Prevalence Index = B/A = 3.62

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)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

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

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

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

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

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

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

SOIL

Sampling Point: DP 15

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	2.5Y 5/1	60	2.5Y 5/2	30	C	M	Sandy	
			2.5Y 5/4	10	C	M		

[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)
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- X Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

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

Remarks:

Appendix C

Stream Assessment Forms

High Gradient Bioassessment Stream Visit Sheet

Stream Name:	Perennial 1 (Squire Branch)			**Location:**	Starfire Renewable Power Project		
				Basin/Watershed:	Buckhorn Creek, HUC12:051002010506		
Lat:	37.42319	**Long:**	-83.08689	**County:**	Knott	**USGS 7.5 Topo:**	Vest
Date:	3/26/2026			**Investigators:**	MB/JK		

Type Sample: ☑ P-CHEM ☐ Macroinvertebrate ☐ Fish ☐ Bact.

WEATHER CONDITIONS:	Current	Past 24-Hours	Has there been rain in the last 7 days?
	☐ Heavy Rain	☐ Heavy Rain	☑ Yes ☐ No
	☐ Steady Rain	☐ Steady Rain	Appr. Air Temp: 70 °F ____ °C
	☐ Intermittent Showers	☐ Intermittent Showers	Inches of rainfall in the past 24 hrs: 0 in
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast	50 % Cloud Cover

P-Chem: Temp (°F) ____ D.O. (mg/L) ____ % Saturation ____ pH (S.U.) ____ Conductivity (µS) 1356 ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	10	ft
Stream Width BF	15	ft
Stream Bottom Width		ft
Avg. Bankfull Depth	2-3	ft
Avg. H_2O Depth Riffle	2	in

Local Watershed Features:
Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☑ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:
☐ Dams ☐ Bridge Abutments
☐ Island ☐ Waterfalls
☐ Other ☐ Culverts

Stream Flow:
☐ Dry ☐ Pooled ☐ Low ☑ Normal
☐ High ☐ Very Rapid or Torrential

Stream Type:
☑ Perennial ☐ Intermittent
☐ Ephemeral ☐ Seep

Riparian Vegetation:
Dominate Type:
☑ Trees ☑ Shrubs ☐ Grasses ☐ Herbaceous
Number of strata:

Dom. Tree/Shrub Taxa:
Red Maple
Tulip Poplar
Red Oak

Canopy Cover:
☐ Fully Exposed (0-25%)
☐ Partially Exposed (25-50%)
☐ Partially Shaded (50-75%)
☑ Fully Shaded (75-100%)

Channel Alterations:
☐ Dredging
☐ Channelization
(☐ Full ☐ Partial)

Substrate: ☐ Est. ☐ P.C.	Riffle 70 %	Run 10 %	Pool 20 %
Silt/Clay(<0.06 mm / <0.002 in)	X	X	X
Sand (0.06 - 2 mm / 0.002-0.08 in)	X	X	X
Gravel (2 - 64 mm / 0.08 - 2.5 in)	X	X	X
Cobble (64 - 256 mm / 2.5 - 10.1 in)	X		
Boulders (>256 mm / >10.1 in)	X		
Bedrock	X		X

Habitat Parameter	Optimal	Sub-optimal	Marginal	Poor
1. Epifaunal Substrate / Available Cover	Greater than 70% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	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

☐	☐	☐	☐	☑	☐	X ☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
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 slowdeep).
Score 15	☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	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; 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 11	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score 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 16	☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) 3	Left Bank ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			
Score (RB) 4	Right Bank ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			

9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**6**	Left Bank ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
		10 9 8 7 6 5 4 3 2 1 0			
Score (RB)	**6**	Right Bank ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
		10 9 8 7 6 5 4 3 2 1 0			
10. Riparian Vegetative Zone Width (score each bank riparian zone) Note: determine left or right side by facing downstream.	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**9**	Left Bank ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
		10 9 8 7 6 5 4 3 2 1 0			
Score (RB)	**9**	Right Bank ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
		10 9 8 7 6 5 4 3 2 1 0			
TOTAL SCORE	**127**				

High Gradient Bioassessment Stream Visit Sheet

Stream Name:	Perennial 2 (Buckhorn Creek)			**Location:**	Starfire Renewable Power Project		
				Basin/Watershed:	Buckhorn Creek, HUC12: 051002010506		
Lat:	37.42425	**Long:**	-83.0821	**County:**	Knott	**USGS 7.5 Topo:**	Vest
Date:	3/24/2026			**Investigators:**	MB/JK		

Type Sample: ☑ P-CHEM ☐ Macroinvertebrate ☐ Fish ☐ Bact.

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ Yes ☐ No

Appr. Air Temp: 45 °F ____ °C

Inches of rainfall in the past 24 hrs: 0.1 in

50 % Cloud Cover

P-Chem: Temp (°F) ____ D.O. (mg/L) ____ % Saturation ____ pH (S.U.) ____ Conductivity (µS) 576 ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	10-15	ft
Stream Width BF	25-40	ft
Stream Bottom Width		ft
Avg. Bankfull Depth	4	ft
Avg. H_2O Depth Riffle	3	in

Local Watershed Features:
Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☑ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:
☐ Dams ☐ Bridge Abutments
☐ Island ☐ Waterfalls
☑ Other Crossing ☐ Culverts

Stream Flow:
☐ Dry ☐ Pooled ☐ Low ☑ Normal
☐ High ☐ Very Rapid or Torrential

Stream Type:
☑ Perennial ☐ Intermittent
☐ Ephemeral ☐ Seep

Riparian Vegetation:
Dominate Type:
☑ Trees ☑ Shrubs
☑ Grasses ☑ Herbaceous
Number of strata:

Dom. Tree/Shrub Taxa:
Red Oak
Hemlock
Sycamore
Multiflora Rose

Canopy Cover:
☐ Fully Exposed (0-25%)
☐ Partially Exposed (25-50%)
☑ Partially Shaded (50-75%)
☐ Fully Shaded (75-100%)

Channel Alterations:
☐ Dredging
☐ Channelization
(☐ Full ☐ Partial)

Substrate: ☐ Est. ☐ P.C.	Riffle 35 %	Run 50 %	Pool 15 %
Silt/Clay(<0.06 mm / <0.002 in)	X	X	X
Sand (0.06 - 2 mm / 0.002-0.08 in)	X	X	X
Gravel (2 - 64 mm / 0.08 - 2.5 in)	X	X	X
Cobble (64 - 256 mm / 2.5 - 10.1 in)	X	X	X
Boulders (>256 mm / >10.1 in)			
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	Greater than 70% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	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
☐	☐	☐	☐	☐	☐	X	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

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 slowdeep).								
Score	**15**	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐					
		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; 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	**15**	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐					
		20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0					
6.	**Channel Alteration**	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.						Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.								
Score	**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	**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 frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.								
Score (LB)	**5**	Left Bank	☐	☐			☐	☐	☐				☑	☐	☐					☐	☐	☐						
			10	9			8	7	6				5	4	3					2	1	0						
Score (RB)	**6**	Right Bank	☐	☐			☐	☐	☑				☐	☐	☐					☐	☐	☐						
			10	9			8	7	6				5	4	3					2	1	0						

9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.		More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**8**	Left Bank	☑ 8			
		10 9	8 7 6	5 4 3	2 1 0	
Score (RB)	**8**	Right Bank	☑ 8			
		10 9	8 7 6	5 4 3	2 1 0	
10. Riparian Vegetative Zone Width (score each bank riparian zone) Note: determine left or right side by facing downstream.		Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**10**	Left Bank	☑ 10			
		10 9	8 7 6	5 4 3	2 1 0	
Score (RB)	**10**	Right Bank	☑ 10			
		10 9	8 7 6	5 4 3	2 1 0	
TOTAL SCORE	**136**					

High Gradient Bioassessment Stream Visit Sheet

Stream Name:	Perennial 3 (Schoolhouse Branch)	**Location:**	Starfire Renewable Power Project
		Basin/Watershed:	Buckhorn Creek, HUC12: 051002010506
Lat:	37.42953	**Long:**	-83.07537
County:	Knott	**USGS 7.5 Topo:**	Vest
Date:	3/24/2026	**Investigators:**	MB/JRR

Type Sample: ☑ P-CHEM ☐ Macroinvertebrate ☐ Fish ☐ Bact.

WEATHER CONDITIONS:

Current	Past 24-Hours
☐ Heavy Rain	☐ Heavy Rain
☐ Steady Rain	☐ Steady Rain
☐ Intermittent Showers	☐ Intermittent Showers
☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ Yes ☐ No

Appr. Air Temp: 45 °F ____ °C

Inches of rainfall in the past 24 hrs: 0.1 in

50 % Cloud Cover

P-Chem: Temp (°F) ____ D.O. (mg/L) ____ % Saturation ____ pH (S.U.) ____ Conductivity (µS) 2700 ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	2-4	ft
Stream Width BF	4-5	ft
Stream Bottom Width		ft
Avg. Bankfull Depth	1	ft
Avg. H_2O Depth Riffle	1	in

Local Watershed Features:
Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☑ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☑ Other Fill abov	☐ Culverts

Stream Flow: ☐ Dry ☐ Pooled ☐ Low ☑ Normal ☐ High ☐ Very Rapid or Torrential

Stream Type: ☑ Perennial ☐ Intermittent ☐ Ephemeral ☐ Seep

Riparian Vegetation:
Dominate Type: ☐ Trees ☑ Shrubs ☑ Grasses ☑ Herbaceous
Number of strata:
Dom. Tree/Shrub Taxa: Autumn Olive

Canopy Cover: ☑ Fully Exposed (0-25%) ☐ Partially Exposed (25-50%) ☐ Partially Shaded (50-75%) ☐ Fully Shaded (75-100%)

Channel Alterations: ☐ Dredging ☐ Channelization (☐ Full ☐ Partial)

Substrate: ☐ Est. ☐ P.C.

	Riffle 70 %	Run 0 %	Pool 30 %
Silt/Clay(<0.06 mm / <0.002 in)	X		X
Sand (0.06 - 2 mm / 0.002-0.08 in)	X		X
Gravel (2 - 64 mm / 0.08 - 2.5 in)	X		X
Cobble (64 - 256 mm / 2.5 - 10.1 in)	X		
Boulders (>256 mm / >10.1 in)			
Bedrock			

Habitat Parameter	Optimal	Sub-optimal	Marginal	Poor
1. Epifaunal Substrate / Available Cover	Greater than 70% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	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
☐	☐	☐	☐	☐	☐	X	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐

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 slowdeep).								
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; 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	**17**	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐				
		20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0					
6.	**Channel Alteration**	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.						Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.						Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.								
Score	**6**	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐				
		20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0					
7.	**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 frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.								
Score (LB)	**8**	Left Bank	☐	☐			☑	☐	☐				☐	☐	☐				☐	☐	☐							
			10	9			8	7	6				5	4	3				2	1	0							
Score (RB)	**9**	Right Bank	☐	☑			☐	☐	☐				☐	☐	☐				☐	☐	☐							
			10	9			8	7	6				5	4	3				2	1	0							

9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.		
Score (LB)	**4**	Left Bank ☐ ☐	☐ ☐ ☐	☐ ☑ ☐	☐ ☐ ☐	
		10 9	8 7 6	5 4 3	2 1 0	
Score (RB)	**5**	Right Bank ☐ ☐	☐ ☐ ☐	☑ ☐ ☐	☐ ☐ ☐	
		10 9	8 7 6	5 4 3	2 1 0	
10. Riparian Vegetative Zone Width (score each bank riparian zone) Note: determine left or right side by facing downstream.	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.		
Score (LB)	**4**	Left Bank ☐ ☐	☐ ☐ ☐	☐ ☑ ☐	☐ ☐ ☐	
		10 9	8 7 6	5 4 3	2 1 0	
Score (RB)	**4**	Right Bank ☐ ☐	☐ ☐ ☐	☐ ☑ ☐	☐ ☐ ☐	
		10 9	8 7 6	5 4 3	2 1 0	
TOTAL SCORE	**90**					

High Gradient Bioassessment Stream Visit Sheet

Stream Name:	Perennial Stream 4			**Location:**	Starfire Renewable Power Project		
				Basin/Watershed:	Buckhorn creek, HUC12: 051002010506		
Lat:	37.4301	**Long:**	-83.07518	**County:**	Knott	**USGS 7.5 Topo:**	Vest
Date:	3/24/2026			**Investigators:**	MB/JRR		

Type Sample: ☑ P-CHEM ☐ Macroinvertebrate ☐ Fish ☐ Bact.

