

**SHAWNEE FOSSIL PLANT PROJECT PHOENIX
ENVIRONMENTAL ASSESSMENT**
McCracken County, Kentucky

Prepared by:
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Background

TVA is proposing to construct a solar project, known as Project Phoenix, at its Shawnee Fossil Plant (SHF), located adjacent to the Ohio River about 10 miles northwest of Paducah, Kentucky. Utilizing a portion of the nearly 309-acre area where coal combustion residuals (CCR) are being closed and managed in place, this Proposed Action would facilitate the repurposing of an industrial brownfield site to produce up to 100 MW of renewable energy. Given its location on a TVA coal plant site, the solar facility would be proximately located to existing transmission lines. The Proposed Action would require associated infrastructure to interconnect to TVA's transmission lines. In conjunction with the proposed solar array installation, TVA is considering the construction of a Battery Energy Storage System (BESS). The action area, which includes the proposed construction of the solar panel arrangement, BESS, transmission connection infrastructure and construction laydown area, will throughout the remainder of this document be referred to as the Project Area.

Project Phoenix would include the installation of an approximately 100 MW solar cap over approximately 186 acres of the closed 309-acre site (Figure 1). The closed site is utilizing HD ClosureTurf® technology, which when paired with PowerCap® racking system, allows for the placement of solar panels without compromising the integrity of the final cover system. TVA's mission of Energy, Environment and Economic Development supports actions towards decarbonization, while maintaining low-cost, safe, clean, reliable, and affordable energy to attract and retain investments and jobs in the valley. These decarbonization goals were reiterated in TVA's 2021 Strategic Intent and Guiding Principles, which provides that TVA is "executing a plan to 70% carbon reduction by 2030, developing a path to approximately 80% carbon reduction by 2035 and aspiration to achieve net-zero emissions by 2050." To support these carbon-reduction efforts, TVA is moving to bring an additional 10,000 MW of solar energy capacity online by 2035.

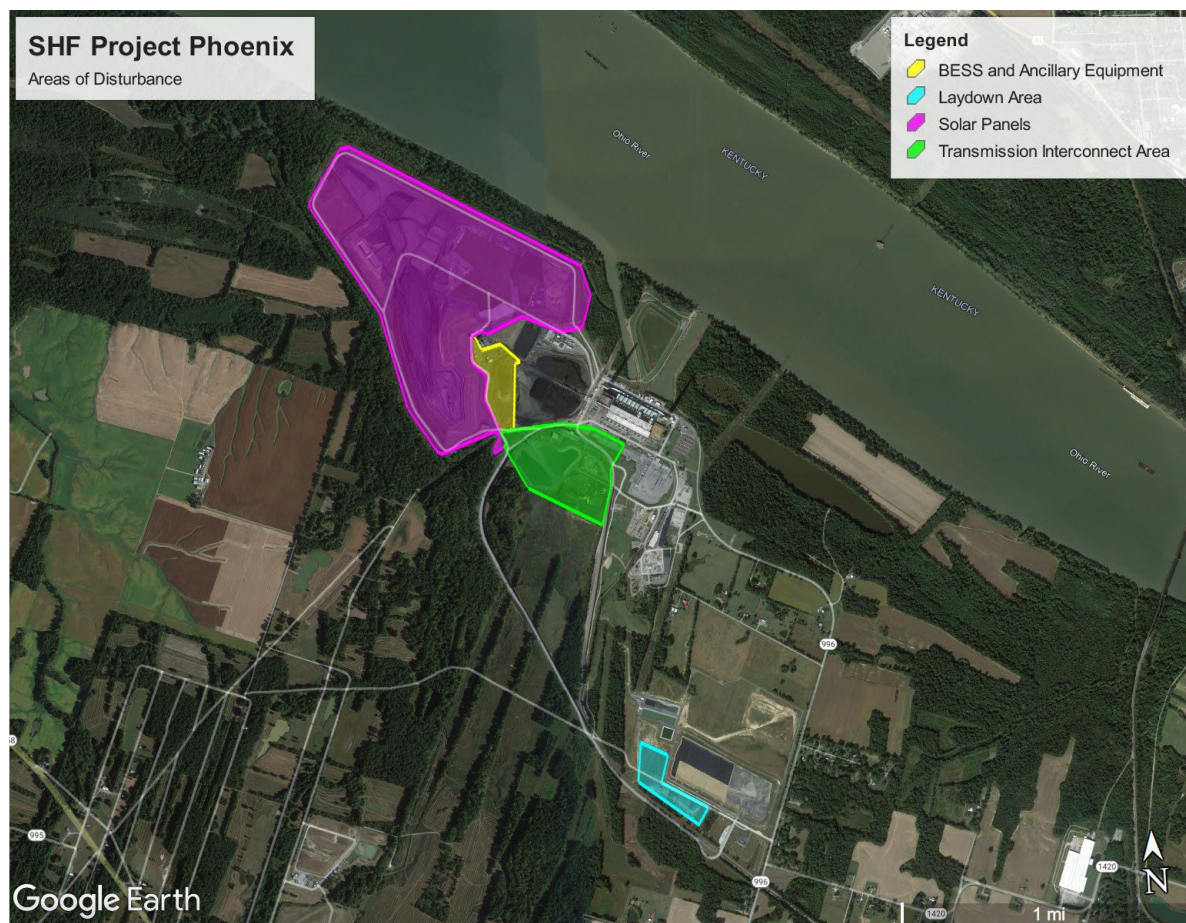


Figure 1. Site map of the proposed solar facility BESS, transmission interconnect area, and construction laydown area.

Purpose and Need for Action

TVA is a corporate agency of the United States and the largest public power provider in the country. Through their partnership with 153 local power companies, TVA supplies energy across 80,000 square miles for 10 million people, 750,000 businesses, and 56 large industrial customers, including military installations and the U.S. Department of Energy facilities at Oak Ridge, Tennessee. TVA's service area includes parts of seven southeastern states called the Tennessee Valley. Since 1933, TVA's mission has been to serve the people of the region to make life better. TVA continues to execute that mission today as it serves the Tennessee Valley through its commitment to leadership and innovation in energy, the environment and economic development. TVA has one of the largest, most diverse, and cleanest energy-generating systems in the nation characterized by low carbon, low rates, and high reliability. TVA produces or obtains electricity from a diverse portfolio of energy sources, including solar, hydroelectric, wind, biomass, fossil fuel, and nuclear.

In June 2019, TVA completed an Integrated Resource Plan (IRP) and associated Environmental Impact Statement (TVA, 2019). The IRP identified the various resources that TVA intends to use to meet the energy needs of the TVA region over the 20-year planning period while achieving TVA's objectives to deliver reliable, low-cost, and cleaner energy

while reducing environmental impacts. The 2019 IRP anticipates growth of solar in all scenarios analyzed, with most scenarios anticipating 5,000-8,000 MW and one anticipating up to 14,000 MW (TVA 2019). TVA began the process of updating its IRP and will issue a new plan in 2024. With the demand for solar energy increasing, TVA has an expansion target of 10,000 MW of solar by 2035. Project Phoenix would provide cost-effective renewable energy consistent with the IRP and TVA goals.

TVA's purpose and need for this action is to optimize power generation by utilizing the transmission related infrastructure present and by redeveloping brownfield areas on the existing plant property for solar generation and potential future energy storage. The construction of the proposed solar facility is designed to utilize this valuable surface area that is located within close proximity to a TVA grid interconnection location. The utilization of the HD ClosureTurf® technology as part of the final cover system, when paired with the PowerCap® racking system as outlined in the proposed action, allows for the placement of solar panels without compromising the integrity of the cover system. In an ongoing Valley Wide effort to optimize and update TVA facilities, this opportunity to add additional carbon free power generation in a strategically optimal location is highly sought after. This proposed solar energy production facility would enhance TVA resources by helping to meet energy production needs and providing cost effective renewable energy. The project would also require associated transmission connection infrastructure, and a laydown area. TVA is also considering constructing a BESS facility within the Project Area.

Proposed Action

TVA is proposing to install an approximately 100 MW alternating current (AC) solar facility, associated transmission interconnection infrastructure, temporary construction laydown area, and BESS facility at SHF. Figure 1 identifies the Project Area, totaling approximately 340 acres. For purposes of this Environmental Assessment (EA), the Project Area consists of an approximately 309-acre area including the Ash Pond 2 and Consolidated Waste Disposal Area, which will throughout this document be referred to as the CCR Area. The Project Area also includes an approximately 13-acre area for construction of the BESS, the corridor for transmission connection infrastructure from the solar array and BESS to the switchyard, and an approximately 14-acre construction laydown area.

The proposed site is located about 10 miles northwest of Paducah, Kentucky, along the shoreline of the Ohio River. The area adjacent to the Project is largely rural and characterized primarily by rural residential and agricultural land usage. The proposed solar installation and associated activities are located within the larger SHF facility where numerous industrial operations are currently in service. The surface area for potential solar panels would be approximately 186 acres in size (Figure 2), with a projected energy production goal of approximately 100 MW of AC (114 MW of DC) power and would utilize a combination of solar panel manufacturers. The quantity and wattage of the panels used would be assessed based on the industry production at the time of panel procurement. Installation of the solar panel facility would be accomplished utilizing the PowerCap® system. The PowerCap® system provides a direct attachment method from the panel to the HD ClosureTurf® without penetration of the final cover system. The entire stability of the system is based on friction. Friction strips are installed on the HD ClosureTurf® surface, while the racking and photovoltaic panels are mechanically fastened to the strips. The panels would be connected to inverters that would, in turn, connect to transmission interconnect infrastructure.



Figure 2. Visual rendering of the placement of solar panels

Construction of Battery Energy Storage System (BESS)

Construction of a 100-MW lithium-ion BESS is proposed to be considered on approximately 13 acres within the Project Area (Figure 1). The on-site battery would be built by TVA and would be connected to the existing switchyard at SHF.

Regional Transmission Interconnect

If future studies indicate improvements are required to the regional transmission system to maintain system stability and integrity, additional site-specific NEPA reviews would be completed for those additional transmission system needs. Upgrades to the transmission system are typically performed to increase the electrical capacity of the existing transmission lines and would include the following:

- *Moving Features that Interfere with Clearance.* As more electricity is transmitted through the transmission line, the temperature of the conductor (the cable that carries the current) rises and the transmission line may sag. Features such as sheds or storage buildings that may be located within the right-of-way (ROW) could interfere with the ability to operate the transmission line safely and would need to be removed.
- *Replacement or Modification of Existing Transmission Line Structures or Installation of Intermediate Transmission Line Structure.* Typical transmission line structure replacement, extension, or installation of intermediate transmission line structures would be performed with standard transmission line equipment such as bulldozers,

bucket trucks, boom trucks, and forklifts. The result of this work would be that the existing conductor would be raised higher to provide the proper ground clearance.