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ Yes ☐ No

Appr. Air Temp: 45 °F ____ °C

Inches of rainfall in the past 24 hrs: 0.1 in

50 % Cloud Cover

P-Chem: Temp (°F) ____ D.O. (mg/L) ____ % Saturation ____ pH (S.U.) ____ Conductivity (µS) 2700 ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	1-3	ft
Stream Width BF	2-4	ft
Stream Bottom Width		ft
Avg. Bankfull Depth	2	ft
Avg. H_2O Depth Riffle	1	in

Local Watershed Features:
Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☑ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:
☐ Dams ☐ Bridge Abutments
☐ Island ☐ Waterfalls
☑ Other Fill abov ☐ Culverts

Stream Flow:
☐ Dry ☐ Pooled ☐ Low ☑ Normal
☐ High ☐ Very Rapid or Torrential

Stream Type:
☑ Perennial ☐ Intermittent
☐ Ephemeral ☐ Seep

Riparian Vegetation:
Dominate Type:
☑ Trees ☑ Shrubs
☑ Grasses ☑ Herbaceous
Number of strata:

Dom. Tree/Shrub Taxa:
Sweet Gum
Autumn Olive

Canopy Cover:
☐ Fully Exposed (0-25%)
☐ Partially Exposed (25-50%)
☑ Partially Shaded (50-75%)
☐ Fully Shaded (75-100%)

Channel Alterations:
☐ Dredging
☐ Channelization
(☐ Full ☐ Partial)

Substrate: ☐ Est. ☐ P.C.	Riffle 90 %	Run 0 %	Pool 10 %
Silt/Clay(<0.06 mm / <0.002 in)	X		X
Sand (0.06 - 2 mm / 0.002-0.08 in)	X		X
Gravel (2 - 64 mm / 0.08 - 2.5 in)	X		X
Cobble (64 - 256 mm / 2.5 - 10.1 in)			X
Boulders (>256 mm / >10.1 in)	X		
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	Greater than 70% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	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
☐	☐	☐	☐	☐	☐	X	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐

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 slowdeep).
Score 7	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; 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 18	20 19 ☑18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 ☑6	5 4 3 2 1 0
7. 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 frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) 7	Left Bank 10 9	8 ☑7 6	5 4 3	2 1 0
Score (RB) 7	Right Bank 10 9	8 ☑7 6	5 4 3	2 1 0

9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.		
Score (LB)	**2**	Left Bank ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☑ ☐ ☐	
		10 9	8 7 6	5 4 3	2 1 0	
Score (RB)	**7**	Right Bank ☐ ☐	☐ ☑ ☐	☐ ☐ ☐	☐ ☐ ☐	
		10 9	8 7 6	5 4 3	2 1 0	
10. Riparian Vegetative Zone Width (score each bank riparian zone) Note: determine left or right side by facing downstream.	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.		
Score (LB)	**2**	Left Bank ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☑ ☐ ☐	
		10 9	8 7 6	5 4 3	2 1 0	
Score (RB)	**5**	Right Bank ☐ ☐	☐ ☐ ☐	☑ ☐ ☐	☐ ☐ ☐	
		10 9	8 7 6	5 4 3	2 1 0	
TOTAL SCORE	**85**					

High Gradient Bioassessment Stream Visit Sheet

Stream Name:	**Perennial 5 (Upper Garden Branch)**			**Location:**	**Starfire Renewable Power Project**		
				Basin/Watershed:	**Buckhorn Creek, HUC 12:051002010506**		
Lat:	**37.43378**	**Long:**	**-83.006607**	**County:**	**Knott**	**USGS 7.5 Topo:**	**Vest**
Date:	**3/24/2026**			**Investigators:**	**MB/JRR**		

Type Sample: ☑ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **58** **°F** ____ **°C**

Inches of rainfall in the past 24 hrs: **0.1** in

50 **% Cloud Cover**

P-Chem: Temp (°F) ____ D.O. (mg/L) ____ % Saturation ____ pH (S.U.) ____ Conductivity (µS) 1090 ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	6	ft
Stream Width BF	10	ft
Stream Bottom Width		ft
Avg. Bankfull Depth	2-3	ft
Avg. H_2O Depth Riffle	2	in

Local Watershed Features:
Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☑ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☐ Culverts

Stream Flow:
☐ Dry ☐ Pooled ☐ Low ☑ Normal
☐ High ☐ Very Rapid or Torrential

Stream Type:

☑ Perennial	☐ Intermittent
☐ Ephemeral	☐ Seep

Riparian Vegetation:
Dominate Type:
☑ Trees ☑ Shrubs ☐ Grasses ☐ Herbaceous
Number of strata: ____

Dom. Tree/Shrub Taxa:
Red Oak
Red Maple

Canopy Cover:
☐ Fully Exposed (0-25%)
☐ Partially Exposed (25-50%)
☐ Partially Shaded (50-75%)
☑ Fully Shaded (75-100%)

Channel Alterations:
☐ Dredging
☐ Channelization
(☐ Full ☐ Partial)

Substrate: ☐ Est. ☐ P.C.	Riffle 35 %	50 10 %	Pool 15 %
Silt/Clay(<0.06 mm / <0.002 in)	X	X	X
Sand (0.06 - 2 mm / 0.002-0.08 in)	X	X	X
Gravel (2 - 64 mm / 0.08 - 2.5 in)	X	X	X
Cobble (64 - 256 mm / 2.5 - 10.1 in)	X	X	
Boulders (>256 mm / >10.1 in)			
Bedrock	X		X

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	Greater than 70% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

Score **15**

20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
☐	☐	☐	☐	☐	☑	X ☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

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 slowdeep).	
Score	**15**	☐ 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; 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.	
Score	**6**	☐ 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	**15**	☐ 20 ☐ 19 ☐ 18 ☐ 17 ☐ 16	☑ 15 ☐ 14 ☐ 13 ☐ 12 ☐ 11	☐ 10 ☐ 9 ☐ 8 ☐ 7 ☐ 6	☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ 0	
6. Channel Alteration		Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.	
Score	**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	**16**	☐ 20 ☐ 19 ☐ 18 ☐ 17 ☑ 16	☐ 15 ☐ 14 ☐ 13 ☐ 12 ☐ 11	☐ 10 ☐ 9 ☐ 8 ☐ 7 ☐ 6	☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ 0	
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.		Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.	
Score (LB)	**7**	Left Bank ☐ 10 ☐ 9	☐ 8 ☑ 7 ☐ 6	☐ 5 ☐ 4 ☐ 3	☐ 2 ☐ 1 ☐ 0	
Score (RB)	**6**	Right Bank ☐ 10 ☐ 9	☐ 8 ☐ 7 ☑ 6	☐ 5 ☐ 4 ☐ 3	☐ 2 ☐ 1 ☐ 0	

9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.		More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
Score (LB)	**6**	Left Bank			
		10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**6**	Right Bank			
		10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone) Note: determine left or right side by facing downstream.		Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
Score (LB)	**9**	Left Bank			
		10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**9**	Right Bank			
		10 9	8 7 6	5 4 3	2 1 0
TOTAL SCORE	**130**				

High Gradient Bioassessment Stream Visit Sheet

Stream Name:	Perennial 6 (Eli Fork)			**Location:**	Starfire Renewable Power Project		
				Basin/Watershed:	Buckhorn Creek, HUC 12:051002010506		
Lat:	37.43593	**Long:**	-83.05733	**County:**	Knott	**USGS 7.5 Topo:**	Vest
Date:	3/24/2026			**Investigators:**	C. Slone		

Type Sample: ☑ P-CHEM ☐ Macroinvertebrate ☐ Fish ☐ Bact.

WEATHER CONDITIONS:	Current	Past 24-Hours	Has there been rain in the last 7 days?
	☐ Heavy Rain	☐ Heavy Rain	☑ Yes ☐ No
	☐ Steady Rain	☐ Steady Rain	Appr. Air Temp: 50 °F ____ °C
	☐ Intermittent Showers	☐ Intermittent Showers	Inches of rainfall in the past 24 hrs: 0.1 in
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast	50 % Cloud Cover

P-Chem: Temp (°F) ____ D.O. (mg/L) ____ % Saturation ____ pH (S.U.) ____ Conductivity (µS) 32 ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	4-10	ft
Stream Width BF	8-12	ft
Stream Bottom Width		ft
Avg. Bankfull Depth	4	ft
Avg. H_2O Depth Riffle	2	in

Local Watershed Features:
Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☐ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:
☐ Dams ☐ Bridge Abutments
☐ Island ☐ Waterfalls
☐ Other ☐ Culverts

Stream Flow:
☐ Dry ☐ Pooled ☐ Low ☑ Normal
☐ High ☐ Very Rapid or Torrential

Stream Type:
☑ Perennial ☐ Intermittent
☐ Ephemeral ☐ Seep

Riparian Vegetation:
Dominate Type:
☑ Trees ☑ Shrubs
☐ Grasses ☑ Herbaceous
Number of strata:

Dom. Tree/Shrub Taxa:
Beech
Red Maple
Ironwood

Canopy Cover:
☐ Fully Exposed (0-25%)
☐ Partially Exposed (25-50%)
☑ Partially Shaded (50-75%)
☐ Fully Shaded (75-100%)

Channel Alterations:
☐ Dredging
☐ Channelization
(☐ Full ☐ Partial)

Substrate: ☐ Est. ☐ P.C.	Riffle 50 %	Run 30 %	Pool 20 %
Silt/Clay(<0.06 mm / <0.002 in)	X	X	X
Sand (0.06 - 2 mm / 0.002-0.08 in)	X	X	X
Gravel (2 - 64 mm / 0.08 - 2.5 in)	X	X	X
Cobble (64 - 256 mm / 2.5 - 10.1 in)	X	X	X
Boulders (>256 mm / >10.1 in)			
Bedrock			

Habitat Parameter	Condition Category: Optimal	Sub-optimal	Marginal	Poor
1. Epifaunal Substrate / Available Cover	Greater than 70% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	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 19

☐ 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 slowdeep).						
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; 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	**18**	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
		20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0			
6.	**Channel Alteration**	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.						Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.						Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.						
Score	**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	**17**	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
		20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0			
8.	**Bank Stability (score each bank)** Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.					Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.						Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.						Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.						
Score (LB)	**10**	Left Bank	☑	☐			☐	☐	☐				☐	☐	☐				☐	☐	☐				
			10	9			8	7	6				5	4	3				2	1	0				
Score (RB)	**10**	Right Bank	☑	☐			☐	☐	☐				☐	☐	☐				☐	☐	☐				
			10	9			8	7	6				5	4	3				2	1	0				

9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.		More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**10**	Left Bank ☑ 10 ☐ 9	☐ 8 ☐ 7 ☐ 6	☐ 5 ☐ 4 ☐ 3	☐ 2 ☐ 1 ☐ 0	
Score (RB)	**10**	Right Bank ☑ 10 ☐ 9	☐ 8 ☐ 7 ☐ 6	☐ 5 ☐ 4 ☐ 3	☐ 2 ☐ 1 ☐ 0	
10. Riparian Vegetative Zone Width (score each bank riparian zone) Note: determine left or right side by facing downstream.		Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**10**	Left Bank ☑ 10 ☐ 9	☐ 8 ☐ 7 ☐ 6	☐ 5 ☐ 4 ☐ 3	☐ 2 ☐ 1 ☐ 0	
Score (RB)	**8**	Right Bank ☐ 10 ☐ 9	☑ 8 ☐ 7 ☐ 6	☐ 5 ☐ 4 ☐ 3	☐ 2 ☐ 1 ☐ 0	
TOTAL SCORE	**183**					

High Gradient Bioassessment Stream Visit Sheet

Stream Name:	Perennial 7 (Baker Branch)	**Location:**	Starfire Renewable Power Project
		Basin/Watershed:	HUC 12: Lower Laurel Fork 051002010602
Lat:	37.43486	**Long:**	-83.03021
County:	Knott	**USGS 7.5 Topo:**	Vest
Date:	3/25/2026	**Investigators:**	MB/JK

Type Sample: ☑ P-CHEM ☐ Macroinvertebrate ☐ Fish ☐ Bact.

WEATHER CONDITIONS:

Current	Past 24-Hours
☐ Heavy Rain	☐ Heavy Rain
☐ Steady Rain	☐ Steady Rain
☐ Intermittent Showers	☑ Intermittent Showers
☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ Yes ☐ No

Appr. Air Temp: 70 °F ____ °C

Inches of rainfall in the past 24 hrs: 0 in

50 % Cloud Cover

P-Chem: Temp (°F) ____ D.O. (mg/L) ____ % Saturation ____ pH (S.U.) ____ Conductivity (µS) 1668 ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	10	ft
Stream Width BF	15	ft
Stream Bottom Width		ft
Avg. Bankfull Depth	3	ft
Avg. H_2O Depth Riffle	2	in

Local Watershed Features:
Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☑ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:
☐ Dams ☐ Bridge Abutments
☐ Island ☐ Waterfalls
☑ Other Crossing ☐ Culverts

Stream Flow:
☐ Dry ☐ Pooled ☐ Low ☑ Normal
☐ High ☐ Very Rapid or Torrential

Stream Type:
☑ Perennial ☐ Intermittent
☐ Ephemeral ☐ Seep

Riparian Vegetation:
Dominate Type:
☑ Trees ☑ Shrubs ☐ Grasses ☑ Herbaceous
Number of strata:

Dom. Tree/Shrub Taxa:
Red Oak
Tulip Poplar

Canopy Cover:
☐ Fully Exposed (0-25%)
☐ Partially Exposed (25-50%)
☐ Partially Shaded (50-75%)
☑ Fully Shaded (75-100%)

Channel Alterations:
☐ Dredging
☐ Channelization
(☐ Full ☐ Partial)

Substrate: ☐ Est. ☐ P.C.	Riffle 20 %	Run 80 %	Pool 0 %
Silt/Clay(<0.06 mm / <0.002 in)	X	X	
Sand (0.06 - 2 mm / 0.002-0.08 in)	X	X	
Gravel (2 - 64 mm / 0.08 - 2.5 in)	X	X	
Cobble (64 - 256 mm / 2.5 - 10.1 in)	X	X	
Boulders (>256 mm / >10.1 in)			
Bedrock			

Habitat Parameter	Optimal	Sub-optimal	Marginal	Poor
1. Epifaunal Substrate / Available Cover	Greater than 70% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	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 10

20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
☐	☐	☐	☐	☐	☐	X	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