- *Conductor Modification.* Conductor modifications include conductor slides, cuts, or floating dead-ends to increase ground clearance. A cut involves removing a small amount of conductor and splicing the ends back together. A slide involves relocating the conductor clamp on the adjacent structure a certain distance toward the area of concern (i.e., “sliding” the clamp). No conductor would be removed. A floating dead-end shortens the suspension insulator string of a structure to gain elevation at the attachment point of the conductor, increasing a span’s clearance. These improvements would require the use of a bucket truck; disturbance would be minor and confined to the immediate area of the clearance issue.
- *Conductor Replacement.* If the existing conductor size cannot support the transmission line’s electrical load, the conductor must be replaced. Bucket trucks or other light-duty equipment would be utilized for access and stringing equipment. Reels of conductor would be delivered to various staging areas along the ROW, and temporary clearance poles would be installed at road crossings to reduce interference with traffic. The new conductor would be connected to the old conductor and pulled down the transmission line through pulleys suspended from the insulators. A bulldozer and specialized tensioning equipment would be used to pull conductors to the proper tension. Crews would then clamp the wires to the insulators and remove the pulleys. Wire pulls vary in length but are limited to a maximum of five-mile pulls. Pull point locations depend on the type of structures supporting the conductor as well as the length of conductor being installed and are typically located along the most accessible path on the ROW (adjacent to road crossings or existing access roads). The area of disturbance at each pull point typically ranges from 200 to 300 feet along the ROW.
- *Adding Surcharge.* Adding rock or dirt (surcharge) to structure footing would sometimes be required when height and/or loading modifications are made to a structure. These changes can create uplift on the existing tower footings or grillage, therefore requiring a stone base settlement to be placed around the existing footings. The additional burden prevents the tower from rising under certain conditions (i.e., weather conditions or conductor loading). Typical installation of surcharge would be performed with tracked equipment with minor ground disturbance. The stone would be piled around the footings as required and the depth would vary depending on the uplift on the affected structures.
- *Modification of Local Power Company Distribution Lines.* Local utilities’ distribution lines can intersect TVA transmission lines. If the local utility crossing does not have adequate clearance, TVA requests that the local utility lower or re-route the crossing.
- *Fiber Optic Ground Wire (OPGW) Installation.* A new Local Power Company (LPC) line can be installed with the help of a helicopter. Designated pull points along the transmission line corridor are used to set up cable reels of optic ground wire for installation. Pull point locations are typically located along the most accessible path on the ROW (adjacent to road crossings or existing access roads). Modifications to the existing transmission line are typically required along the length of the transmission line. Existing access roads would be used for the pull point locations. Development of new temporary or permanent access roads to support upgrades to the existing transmission lines may be needed. Depending on access needs, existing access roads may require

modifications such as brush clearing or tree trimming to allow for passage of equipment and bucket trucks. Tree removal is not anticipated and if required would be a negligible amount. Modifications would generally be limited to the existing 20-foot-wide access road area, and, if needed, tree trimming to allow a vertical clearance of up to 12 feet. Minor ground disturbance is expected in these areas, but, if the ground is disturbed, the access road area would be revegetated using native, low-growing plant species after required transmission line upgrade work is completed (TVA 2022). Areas such as pasture, agricultural fields, or lawns would be returned to their former condition.

Other Environmental Reviews and Documentation

- *SHF Project Phoenix Solar Demonstration* (TVA 2023) - This Categorical Exclusion Checklist (CEC) evaluated the impacts of placing one block of solar panels in the Project Area for demonstration purposes. The demonstration area is temporary in nature and will be utilized for evaluating local environmental factors on the system, verifying that the modeled output is accurate and providing a visual of the system.
- *SHF Project Phoenix BESS Geotechnical Borings* (TVA 2023) - This CEC evaluated the impacts of advancing soil borings within the BESS footprint for geotechnical and engineering purposes.
- *Shawnee Fossil Plant Coal Combustion Residual Management Final Supplemental Environmental Impact Statement* (TVA 2018) – This EIS evaluated the need and locations to build a new Process Water Basin and additional closure options for Ash Pond 2/Consolidated Waste Disposal Area. The record of decision (ROD) describes the preferred alternative is closure-in-place with capping.
- *Shawnee Fossil Plant Coal Combustion Residual Management Final Environmental Impact Statement* (TVA 2017) – This EIS was prepared as part of an effort to manage the disposal of CCR materials on a dry basis, and to meet new CCR regulations. This document evaluated the need to close Ash Pond 2. In the ROD, TVA determined that it would implement construction of a new lined landfill for the storage of dry CCR and elected to consider the closure alternative for Ash Pond 2/Consolidated Waste Disposal Area.

Alternatives

Description of Alternatives

In accordance with guidelines outlined in the National Environmental Policy Act (NEPA), TVA has determined there are 2 alternatives available to TVA: Alternative A – The No Action Alternative and Alternative B – Construction of the Solar Panel Facility and the Associated Infrastructure.

Alternative A – The No Action Alternative

Under Alternative A, the solar facility, BESS, and associated transmission interconnection infrastructure would not be constructed and operated at the SHF facility, and TVA would pursue other actions to meet its renewable energy goals established in the 2019 IRP (TVA 2019). The identified land would not be developed into the solar facility, BESS, and associated transmission interconnection infrastructure, and TVA would rely on other energy sources to meet energy supply needs and increase renewable energies.

Alternative B – Construction of the Solar Panel Facility and the Associated Infrastructure

Under Alternative B, TVA would install and operate the solar facility, potential BESS, and associated transmission interconnection infrastructure, providing additional carbon free power generation to the TVA electrical grid. The Proposed Action Alternative would pursue the installation of approximately 186-acres of solar panel coverage and operation, producing approximately 100 MW of Alternating Current (AC) solar power in McCracken County, KY. The proposed action would include the installation of accompanying infrastructure including the installation of a BESS, transmission interconnect infrastructure, and temporary construction laydown area.

Preferred Alternative

TVA has identified Alternative B – Construction of the Solar Panel Facility and the Associated Infrastructure as the preferred Action Alternative.

Impacts Evaluated

The following section describes the existing environmental, social, and economic conditions of the Project Area and the potential environmental effects that could result from implementing the Proposed Action. TVA documented the effects to air quality, floodplains, soil erosion and surface water, groundwater, wetlands, vegetation, aquatic ecology, terrestrial ecology, prime farmland, archaeological and historic resources, managed and natural areas, hazardous and solid waste, noise, visual, transportation, socioeconomics and environmental justice.

Aquatics

The Project Area is located in McCracken County, Kentucky and falls within the Redstone Creek-Ohio River (0514020607) 10-digit HUC watershed, encompassed by Wabash–Ohio Bottomlands ecoregion (Bailey et al. 1994). Field surveys conducted on May 16, 2023, documented one intermittent stream, eight ephemeral streams/wet weather conveyances, and four man-made ponds within the Project Area. A listing of aquatic features documented in the Project Area is provided in Appendix A. The intermittent stream (Seq. ID=S001) documented during the field survey was partially forested and had substrate composition consisting primarily of clay and gravel. The low-quality ephemeral streams that primarily function as surface water drainages were impacted from previous activities onsite associated with energy generation but are not likely to be directly impacted as a result of the Proposed Action. The four man-made retention basins function as process water or stormwater retention basins filled primarily by artificial discharge sources.

TVA assigns appropriate Streamside Management Zones (SMZs) and Best Management Practices (BMPs) following field surveys. Stream categorization, potential presence of listed species, and other factors are included in this review. Appropriate application of the BMPs minimizes the potential for impacts to water quality and instream habitat for aquatic organisms.

The Endangered Species Act (ESA) provides broad protection for species of fishes, wildlife, and plants that are listed as threatened or endangered in the United States or elsewhere. The ESA outlines procedures for federal agencies to follow when taking actions that may jeopardize federally listed species or designated critical habitat. The policy of Congress is that federal agencies must seek to conserve endangered and threatened species and use their authorities in furtherance of the ESA's purposes.

A review of the TVA Natural Heritage Database for records of listed aquatic animal species indicated that 6 federally listed aquatic species are known from the potentially affected ten-digit HUC watershed of the project (Table 1). Additionally, 20 of the aquatic species queried in the watershed are state listed in Kentucky. Review of the U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Consultation (IPaC) tool of the proposed Project Area yielded 7 additional mussel species: the Clubshell, Fanshell, Longsolid, Northern Riffleshell, Ring Pink, Rough Pigtoe, and Spectaclecase. All seven mussels are listed as non-essential experimental populations. None of the streams documented during the May 2023 field survey would provide suitable habitat to support any of the species listed in Table 1. Therefore, due to a lack of suitable habitat within the Project Area for listed aquatic species, the Proposed Action is not anticipated to impact federally threatened, endangered or state-listed aquatic species.

Table 1. Records of State-listed aquatic animal species within the Redstone Creek-Ohio River (0514020607) 10-digit HUC watershed (TVA Request ID 42589).¹

Common Name	Scientific Name	Element Rank ²	Federal Status ³	State Status (rank ⁴)
FISH				
Alligator Gar	<i>Atractosteus spatula</i>	H?		LE (S1)
Black Buffalo	<i>Ictiobus niger</i>	E		S (S3)
Chain Pickerel	<i>Esox niger</i>	H?		S (S3)
Cypress Minnow	<i>Hybognathus hayi</i>	E		LE (S1)
Inland Silverside	<i>Menidia beryllina</i>	A		LT (S2)
Lake Chubsucker	<i>Erimyzon sucetta</i>	H?		LT (S2)
Mountain Brook Lamprey	<i>Ichthyomyzon greeleyi</i>	H?		LT (S2)
Northern Madtom	<i>Noturus stigmosus</i>	D		S (S2,S3)
Redspotted Sunfish	<i>Lepomis miniatus</i>	D		LT (S2)
Taillight Shiner	<i>Notropis maculatus</i>	E		LT (S2,S3)
SNAILS				
Armored Rocksnail	<i>Lithasia armigera</i>	C		S (S3,S4)
Onyx Rocksnail	<i>Leptoxis praerosa</i>	H		S (S3,S4)
Varicose Rocksnail	<i>Lithasia verrucosa</i>	E		S (S3,S4)
MUSSELS				
Clubshell	<i>Pleurobema clava</i>		LE	
Fanshell	<i>Cyprogenia stegaria</i>		LE	
Fat Pocketbook	<i>Potamilus capax</i>	E	LE	LT (S2)
Longsolid	<i>Fusconaia subrotunda</i>		LT	
Northern Riffleshell	<i>Epioblasma rangiana</i>		LE	
Orange-foot Pimpleback	<i>Plethobasus cooperianus</i>	E	LE,XN	LE (S1)
Pink Mucket	<i>Lampsilis abrupta</i>	E	LE	LE (S1)
Pocketbook	<i>Lampsilis ovata</i>	C		LE (S1)
Rabbitsfoot	<i>Quadrula cylindrica</i>	E	LT	LE (S2)
Ring Pink	<i>Obovaria retusa</i>		LE	
Rough Pigtoe	<i>Pleurobema plenum</i>		LE	
Sheepnose	<i>Plethobasus cyphyus</i>	D	LE	LE (S1)

Smooth Rabbitsfoot	<i>Quadrula cylindrica cylindrica</i>	U	LT	LT (S2)
Spectaclecase	<i>Cumberlandia monodonta</i>		LE	

¹ Source: TVA Natural Heritage and USFWS IpaC databases, queried on 6/7/2023 by R. Anderson Smith

² Heritage Element Occurrence Rank: C = fair estimated viability; D = Poor estimated viability; E = extant record ≤25 years old; H = historical record ≥ 25 years old; H? = Possibly historical; U = Unrankable; X = extirpated

³ Status Codes: LE or E = Listed Endangered; LT or T = Listed Threatened; PT = Proposed Threatened; S = Special Concern; UR = Under Review

⁴ State Ranks: S1 = Critically Imperiled; S2 = Imperiled, S3 = Vulnerable, S4 = Apparently secure

Efforts were made during project planning and siting phase to avoid stream impacts to the extent practicable under the Proposed Action. All streams identified within the Project Area would be avoided. TVA would further avoid stream disturbance through adherence to stream BMPs (TVA 2022) and/or standard permit requirements. These BMPs are designed in part to minimize disturbance of riparian areas and reduce the subsequent erosion and sedimentation that potentially impact nearby streams. Therefore, with stream avoidance and BMPs in place, the Proposed Action would not result in any measurable impacts to regional stream conditions.

No suitable habitat for federal or state-listed aquatic species is present within the Project Area due to long term disturbance and impacts from onsite activities associated with energy generation. Federally Designated Critical Habitat (DCH) for the federally listed rabbitsfoot occurs in the main stem Ohio River adjacent to the Shawnee Fossil Plant. However, the streams documented in the vicinity of the project would not provide adequate habitat for the rabbitsfoot or any of the federally listed mussel species listed in Table 1. No adverse modifications to rabbitsfoot designated critical habitat would be made as a result of the Proposed Action. Therefore, due to a lack of suitable habitat for listed aquatic species, and since no impacts are proposed to any streams documented within the Project Area, no impacts to federal or state listed aquatic species are anticipated to occur as a result of the Proposed Action.

Vegetation

Aerial photos, topographic maps, and a site visit by TVA biologists indicated the Project Area consists primarily of heavily disturbed herbaceous vegetation. The Project Area also includes mowed herbaceous vegetation, roads, paved areas, or areas of herbaceous and shrubby vegetation under transmission lines or along roads. Only a small area of secondary forest remains along the edge of the Project Area. This forested area is indicative of low-quality habitat with a mixture of invasive and early successional native species. The proposed Project Area does not support any high-quality plant communities or areas with high conservation value.

Executive Order 13112 serves to prevent the introduction of invasive species and provides for their control to minimize the economic, ecological, and human health impacts that those species potentially cause. In this context, invasive species are nonnative species that invade natural areas, displace native species, and degrade ecological communities or ecosystem processes (Miller 2010). Much of the Project Area is dominated by invasive species, which reflects the frequency and magnitude of disturbance present on site. The Proposed Action would not contribute to the spread of invasive species.

A June 2023 query of the TVA Heritage database indicates that four state listed plant species have been previously reported within a five-mile vicinity of the proposed Project

Area. No federally listed species are known from within this area or anywhere within the boundaries of McCracken County, Kentucky. An IPaC query of the Project Area resulted in no federally listed species and no critical habitat for protected plant species occurring in the Project Area. Additionally, aerial photos, site photos, topographic maps, knowledge of rare plant habitats, and field surveys of the Project Area indicate that federally listed or proposed threatened plant species do not occur on the site.

Table 2. State-listed plant species previously documented from within a five-mile vicinity of the Proposed Action. ¹

Common Name	Scientific Name	State Status ²	State Rank ³
Green Milkweed	<i>Asclepias hirtella</i>	T	S2
Water Hickory	<i>Carya aquatica</i>	T	S2
Five-lobed Cayaponia	<i>Cayaponia quinqueloba</i>	E	S1
Snow Squarestem	<i>Melanthera nivea</i>	S	S3

¹ Source: TVA Natural Heritage Database, April 2023.

² Status Codes: E = Listed Endangered; T = Listed Threatened; S = Listed Special Concern.

³ State Ranks: S1 = Critically Imperiled; S2 = Imperiled; S3 = Vulnerable

Completion of the Proposed Action would not negatively impact vegetation on any appreciable scale. The forested and herbaceous communities currently found within the Project Area did not support native plant communities with high conservation value. Portions of the Project Area would be permanently converted to industrial use, but these areas do not support unique or high conservation value plant communities. The implementation of the Proposed Action would have a negligible impact on the terrestrial vegetation ecology of the region.

Terrestrial Ecology (Wildlife)

The Project Area consists of a heavily disturbed area with little to no unaltered natural habitat. The Project Area includes mowed herbaceous vegetation, various man-made process water and stormwater retention basins, roads, paved areas, or otherwise herbaceous and shrubby vegetation under transmission lines or mowed grassy areas along roads. Only a small area of secondary forest remains on the edge of the Project Area. One intermittent stream and five small wetlands also occur within the Project Area.

Mowed herbaceous fields and the coal yard runoff ditch do not offer suitable habitat for rare wildlife species but can be used by many common species. Birds that utilize these grassy areas include Canada goose, eastern meadowlark, grasshopper sparrow, killdeer, European starling, and red-tailed hawk (National Geographic 2002). Small mammals that can be found in these grassy areas include eastern cottontail, eastern mole, white-footed mouse, deer mouse, meadow jumping mouse, southeastern shrew, woodland vole, meadow vole, eastern gray squirrel, eastern fox squirrel, and eastern chipmunk (Whitaker 1996). Other mammals that may be located in the vicinity of SHF include striped skunk, opossum, raccoon, red fox, gray fox, coyote, bobcat, woodchuck, beaver, muskrat, and mink (Whitaker 1996). Mist netting in the nearby Western Kentucky Wildlife Management Area (WKWMA) has identified the presence of common and rare bats. The stream and wetland areas within the project boundary may provide habitat for American toad, Fowlers toad, spring peeper, and upland chorus frog.

Small patches of disturbed forest adjacent to industrialized areas are often used by the American crow, American robin, American goldfinch, blue jay, eastern towhee, northern cardinal, northern mockingbird, red-winged blackbird, red shouldered hawk, and wild turkey (National Geographic 2002). Reptiles that may use these habitats in this region include eastern box turtle and eastern kingsnake (Powell et al. 2016).

One small channel of water that was temporarily created as a result of dewatering activities in the CCR Area mimicked natural shoreline habitat. This feature could potentially be used by migrating shorebirds as stopover habitat. The man-made process water and stormwater retention basins have graveled or heavily vegetated edges that do not provide desirable shorebird stopover habitats. Wading birds such as double-crested cormorants, great blue herons, and green herons as well as other species such as mallards and Canada geese may use these retention basins. Common turtles such as the common snapping turtle, red-eared slider, and river cooter may also use these retention basins (Buhlmann et al. 2008). The nearby WKWMA is considered a birding hotspot, with 183 species recorded there (eBird 2023). No colonies of wading birds are known within three miles of the Project Area.

No cave records are known within three miles of the Project Area. No caves were observed during the field survey. For additional information regarding Terrestrial Wildlife Habitat, see Appendix F.

Review of the TVA Regional Natural Heritage Database on April 21, 2023, resulted in records of nine state-listed species (Duke's skipper, northern crawfish frog, western mud snake, hooded merganser, fish crow, Bell's vireo, little brown bat, osprey, southeastern bat), one federally protected species (bald eagle), and three federally listed species within three miles of the Project Area (Interior least tern, Indiana bat, and northern long-eared bat), and federally proposed endangered species (tricolored bat). The federally endangered gray bat and the federally proposed endangered alligator snapping turtle are also known from McCracken County, Kentucky. In addition, the US Fish and Wildlife Service also has determined that the candidate species, monarch butterfly, and non-essential populations of the whooping crane have the potential to occur in the Project Area (Table 3). Species-specific information and habitat suitability within the Project Area are discussed below.

Table 3. Federally listed terrestrial animal species reported from McCracken County, Kentucky and other species of conservation concern documented within three miles of the Project Area¹

Common Name	Scientific Name	Status ²	
		Federal	State ³ (Rank ³)
Amphibians			
Northern crawfish frog	<i>Rana areolata circulosa</i>	--	S(S3)
Birds			
Bald eagle	<i>Haliaeetus leucocephalus</i>	DL	S(S3B,S3S4)N
Bell's vireo	<i>Vireo bellii</i>	--	S(S2S3B) (S2S3B)
Fish crow	<i>Corvus ossifragus</i>	--	S(S3B)
Hooded merganser	<i>Lophodytes cucullatus</i>	--	T(S2B,S3S4N))

Interior least tern	<i>Sterna antillarum athaloassos</i>	DL	E(S1S2B)
Osprey	<i>Pandion haliaetus</i>	-	S(S3S4B)
Whooping crane ⁴	<i>Grus americana</i>	EXPN	SNA
Invertebrates			
Duke's skipper	<i>Euphyes dukesi</i>	--	T(S2)
Monarch butterfly ^{4,5}	<i>Danaus plexippus</i>	C	-(S4)
Mammals			
Gray bat ⁶	<i>Myotis grisescens</i>	E	T(S2)
Indiana bat	<i>Myotis sodalis</i>	E	E(S1S2)
Little brown bat	<i>Myotis lucifugus</i>	--	T(S2)
Northern long-eared bat	<i>Myotis septentrionalis</i>	E	E(S1)
Southeastern bat	<i>Myotis austroriparius</i>	--	S(S3)
Tricolored bat	<i>Perimyotis subflavus</i>	PE	T(S2)
Reptiles			
Alligator snapping turtle ⁶	<i>Macrochelys temminckii</i>	PT	E(S1)
Western mud snake	<i>Farancia abacura reinwardtii</i>	--	S(S3)

¹Source: TVA Regional Natural Heritage Database, extracted 4/21/2023 and USFWS Information for Planning and Consultation (IPaC) resource list (<https://ecos.fws.gov/ipac/>), accessed 6/13/2023.

²Status Codes: C = Candidate species; DL = Delisted; E = Endangered; EXPN = Experimental Population, Non-Essential; PE = Proposed Endangered; PT = Proposed Threatened; S = Special Concern; SNA = T = Threatened

³State Ranks: S1 = Critically Imperiled; S2 = Imperiled; S3 = Vulnerable; S4 = Apparently Secure; S#B = Status of Breeding population; S#N = Status of Non-breeding population.

⁴USFWS has determined that this species could occur within the PA.

⁵Historically this species has not been tracked by state or federal heritage programs.

⁶Species known from McCracken County, Kentucky but not from within three miles of the PA.

Under the Proposed Action, TVA would create a solar facility, BESS, and associated transmission interconnection infrastructure at the SHF. Suitable habitat for Bell's vireo, whooping crane, and alligator snapping turtle does not exist within the Project Area. These species would not be impacted by the Proposed Action. Approximately 10 trees would be removed; however, no impacts to streams or wetlands would occur, and therefore, no impacts to northern gopher frog, Duke's skipper, fish crow, hooded merganser, and western mud snake would occur. No impacts to the coal yard runoff ditch would occur in association with the Proposed Action; therefore, stopover habitat for interior least tern would not be impacted and no impacts to this species are anticipated.

The USFWS IPaC tool identified fourteen migratory birds of conservation concern that could occur within the Project Area: bald eagle, black-billed cuckoo, bobolink, cerulean warbler, chimney swift, field sparrow, Henslow's sparrow, Kentucky warbler, lesser yellowlegs, prairie warbler, prothonotary warbler, red-headed woodpecker, rusty blackbird, and wood thrush.

Breeding and foraging habitat does not exist for chimney swift within the Project Area. Eastern whip-poor-will breeding habitat is not present within the Project Area. The small, forested edge habitat in the Project Area may provide suitable breeding habitat for the black-billed cuckoo, red-headed woodpecker, and wood thrush. The field under the existing transmission right-of-way (ROW) may provide habitat for the field sparrow and Henslow's sparrow. The coal yard runoff ditch area may provide low quality stopover habitat for less

yellowlegs. Suitable habitat for the rest of the identified migratory birds of conservation concern does not occur in the Project Area. Tree removal is proposed in winter when black-billed cuckoo and wood thrush would have migrated out of the region. Red-headed woodpecker could be present but would not be nesting at this time of year. Tree removal could cause red-headed woodpeckers to flush if present in the area during the disturbance. Depending on the timing of the ground disturbance in the ROW, direct impacts to nesting birds could occur. No impacts to stormwater spillways within the CCR Area would occur in association with the Proposed Action. Considering the relatively small amounts of habitat to be impacted, and the availability of higher quality habitat in areas immediately adjacent to the Project Area, populations of migratory birds of conservation concern would not be impacted by the Proposed Action.