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 slowdeep).
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; 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 15	☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score 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 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 frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) 3	Left Bank ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			
Score (RB) 5	Right Bank ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			

9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**4**	Left Bank ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐			
		10 9 8 7 6 5 4 3 2 1 0			
Score (RB)	**6**	Right Bank ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
		10 9 8 7 6 5 4 3 2 1 0			
10. Riparian Vegetative Zone Width (score each bank riparian zone) Note: determine left or right side by facing downstream.	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**3**	Left Bank ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐			
		10 9 8 7 6 5 4 3 2 1 0			
Score (RB)	**5**	Right Bank ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐			
		10 9 8 7 6 5 4 3 2 1 0			
TOTAL SCORE	**103**				

High Gradient Bioassessment Stream Visit Sheet

Stream Name:	**Intermittent Stream 1 (Hurricane Branch)**			**Location:**	**Starfire Renewable Power Project**		
				Basin/Watershed:	**Buckhorn Creek, HUC12:051002010506**		
Lat:	**37.4128**	**Long:**	**-83.0986**	**County:**	**Knott**	**USGS 7.5 Topo:**	**Vest**
Date:	**3/26/2026**			**Investigators:**	**C. Slone, L. Darnell**		
Type Sample:	☐ **P-CHEM**	☐ **Macroinvertebrate**	☐ **Fish**	☐ **Bact.**			

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **65** **°F** ____ **°C**

Inches of rainfall in the past 24 hrs: **0** in

70 **% Cloud Cover**

P-Chem: Temp (°F) ____ D.O. (mg/L) ____ % Saturation ____ pH (S.U.) ____ Conductivity (µS) ____ ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	1	ft
Stream Width BF	2-4	ft
Stream Bottom Width		ft
Avg. Bankfull Depth	0.5	ft
Avg. H_2O Depth Riffle	<1	in

Local Watershed Features:
Predominant Surrounding Land Use:

☑ Surface Mining	☐ Construction	☐ Forest
☐ Deep Mining	☐ Commercial	☑ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☐ Culverts

Stream Flow:
☐ Dry ☑ Pooled ☑ Low ☐ Normal
☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial	☑ Intermittent
☐ Ephemeral	☐ Seep

Riparian Vegetation:
Dominate Type:

☐ Trees	☐ Shrubs		
☑ Grasses	☐ Herbaceous		

Number of strata: ____

Dom. Tree/Shrub Taxa: Autumn Olive

Canopy Cover:
☑ Fully Exposed (0-25%)
☐ Partially Exposed (25-50%)
☐ Partially Shaded (50-75%)
☐ Fully Shaded (75-100%)

Channel Alterations:
☐ Dredging
☑ Channelization
(☑ Full ☐ Partial)

Substrate: ☐ Est. ☑ P.C.

	Riffle 75 %	Run 10 %	Pool 15 %
Silt/Clay(<0.06 mm / <0.002 in)	X	X	X
Sand (0.06 - 2 mm / 0.002-0.08 in)			
Gravel (2 - 64 mm / 0.08 - 2.5 in)	X	X	X
Cobble (64 - 256 mm / 2.5 - 10.1 in)	X	X	X
Boulders (>256 mm / >10.1 in)			
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	Greater than 70% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	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

Parameter				
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 slowdeep).
Score 13	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; 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 15	20 19 18 17 16	☑15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 ☑2 1 0
7. 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 frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) 7	Left Bank 10 9	8 ☑7 6	5 4 3	2 1 0
Score (RB) 7	Right Bank 10 9	8 ☑7 6	5 4 3	2 1 0

9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**5**	Left Bank ☐ ☐	☐ ☐ ☐	☑ ☐ ☐	☐ ☐ ☐
		10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**5**	Right Bank ☐ ☐	☐ ☐ ☐	☑ ☐ ☐	☐ ☐ ☐
		10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone) Note: determine left or right side by facing downstream.	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**5**	Left Bank ☐ ☐	☐ ☐ ☐	☑ ☐ ☐	☐ ☐ ☐
		10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**5**	Right Bank ☐ ☐	☐ ☐ ☐	☑ ☐ ☐	☐ ☐ ☐
		10 9	8 7 6	5 4 3	2 1 0
TOTAL SCORE	**88**				

High Gradient Bioassessment Stream Visit Sheet

Stream Name:	**Intermittent 2**			**Location:**	**Starfire Renewable Power Project**		
				Basin/Watershed:	**Buckhorn Creek, HUC12:051002010506**		
Lat:	**37.42063**	**Long:**	**-83.087**	**County:**	**Knott**	**USGS 7.5 Topo:**	**Vest**
Date:	**3/26/2026**			**Investigators:**	**MB/JK**		

Type Sample: ☑ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **70** **°F** ____ **°C**

Inches of rainfall in the past 24 hrs: **0** in

50 **% Cloud Cover**

P-Chem: Temp (°F) ____ D.O. (mg/L) ____ % Saturation ____ pH (S.U.) ____ Conductivity (µS) 199 ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	____	ft
Stream Width BF	8	ft
Stream Bottom Width	____	ft
Avg. Bankfull Depth	1.5	ft
Avg. H_2O Depth Riffle	____	in

Local Watershed Features:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☑ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams ☐ Bridge Abutments
☐ Island ☐ Waterfalls
☐ Other ☐ Culverts

Stream Flow:

☐ Dry ☐ Pooled ☐ Low ☑ Normal
☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial ☑ Intermittent
☐ Ephemeral ☐ Seep

Riparian Vegetation:

Dominate Type:
☑ Trees ☑ Shrubs
☐ Grasses ☐ Herbaceous
Number of strata: ____

Dom. Tree/Shrub Taxa:
Red Oak
Red Maple

Canopy Cover:

☐ Fully Exposed (0-25%)
☐ Partially Exposed (25-50%)
☐ Partially Shaded (50-75%)
☑ Fully Shaded (75-100%)

Channel Alterations:

☐ Dredging
☐ Channelization
(☐ Full ☐ Partial)

Substrate: ☐ Est. ☐ P.C.

	Riffle 90 %	Run ____ %	Pool 10 %
Silt/Clay(<0.06 mm / <0.002 in)	X		X
Sand (0.06 - 2 mm / 0.002-0.08 in)	X		X
Gravel (2 - 64 mm / 0.08 - 2.5 in)	X		
Cobble (64 - 256 mm / 2.5 - 10.1 in)	X		
Boulders (>256 mm / >10.1 in)	X		
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	Greater than 70% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	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
☐	☐	☐	☐	☐	☐	X	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

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 slowdeep).
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; 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 5	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score 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 16	☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) 2	Left Bank ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			
Score (RB) 3	Right Bank ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			

9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.		More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**6**	Left Bank ☐ ☐	☐ ☐ ☑	☐ ☐ ☐	☐ ☐ ☐	
		10 9	8 7 6	5 4 3	2 1 0	
Score (RB)	**6**	Right Bank ☐ ☐	☐ ☐ ☑	☐ ☐ ☐	☐ ☐ ☐	
		10 9	8 7 6	5 4 3	2 1 0	
10. Riparian Vegetative Zone Width (score each bank riparian zone) Note: determine left or right side by facing downstream.		Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**6**	Left Bank ☐ ☐	☐ ☐ ☑	☐ ☐ ☐	☐ ☐ ☐	
		10 9	8 7 6	5 4 3	2 1 0	
Score (RB)	**6**	Right Bank ☐ ☐	☐ ☐ ☑	☐ ☐ ☐	☐ ☐ ☐	
		10 9	8 7 6	5 4 3	2 1 0	
TOTAL SCORE	**98**					

High Gradient Bioassessment Stream Visit Sheet

Stream Name:	**Intermittent 3**			**Location:**	**Starfire Renewable Power Project**		
				Basin/Watershed:	**Buckhorn Creek, HUC12:051002010506**		
Lat:	**37.4204**	**Long:**	**-83.08546**	**County:**	**Knott**	**USGS 7.5 Topo:**	**Vest**
Date:	**3/24/2026**			**Investigators:**	**MB/JK**		

Type Sample: ☑ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **70** **°F** ____ **°C**

Inches of rainfall in the past 24 hrs: **0.1** in

50 **% Cloud Cover**

P-Chem: Temp (°F) ____ D.O. (mg/L) ____ % Saturation ____ pH (S.U.) ____ Conductivity (µS) 1106 ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	____	ft
Stream Width BF	12	ft
Stream Bottom Width	____	ft
Avg. Bankfull Depth	____	ft
Avg. H_2O Depth Riffle	____	in

Local Watershed Features:
Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☑ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☑ Other	☐ Culverts

Stream Flow:

☐ Dry	☐ Pooled	☑ Low	☐ Normal	
☐ High	☐ Very Rapid or Torrential			

Stream Type:

☐ Perennial	☑ Intermittent
☐ Ephemeral	☐ Seep

Riparian Vegetation:

Dominate Type:

☑ Trees	☑ Shrubs	**Dom. Tree/Shrub Taxa:**	Red Oak
☐ Grasses	☐ Herbaceous		Red Maple
Number of strata:			

Canopy Cover:

☐ Fully Exposed (0-25%)	
☐ Partially Exposed (25-50%)	
☐ Partially Shaded (50-75%)	
☑ Fully Shaded (75-100%)	

Channel Alterations:

☐ Dredging	
☐ Channelization	
(☐ Full	☐ Partial)

Substrate: ☐ Est. ☐ P.C.

	Riffle 90 %	Run ____ %	Pool 10 %
Silt/Clay(<0.06 mm / <0.002 in)	X		X
Sand (0.06 - 2 mm / 0.002-0.08 in)	X		X
Gravel (2 - 64 mm / 0.08 - 2.5 in)	X		
Cobble (64 - 256 mm / 2.5 - 10.1 in)	X		
Boulders (>256 mm / >10.1 in)	X		
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	Greater than 70% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	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 **10**

20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
☐	☐	☐	☐	☐	☐	X	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

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 slowdeep).
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; 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
Score 6	☐20 ☐19 ☐18 ☐17 ☐16	☐15 ☐14 ☐13 ☐12 ☐11	☐10 ☐9 ☐8 ☐7 ☑6	☐5 ☐4 ☐3 ☐2 ☐1 ☐0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
Score 6	☐20 ☐19 ☐18 ☐17 ☐16	☐15 ☐14 ☐13 ☐12 ☐11	☐10 ☐9 ☐8 ☐7 ☑6	☐5 ☐4 ☐3 ☐2 ☐1 ☐0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score 10	☐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 16	☐20 ☐19 ☐18 ☐17 ☑16	☐15 ☐14 ☐13 ☐12 ☐11	☐10 ☐9 ☐8 ☐7 ☐6	☐5 ☐4 ☐3 ☐2 ☐1 ☐0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) 1	Left Bank ☐10 ☐9	☐8 ☐7 ☐6	☐5 ☐4 ☐3	☐2 ☑1 ☐0
Score (RB) 1	Right Bank ☐10 ☐9	☐8 ☐7 ☐6	☐5 ☐4 ☐3	☐2 ☑1 ☐0

9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.		More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**6**	Left Bank	☐ ☐	☐ ☐ ☑	☐ ☐ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**6**	Right Bank	☐ ☐	☐ ☐ ☑	☐ ☐ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone) Note: determine left or right side by facing downstream.		Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**6**	Left Bank	☐ ☐	☐ ☐ ☑	☐ ☐ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**6**	Right Bank	☐ ☐	☐ ☐ ☑	☐ ☐ ☐	☐ ☐ ☐
			10 9	8 7 6	5 4 3	2 1 0
TOTAL SCORE	**90**					

High Gradient Bioassessment Stream Visit Sheet

Stream Name:	**Intermittent 4**			**Location:**	**Starfire Renewable Power Project**		
				Basin/Watershed:	**Buckhorn Creek, HUC12:051002010506**		
Lat:	**37.42444**	**Long:**	**-83.08273**	**County:**	**Knott**	**USGS 7.5 Topo:**	**Vest**
Date:	**3/24/2026**			**Investigators:**	**MB/JRR**		

Type Sample: ☑ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **45** **°F** ____ **°C**

Inches of rainfall in the past 24 hrs: **0.1** in

50 **% Cloud Cover**

P-Chem: Temp (°F) ____ D.O. (mg/L) ____ % Saturation ____ pH (S.U.) ____ Conductivity (µS) 270 ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	____	ft
Stream Width BF	2-4	ft
Stream Bottom Width	____	ft
Avg. Bankfull Depth	____	ft
Avg. H_2O Depth Riffle	____	in

Local Watershed Features:
Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☐ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☐ Culverts

Stream Flow:

☐ Dry	☐ Pooled	☐ Low	☑ Normal	
☐ High	☐ Very Rapid or Torrential			

Stream Type:

☐ Perennial	☑ Intermittent
☐ Ephemeral	☐ Seep

Riparian Vegetation:

Dominate Type:

☑ Trees	☑ Shrubs	**Dom. Tree/Shrub Taxa:**	Red Oak
☐ Grasses	☐ Herbaceous		Red Maple
Number of strata:			

Canopy Cover:

☐ Fully Exposed (0-25%)	
☐ Partially Exposed (25-50%)	
☐ Partially Shaded (50-75%)	
☑ Fully Shaded (75-100%)	

Channel Alterations:

☐ Dredging	
☐ Channelization	
(☐ Full	☐ Partial)

Substrate: ☐ Est. ☐ P.C.