Due to the distance from known records to the Project Area (approximately 0.6 miles), no bald eagle nests would be impacted by the Proposed Action. No impacts to the man-made process water and stormwater retention basins would occur; therefore, no impacts to foraging habitat would occur. The Proposed Action is in compliance with the National Bald Eagle Management Guidelines. One osprey nest occurs in the Project Area; however, no actions are proposed within 660 feet of the nest. No impacts would occur to the man-made process water and stormwater retention basins; therefore, no impacts would occur to foraging habitat for this species. Ospreys would not be impacted by the Proposed Action.

Monarch butterfly habitat may exist within the Project Area on the existing transmission ROW. Vegetation removal could occur at isolated locations in the existing transmission ROW. Depending on the timing of the ground disturbance, monarch adults and/or larvae could be present in the region. Adults would be expected to flush if disturbed. Larvae could be directly impacted should suitable milkweed species be present in the exact areas of disturbance and should adults have laid eggs on those individual plants. This species is currently listed under the Endangered Species Act (ESA) as a candidate species and is not subject to Section 7 consultation under the ESA. Due to the relatively small areas of potential impacts, the Proposed Action would not jeopardize the continued existence of monarch butterfly.

Six federally listed or state protected bat species were evaluated based on the potential for the species to occur within the Project Area. No caves or other hibernacula for any of the reviewed bat species is known within the Project Area or within three miles of the Project Area. Suitable foraging habitat around a forest edge and over wetlands, streams and retention basins occurs for all six species. However, no impacts to aquatic foraging habitat would occur and only a small edge of forested habitat would be impacted, with the removal of approximately 10 small trees not suitable for bat roosting. Therefore, there would be no measurable impacts to foraging bats. Trees proposed for removal do not offer suitable summer roosting habitat for Indiana bat, northern long-eared bat, little brown bat, or southeastern bats. Trees proposed for removal may provide a small amount of low-quality roosting habitat for the tricolored bat; however, tree removal is proposed during winter period (November 15th – March 31st) when this species would not be utilizing roosting trees near the Project Area.

Due to the lack of impacts to roosting habitat and minimization of impacts to foraging habitat, the Proposed Action is not likely to impact gray bat, Indiana bat, and northern long-eared bat, little brown bats, or southeastern bats. Due to the lack of impacts to winter roosting habitat, the small amount (10 trees) of potential summer habitat proposed for removal, the winter timing of the tree removal, the larger quantities of much higher quality

habitat that exists adjacent to the Project Area, and the minimization of impacts to foraging habitat, the Proposed Action would not jeopardize the continued existence of the tricolored bat.

The Proposed Action would result in the displacement of wildlife (primarily common, habituated species) currently using the area. Direct effects to some individuals could occur if those individuals are immobile during the time of habitat removal (e.g., during breeding/nesting or hibernation seasons). Habitat removal likely would disperse mobile wildlife into surrounding areas in attempts to find new food resources, shelter, and to reestablish territories. Due to the low quality of habitat present within the Project Area and the amount of similarly suitable or higher quality habitat in areas immediately adjacent to the Project Area, populations of common wildlife species likely would not be impacted by the Proposed Action.

Wetlands

Wetlands are those areas inundated or saturated by surface or groundwater such that vegetation adapted to saturated soil conditions are prevalent. Examples include bottomland forests, swamps, wet meadows, isolated depressions, and fringe wetland areas along the edges of watercourses and impoundments. Wetlands provide many societal benefits such as toxin absorption and sediment retention for improved downstream water quality, stormwater impediment and attenuation for flood control, shoreline buffering for erosion protection, and provision of fish and wildlife habitat for commercial, recreational, and conservation purposes. A wetland assessment was performed to ascertain wetland presence, condition, and extent to which wetland functions are provided within the proposed Project Area. Field surveys were conducted on May 16, 2023, to delineate wetland areas potentially affected by the Proposed Action.

Activities in wetlands are regulated by state and federal agencies to ensure no net loss of wetland resources. Under Clean Water Act (CWA) §404, activities resulting in the discharge of dredge or fill material to waters of the U.S., including wetlands, must be authorized by the U.S. Army Corps of Engineers (USACE) through a Nationwide, Regional, or Individual Permit to ensure no more than minimal impacts to the aquatic environment. Section §401 of the Clean Water Act (CWA) requires state water quality certification for projects in need of USACE approval. In Kentucky, the Kentucky Division of Water (KDOW) is responsible for certifying CWA Section 404 permits are compliant with state water quality regulations. Lastly, Executive Order 11990 requires federal agencies to avoid construction in wetlands and minimize wetland degradation to the extent practicable. Wetland determinations were performed according to the USACE standards, which require documentation of hydrophytic (wet-site) vegetation, hydric soil, and wetland hydrology (Environmental Laboratory 1987; Lichvar et al. 2016; USACE 2010).

Using a TVA-developed modification of the Ohio Rapid Assessment Method (Mack 2001) specific to the TVA region (TVA Rapid Assessment Method or “TVARAM”) wetlands were evaluated by their functions and classified into three categories: low quality, moderate quality, and high quality. The Proposed Action traverses the heavily developed landscape of the SHF in McCracken County, Kentucky. The Project Area is located across the Redstone Creek – Ohio River watershed (HUC10: 0514020607). The Project Area for the Proposed Action was field surveyed to identify actual wetland extent and quality. A total of five wetland complexes, totaling 0.34 acres, were identified within the proposed Project Area (USACE, Appendix E). The combination of land-use practices and landscape position dictates the wetland habitat type, wetland functional capacity, and wetland value. The

identified wetlands consisted of emergent habitat, all exhibiting poor quality, thus providing low resource value to the surrounding landscape (Table 4a and 4b).

Table 4a. Acreage of wetlands representing low, moderate, or high resource value within the Project Area and relative to total mapped wetland occurrence within the watershed.

Watershed (10-HUC)	NWI Estimated Total Wetland Acres in Watershed*	Delineated Wetland Acreage in Project Area			
		Low Value	Moderate Value	High Value	TOTAL
Redstone Creek – Ohio River (0514020607)	11331	0.34	0	0	0.34

*National Wetland Inventory (USFWS 1982)

Table 4b. Acreage of wetlands by habitat type within the Project Area and relative to total mapped wetland occurrence within the watershed.

Watershed (10-HUC)	NWI Estimated Total Wetland Acres in Watershed	Delineated Total Wetland Acreage in Proposed Project Area			
		Emergent	Scrub-Shrub	Forested	TOTAL
Redstone Creek – Ohio River (0514020607)	11331	0.34	0	0	0.34

Emergent wetland within the Project Area totaled 0.34 acres across five delineated wetland areas. Emergent wetlands are generally devoid of woody vegetation with predominant cover by non-woody species across areas periodically saturated and/or inundated. Emergent wetlands in this general vicinity are often found where land-use practices or inundation deter growth of woody species. All wetland habitats encountered within the proposed Project Area were emergent vegetated swales. These wetland areas contained indicators of wetland hydrology influencing soil physiology such that coloration indicative of wetland conditions were evident in the soil profile. Emergent wetlands were dominated by common emergent wetland vegetation including *Eleocharis acicularis*, *Carex vulpinoidea*, and *Arundinaria tecta* (Appendix E). All emergent wetland habitat encountered scored as low quality using TVARAM, indicating poor wetland quality, due to small size, surrounding land use, and evidence of disturbance (e.g., mowing, past construction, etc.) (Table 4b, Appendix D).

Efforts were made during project planning and siting to avoid wetland impacts to the extent practicable. The proposed Project Area contains a total of 0.34 acres of emergent wetland. Under the Proposed Action, all wetlands identified within the Project Area would be avoided. TVA would further avoid wetland disturbance through adherence to wetland BMPs for all work necessary near delineated wetland boundaries (TVA 2022). Therefore, with wetland avoidance and BMPs in place, the Proposed Action would have no impact on wetlands.

Managed and Natural Areas

Managed areas include lands held in public ownership that are managed by an entity (e.g., TVA, US Department of Agriculture, US Forest Service, State of Kentucky) to protect and maintain certain ecological and/or recreational features. Natural areas include ecologically significant sites; federal, state, or local park lands; national or state forests; wilderness areas; scenic areas; wildlife management areas; recreational areas; greenways; trails; Nationwide Rivers Inventory streams; and wild and scenic rivers. Ecologically significant sites are either tracts of privately owned land that are recognized by resource biologists as having significant environmental resources or identified tracts on TVA lands that are ecologically significant but not specifically managed by TVA's Natural Areas program. A review of the TVA Natural Heritage Project database identified 4 managed and natural areas within three miles of the Project Area (Table 5).

Table 5. Managed/Natural Areas that occur within, adjacent to, or within 3 miles of the Project Area.

Natural Areas	Acres	Solar Project Area	Laydown area for panels	Interconnect	BESS & Transformer yard
Bayou Creek Registered State Natural Area	174.54	0.3 mi northwest	2.6 mi northwest	1.5 mi northwest	1.3 mi northwest
Metropolis Lake State Nature Preserve	123.23	0.6 mi southeast	0.8 mi southeast	0.3 mi southeast	0.6 mi southeast
Metropolis Lake	37.15	0.7 mi southeast	1.0 mi southeast	0.4 mi southeast	0.7 mi southeast
Metropolis Lake TVA Habitat Protection Area	0.77	0.6 mi southeast	1.1 mi southeast	0.4 mi southeast	0.6 mi southeast

Of the four managed and natural areas that occur within 3 miles of the proposed Project Area, all areas fall within one mile of some part of the Project Area and could potentially be indirectly impacted by the Proposed Action; however, none of these areas directly overlap with or fall directly adjacent to the Project Area. The Bayou Creek Registered State Natural Area is managed by the Kentucky Department of Fish and Wildlife. No significant or long-term impacts to this area are expected. The Metropolis Lake State Nature Preserve and the Metropolis Lake State Resource Water are managed by the Kentucky State Nature Preserve Commission. No long-term or significant impacts to these areas are expected. The Metropolis Lake TVA Habitat Protection Area (HPA) has had endangered, threatened, and species of concern aquatic observations noted. No significant or long-term impacts to this TVA HPA are expected as a result of this project. The Proposed Action is not expected to have any long-term or measurable impacts on nearby natural areas.

Floodplains

A floodplain is the relatively level land area along a stream or river that is subject to periodic flooding. The area subject to a 1-percent chance of flooding in any given year is normally called the 100-year floodplain. The area subject to a 0.2-percent chance of flooding in any given year is normally called the 500-year floodplain. It is necessary to evaluate development in the 100-year floodplain to ensure that the project is consistent with the requirements of EO 11988, Floodplain Management.

Based on TVA terrain data, the 2011 McCracken County, Kentucky, Flood Insurance Study, and McCracken County, Kentucky, Flood Insurance Rate Map (FIRM) Panel Number

21145C0045F, effective 11/2/2011, the entire Project Area would be located outside the 100-year floodplain and above the 100-year flood elevation, which would be consistent with EO 11988. The Proposed Action would also be located outside the 500-year floodplain and above the 500-year flood elevation. Based on the implementation of standard BMPs and the fact that the Proposed Action is set to be conducted entirely outside of any regulated floodplain, the project is expected to have no significant impact on floodplains and their natural and beneficial values.