	Riffle 90 %	Run ____ %	Pool 10 %
Silt/Clay(<0.06 mm / <0.002 in)			X
Sand (0.06 - 2 mm / 0.002-0.08 in)			X
Gravel (2 - 64 mm / 0.08 - 2.5 in)	X		X
Cobble (64 - 256 mm / 2.5 - 10.1 in)	X		
Boulders (>256 mm / >10.1 in)			
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	Greater than 70% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

Score **14**

20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
☐	☐	☐	☐	☐	☐	X☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

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 14	20 19 18 17 16	15 [x] 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 slowdeep).
Score 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	[x] 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; 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
Score 15	20 19 18 17 16	[x] 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 [x] 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score 17	20 19 18 [x] 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	[x] 15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) 6	Left Bank 10 9	8 7 [x] 6	5 4 3	2 1 0
Score (RB) 6	Right Bank 10 9	8 7 [x] 6	5 4 3	2 1 0

9. **Vegetative Protection (score each bank)** Note: determine left or right side by facing downstream.		More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
Score (LB)	**7**	Left Bank	☐ 10 ☐ 9	☐ 8 ☑ 7 ☐ 6	☐ 5 ☐ 4 ☐ 3	☐ 2 ☐ 1 ☐ 0
Score (RB)	**7**	Right Bank	☐ 10 ☐ 9	☐ 8 ☑ 7 ☐ 6	☐ 5 ☐ 4 ☐ 3	☐ 2 ☐ 1 ☐ 0
10. **Riparian Vegetative Zone Width (score each bank riparian zone)** Note: determine left or right side by facing downstream.		Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
Score (LB)	**8**	Left Bank	☐ 10 ☐ 9	☑ 8 ☐ 7 ☐ 6	☐ 5 ☐ 4 ☐ 3	☐ 2 ☐ 1 ☐ 0
Score (RB)	**8**	Right Bank	☐ 10 ☐ 9	☑ 8 ☐ 7 ☐ 6	☐ 5 ☐ 4 ☐ 3	☐ 2 ☐ 1 ☐ 0
TOTAL SCORE	**130**					

High Gradient Bioassessment Stream Visit Sheet

Stream Name:	**Intermittent 5**			**Location:**	**Starfire Renewable Power Project**		
				Basin/Watershed:	**Buckhorn Creek, HUC12:051002010506**		
Lat:	**37.42768**	**Long:**	**-83.08124**	**County:**	**Knott**	**USGS 7.5 Topo:**	**Vest**
Date:	**3/23/2026**			**Investigators:**	**MB/JRR**		

Type Sample: ☑ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☐ **Yes** ☑ **No**

Appr. Air Temp: **65** **°F** ____ **°C**

Inches of rainfall in the past 24 hrs: **0** in

50 **% Cloud Cover**

P-Chem: Temp (°F) ____ D.O. (mg/L) ____ % Saturation ____ pH (S.U.) ____ Conductivity (µS) 2380 ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	____	ft
Stream Width BF	3	ft
Stream Bottom Width	____	ft
Avg. Bankfull Depth	1	ft
Avg. H_2O Depth Riffle	____	in

Local Watershed Features:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☑ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams ☐ Bridge Abutments
☐ Island ☐ Waterfalls
☐ Other ☐ Culverts

Stream Flow:

☐ Dry ☐ Pooled ☑ Low ☐ Normal
☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial ☑ Intermittent
☐ Ephemeral ☐ Seep

Riparian Vegetation:

Dominate Type:
☑ Trees ☑ Shrubs
☐ Grasses ☐ Herbaceous
Number of strata: ____

Dom. Tree/Shrub Taxa:
Red Oak
Red Maple

Canopy Cover:

☐ Fully Exposed (0-25%)
☐ Partially Exposed (25-50%)
☐ Partially Shaded (50-75%)
☑ Fully Shaded (75-100%)

Channel Alterations:

☐ Dredging
☐ Channelization
(☐ Full ☐ Partial)

Substrate: ☐ Est. ☐ P.C.

	Riffle 85 %	Run ____ %	Pool 15 %
Silt/Clay(<0.06 mm / <0.002 in)			X
Sand (0.06 - 2 mm / 0.002-0.08 in)			X
Gravel (2 - 64 mm / 0.08 - 2.5 in)	X		
Cobble (64 - 256 mm / 2.5 - 10.1 in)	X		
Boulders (>256 mm / >10.1 in)			
Bedrock			X

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	Greater than 70% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

Score **16**

20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
☐	☐	☐	☐	☑	☐	X	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

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	**16**	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
		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 slowdeep).						
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; 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.						
Score	**15**	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
		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			
6.	**Channel Alteration**	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.						
Score	**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	**16**	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
		20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0			
8.	**Bank Stability (score each bank)** Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.					Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.					Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.						
Score (LB)	**7**	Left Bank	☐	☐		☐	☑	☐		☐	☐	☐			☐	☐	☐									
			10	9		8	7	6		5	4	3			2	1	0									
Score (RB)	**6**	Right Bank	☐	☐		☐	☐	☑		☐	☐	☐			☐	☐	☐									
			10	9		8	7	6		5	4	3			2	1	0									

9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.		More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**6**	Left Bank				
		10 9	8 7 ☑ 6	5 4 3	2 1 0	
Score (RB)	**6**	Right Bank				
		10 9	8 7 ☑ 6	5 4 3	2 1 0	
10. Riparian Vegetative Zone Width (score each bank riparian zone) Note: determine left or right side by facing downstream.		Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**9**	Left Bank				
		10 ☑ 9	8 7 6	5 4 3	2 1 0	
Score (RB)	**9**	Right Bank				
		10 ☑ 9	8 7 6	5 4 3	2 1 0	
TOTAL SCORE	**144**					

High Gradient Bioassessment Stream Visit Sheet

Stream Name:	**Intermittent 6**			**Location:**	**Starfire Renewable Power Project**		
				Basin/Watershed:	**Buckhorn Creek, HUC12:051002010506**		
Lat:	**37.4299**	**Long:**	**-83.071**	**County:**	**Knott**	**USGS 7.5 Topo:**	**Vest**
Date:	**3/23/2026**			**Investigators:**	**MB/JRR**		

Type Sample: ☑ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☐ **Yes** ☑ **No**

Appr. Air Temp: **65** **°F** ____ **°C**

Inches of rainfall in the past 24 hrs: **0** in

50 **% Cloud Cover**

P-Chem: Temp (°F) ____ D.O. (mg/L) ____ % Saturation ____ pH (S.U.) ____ Conductivity (µS) 440 ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	____	ft
Stream Width BF	5	ft
Stream Bottom Width	____	ft
Avg. Bankfull Depth	2	ft
Avg. H_2O Depth Riffle	____	in

Local Watershed Features:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☑ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams ☐ Bridge Abutments
☐ Island ☐ Waterfalls
☐ Other ☐ Culverts

Stream Flow:

☐ Dry ☐ Pooled ☐ Low ☐ Normal
☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial ☑ Intermittent
☐ Ephemeral ☐ Seep

Riparian Vegetation:

Dominate Type:
☑ Trees ☑ Shrubs
☐ Grasses ☐ Herbaceous
Number of strata: ____

Dom. Tree/Shrub Taxa:
Red Oak
Red Maple

Canopy Cover:

☐ Fully Exposed (0-25%)
☐ Partially Exposed (25-50%)
☐ Partially Shaded (50-75%)
☑ Fully Shaded (75-100%)

Channel Alterations:

☐ Dredging
☐ Channelization
(☐ Full ☐ Partial)

Substrate: ☐ Est. ☐ P.C.

	Riffle 90 %	Run ____ %	Pool 10 %
Silt/Clay(<0.06 mm / <0.002 in)	X		X
Sand (0.06 - 2 mm / 0.002-0.08 in)	X		
Gravel (2 - 64 mm / 0.08 - 2.5 in)	X		
Cobble (64 - 256 mm / 2.5 - 10.1 in)	X		
Boulders (>256 mm / >10.1 in)	X		
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	Greater than 70% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

Score **15**

☐ ☐ ☐ ☐ ☐ ☑ X ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

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 slowdeep).
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; 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 7	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score 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 16	☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) 5	Left Bank ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			
Score (RB) 4	Right Bank ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			

9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.		More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
Score (LB)	**6**	Left Bank	☐ 10 ☐ 9	☐ 8 ☐ 7 ☑ 6	☐ 5 ☐ 4 ☐ 3	☐ 2 ☐ 1 ☐ 0
Score (RB)	**6**	Right Bank	☐ 10 ☐ 9	☐ 8 ☐ 7 ☑ 6	☐ 5 ☐ 4 ☐ 3	☐ 2 ☐ 1 ☐ 0
10. Riparian Vegetative Zone Width (score each bank riparian zone) Note: determine left or right side by facing downstream.		Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
Score (LB)	**9**	Left Bank	☐ 10 ☑ 9	☐ 8 ☐ 7 ☐ 6	☐ 5 ☐ 4 ☐ 3	☐ 2 ☐ 1 ☐ 0
Score (RB)	**9**	Right Bank	☐ 10 ☑ 9	☐ 8 ☐ 7 ☐ 6	☐ 5 ☐ 4 ☐ 3	☐ 2 ☐ 1 ☐ 0
TOTAL SCORE	**124**					

High Gradient Bioassessment Stream Visit Sheet

Stream Name:	**Intermittent 7**			**Location:**	**Starfire Renewable Power Project**		
				Basin/Watershed:	**Buckhorn Creek, HUC12:051002010506**		
Lat:	**37.43459**	**Long:**	**-83.06596**	**County:**	**Knott**	**USGS 7.5 Topo:**	**Vest**
Date:	**3/24/2026**			**Investigators:**	**MB/JRR**		

Type Sample: ☑ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **45** **°F** ____ **°C**

Inches of rainfall in the past 24 hrs: **0.1** in

50 **% Cloud Cover**

P-Chem: Temp (°F) ____ D.O. (mg/L) ____ % Saturation ____ pH (S.U.) ____ Conductivity (µS) 32.9 ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	____	ft
Stream Width BF	5	ft
Stream Bottom Width	____	ft
Avg. Bankfull Depth	1.5	ft
Avg. H_2O Depth Riffle	____	in

Local Watershed Features:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☐ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☐ Culverts

Stream Flow:

☐ Dry ☐ Pooled ☐ Low ☑ Normal

☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial	☑ Intermittent
☐ Ephemeral	☐ Seep

Riparian Vegetation:

Dominate Type:

☑ Trees	☑ Shrubs
☐ Grasses	☐ Herbaceous

Number of strata: ____

Dom. Tree/Shrub Taxa:

Red Oak

Red Maple

Canopy Cover:

☐ Fully Exposed (0-25%)

☐ Partially Exposed (25-50%)

☐ Partially Shaded (50-75%)

☑ Fully Shaded (75-100%)

Channel Alterations:

☐ Dredging

☐ Channelization

(☐ Full ☐ Partial)

Substrate: ☐ Est. ☐ P.C.	Riffle 40 %	Run 40 %	Pool 20 %
Silt/Clay(<0.06 mm / <0.002 in)	X	X	X
Sand (0.06 - 2 mm / 0.002-0.08 in)	X	X	X
Gravel (2 - 64 mm / 0.08 - 2.5 in)	X	X	X
Cobble (64 - 256 mm / 2.5 - 10.1 in)	X		
Boulders (>256 mm / >10.1 in)			
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	Greater than 70% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	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**

☐	☐	☐	☐	☑	☐	X☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
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 14	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 slowdeep).
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; 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 15	20 19 18 17 16	☑15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score 17	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 frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) 8	Left Bank 10 9	☑8 7 6	5 4 3	2 1 0
Score (RB) 8	Right Bank 10 9	☑8 7 6	5 4 3	2 1 0

9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.		More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**8**	Left Bank	☑ 8			
		10 9	8	7 6	5 4 3	2 1 0
Score (RB)	**8**	Right Bank	☑ 8			
		10 9	8	7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone) Note: determine left or right side by facing downstream.		Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**9**	Left Bank	☑ 9			
		10 9	8	7 6	5 4 3	2 1 0
Score (RB)	**9**	Right Bank	☑ 9			
		10 9	8	7 6	5 4 3	2 1 0
TOTAL SCORE	**149**					

High Gradient Bioassessment Stream Visit Sheet

Stream Name:	**Intermittent 8**			**Location:**	**Starfire Renewable Power Project**		
				Basin/Watershed:	**Buckhorn Creek, HUC12:051002010506**		
Lat:	**37.43326**	**Long:**	**-83.06427**	**County:**	**Knott**	**USGS 7.5 Topo:**	**Vest**
Date:	**3/24/2026**			**Investigators:**	**MB/JRR**		

Type Sample: ☑ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:

Current	**Past 24-Hours**
☐ Heavy Rain	☐ Heavy Rain
☐ Steady Rain	☐ Steady Rain
☐ Intermittent Showers	☐ Intermittent Showers
☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **45** **°F** ____ **°C**

Inches of rainfall in the past 24 hrs: **0.1** in

50 **% Cloud Cover**

P-Chem: Temp (°F) ____ D.O. (mg/L) ____ % Saturation ____ pH (S.U.) ____ Conductivity (µS) 32 ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	____	ft
Stream Width BF	4	ft
Stream Bottom Width	____	ft
Avg. Bankfull Depth	1.5	ft
Avg. H_2O Depth Riffle	____	in

Local Watershed Features:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☐ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☐ Culverts

Stream Flow:

☐ Dry ☐ Pooled ☐ Low ☑ Normal

☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial	☑ Intermittent
☐ Ephemeral	☐ Seep

Riparian Vegetation:

Dominate Type:

☑ Trees	☑ Shrubs
☐ Grasses	☐ Herbaceous

Number of strata: ____

Dom. Tree/Shrub Taxa:

Red Oak

Red Maple

Canopy Cover:

☐ Fully Exposed (0-25%)

☐ Partially Exposed (25-50%)

☐ Partially Shaded (50-75%)

☑ Fully Shaded (75-100%)

Channel Alterations:

☐ Dredging

☐ Channelization

(☐ Full ☐ Partial)

Substrate: ☐ Est. ☐ P.C.	Riffle 95 %	Run ____ %	Pool 5 %
Silt/Clay(<0.06 mm / <0.002 in)	X		X
Sand (0.06 - 2 mm / 0.002-0.08 in)	X		X
Gravel (2 - 64 mm / 0.08 - 2.5 in)	X		
Cobble (64 - 256 mm / 2.5 - 10.1 in)	X		
Boulders (>256 mm / >10.1 in)	X		
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	Greater than 70% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	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
☐	☐	☐	☐	☑	☐	X	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

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 slowdeep).
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; 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 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6 ✓	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score 17	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 16	20 19 18 17 16 ✓	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) 6	Left Bank 10 9	8 7 6 ✓	5 4 3	2 1 0
Score (RB) 6	Right Bank 10 9	8 7 6 ✓	5 4 3	2 1 0

9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.		More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**8**	Left Bank	☑ 9	8	7	6
			10			5 4 3 2 1 0
Score (RB)	**8**	Right Bank	☑ 9	8	7	6
			10			5 4 3 2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone) Note: determine left or right side by facing downstream.		Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**9**	Left Bank	☑ 9	8	7	6
			10			5 4 3 2 1 0
Score (RB)	**9**	Right Bank	☑ 9	8	7	6
			10			5 4 3 2 1 0
TOTAL SCORE	**128**					

High Gradient Bioassessment Stream Visit Sheet

Stream Name:	**Intermittent 9**			**Location:**	**Starfire Renewable Power Project**		
				Basin/Watershed:	**Buckhorn Creek, HUC12:051002010506**		
Lat:	**37.43661**	**Long:**	**-83.05073**	**County:**	**Knott**	**USGS 7.5 Topo:**	**Vest**
Date:	**3/25/2026**			**Investigators:**	**MB/JK**		

Type Sample: ☑ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **65** **°F** ____ **°C**

Inches of rainfall in the past 24 hrs: **0** in

50 **% Cloud Cover**

P-Chem: Temp (°F) ____ D.O. (mg/L) ____ % Saturation ____ pH (S.U.) ____ Conductivity (µS) 28.5 ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	____	ft
Stream Width BF	3	ft
Stream Bottom Width	____	ft
Avg. Bankfull Depth	1	ft
Avg. H_2O Depth Riffle	____	in

Local Watershed Features:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☑ Commercial	☑ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☐ Culverts

Stream Flow:

☐ Dry ☐ Pooled ☐ Low ☑ Normal

☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial	☑ Intermittent
☐ Ephemeral	☐ Seep

Riparian Vegetation:

Dominate Type:

☑ Trees ☑ Shrubs ☐ Grasses ☐ Herbaceous

Number of strata: ____

Dom. Tree/Shrub Taxa:

Red Oak

Red Maple

Canopy Cover:

☐ Fully Exposed (0-25%)

☐ Partially Exposed (25-50%)

☐ Partially Shaded (50-75%)

☑ Fully Shaded (75-100%)

Channel Alterations:

☐ Dredging

☐ Channelization

(☐ Full ☐ Partial)

Substrate: ☐ Est. ☐ P.C.

	Riffle 90 %	Run ____ %	Pool 10 %
Silt/Clay(<0.06 mm / <0.002 in)	X		X
Sand (0.06 - 2 mm / 0.002-0.08 in)	X		X
Gravel (2 - 64 mm / 0.08 - 2.5 in)	X		
Cobble (64 - 256 mm / 2.5 - 10.1 in)	X		
Boulders (>256 mm / >10.1 in)	X		
Bedrock			X

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	Greater than 70% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

Score **16**

☐ ☐ ☐ ☐ ☑ ☐ X ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

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 slowdeep).
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; 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			
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score 16	☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
7. 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 16	☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) 8	Left Bank ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			
Score (RB) 7	Right Bank ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			

9. **Vegetative Protection (score each bank)** Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.		
Score (LB)	**8**	Left Bank ☐ ☐	☑ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	
		10 9	8 7 6	5 4 3	2 1 0	
Score (RB)	**8**	Right Bank ☐ ☐	☑ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	
		10 9	8 7 6	5 4 3	2 1 0	
10. **Riparian Vegetative Zone Width (score each bank riparian zone)** Note: determine left or right side by facing downstream.	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.		
Score (LB)	**9**	Left Bank ☐ ☑	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	
		10 9	8 7 6	5 4 3	2 1 0	
Score (RB)	**9**	Right Bank ☐ ☑	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	
		10 9	8 7 6	5 4 3	2 1 0	
TOTAL SCORE	**137**					

High Gradient Bioassessment Stream Visit Sheet

Stream Name:	**Intermittent 10**			**Location:**	**Starfire Renewable Power Project**		
				Basin/Watershed:	**Buckhorn Creek, HUC12:051002010506**		
Lat:	**37.43755**	**Long:**	**-83.0478**	**County:**	**Knott**	**USGS 7.5 Topo:**	**Vest**
Date:	**3/24/2026**			**Investigators:**	**MB/JRR**		

Type Sample: ☑ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:

Current	**Past 24-Hours**
☐ Heavy Rain	☐ Heavy Rain
☐ Steady Rain	☐ Steady Rain
☐ Intermittent Showers	☐ Intermittent Showers
☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **45** **°F** ____ **°C**

Inches of rainfall in the past 24 hrs: **0.1** in

50 **% Cloud Cover**

P-Chem: Temp (°F) ____ D.O. (mg/L) ____ % Saturation ____ pH (S.U.) ____ Conductivity (µS) 34 ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	____	ft
Stream Width BF	2.5	ft
Stream Bottom Width	____	ft
Avg. Bankfull Depth	1	ft
Avg. H_2O Depth Riffle	____	in

Local Watershed Features:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☐ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☐ Culverts

Stream Flow: ☐ Dry ☐ Pooled ☑ Low ☐ Normal ☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial	☑ Intermittent
☐ Ephemeral	☐ Seep

Riparian Vegetation:

Dominate Type:

☑ Trees	☑ Shrubs
☐ Grasses	☐ Herbaceous

Number of strata: ____

Dom. Tree/Shrub Taxa: Red Oak, Red Maple

Canopy Cover:

☐ Fully Exposed (0-25%)
☐ Partially Exposed (25-50%)
☐ Partially Shaded (50-75%)
☑ Fully Shaded (75-100%)

Channel Alterations:

☐ Dredging
☐ Channelization (☐ Full ☐ Partial)

Substrate: ☐ Est. ☐ P.C.

	Riffle 95 %	Run ____ %	Pool 5 %
Silt/Clay(<0.06 mm / <0.002 in)	X		X
Sand (0.06 - 2 mm / 0.002-0.08 in)	X		X
Gravel (2 - 64 mm / 0.08 - 2.5 in)	X		
Cobble (64 - 256 mm / 2.5 - 10.1 in)	X		
Boulders (>256 mm / >10.1 in)	X		
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	Greater than 70% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	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
☐	☐	☐	☐	☑	☐	X ☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

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 slowdeep).						
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; 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	**6**	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐
		20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0			
6.	**Channel Alteration**	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.						
Score	**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	**16**	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
		20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0			
8.	**Bank Stability (score each bank)** Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.					Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.					Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.						
Score (LB)	**5**	Left Bank	☐	☐		☐	☐	☐		☑	☐	☐			☐	☐	☐								
			10	9		8	7	6		5	4	3			2	1	0								
Score (RB)	**5**	Right Bank	☐	☐		☐	☐	☐		☑	☐	☐			☐	☐	☐								
			10	9		8	7	6		5	4	3			2	1	0								

9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.		More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**8**	Left Bank	☑			
		10 9	8 7 6	5 4 3	2 1 0	
Score (RB)	**8**	Right Bank	☑			
		10 9	8 7 6	5 4 3	2 1 0	
10. Riparian Vegetative Zone Width (score each bank riparian zone) Note: determine left or right side by facing downstream.		Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**8**	Left Bank	☑			
		10 9	8 7 6	5 4 3	2 1 0	
Score (RB)	**8**	Right Bank	☑			
		10 9	8 7 6	5 4 3	2 1 0	
TOTAL SCORE	**133**					

High Gradient Bioassessment Stream Visit Sheet

Stream Name:	**Intermittent 11**			**Location:**	**Starfire Renewable Power Project**		
				Basin/Watershed:	**Buckhorn Creek, HUC12:051002010506**		
Lat:	**37.43757**	**Long:**	**-83.04528**	**County:**	**Knott**	**USGS 7.5 Topo:**	**Vest**
Date:	**3/24/2026**			**Investigators:**	**MB/JRR**		

Type Sample: ☑ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **45** **°F** ____ **°C**

Inches of rainfall in the past 24 hrs: **0.1** in

50 **% Cloud Cover**

P-Chem: Temp (°F) ____ D.O. (mg/L) ____ % Saturation ____ pH (S.U.) ____ Conductivity (µS) 27.2 ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW		ft
Stream Width BF	4	ft
Stream Bottom Width		ft
Avg. Bankfull Depth	2	ft
Avg. H_2O Depth Riffle		in

Local Watershed Features:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☐ Pasture/Grazing
☐ Oil Wells	☑ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☐ Culverts

Stream Flow:

☐ Dry ☐ Pooled ☐ Low ☑ Normal

☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial ☑ Intermittent

☐ Ephemeral ☐ Seep

Riparian Vegetation:

Dominate Type:

☑ Trees ☑ Shrubs ☐ Grasses ☐ Herbaceous

Number of strata: ____

Dom. Tree/Shrub Taxa:

Red Oak

Red Maple

Canopy Cover:

☐ Fully Exposed (0-25%)

☐ Partially Exposed (25-50%)

☐ Partially Shaded (50-75%)

☑ Fully Shaded (75-100%)

Channel Alterations:

☐ Dredging

☐ Channelization

(☐ Full ☐ Partial)

Substrate: ☐ Est. ☐ P.C.	Riffle 90 %	Run ____ %	Pool 10 %
Silt/Clay(<0.06 mm / <0.002 in)	X		X
Sand (0.06 - 2 mm / 0.002-0.08 in)	X		X
Gravel (2 - 64 mm / 0.08 - 2.5 in)	X		
Cobble (64 - 256 mm / 2.5 - 10.1 in)	X		
Boulders (>256 mm / >10.1 in)	X		
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	Greater than 70% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	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
☐	☐	☐	☐	☑	☐	X	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

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 slowdeep).
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; 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
Score 15	☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	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			
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score 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 16	☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) 8	Left Bank ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			
Score (RB) 5	Right Bank ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			

9. **Vegetative Protection (score each bank)** Note: determine left or right side by facing downstream.		More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
Score (LB)	**8**	Left Bank	☑ 9	8	5	2
			10	7 6	4 3	1 0
Score (RB)	**8**	Right Bank	☑ 9	8	5	2
			10	7 6	4 3	1 0
10. **Riparian Vegetative Zone Width (score each bank riparian zone)** Note: determine left or right side by facing downstream.		Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
Score (LB)	**9**	Left Bank	☑ 9	8	5	2
			10	7 6	4 3	1 0
Score (RB)	**9**	Right Bank	☑ 9	8	5	2
			10	7 6	4 3	1 0
TOTAL SCORE	**144**					

High Gradient Bioassessment Stream Visit Sheet

Stream Name:	**Intermittent 12**			**Location:**	**Starfire Renewable Power Project**		
				Basin/Watershed:	**Buckhorn Creek, HUC12:051002010506**		
Lat:	**37.43603**	**Long:**	**-83.04321**	**County:**	**Knott**	**USGS 7.5 Topo:**	**Vest**
Date:	**3/24/2026**			**Investigators:**	**MB/JRR**		

Type Sample: ☑ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:

Current	**Past 24-Hours**
☐ Heavy Rain	☐ Heavy Rain
☐ Steady Rain	☐ Steady Rain
☐ Intermittent Showers	☐ Intermittent Showers
☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **45** **°F** ____ **°C**

Inches of rainfall in the past 24 hrs: **0.1** in

50 **% Cloud Cover**

P-Chem: Temp (°F) ____ D.O. (mg/L) ____ % Saturation ____ pH (S.U.) ____ Conductivity (µS) 30 ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	____	ft
Stream Width BF	5	ft
Stream Bottom Width	____	ft
Avg. Bankfull Depth	1.5	ft
Avg. H_2O Depth Riffle	____	in

Local Watershed Features:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☐ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☐ Culverts

Stream Flow:

☐ Dry ☐ Pooled ☐ Low ☑ Normal

☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial	☑ Intermittent
☐ Ephemeral	☐ Seep

Riparian Vegetation:

Dominate Type:

☑ Trees ☑ Shrubs ☐ Grasses ☐ Herbaceous

Number of strata: ____

Dom. Tree/Shrub Taxa:

Red Oak

Red Maple

Canopy Cover:

☐ Fully Exposed (0-25%)

☐ Partially Exposed (25-50%)

☐ Partially Shaded (50-75%)

☑ Fully Shaded (75-100%)

Channel Alterations:

☐ Dredging

☐ Channelization

(☐ Full ☐ Partial)

Substrate: ☐ Est. ☐ P.C.