Parks & Recreation

This section addresses recreational areas that are immediately adjacent to (within 0.5 miles) or within the region of the Project Area (3-mile radius). Aerial photos and maps indicated several recreational areas within the project's vicinity, and a summary of each area identified will be discussed below.

The site of the Proposed Action lies directly on the banks of the Ohio River in Kentucky, and adjacent to the Illinois border. Metropolis Boat Ramp lies 2.7 miles east of the Project Area on the opposite bank, north of the Proposed Action. The public boat ramp includes a concrete boat launch site, and a large parking lot adjacent to the ramp. Metropolis Boat Ramp hosts bank fishing and boaters year-round who utilize the river for fishing and recreational water usage. Additionally, on the north side of the river lies Dorothy Miller Park (3-miles east of the Project Area), a city park owned and operated by the city of Metropolis, Illinois. Dorothy Miller Park includes picnic shelters, each with six picnic tables, and large green spaces for recreation users including bicyclists, hikers, etc., and those utilizing the Ohio River for water recreation. Within Dorothy Miller Park is the Metropolis Hope Lighthouse, which is owned and operated by the nonprofit organization Hope Light Foundation and is a popular attraction for visitors.

In addition to Dorothy Miller Park, there are three city parks within the 3-mile vicinity of the proposed Project Area that are owned and operated by the city of Metropolis, Illinois. Franklin Park, located 2.4 miles east of the Project Area, includes an outdoor basketball court (open year-round) and outdoor swimming pool (open during summer months) that are both open to the public. Memorial Park, located 2.6 miles east of the Project Area, includes a green space and pavilion for recreation users, and is open to the public year-round. Lastly, Washington Park (located 2.8 miles east of the Project Area) is a public park open year-round that hosts various green spaces for recreation, and a covered gazebo in the center of the park.

On the bank adjacent to the Project Area lies Metropolis Lake Nature Preserve and Metropolis Lake. This Nature Preserve provides 123 acres of important habitat for rare species and recreational opportunities. The preserve is owned by Kentucky State Nature Preserves Commission (KSNPC), as well as two adjacent acres along the western boundary of the preserve being owned by TVA. TVA and KSNPC help protect the natural integrity of the lake and land that make up the preserve. Along with being open to the public for fishing, the preserve also hosts a 0.8-mile foot trail that traverses the area south of the lake.

Lastly, West Kentucky State Wildlife Management Area lies 2.7 miles southwest of the Project Area. The wildlife management area (WMA) includes twelve recreational fishing ponds with access for small boats, areas for picnicking, and trails for hiking. Horseback riding also occurs on the property by permit only. National caliber horseback bird dog field trials, retriever field trials, and retriever test hunts are hosted September through May on

the WMA. Additionally, the WMA includes an archery range (mobility-impaired accessible) with 10 to 50-yard targets open daily during daylight hours, wildlife viewing areas (Tupelo Swamp), a handicap accessible fishing pier, and primitive camp sites.

The Proposed Action would not negatively impact recreational areas. Due to the distance and nature of the project, impacts to recreational areas would be minor and temporary, including noise and transportation influencing recreational areas within one mile of the Project Area. Members of the public accessing the Ohio River, Metropolis Lake, Metropolis Boat Ramp, and Dorothy Miller Park may temporarily experience visual impacts during construction of the project; however, these impacts are expected to be minor and temporary. Once the Proposed Action has been completed, visual, noise and transportation impacts would cease.

Cultural Compliance

TVA has determined that the proposed solar array is an undertaking (as defined at 36 CFR § 800.16(y)) that has the potential to cause effects on historic properties, if any are in the Proposed Action's Area of Potential Effects (APE). TVA determined that the undertaking's APE consists of the Project Area plus areas within one-half mile from which the solar array, BESS, and transmission line structures would be visible ("viewshed"). TVA completed a desktop review to identify historic properties (archaeological sites, cemeteries, or historic architectural properties listed in, or considered eligible for listing in, the National Register of Historic Places (NRHP) in the APE. The review included current and historic topographic maps; TVA's engineering report on SHF (TVA 1969); TVA's historic photograph collection; TVA's Cultural Resources Management System; historic aerial photographs available at the U.S. Geological Survey (EarthExplorer); the U.S. Soil Conservation Service Web Soil Survey; the USGS Lidar Explorer; NRHP listings; the Kentucky Heritage Council's data on archaeological sites and historic resources; and previous survey reports.

Most, if not all, of the area within the Project Area has been affected by deep ground disturbance associated with the construction and maintenance of SHF. Moreover, all areas with any archaeological potential in the Project Area have been included in prior archaeological surveys. Previous disturbance is documented to varying degrees by construction drawings and historic photographs taken during construction in the 1950s. It is also apparent in the field based on landforms, which show evidence of cut and fill activity. During TVA's Section 106 review of the proposed installation of Selective Catalytic Reduction (SCR) equipment on Units 2, 3, 7, and 8 in September 2022, TVA concluded that the proposed laydown and spoils disposal areas had been subjected to significant ground disturbance in the past and had no potential for archaeological sites. TVA consulted with the Kentucky State Historic Preservation Officer (SHPO) and federally recognized Indian tribes with an interest in McCracken County, Kentucky, regarding that finding. None of the consulting parties objected. TVA completed NHPA Section 106 compliance for the SCR project and is currently using the area as spoils disposal. As the footprint of the Project Area is confined to the active work area adjacent to the SHF and areas affected by SCR spoils disposal, there is no potential for archaeological sites in that portion of the footprint.

TVA completed an archaeological survey of the SHF rail loop in 2018 (Hunter 2018), which identified no archaeological sites in the current Project Area. These findings were used to support TVA's compliance with NEPA and the National Historic Preservation Act (NHPA)

regarding a process water basin. TVA consulted with the Kentucky SHPO and federally recognized Indian tribes. The SHPO ultimately agreed with TVA that no NRHP eligible or potentially eligible archaeological sites are located in the rail loop. TVA subsequently constructed the process water basin in the north rail loop area. TVA's consultation on the process water basin also included some areas outside the rail loop where some of the transmission structures would be installed; archaeological survey identified no archaeological resources in this area and TVA completed NHPA Section 106 consultation without objections from any consulting party. Based on the documentation of prior disturbance, combined with the negative findings from previous archaeological surveys, TVA finds that no archaeological resources or cemeteries exist in the Project Area.

SHF is listed in the NRHP under Criterion A for significance at the local level in the area of Industry for its historical association with TVA's post World War II fossil power plant program in Kentucky, with a period of significance from 1951-1965 (Weaver et al. 2015). The property was listed in the NRHP as a historic district with 19 contributing resources. Since that time, one of the contributing resources, the barge unloading harbor, and one of the contributing belt conveyors, have been removed (after consultation with the Kentucky SHPO and agreement that no additional mitigation measures were needed). Based on TVA's recent consultation regarding the SCR project, SHF remains eligible for inclusion in the NRHP despite modifications that have been completed in some areas, notably the north side of the powerhouse where the flue gas handling equipment is located. Based on prior reviews and consultation and the Kentucky Heritage Council data, no additional historic resources other than SHF are located in the APE.

The CCR Area on which the solar array would be constructed is not a contributing resource to NRHP-eligible SHF. Further, the installation of the BESS, and transmission interconnect would not require the modification or removal of any building or structure that is a contributing resource to SHF. Therefore, the Proposed Action would not result in any physical effects on SHF.

TVA's review included an assessment of the Proposed Action's possible visual effects on SHF. To assess the potential visual effect on SHF from the Project Area, TVA contracted with TRC Environmental Corporation for an assessment of effects. The assessment included a GIS-based viewshed model and a field reconnaissance. The results of the assessment (Price 2023) indicate the Proposed Action would be visible from limited vantage points in areas containing contributing resources such as the powerhouse and switchyard. However, most of the solar panels would not be visible from the powerhouse area because they would be on sides of the CCR Area facing away from the powerhouse. In addition, the coal storage yard is located between the powerhouse and Project Area and would obscure much of the view toward the solar array. As the BESS and transformer yard would be much smaller and lower in elevation than the solar array, these also would have limited, if any, visibility from SHF contributing resources. Finally, the solar array's distance from the powerhouse would greatly diminish the project's visibility from the few vantage points within the listed property from which the panels would be visible. Therefore, TVA has found that the visual effect from the solar array would not be adverse.

Numerous existing transmission line structures are in the area where the on-site transmission interconnect would be constructed. Visually this landscape is dominated by the switchyard, nine of the plant's high-voltage transmission lines, the coal pile, the railroad,

a non-historic bridge, the process water basin, and a patch of woods. Contributing structures that would have views of the new transmission line structures include the rail hopper building, a belt conveyor, the switchyard, and the empty storage yard. Several non-contributing structures are also present in this area including warehouses, the process water basin, a bridge spanning the railroad, a large utility building, and the south slopes of the CCR Area. This area of SHF has experienced some loss of historic integrity due to the large number of non-contributing buildings and structures. Therefore, TVA finds that the visual effect of the new transmission structures would be minor in comparison with changes that have already taken place given the large number of transmission line structures already present.

TVA finds that the Proposed Action would have a minor visual effect on SHF, but that the effect would not be adverse. Therefore, the Proposed Action's impact on historic resources would be minor. TVA consulted with the Kentucky SHPO regarding this finding in May 2023. SHPO responded with comments in June 2023, including a request to add additional information about the project's viewshed to the viewshed assessment report. TVA addressed the comments and provided a revised report to SHPO in August 2023. SHPO concurred with TVA's finding of No Adverse Effect to Historic Properties in a letter received September 29, 2023. Therefore, TVA has completed its obligations for the project under 36 CFR § 800.

Soil Erosion & Surface Water

The SHF site is located on the Ohio River, 35 miles upstream of its confluence with the Mississippi River (Ohio River Mile [ORM] 946). The plant is bordered by the Ohio River and Little Bayou Creek, which are both classified as warm water aquatic habitat, fish consumption, primary contact recreation, secondary contact recreation, and domestic water supply. Various portions of the Ohio River are also designated as Outstanding State Resource Waters (KDEP 2022a). The TVA SHF facility discharge is located between Lock and Dam 52 at Ohio River Mile (ORM) 938.9 and Lock and Dam 53 at ORM 962.6. These two locks and dams are under the control of and are operated by the United States Army Corps of Engineers (USACE), and have been replaced by the Olmstead Locks and Dam at ORM 964.6. The average monthly stream flow is approximately 267,700 cubic foot per second (cfs). Generally, the Ohio River average depth is 24 feet and at its widest point is 1 mile across at Smithland Dam, about 27 miles upstream of SHF (ORSANCO 2023).

Surface water is any water that flows above ground and includes, but is not limited to, streams, wet weather conveyances, ponds, lakes, and wetlands. Streams are classified as perennial, intermittent, and ephemeral based on the occurrence of surface flow. Surface waters with certain physical and hydrologic characteristics (defined bed and bank, ordinary high-water mark, or specific hydrologic, soil, and vegetation criteria are considered Waters of the U.S. (or jurisdictional waters) and are under the regulatory jurisdiction of USACE. The Clean Water Act (CWA) is the primary federal statute that governs the discharge of pollutants and fill materials into Waters of the U.S. under Sections 402, 404 and 401. The limits of Waters of the U.S. are defined through a jurisdictional determination approved of by USACE. State agencies have jurisdiction over water quality.