	Riffle 80 %	Run 10 %	Pool 10 %
Silt/Clay(<0.06 mm / <0.002 in)	X	X	X
Sand (0.06 - 2 mm / 0.002-0.08 in)	X	X	X
Gravel (2 - 64 mm / 0.08 - 2.5 in)	X	X	
Cobble (64 - 256 mm / 2.5 - 10.1 in)	X		
Boulders (>256 mm / >10.1 in)			
Bedrock		X	X

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	Greater than 70% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

Score **16**

20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
☐	☐	☐	☐	☑	☐	X	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

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 16	☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	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 slowdeep).
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; 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
Score 15	☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	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 13	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score 16	☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
7. 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 16	☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) 5	Left Bank ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			
Score (RB) 6	Right Bank ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			

9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.		More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**8**	Left Bank	☑			
		10 9	8 7 6	5 4 3	2 1 0	
Score (RB)	**8**	Right Bank	☑			
		10 9	8 7 6	5 4 3	2 1 0	
10. Riparian Vegetative Zone Width (score each bank riparian zone) Note: determine left or right side by facing downstream.		Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**9**	Left Bank	☑			
		10 9	8 7 6	5 4 3	2 1 0	
Score (RB)	**9**	Right Bank	☑			
		10 9	8 7 6	5 4 3	2 1 0	
TOTAL SCORE	**147**					

High Gradient Bioassessment Stream Visit Sheet

Stream Name:	**Intermittent 13**			**Location:**	**Starfire Renewable Power Project**		
				Basin/Watershed:	**HUC 12: Lower Laurel Fork 051002010602**		
Lat:	**37.43629**	**Long:**	**-83.03532**	**County:**	**Knott**	**USGS 7.5 Topo:**	**Vest**
Date:	**3/25/2026**			**Investigators:**	**MB/JK**		

Type Sample: ☑ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **65** **°F** ____ **°C**

Inches of rainfall in the past 24 hrs: **0** in

50 **% Cloud Cover**

P-Chem: Temp (°F) ____ D.O. (mg/L) ____ % Saturation ____ pH (S.U.) ____ Conductivity (µS) 40 ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	____	ft
Stream Width BF	3	ft
Stream Bottom Width	____	ft
Avg. Bankfull Depth	1	ft
Avg. H_2O Depth Riffle	____	in

Local Watershed Features:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☐ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☐ Culverts

Stream Flow:

☐ Dry ☐ Pooled ☐ Low ☑ Normal

☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial	☑ Intermittent
☐ Ephemeral	☐ Seep

Riparian Vegetation:

Dominate Type:

☑ Trees ☑ Shrubs ☐ Grasses ☐ Herbaceous

Number of strata: ____

Dom. Tree/Shrub Taxa:

Red Oak

Red Maple

Canopy Cover:

☐ Fully Exposed (0-25%)

☐ Partially Exposed (25-50%)

☐ Partially Shaded (50-75%)

☑ Fully Shaded (75-100%)

Channel Alterations:

☐ Dredging

☐ Channelization

(☐ Full ☐ Partial)

Substrate: ☐ Est. ☐ P.C.	Riffle 90 %	Run ____ %	Pool 10 %
Silt/Clay(<0.06 mm / <0.002 in)	X		X
Sand (0.06 - 2 mm / 0.002-0.08 in)	X		X
Gravel (2 - 64 mm / 0.08 - 2.5 in)	X		
Cobble (64 - 256 mm / 2.5 - 10.1 in)	X		
Boulders (>256 mm / >10.1 in)	X		
Bedrock	X		X

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	Greater than 70% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	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
☐	☐	☐	☐	☑	☐	X	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

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 slowdeep).
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; 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 11	20 19 18 17 16	15 14 13 12 ☑11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score 19	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 16	20 19 18 17 ☑16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) 9	Left Bank 10 ☑9	8 7 6	5 4 3	2 1 0
Score (RB) 9	Right Bank 10 ☑9	8 7 6	5 4 3	2 1 0

9. **Vegetative Protection (score each bank)** Note: determine left or right side by facing downstream.		More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
Score (LB)	**9**	Left Bank ☐ ☑	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
		10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**9**	Right Bank ☐ ☑	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
		10 9	8 7 6	5 4 3	2 1 0
10. **Riparian Vegetative Zone Width (score each bank riparian zone)** Note: determine left or right side by facing downstream.		Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
Score (LB)	**9**	Left Bank ☐ ☑	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
		10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**9**	Right Bank ☐ ☑	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
		10 9	8 7 6	5 4 3	2 1 0
TOTAL SCORE	**144**				

High Gradient Bioassessment Stream Visit Sheet

Stream Name:	**Intermittent 14**			**Location:**	**Starfire Renewable Power Project**		
				Basin/Watershed:	**HUC 12: Lower Laurel Fork 051002010602**		
Lat:	**37.43476**	**Long:**	**-83.02974**	**County:**	**Knott**	**USGS 7.5 Topo:**	**Vest**
Date:	**3/25/2026**			**Investigators:**	**MB/JK**		

Type Sample: ☑ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **65** **°F** ____ **°C**

Inches of rainfall in the past 24 hrs: **0** in

50 **% Cloud Cover**

P-Chem: Temp (°F) ____ D.O. (mg/L) ____ % Saturation ____ pH (S.U.) ____ Conductivity (µS) 2720 ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	____	ft
Stream Width BF	4	ft
Stream Bottom Width	____	ft
Avg. Bankfull Depth	1.5	ft
Avg. H_2O Depth Riffle	____	in

Local Watershed Features:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☑ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☐ Other	☐ Culverts

Stream Flow:

☐ Dry ☐ Pooled ☐ Low ☑ Normal

☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial	☑ Intermittent
☐ Ephemeral	☐ Seep

Riparian Vegetation:

Dominate Type:

☑ Trees	☑ Shrubs
☑ Grasses	☐ Herbaceous

Number of strata: ____

Dom. Tree/Shrub Taxa:

Red Oak

Red Maple

Canopy Cover:

☐ Fully Exposed (0-25%)

☐ Partially Exposed (25-50%)

☑ Partially Shaded (50-75%)

☐ Fully Shaded (75-100%)

Channel Alterations:

☐ Dredging

☐ Channelization

(☐ Full ☐ Partial)

Substrate: ☐ Est. ☐ P.C.	Riffle 90 %	Run ____ %	Pool 10 %
Silt/Clay(<0.06 mm / <0.002 in)	X		X
Sand (0.06 - 2 mm / 0.002-0.08 in)	X		X
Gravel (2 - 64 mm / 0.08 - 2.5 in)	X		X
Cobble (64 - 256 mm / 2.5 - 10.1 in)	X		
Boulders (>256 mm / >10.1 in)	X		
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	Greater than 70% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	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
☐	☐	☐	☐	☐	☑	X	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

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 slowdeep).	
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; 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	**11**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐				
		20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0				
6. Channel Alteration		Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.	
Score	**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	**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 frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.	
Score (LB)	**6**	Left Bank ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐				
		10 9 8 7 6 5 4 3 2 1 0				
Score (RB)	**6**	Right Bank ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐				
		10 9 8 7 6 5 4 3 2 1 0				

9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.		More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**6**	Left Bank				
		10 9	8 7 ☑ 6	5 4 3	2 1 0	
Score (RB)	**6**	Right Bank				
		10 9	8 7 ☑ 6	5 4 3	2 1 0	
10. Riparian Vegetative Zone Width (score each bank riparian zone) Note: determine left or right side by facing downstream.		Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**5**	Left Bank				
		10 9	8 7 6	☑ 5 4 3	2 1 0	
Score (RB)	**5**	Right Bank				
		10 9	8 7 6	☑ 5 4 3	2 1 0	
TOTAL SCORE	**118**					

High Gradient Bioassessment Stream Visit Sheet

Stream Name:	**Intermittent 15**			**Location:**	**Starfire Renewable Power Project**		
				Basin/Watershed:	**HUC 12: Lower Laurel Fork 051002010602**		
Lat:	**37.43656**	**Long:**	**-83.0245**	**County:**	**Knott**	**USGS 7.5 Topo:**	**Vest**
Date:	**3/25/2026**			**Investigators:**	**MB/JK**		

Type Sample: ☑ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **60** **°F** ____ **°C**

Inches of rainfall in the past 24 hrs: **0** in

50 **% Cloud Cover**

P-Chem: Temp (°F) ____ D.O. (mg/L) ____ % Saturation ____ pH (S.U.) ____ Conductivity (µS) 3450 ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	____	ft
Stream Width BF	3-4	ft
Stream Bottom Width	____	ft
Avg. Bankfull Depth	1.5	ft
Avg. H_2O Depth Riffle	____	in

Local Watershed Features:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☑ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams ☐ Bridge Abutments
☐ Island ☐ Waterfalls
☐ Other ☐ Culverts

Stream Flow:

☐ Dry ☐ Pooled ☐ Low ☑ Normal
☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial ☑ Intermittent
☐ Ephemeral ☐ Seep

Riparian Vegetation:

Dominate Type:
☑ Trees ☑ Shrubs
☐ Grasses ☐ Herbaceous
Number of strata: ____

Dom. Tree/Shrub Taxa:
Red Oak
Red Maple

Canopy Cover:

☐ Fully Exposed (0-25%)
☐ Partially Exposed (25-50%)
☐ Partially Shaded (50-75%)
☑ Fully Shaded (75-100%)

Channel Alterations:

☐ Dredging
☐ Channelization
(☐ Full ☐ Partial)

Substrate: ☐ Est. ☐ P.C.

	Riffle 80 %	Run ____ %	Pool 20 %
Silt/Clay(<0.06 mm / <0.002 in)	X		X
Sand (0.06 - 2 mm / 0.002-0.08 in)	X		X
Gravel (2 - 64 mm / 0.08 - 2.5 in)	X		X
Cobble (64 - 256 mm / 2.5 - 10.1 in)	X		
Boulders (>256 mm / >10.1 in)	X		
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	Greater than 70% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	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**

☐	☐	☐	☐	☐	☑	X ☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
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 slowdeep).	
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; 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	**6**	☐ 20 ☐ 19 ☐ 18 ☐ 17 ☐ 16	☐ 15 ☐ 14 ☐ 13 ☐ 12 ☐ 11	☐ 10 ☐ 9 ☐ 8 ☐ 7 ☑ 6	☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ 0	
6. Channel Alteration		Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.	
Score	**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	**16**	☐ 20 ☐ 19 ☐ 18 ☐ 17 ☑ 16	☐ 15 ☐ 14 ☐ 13 ☐ 12 ☐ 11	☐ 10 ☐ 9 ☐ 8 ☐ 7 ☐ 6	☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ 0	
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.		Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.	
Score (LB)	**5**	Left Bank ☐ 10 ☐ 9	☐ 8 ☐ 7 ☐ 6	☑ 5 ☐ 4 ☐ 3	☐ 2 ☐ 1 ☐ 0	
Score (RB)	**5**	Right Bank ☐ 10 ☐ 9	☐ 8 ☐ 7 ☐ 6	☑ 5 ☐ 4 ☐ 3	☐ 2 ☐ 1 ☐ 0	

9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.		More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
Score (LB)	**6**	Left Bank			
		10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**6**	Right Bank			
		10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone) Note: determine left or right side by facing downstream.		Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
Score (LB)	**9**	Left Bank			
		10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**9**	Right Bank			
		10 9	8 7 6	5 4 3	2 1 0
TOTAL SCORE	**120**				

High Gradient Bioassessment Stream Visit Sheet

Stream Name:	**Intermittent A**			**Location:**	**Starfire Renewable Power Project**		
				Basin/Watershed:	**HUC 12: Lower Laurel Fork 051002010602**		
Lat:	**37.391**	**Long:**	**-83.143**	**County:**	**Perry**	**USGS 7.5 Topo:**	**Noble**
Date:	**3/24/2026**			**Investigators:**	**CS/LD**		

Type Sample: ☐ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **45** **°F** ____ **°C**

Inches of rainfall in the past 24 hrs: **0.1** in

50 **% Cloud Cover**

P-Chem: Temp (°F) ____ D.O. (mg/L) ____ % Saturation ____ pH (S.U.) ____ Conductivity (µS) ____ ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW	____	ft
Stream Width BF	4	ft
Stream Bottom Width	____	ft
Avg. Bankfull Depth	2	ft
Avg. H_2O Depth Riffle	____	in

Local Watershed Features:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☑ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments	
☐ Island	☐ Waterfalls	
☐ Other	☑ Culverts	

Stream Flow:

☐ Dry ☐ Pooled ☐ Low ☑ Normal

☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial ☑ Intermittent

☐ Ephemeral ☐ Seep

Riparian Vegetation:

Dominate Type:

☑ Trees ☑ Shrubs ☑ Grasses ☐ Herbaceous

Number of strata: ____

Dom. Tree/Shrub Taxa:

Sweet Gum

Spicebush

Sycamore

Canopy Cover:

☐ Fully Exposed (0-25%)

☐ Partially Exposed (25-50%)

☐ Partially Shaded (50-75%)

☑ Fully Shaded (75-100%)

Channel Alterations:

☐ Dredging

☑ Channelization

(☐ Full ☑ Partial)

Substrate: ☐ Est. ☐ P.C.	Riffle 45 %	Run 35 %	Pool 20 %
Silt/Clay(<0.06 mm / <0.002 in)	X	X	X
Sand (0.06 - 2 mm / 0.002-0.08 in)			
Gravel (2 - 64 mm / 0.08 - 2.5 in)	X	X	X
Cobble (64 - 256 mm / 2.5 - 10.1 in)	X	X	
Boulders (>256 mm / >10.1 in)	X	X	
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	Greater than 70% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

Score **10**

20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
☐	☐	☐	☐	☐	☐	X	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

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 slowdeep).
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; 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	**9**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
		20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
6. Channel Alteration		Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score	**8**	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
		20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
7. 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 frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB)	**5**	Left Bank ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
		10 9 8 7 6 5 4 3 2 1 0			
Score (RB)	**5**	Right Bank ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
		10 9 8 7 6 5 4 3 2 1 0			

9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.		More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**6**	Left Bank				
		10 9	8 7 ☑ 6	5 4 3	2 1 0	
Score (RB)	**6**	Right Bank				
		10 9	8 7 ☑ 6	5 4 3	2 1 0	
10. Riparian Vegetative Zone Width (score each bank riparian zone) Note: determine left or right side by facing downstream.		Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**5**	Left Bank				
		10 9	8 7 6	5 ☑ 4 3	2 1 0	
Score (RB)	**4**	Right Bank				
		10 9	8 7 6	5 4 ☑ 3	2 1 0	
TOTAL SCORE	**102**					

High Gradient Bioassessment Stream Visit Sheet

Stream Name:	**Intermittent B**			**Location:**	**Starfire Renewable Power Project**		
				Basin/Watershed:	**HUC 12: Lower Laurel Fork 051002010602**		
Lat:	**37.391**	**Long:**	**-83.143**	**County:**	**Perry**	**USGS 7.5 Topo:**	**Noble**
Date:	**3/24/2026**			**Investigators:**	**CS/LD**		

Type Sample: ☐ **P-CHEM** ☐ **Macroinvertebrate** ☐ **Fish** ☐ **Bact.**

WEATHER CONDITIONS:	**Current**	**Past 24-Hours**
	☐ Heavy Rain	☐ Heavy Rain
	☐ Steady Rain	☐ Steady Rain
	☐ Intermittent Showers	☐ Intermittent Showers
	☑ Clear/Sunny/Overcast	☑ Clear/Sunny/Overcast

Has there been rain in the last 7 days? ☑ **Yes** ☐ **No**

Appr. Air Temp: **45** **°F** ____ **°C**

Inches of rainfall in the past 24 hrs: **0.1** in

50 **% Cloud Cover**

P-Chem: Temp (°F) ____ D.O. (mg/L) ____ % Saturation ____ pH (S.U.) ____ Conductivity (µS) ____ ☐ Grab

Instream Watershed Features (at time of Assessment):

Stream Width EOW		ft
Stream Width BF	2	ft
Stream Bottom Width		ft
Avg. Bankfull Depth	0.5	ft
Avg. H_2O Depth Riffle		in

Local Watershed Features:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☑ Forest
☐ Deep Mining	☐ Commercial	☑ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewer

Hydraulic Structures:

☐ Dams	☐ Bridge Abutments
☐ Island	☐ Waterfalls
☑ Other Crossing	☐ Culverts

Stream Flow:

☐ Dry ☐ Pooled ☐ Low ☑ Normal

☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial ☑ Intermittent

☐ Ephemeral ☐ Seep

Riparian Vegetation:

Dominate Type:

☑ Trees ☑ Shrubs ☑ Grasses ☑ Herbaceous

Number of strata:

Dom. Tree/Shrub Taxa:

Sweet Gum

Red Maple

Canopy Cover:

☐ Fully Exposed (0-25%)

☐ Partially Exposed (25-50%)

☑ Partially Shaded (50-75%)

☐ Fully Shaded (75-100%)

Channel Alterations:

☐ Dredging

☐ Channelization

(☐ Full ☐ Partial)

Substrate: ☐ Est. ☐ P.C.	Riffle 20 %	Run 60 %	Pool 20 %
Silt/Clay(<0.06 mm / <0.002 in)	X	X	X
Sand (0.06 - 2 mm / 0.002-0.08 in)	X		
Gravel (2 - 64 mm / 0.08 - 2.5 in)	X	X	X
Cobble (64 - 256 mm / 2.5 - 10.1 in)	X	X	X
Boulders (>256 mm / >10.1 in)			
Bedrock			

Habitat Parameter	**Condition Category**			
	Optimal	**Sub-optimal**	**Marginal**	**Poor**
1. Epifaunal Substrate / Available Cover	Greater than 70% of substrate favorable for epifaunal colonization & fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in form of new fall, but not yet prepared for colonization (may rate at high end of scale).	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 **9**

20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
☐	☐	☐	☐	☐	☐	X	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐

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 slowdeep).
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; 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 11	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
Score 13	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			
7. 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 frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Score (LB) 6	Left Bank ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			
Score (RB) 6	Right Bank ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
	10 9 8 7 6 5 4 3 2 1 0			

9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
Score (LB)	**6**	Left Bank ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
		10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**6**	Right Bank ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐ ☐			
		10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone) Note: determine left or right side by facing downstream.	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Score (LB)	**5**	Left Bank ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐			
		10 9	8 7 6	5 4 3	2 1 0
Score (RB)	**5**	Right Bank ☐ ☐ ☐ ☐ ☐ ☑ ☐ ☐ ☐ ☐ ☐			
		10 9	8 7 6	5 4 3	2 1 0
TOTAL SCORE	**109**				

Appendix D

Site Photographs



Photograph 1: General view of reclaimed mine lands in the western section of the gen-tie corridor. March 26, 2026.



Photograph 2: View of reclaimed mine lands in the west-central section of the gen-tie corridor between Schoolhouse Branch and Upper Garden Branch. March 25, 2026.



Photograph 3: View of typical upland forest on upper hillslopes and ridgetops around the gen-tie corridor. Some ridgetops, such as the one in the background, have exposed rock outcrops. March 25, 2026.



Photograph 4: View of typical forest in lower valleys around the gen-tie corridor. March 24, 2026.



Photograph 5: View of Squire Branch (Perennial 1). March 26, 2026.



Photograph 6: View of Buckhorn Creek (Perennial 2) in the west-central section of the gen-tie corridor. This reach is located approximately 0.35 mile downstream of Critical Habitat Unit 1 for the Kentucky arrow darter. March 24, 2026.



Photograph 7: View of a reach of Schoolhouse Branch (Perennial 3) upstream of Pond 1. It appears that water treatment chemicals have colored the water. March 24, 2026.



Photograph 8: View of Perennial Stream 4 which is a tributary to Schoolhouse Branch. March 24, 2026.



Photograph 9: View of Upper Garden Branch (Perennial 5) near the middle of the gen-tie corridor. March 25, 2026.



Photograph 10: View of Eli Fork (Perennial 6) in the west-central section of the gen-tie corridor. This reach is part of Critical Habitat Unit 2 for the Kentucky arrow darter. March 24, 2026.



Photograph 11: View of Baker Branch (Perennial 7) near the eastern end of the gen-tie corridor. March 25, 2026.



Photograph 12: View of Intermittent Stream 1, which is a reach of Hurricane Branch, in a reclaimed mined area in the western section of the gen-tie. March 26, 2026.



Photograph 13: View of Intermittent Stream 2. March 26. 2026.



Photograph 14: View of Intermittent Stream 3. March 26, 2026.



Photograph 15: View of Intermittent Stream 4, facing downslope toward Buckhorn Creek. March 24, 2026.



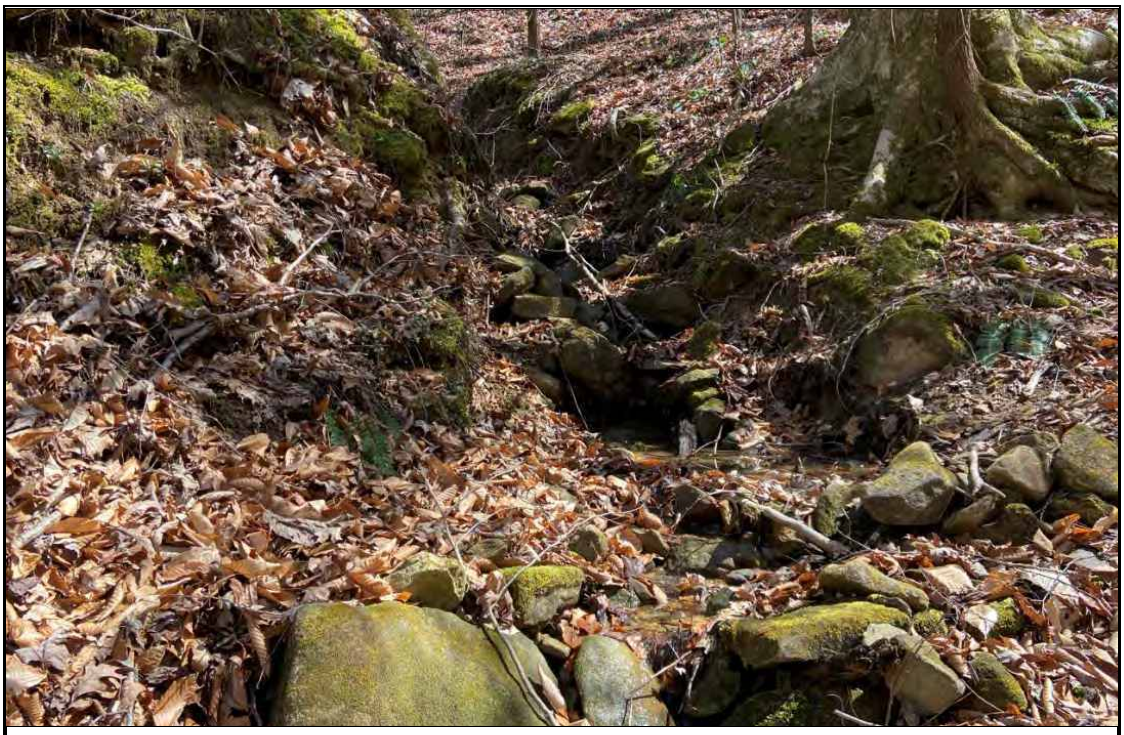
Photograph 16: View of Intermittent Stream 5. March 23, 2026.



Photograph 17: View of Intermittent Stream 6. March 23, 2026.



Photograph 18: View of Intermittent Stream 7. March 24, 2026.



Photograph 19: View of Intermittent Stream 8. March 24, 2026.



Photograph 20: View of Intermittent Stream 9. March 25, 2026.



Photograph 21: View of Intermittent Stream 10. March 24, 2026.



Photograph 22: View of Intermittent Stream 11. March 24, 2026.



Photograph 23: View of Intermittent Stream 12. March 24, 2026.



Photograph 24: View of Intermittent Stream 13. March 25, 2026.



Photograph 25: View of Intermittent Stream 14. March 25, 2026.



Photograph 26: View of Intermittent Stream 15. March 25, 2026.



Photograph 27: View of Intermittent Stream A which is located in the central section of the West Lick Road corridor. March 23, 2026.



Photograph 28: View of Intermittent Stream B which is located in the southern section of the West Lick Road corridor. March 23, 2026.



Photograph 29: View of an intermittent drainage just downslope of Intermittent Stream A, which was classified as a ditch. This section is a steep valley filled with large boulders, which is assumed to have been created during mine reclamation work. March 23, 2026.



Photograph 30: View of Ephemeral Stream 7, which is typical of ephemeral streams on the site. March 24, 2026.



Photograph 31: View of Ephemeral Stream 10, which is typical of ephemeral streams on the site. March 24, 2026.



Photograph 30: View of Ephemeral Stream 12, which is typical of ephemeral streams on the site. March 24, 2026.



Photograph 33: View of Wetland 1. March 26, 2026.



Photograph 34: View of Wetland 2. March 24, 2026.



Photograph 35: View of a constructed pond (Pond 2) with a wetland fringe (Wetland 3) on reclaimed mine land between Schoolhouse Branch and Upper Garden Branch. Match 25, 2026.



Photograph 36: View of a seep wetland (Wetland 4) located in the forest at the base of a hillslope beside Eli Fork. March 24, 2026.



Photograph 37: View of Wetland A, which is located in the West Lick Road corridor. March 23, 2026.



Photograph 38: View of Wetland, B which is located in the West Lick Road corridor. March 23, 2026.



Photograph 39: View of Wetland C, which is located in the West Lick Road corridor. March 23, 2026.



Photograph 40: View of Wetland D, which is located adjacent to Intermittent Stream A in the West Lick Road corridor. March 23, 2026.



Photograph 41: View of a constructed open water pond (Pond 1) in the Schoolhouse Branch valley. This pond may have been constructed for water quality purposes. March 25, 2026.