The Project Area is located in McCracken County, Kentucky, and falls within the Redstone Creek-Ohio River (0514020607) 10-digit HUC watershed. A May 2023 field review by the TVA aquatic group documented a total of 13 aquatic features, including 1 intermittent stream, 8 wet weather conveyances (WWCs)/ephemeral streams, and 4 man-made

process water and stormwater retention basins within the proposed Project Area (TVA 2023).

The CWA requires states to identify all waters where required pollution controls are not sufficient to attain or maintain applicable water quality standards and to establish priorities for the development of limits based on the severity of the pollution and the sensitivity of the established uses of those waters. States are required to submit reports to the USEPA. The term “303(d) list” refers to the list of impaired and threatened streams and water bodies identified by the state. All of the Ohio River bordering Kentucky supports aquatic life and drinking water use. Primary contact recreation is impaired for nearly 350 stream mi, or about 53 percent of the river in Kentucky. The pollutant causing this impairment is the pathogen indicator, *E. coli*. No reaches of the Ohio River fully support all assessed uses. This limited support is often a result of combined sewer overflows during and immediately following rainfall events along the riverfront and downstream of urban areas. All of the Ohio River only partially supports the fish consumption use because of polychlorinated biphenyls and dioxin, while methylmercury residue in fish tissue is a cause of less than full support in many of the river miles.

Besides the State of Kentucky’s statewide fish consumption advisory for mercury, long-standing fish consumption advisories remain in effect for the 7.2 miles of Little Bayou Creek for PCBs (KDEP 2022b). Little Bayou Creek is identified as not supporting warm water aquatic habitat due to pollutants including metals and radiation (KDEP 2022b). The suspected sources of the pollutants are industrial point sources and waste disposal from the former Department of Energy’s Paducah Gaseous Diffusion Plant (PGDP). A total maximum daily loading limit (TMDL) was put in place for polychlorinated biphenyls (PCBs) for this stream segment in 2001 (KDEP 2001).

There are several existing wastewater streams at SHF permitted under Kentucky Pollution Discharge Elimination System (KPDES) Permit Number KY0004219 (KDEP 2018): Outfall 001 (process and stormwater discharges from the process water basin and discharge channel), Outfall 002 (condenser cooling water), Outfall 003 (treated sanitary wastewater discharges), along with multiple stormwater outfalls. Potentially affected onsite wastewater streams include the CCR Area stormwater discharges from Outfalls 012–033.

The main focus of discussion is the stormwater discharges that are potentially affected by the Proposed Action. Per the KPDES permit, Outfalls 012-033 are permitted to discharge stormwater runoff from roads, riprapped ditch lines, and the ClosureTurf® cover over the CCR Area.

Wastewater generated during construction of the Proposed Action may include construction-related stormwater runoff, drainage of work areas, non-detergent equipment washings and dust control. The construction activities would be located on the plant property that already supports heavy industrial uses. However, soil disturbances associated with construction activities can potentially result in adverse water quality impacts. Soil erosion and sedimentation can clog small streams and impact aquatic life. The proposed solar panel and racking system that would be installed on the solar site would greatly reduce the potential for construction-related pollutants to stormwater runoff since the system would avoid soil disturbance on the closure system. Appropriate BMPs would be followed, and all Proposed Action activities would be conducted in a manner to ensure that waste materials are contained. The introduction of pollutants to the receiving waters would

be avoided or minimized to the greatest degree possible. TVA would comply with all appropriate state and federal permit requirements.

The site BMP Plan, required by the KPDES permit, would be updated to include project specific BMPs or a stand-alone project BMP plan would be prepared. This plan would identify specific BMPs to address construction-related activities that would be adopted to minimize stormwater impacts. Instructions for proper BMPs found in *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority* (TVA 2022) would be used to avoid contamination of surface water within and around the Project Area. The use of BMPs for controlling soil erosion and run off would minimize the potential impacts to surface water.

Impervious buildings and infrastructure prevent rain from percolating through the soil and result in additional runoff of water and pollutants into storm drains, ditches, and streams. The majority of the Project Area is within an industrial site and is partially covered with impervious structures or ground cover that decreases percolation. The Proposed Action would be expected to slightly increase the impervious cover within the Project Area, resulting in an increase in stormwater runoff. Aspects of the Project potentially contributing to an increase in runoff include the solar infrastructure and the BESS. Flow would be managed with implementation of the appropriate BMPs and by directing stormwater discharge through a sufficiently engineered stormwater outfall system.

Activities supporting the construction project, such as construction materials, equipment storage, or maintenance also have the possibility to introduce pollutants to stormwater. Debris associated with installation and maintenance of the site would be properly disposed of in accordance with applicable solid and hazardous waste regulations; heavy equipment would be inspected for leaks; and any underground wire installation and general heavy equipment activity would be conducted in a manner to minimize soil and cover disturbance. Equipment washing and dust control discharges would be handled in accordance with BMPs described in the BMP Plan required by the site's KPDES Permit KY0004219 to minimize construction impacts to surface waters.

Sanitary wastes generated during construction activities would be collected by the existing sewage treatment system, on-site septic system(s) or by means of portable toilets (i.e., porta lets). These portable toilets would be located throughout construction areas and would be pumped out regularly, and the sewage would be transported by a vacuum truck to a publicly owned wastewater treatment works that accepts pump out.

Maintenance activities associated with solar operations would possibly include, but would not be limited to, periodic inspections, repairs, herbicide/pesticide use, battery replacement, lawn maintenance and potentially panel cleanings. Water needs for the Project Area would be met using municipal water or water trucks; the Proposed Action would not require potable water or a water treatment system.

During operation, it would be expected that modules would be cleaned by precipitation. However, if modules needed to be manually cleaned, purified water, free of detergents and additives, would be trucked-in and would not produce a discharge. If an additive is required to help facilitate the cleaning process, then the wastewater stream or the waste product would need to be evaluated to ensure it is properly disposed of according to applicable Federal, State and local regulations or added and approved by the sites KPDES permit.

The racking system and solar panels would be secured on the surface of the HD ClosureTurf® surface. Little, if any, vegetative maintenance would be required. Other vegetation within the Project Area would be actively maintained to control growth including mowing, trimming and possibly the use of pre-emergent and post-emergent herbicides. No herbicides would be used in the buffer areas or within 50 feet of a water body and all requirements of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) would be followed. Any herbicides used would be applied in accordance with applicable state and federal laws and regulations. Only herbicides registered with the EPA would be used. Herbicides would be applied per the EPA-approved label and by a certified, licensed applicator.

Batteries that may be installed and used on site would have a secondary containment to reduce potential spills or leaks. Any spillage would be remedied in a timely manner. Contaminated soil would be removed and disposed of properly to prevent contact with stormwater. All fuel tanks would be kept in a containment area. Oils or other fluids would also be stored in a manner that prevents contamination in the event of a spill. Equipment washing and dust control discharges would be handled in accordance with BMPs described in the Stormwater/BMP Plan for water-only cleaning and dust control. Any underground utilities should be identified before any digging takes place and all utility pipes/lines should be marked and avoided during construction activities.

Should the removal of the solar panels be required due to damage or decommissioning activities, most of the decommissioned equipment and materials, including photovoltaic (PV) panels, racks, and transformers, would be recycled. Materials that cannot be recycled and other waste would be disposed of properly in accordance with applicable local, state, and federal laws and regulations. With proper implementation of controls, the Proposed Action would be expected to have the potential for only temporary minor impacts and would not be expected to have long-term direct or indirect impacts to wetlands, streams or any other local water resources.

Both direct and indirect adverse impacts to potentially jurisdictional streams could occur. Buffers of 50 ft would be maintained along each side of jurisdictional streams as a conservative avoidance measure. These areas would be avoided during construction to the greatest extent feasible. Aquatics field surveys conducted in May of 2023 (TVA 2023) of the Project Area documented a total of 13 aquatic features, including 1 intermittent stream, 8 wet weather conveyances (WWCs)/ephemeral streams and 4 man-made process water and stormwater retention basins within the proposed Project Area. A Nationwide Permit (NWP) or Individual permit could be required from the USACE and a 401 Water Quality Certification for impacts to jurisdictional streams including stream crossing activities and/or stream disturbance. Current regulations of ephemeral stream impacts at the time of permitting would determine if mitigation would be required by the USACE. With the implementation of appropriate BMPs, only temporary, minor impacts to surrounding surface waters would be expected from the Proposed Action.

Air Quality

The Clean Air Act regulates the emission of air pollutants and, through its implementing regulations, establishes National Ambient Air Quality Standards (NAAQS) for several “criteria” pollutants that are designed to protect the public health and welfare with an ample margin of safety. The criteria pollutants are ozone, particulate matter, carbon monoxide (CO), nitrous oxides (NOx), sulfur dioxide (SO₂) and lead. There are two types of NAAQS: primary standards (set to protect public health) and secondary standards (set to protect

public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings). Specified geographic areas are designated as attainment, nonattainment or unclassifiable for specific NAAQS. Areas with ambient concentrations of criteria pollutants exceeding the NAAQS are designated as nonattainment areas, and new emissions sources to be located in or near these areas are subject to more stringent air permitting requirements. The air quality in McCracken County, Kentucky, meets applicable federal and state air quality standards. McCracken County and the surrounding counties (Ballard, Carlisle, Graves, Marshall and Livingston in Kentucky as well as Massac, Pope, and Pulaski in Illinois) are all in attainment with applicable NAAQS (USEPA 2016). The proposed facilities would be subject to both federal and state regulations. These regulations impose permitting requirements and specific standards for expected air emissions. The proposed facility would continue to comply with applicable state and federal regulations.

Transient air pollutant emissions would occur during the construction phase. Construction related air quality impacts would primarily result from site preparation and the operation of construction vehicles and equipment and worker personnel vehicles. The daily workforce during construction is expected to be approximately 50 workers. Combustion of gasoline and diesel fuels by internal combustion engines (vehicles, generators, construction equipment, etc.) would occur during construction and would generate local emissions of particulate matter, NO_x, CO, volatile organic compounds (VOC) and SO₂. These emissions would be small and would result in negligible impacts to air quality.

Site preparation and vehicular traffic over paved and unpaved roads at the site also would result in the emission of fugitive dust during active construction periods. Based on analyses conducted at other construction sites, it is expected that the largest fraction (greater than 95 percent by weight) of fugitive dust emissions would be deposited within the construction site boundaries. To minimize air impacts, TVA requires all contractors to keep construction equipment properly maintained and to use BMPs (such as covered loads and wet suppression) to minimize fugitive dust. Air quality impacts from construction activities would be temporary (less than 5 years) and would depend on both man-made factors (intensity of activity, control measures) and natural factors such as wind speed and direction, soil moisture, etc. However, even under unusually adverse conditions, these emissions from construction activities would have at most a minor transient impact on air quality and would be well below the applicable ambient air quality standards. Overall, the potential impacts to air quality from construction related activities on local and regional air quality would be minimal.

Climate Change

“Climate change” refers to any substantive change in measures of climate, such as temperature, precipitation, or wind. The 2018 National Climate Assessment concluded that global climate is projected to continue to change over this century and beyond. The amount of warming projected beyond the next few decades, by these studies, is directly linked to the cumulative global emissions of greenhouse gases (e.g., CO₂, methane) and particles. The 2018 National Climate Assessment concluded that by the end of this century, a 2.3° Fahrenheit (F) to 6.7°F rise can be projected under the lower emissions scenario and a 5.4°F to 11°F rise for a higher emissions scenario (Jay et al. 2018).