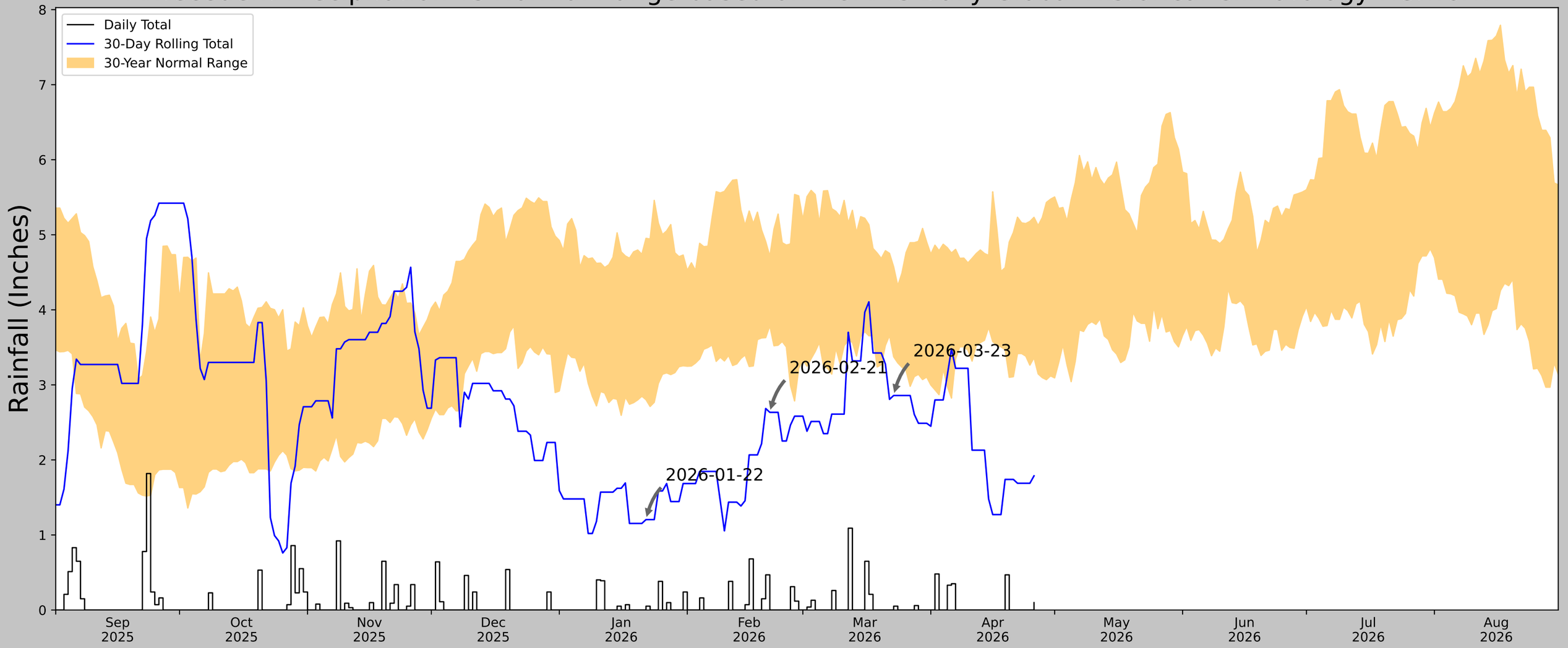


Photograph 42: View of a constructed pond (Pond 2) with a wetland fringe (Wetland 3) on reclaimed mine land between Schoolhouse Branch and Upper Garden Branch. Match 25, 2026.

Appendix E

Precipitation Data

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	37.4248, -83.0829
Observation Date	2026-03-23
Elevation (ft)	994.529
Drought Index (PDSI)	Mild drought
WebWIMP H_2O Balance	Wet Season

30 Days Ending	30^{th} %ile (in)	70^{th} %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2026-03-23	3.373622	4.572835	2.858268	Dry	1	3	3
2026-02-21	3.787008	4.712992	2.633858	Dry	1	2	2
2026-01-22	2.802362	4.952756	1.204724	Dry	1	1	1
Result							Drier than Normal - 6

Figures and tables made by the Antecedent Precipitation Tool Version 3.0

US Army Corps of Engineers.

ERDC

Developed by:
U.S. Army Corps of Engineers and
U.S. Army Engineer Research and Development Center

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
HAZARD WTR WKS	37.2472, -83.1817	879.921	13.418	114.608	7.576	11202	90
HAZARD 1.7 NW	37.2729, -83.2136	1203.084	2.496	323.163	1.93	6	0
VIPER 0.5 N	37.1877, -83.1494	938.976	4.479	59.055	2.28	52	0
HAZARD STATE POLICE	37.2983, -83.2158	1328.084	3.998	448.163	3.591	29	0
CARR FORK LAKE	37.2333, -83.0333	1014.108	8.219	134.187	4.801	14	0
HYDEN	37.15, -83.3667	970.144	12.197	90.223	6.589	1	0
TALBERT 1.9 ESE	37.4124, -83.4255	863.845	17.598	16.076	8.202	15	0
JACKSON 8.4 SE	37.4654, -83.2802	770.013	16.017	109.908	8.968	5	0
BUCKHORN LAKE	37.3417, -83.4706	779.856	17.17	100.065	9.445	17	0
JEREMIAH 1 S	37.1614, -82.9364	1100.066	14.744	220.145	9.881	5	0
SKYLINE 1 SE	37.0875, -82.9928	1083.005	15.163	203.084	9.903	7	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	37.4248, -83.0829
Observation Date	2026-03-24
Elevation (ft)	994.529
Drought Index (PDSI)	Mild drought
WebWIMP H_2O Balance	Wet Season

30 Days Ending	30^{th} %ile (in)	70^{th} %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2026-03-24	3.29252	4.320866	2.858268	Dry	1	3	3
2026-02-22	3.520866	5.075591	2.633858	Dry	1	2	2
2026-01-23	2.711811	4.943307	1.204724	Dry	1	1	1
Result							Drier than Normal - 6

Figures and tables made by the Antecedent Precipitation Tool Version 3.0

US Army Corps of Engineers.

ERDC

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VIPER 0.5 N	37.1877, -83.1494	938.976	4.479	59.055	2.28	52	0
HAZARD STATE POLICE	37.2983, -83.2158	1328.084	3.998	448.163	3.591	29	0
CARR FORK LAKE	37.2333, -83.0333	1014.108	8.219	134.187	4.801	14	0
HYDEN	37.15, -83.3667	970.144	12.197	90.223	6.589	1	0
TALBERT 1.9 ESE	37.4124, -83.4255	863.845	17.598	16.076	8.202	15	0
JACKSON 8.4 SE	37.4654, -83.2802	770.013	16.017	109.908	8.968	5	0
BUCKHORN LAKE	37.3417, -83.4706	779.856	17.17	100.065	9.445	17	0
JEREMIAH 1 S	37.1614, -82.9364	1100.066	14.744	220.145	9.881	5	0
SKYLINE 1 SE	37.0875, -82.9928	1083.005	15.163	203.084	9.903	7	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	37.4248, -83.0829
Observation Date	2026-03-25
Elevation (ft)	994.529
Drought Index (PDSI)	Mild drought
WebWIMP H_2O Balance	Wet Season

30 Days Ending	30^{th} %ile (in)	70^{th} %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2026-03-25	3.235433	4.488189	2.858268	Dry	1	3	3
2026-02-23	3.528347	5.276378	2.633858	Dry	1	2	2
2026-01-24	2.767717	5.458662	1.204724	Dry	1	1	1
Result							Drier than Normal - 6

Figures and tables made by the Antecedent Precipitation Tool Version 3.0

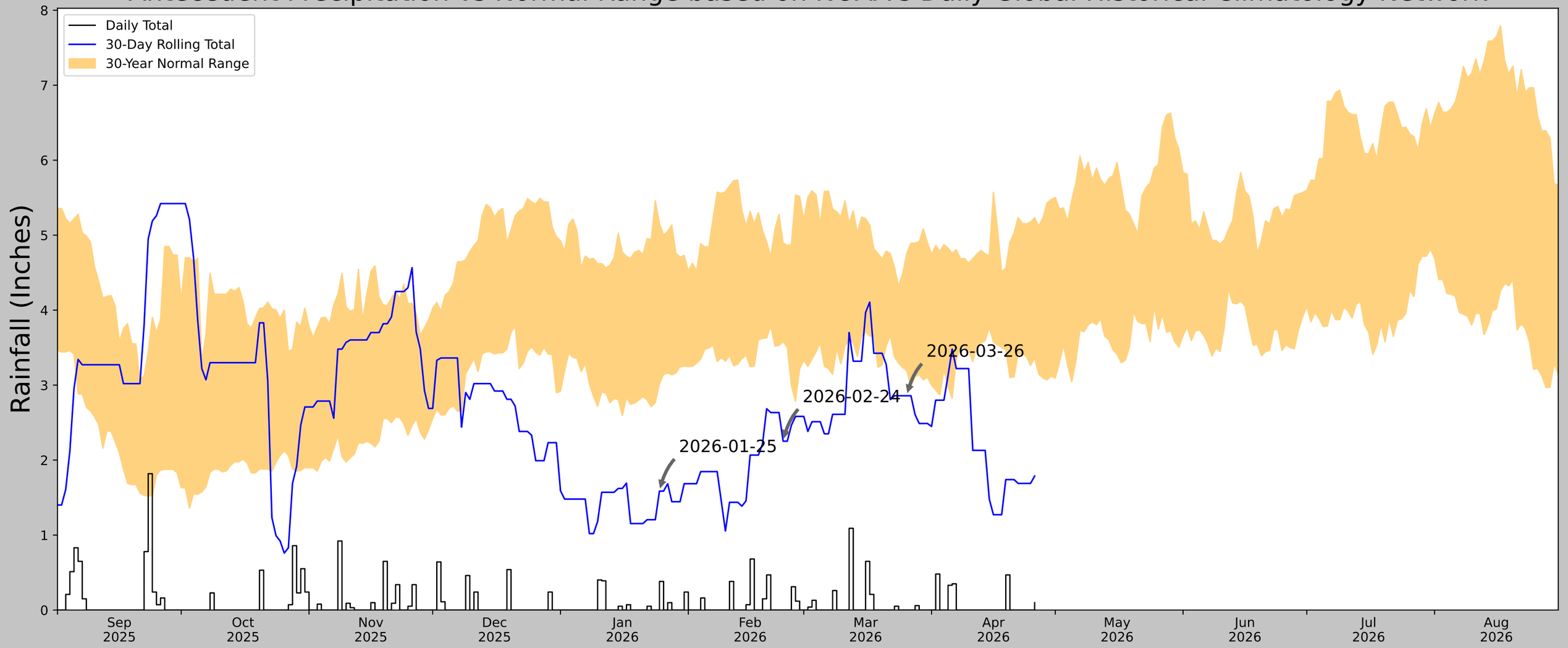
US Army Corps of Engineers.

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JACKSON 8.4 SE	37.4654, -83.2802	770.013	16.017	109.908	8.968	5	0
BUCKHORN LAKE	37.3417, -83.4706	779.856	17.17	100.065	9.445	17	0
JEREMIAH 1 S	37.1614, -82.9364	1100.066	14.744	220.145	9.881	5	0
SKYLINE 1 SE	37.0875, -82.9928	1083.005	15.163	203.084	9.903	7	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	37.4248, -83.0829
Observation Date	2026-03-26
Elevation (ft)	994.529
Drought Index (PDSI)	Mild drought
WebWIMP H_2O Balance	Wet Season

30 Days Ending	30^{th} %ile (in)	70^{th} %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2026-03-26	3.190945	4.762205	2.858268	Dry	1	3	3
2026-02-24	3.577953	4.894095	2.251969	Dry	1	2	2
2026-01-25	3.019291	5.156693	1.586614	Dry	1	1	1
Result							Drier than Normal - 6

Figures and tables made by the Antecedent Precipitation Tool Version 3.0

US Army Corps of Engineers

ERDC

Developed by:
U.S. Army Corps of Engineers and
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Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
HAZARD WTR WKS	37.2472, -83.1817	879.921	13.418	114.608	7.576	11202	90
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HAZARD STATE POLICE	37.2983, -83.2158	1328.084	3.998	448.163	3.591	29	0
CARR FORK LAKE	37.2333, -83.0333	1014.108	8.219	134.187	4.801	14	0
HYDEN	37.15, -83.3667	970.144	12.197	90.223	6.589	1	0
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JACKSON 8.4 SE	37.4654, -83.2802	770.013	16.017	109.908	8.968	5	0
BUCKHORN LAKE	37.3417, -83.4706	779.856	17.17	100.065	9.445	17	0
JEREMIAH 1 S	37.1614, -82.9364	1100.066	14.744	220.145	9.881	5	0
SKYLINE 1 SE	37.0875, -82.9928	1083.005	15.163	203.084	9.903	7	0

Table 1 - Recent Precipitation History
Merged Weather Station Data for Starfire Site
Knott County, Kentucky

Date	Precipitation (inches)
2/21/2026	0.00
2/22/2026	0.00
2/23/2026	0.00
2/24/2026	0.00
2/25/2026	0.00
2/26/2026	0.31
2/27/2026	0.12
2/28/2026	0.00
3/1/2026	0.00
3/2/2026	0.04
3/3/2026	0.13
3/4/2026	0.00
3/5/2026	0.00
3/6/2026	0.00
3/7/2026	0.00
3/8/2026	0.26
3/9/2026	0.00

Date	Precipitation (inches)
3/10/2026	0.00
3/11/2026	0.00
3/12/2026	1.09
3/13/2026	0.00
3/14/2026	0.00
3/15/2026	0.00
3/16/2026	0.65
3/17/2026	0.21
3/18/2026	0.00
3/19/2026	0.00
3/20/2026	0.00
3/21/2026	0.00
3/22/2026	0.00
3/23/2026	0.05
3/24/2026	0.00
3/25/2026	0.00
3/26/2026	0.00

Merged precipitation data generated by Antecedent Precipitation Tool, Version 3.0.
Weather data is from Buckhorn Lake, Carr Fork Lake, Hazard 1.7NW, Hazard State Police, Hazard Water Works, Hyden, Jackson 8.4SE, Jeremiah 1S, Skyline 1SE, Talbert 1.9ESE, and Viper 0.5N weather stations.
Gray shading indicates the dates of the delineation.