The southeastern United States is one of the few regions globally that does not exhibit an overall warming trend in surface temperature over the 20th century. This “warming hole” also includes part of the Great Plains and Midwest regions in the summer. Historically, temperatures increased rapidly in the southeast during the early part of the 20th century,

then decreased rapidly during the middle of the 20th century. Since the 1960s, temperatures in the southeast have been increasing. Recent increases in temperature in the southeast have been most pronounced in the summer season, particularly along the Gulf and Atlantic coasts. However, temperature trends in the southeast over the period of 1895 to 2011 are found to be statistically insignificant for any season. In the southeast, the number of extreme hot days has tended to decrease or remain the same, while the number of very warm summer nights has tended to increase. The number of extremely cold days has tended to decrease. Global warming is a long-term trend, but that does not mean that every year will be warmer. Day-to-day and year-to-year changes in weather patterns will continue to produce variation, even as the climate warms. Generally, climate change results in Earth's lower atmosphere becoming warmer and moister, resulting in the potential for more energy for storms and certain severe weather events. Trends in extreme rainfall vary from region to region.

CO₂ emissions would occur during the construction phase. Construction-related CO₂ emissions would be primarily related to the combustion of gasoline and diesel fuels by internal combustion engines (vehicles, generators, construction equipment, etc.). Carbon dioxide is removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle (USEPA 2020). Tree removal would also reduce the long-term potential of carbon sequestration, however the small number of trees (less than 10) set for removal would have a negligible impact on this function. The total amount of these GHG emissions would be small and temporary. These emissions would not adversely impact regional GHG levels with no discernable link or effect to changes in global climate. Therefore, the Proposed Action Alternative would not result in a measurable impact on climate change.

No direct or indirect impacts to regional climate would be associated with the completion of the Proposed Action. Local or regional climate effects can occur, for example, with major changes in land use that affect the hydrological cycle, or that create large impervious surfaces, thus changing the radiative heat balance over a large area. The Proposed Action would not change the surface characteristics and would have little effect on soil permeability and hydrologic characteristics of the developed area. Vegetation would not grow within the solar panel deployment area due to the final cover system for the CCR Area that includes HD ClosureTurf®. Therefore, average temperatures and surface hydrology of the developed area is not expected to change in any measurable way as a result of the Proposed Action.

Geology

Geologically, SHF lies at the northeastern limit of the Mississippi Embayment and within the Gulf Coastal Plain Physiographic Province. The predominant natural features of the site, most evident prior to plant construction, are the recent floodplain of the Ohio River as well as the low upland terrace developed on loess deposits (Kellberg 1951). The Ohio River floodplain along the riverbank averages about 2,000 feet in width. The floodplain is characterized by a natural levee immediately adjacent to the river and a lower, locally swampy area, extending south of the levee to the base of the upland terrace. At the southern margin of the floodplain, the topography rises some 20 to 30 feet to a relatively flat upland terrace bench. Most of the plant facilities are situated on this terrace (TVA 2005).

The soil mantle beneath SHF is made up of more than 300 feet of unconsolidated deposits of clay, silt, sand, and gravel, ranging from Cretaceous to Holocene in age. These continental sediments were deposited on an irregular erosional surface consisting of

several terraces and have a total thickness ranging from less than 1 foot to approximately 120 feet. Surface deposits at SHF consist of a combination of loess and alluvium. These deposits are generally 5 to 25 feet thick, and in some areas have been completely reworked during facility construction and operation.

Beneath the loess and alluvium are the Upper Continental Deposits (UCD) and Lower Continental Deposits (LCD). Minor deposits of clay and gravel within the UCD affect local groundwater flow. The thickness of the upper terrace sediments ranges from 15 feet to 55 feet in the region. The lower gravel unit and associated sand layers within the LCD are commonly referred to as the Regional Gravel Aquifer (RGA), the principal aquifer in the region. Historic test borings in the area indicate RGA thicknesses of 30 feet to 65 feet. Regionally, the RGA is thinner near the Ohio River, and the thickness increases with distance from the river (Boggs and Lindquist 2000). The RGA is discussed further in the Groundwater section below. No impacts to geology are anticipated from the Proposed Action.

Groundwater

The uppermost aquifer at the CCR Area is the RGA. Regionally, groundwater flow in the RGA is towards the Ohio River floodplain (i.e., toward the northeast). The on-site predominant flow direction in the RGA is also toward the Ohio River floodplain (east-northeast). The lower permeability sediments of the McNairy Formation act as a basal aquitard for the RGA (WSP 2023).

No impacts to groundwater are anticipated from the Proposed Action. The Proposed Action would be performed near the ground surface and generally not contain materials likely to be transported to groundwater.

Noise

Noise is generally described as unwanted sound, which can be based either on objective effects (hearing loss, damage to structures, etc.) or subjective judgments (such as community annoyance). Sound is usually represented on a logarithmic scale with a unit called the decibel (dB). Sound on the decibel scale is referred to as sound level. The threshold of human hearing is approximately 0 dB, and the threshold of discomfort or pain is around 120 dB. Noise levels are computed over a 24-hour period and adjusted for nighttime annoyances to produce the day-night average sound level (DNL). DNL is the community noise metric recommended by the USEPA and has been adopted by most federal agencies (USEPA 1974). A DNL of 65 A-weighted decibels (dBA) is the level most commonly used for noise planning purposes and represents a compromise between community impact and the need for activities such as construction. The A-weighted sound level represents the approximate frequency response characteristic of the average young human ear. Areas exposed to a DNL above 65 dBA are generally not considered suitable for residential use. A DNL of 55 dBA was identified by USEPA as a level below which there is no adverse impact (USEPA 1974).

Direct and indirect noise impacts associated with implementation of the Proposed Action would primarily occur during construction. Construction equipment produces a range of sounds while operational. Noisy construction equipment, such as delivery trucks, dump trucks, water trucks, service trucks, chain saws, skidders, bulldozers, tractors, and/or low ground-pressure feller-bunchers, produce maximum noise levels at 50 feet of approximately 84 to 85 dBA. This type of equipment may be used for approximately 24 to 36 months at the Project Site. Construction noise would cause temporary and minor adverse impacts to

the ambient sound environment around the Project Site vicinity. The facilities and activities that already take place within SHF likely produce ambient sounds that are at or higher than the typical 45 to 55 dBA in the Project Area, and these existing noises would help make effects from the Project more minimal. Additionally, construction would primarily occur during daylight hours, between sunrise and sunset; therefore, the Project would not affect ambient noise levels at night during most of the construction period. Most of the proposed equipment would not be operating on site for the entire construction period but would be phased in and out according to the progress of the Project. Based on these findings the noise associated with the project would not have adverse impacts.

Solid Waste

Solid waste consists of a broad range of nonhazardous materials including refuse, sanitary wastes, contaminated environmental media, and scrap metals along with nonhazardous wastewater treatment plant sludge, air pollution control wastes, industrial waste, and other materials (solid, liquid, or contained gaseous substances). CCR Units are regulated as solid waste, a nonhazardous industrial waste, by the EPA. Subtitle D of the RCRA and its implementing regulations establish minimum federal technical standards and guidelines for management of nonhazardous solid waste. States are primarily responsible for planning, regulating, implementing, and enforcing solid waste management. In Kentucky, solid waste is regulated by Title 401, Chapter 46, Regulation 120. The Kentucky Division of Waste Management (KDWM) within the Energy and Environment Cabinet, Department for Environmental Protection, regulates solid waste at the SHF facility. KDWM Solid Waste Permit #SW07300041, SW07300081 encompasses activities pertaining to the CCR Unit.

No impacts to solid waste or solid waste containing CCR are anticipated from the Proposed Action. The Proposed Action would be performed within the CCR Area and in areas which are not presumed to contain CCR.

Hazardous Materials

Hazardous materials, including hazardous substances and hazardous waste, are defined as any substance or material that has been determined to be capable of posing an unreasonable risk to health, safety, and property. Hazardous waste is listed under RCRA, meeting certain characteristics relating ignitability, corrosivity, reactivity, or toxicity.

Hazardous materials and management of these materials are regulated under a variety of federal laws including the Occupational Safety and Health Administration (OSHA) standards, the Emergency Planning and Community Right to Know Act (EPCRA), and the Toxic Substances Control Act along with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). TVA adheres to these requirements. Under EPCRA regulations 40 CFR 355, facilities that have any extremely hazardous substances present in quantities above the threshold planning quantity, are required to provide reporting information to the State Emergency Response Commission, local emergency planning committee, and local fire department.

Inventory reporting to the indicated emergency response parties is required for facilities with greater than the threshold planning quantity of any extremely hazardous substances or greater than 10,000 pounds of any OSHA regulated hazardous material. EPCRA also requires inventory reporting for all releases and discharges of certain toxic chemicals. TVA applies these requirements as a matter of policy. The federal law regulating hazardous wastes is RCRA, and RCRA regulations define what constitutes as hazardous waste and establish a “cradle to grave” system for management and disposal of such wastes. Subtitle

C of RCRA also includes separate, less stringent regulations for certain potentially hazardous wastes. Used oil, for example, is regulated differently depending on whether it is disposed of or recycled. Specific requirements are provided under RCRA for generators, transporters, processors, and burners of used oil that are recycled. Universal wastes may be managed in accordance with the RCRA requirements for hazardous wastes or by special, less stringent provisions. Generators of special wastes are required to register with the Energy and Environment Cabinet and are subject to the provisions of Kentucky Revised Statutes § 224.46-510.

SHF generates a limited quantity of hazardous waste and is considered a small quantity generator of hazardous waste. Generated waste streams are related to maintenance and testing activities and include small quantities of waste paint, paint chips, solvents, absorbents, abrasive wastes, printed circuit boards, cathode ray tubes, paper insulated lead cable, and liquid-filled fuses along with oily rags and solvent contaminated rags and silver containing wastes from welding. Maintenance activities also generate used oils including pump lube oils, gear box oils, vacuum pump oils, hydraulic oils, and cutting oils in addition to used engine and transmission oils from vehicles and heavy equipment. These used oils are generally recycled. Limited amounts of universal wastes (mercury containing relays or similar mercury containing equipment, batteries, and lamps) are routinely generated from the plant infrastructure and operations. SHF is considered a small quantity handler of universal wastes. The proper management of these materials/wastes is performed in accordance with established procedures and applicable federal, state, and local laws and regulations.

Transportation

This section describes roadways and other transportation infrastructure serving the Project Area and surrounding area, and potential impacts on transportation that would be associated with the Proposed Action.

The closest airport is the Barkley Regional Airport, located approximately 4.3- miles south of the Project Area. There are two existing Kentucky Transportation Cabinet (KYTC) stations immediately adjacent to the Project Area to provide traffic volume Reservation Road. KYTC traffic count data was obtained using the KYTC Traffic Database. The values provided are annual average daily traffic (AADT) volumes. AADT volumes are based on 24-hour, two directional counts at a given location. The raw traffic data is mathematically adjusted for vehicle type, determined by an axle correction factor. The data is then statistically corrected by seasonal variation factor that considers time of year and day of the week. Carneal Road AADT includes 589 vehicles/day to the east and 1,199 vehicles/day from the south off Metropolis Lake Road to the SHF entrance.

Under the Proposed Action, the construction and operation of Project Phoenix would have no effect on the operation of the nearby Barkley Regional Airport, located approximately 4.3-miles south of the Project Area, south of highway 60. The distance between the regional airport and the proposed Project Area, coupled with the existing industrial development and roadways within the proposed Project Area, serve to minimize any effects the Proposed Action may have on air traffic. The operation of the solar facility would not affect commercial air passenger or freight traffic in the region.

During construction period at the facility, a maximum of 50 workers would be present at the site from 7am to 5pm, 6 days a week (Monday through Saturday) for less than 5 years. A majority of the workers would likely come from the local or regional area, and approximately

40 percent of the workforce would be supervisory personnel that would likely come from out-of-state, and many would stay in local hotels near or within the Paducah area. Workers would either drive their own vehicles or carpool to the Project Area. Parking would be on site during the day. Some work teams may visit local restaurants and businesses during work hours.

Additional traffic due to deliveries and waste removal would consist of a maximum of approximately 50 vehicles per day during construction. Traffic flow around the work site would be heaviest at the beginning of the workday, at lunch, and at the end of the workday. All deliveries and workers would access the Project Area from Metropolis Lake Road. No major industries are located at the site access point. Should traffic flow be a problem for local residences or businesses, TVA would consider staggered work shifts to space out the flow of traffic to and from the Project Area. Use of such mitigation measures would minimize potential adverse impacts to traffic and transportation to less than problematic levels. Several on-site 16-20-foot-wide maintenance roads would be used and maintained on the Project Area.

No impacts to transportation are anticipated from the Proposed Action. The proposed installation would not change transportation patterns once it returns to normal operation. Therefore, the operation of the facility would not have a noticeable impact on local roadways. Overall, the Proposed Action would not result in indirect impacts to transportation.

Public Health

The mission of the U.S. Occupational Safety and Health Administration (OSHA), a division of the U.S. Department of Labor, is to ensure safe and healthful working conditions for working men and women by setting and enforcing standards and by providing training, outreach, education, and assistance. The State of Kentucky has an OSHA-approved plan under the Kentucky Occupational and Safety and Health Administration of the Kentucky Department of Labor and Workforce Development which covers employees in the private sector and state and local government. Land uses on both the BESS pilot project and the solar panel installation are currently part of the Shawnee Fossil Plant operational area and no persons currently live within the Project Area. Since the land proposed to be occupied by the proposed Project Area is not used by, or accessible to the general public, there are no current public health and safety issues.

Under the Proposed Action, workers in the Project Area would have an increased safety risk associated with the construction activities. However, because construction work has known hazards, standard practice is for contractors to establish and maintain health and safety plans in compliance with OSHA regulations. Such health and safety plans emphasize BMPs for site safety management to minimize potential risks to workers. Examples of best practices include employee safety orientations; establishment of work procedures and programs for site activities; use of equipment guards; emergency shut-down procedures; lockout procedures; site housekeeping; personal protective equipment; regular safety inspections; and plans and procedures to identify and resolve hazards. Potential public health and safety hazards could result in association with the flow of construction traffic along the public roadways. Health and safety plans established and adhered to by the construction team would include traffic procedures to minimize potential safety concerns. Emergency response for the proposed Project Area would be provided by the local, regional, and state law enforcement, fire, and emergency responders. No public health or safety hazards would be anticipated as a result of operations. Overall, impacts to public

health and safety in association with implementation of the Proposed Action would be considered temporary and minor.

Visual Resources

The visual landscape of an area is formed by physical, biological and man-made features that combine to influence both landscape identifiability and uniqueness. Scenic resources within a landscape are evaluated based on a number of factors that include scenic attractiveness, integrity and visibility. Scenic attractiveness is a measure of scenic quality based on human perceptions of intrinsic beauty as expressed in the forms, colors, textures and visual composition of each landscape. Scenic integrity is a measure of scenic importance based on the degree of visual unity and wholeness of the natural landscape character. The varied combinations of natural features and human alterations both shape landscape character and help define their scenic importance.

The subjective perceptions of a landscape's aesthetic quality and sense of place is dependent on where and how it is viewed. Scenic visibility of a landscape may be described in terms of three distance contexts: (1) foreground, (2) middleground and (3) background. In the foreground, an area within 0.5 mile of the observer, individual details of specific objects are important and easily distinguished. In the middleground, from 0.5 to 4 miles from the observer, object characteristics are distinguishable, but their details are weak and tend to merge into larger patterns. In the distant part of the landscape, the background, details and colors of objects are not normally discernible unless they are especially large, standing alone, or have a substantial color contrast. In this assessment, the background is measured as 4 to 10 miles from the observer. Visual and aesthetic impacts associated with a particular action may occur as a result of the introduction of a feature that is not consistent with the existing viewshed. Consequently, the character of an existing site is an important factor in evaluating potential visual impacts.

For this analysis, the affected environment is considered to include the proposed Project Area, and encompasses both permanent and temporary impact areas, as well as the physical and natural features of the landscape. The Project Area is located entirely within the existing SHF, in an already industrialized area. The trees along the Ohio River screen the area from recreational boaters and trees also line the western property boundary. There are no residences or sensitive observers in the immediate vicinity. Due to the height of the CCR Unit, some observers on the Ohio River and in the general project vicinity might be able to see the solar panels on top of a large grassy mound adjacent to the SHF powerhouse. Due to the present characteristics within the SHF and the proposed Project Area, implementation of the Proposed Action would have only minor potential impact on the visual resources of this area.

Prime Farmland

Prime farmland, as defined by the U.S. Department of Agriculture (USDA), "is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses (the land could be cropland, pastureland, rangeland, forest land, or other land, but not urban built-up land or water). The soils are of the highest quality and can economically produce sustained high yields of crops when treated and managed according to acceptable farming methods." Prime farmland is land that is the most suitable for economically producing sustained high yields of food, feed, fiber, forage, and oilseed crops. Due to the industrial nature of the previous land usage practice of CCR management, there is no potential prime farmland set to be impacted by the Proposed Action.

Socioeconomics and Environmental Justice

This section describes an overview of existing socioeconomic conditions and environmental justice considerations that would be associated with the Proposed Action. EO 12898 on Environmental Justice directs Federal agencies to consider the impacts of their actions on minority and low-income populations and to avoid disproportionate adverse impacts to those populations. While TVA is not listed as a Federal agency subject to EO 12898, TVA typically addresses environmental justice concerns through its NEPA analysis for Federal projects.

Based on U.S. Census data available through the EPA's EJSCREEN, 32 people live within a one-mile radius of the Project Area, which is approximately 0.0004 percent of the McCracken County population of 65,485 (Census 2020). Tables 6 and 7 below provide a breakdown of relevant population, income, and low-income data. Since the proposed Project Area falls near the Paducah city limits, the Paducah city population, income, and poverty data are provided for comparison and reference.

Table 6. Site Project Population

Project Phoenix Population Data					
Geography	Population	Population Demographics			
	Total	White	Percent White	Minority	Percent Minority
Kentucky	4,512,310	3,925,710	87%	586,600	13%
Paducah Metro Area	26,834	18,784	70%	8,050	30%
McCracken County, Kentucky	67,490	56,017	83%	11,473	17%
1-Mile Radius - Project Site	32	29	90%	3	10%

Sources: *U.S. Census Bureau. American Fact Finder; 2020 ACS 5-year estimates. Accessed June 6, 2023. www.census.gov/quickfacts/KY

*USEPA. EJSCREEN. Accessed June 6, 2023. Available at: <https://ejscreen.epa.gov/mapper/>

Recorded population within the one-mile radius is predominantly white, with 90 percent reporting race as white and 10 percent minority (USEPA 2020a). The reported minority population within the one-mile radius is about 7 percentage points lower than the McCracken County minority population of 17 percent, which is more than Kentucky's 13 percent minority population average (Table 6).

Within one mile of the Project Area, a slightly lower per capita income, \$25,202, has been reported as compared to McCracken County's per capita income of \$30,044. The low-income rate within one mile of the Project Area is 41 percent, which is relatively similar to the McCracken County low-income rate of 38 percent (Table 7).

Table 7. Project Site Income and Poverty

Project Phoenix Income and Poverty Data	
Geography	Household Income

	Total Households	Per Capita Income	Low Income
Kentucky	1,748,475	\$30,634.00	36%
Paducah Metro Area	11,465	\$30,580.00	43%
McCracken County, Kentucky	27,787	\$30,044.00	38%
1-Mile Radius - Project Site	254	\$25,202.00	41%

Under the Proposed Action, the proposed facility consolidation would be constructed. Approximately 50 workers would be employed during construction, lasting less than 5 years. Most of these workers would be based in the local area, leading to a short-term beneficial impact on the local economy.

No impacts to socioeconomics or environmental justice would occur from the proposed TVA substation or transmission interconnect modifications. Operation of the facility would not result in an increase in local employment as no workers would be needed for day-to-day operation of the solar facility. While periodic maintenance activities, primarily mowing, would be done by local workers, this would not result in an increase in employment. Although it is too early to quantify, the project would benefit the local tax base through the increased property taxes due to site improvements.

While there are only limited and short-term benefits to the labor force, the project would sustain better positions in McCracken County and the State of Kentucky in economic development ventures. When compared to state and county data, there is a slightly lower concentration of minority population near the project. While there is what would potentially be considered a low-income population near the Project Area, the overall impacts of the Proposed Action, most of which would occur during the short construction period, would be minor. The off-site impacts (i.e., to surrounding properties) would be negligible. Consequently, there would be no disproportionately adverse impacts to minority and low-income populations.

Cumulative Impacts

CEQ regulations define a cumulative impact as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions” (40 CFR § 1508.7 issued in 1978). Cumulative impacts should be considered early in the project development process, as identification of potential cumulative impacts may assist in the design and selection of alternatives and mitigation measures to minimize a project’s environmental impacts.

As described above, the construction and operation of the solar facility under the Proposed Action would result in minor and temporary direct impacts to terrestrial zoology, parks & recreation, local water resources, visual resources, noise, and air quality. The construction and operation of the solar facility, potential BESS, and associated transmission interconnection infrastructure would not impact the existing infrastructure capacity, allowing additional industrial development in the vicinity of the Project Area and would improve electrical system resiliency.

Under the Proposed Action, TVA would utilize the approximately 309 acres of the SHF CCR Area site in McCracken County. There are no known planned projects in the area that would likely contribute to cumulative impacts associated with the Proposed Action. Desktop research of potential past, present, and future actions in the McCracken County, Kentucky area was conducted.

Resources examined included:

- KYTC transportation projects
- TVA environmental reviews website;
- Local and regional news sources; and
- McCracken County and City of Paducah government website records.

Kentucky Transportation Cabinet 2020-2023 Transportation Improvement Program was reviewed for potential present and future actions within the vicinity of the Project Area. No projects within the vicinity of the proposed Project Area were identified. Therefore, no adverse cumulative impacts have been identified from KYTC transportation projects. Upon review of TVA's environmental reviews, there is an existing environmental review underway regarding the construction of a new SCR system at the SHF. This Project Area overlaps with the proposed BESS construction site; however, an agreement has been made to share this area to accommodate both projects. Therefore, no cumulative impacts have been identified from TVA's environmental reviews.

Mitigation

Proposed Action would implement routine minimization and mitigation measures for resources potentially affected by the Project. These measures would be developed in conjunction with industry proven BMPs, requirements of regulatory permits, and adherence to the following plans:

- Storm Water Pollution Prevention Plan (SWPPP),
- Spill Prevention, Control, and Countermeasures (SPCC) Plan, and
- Unanticipated Discovery Plan for Cultural Resources.
- TVA would employ standard BMPs, as described in A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities – Revision 4, TVA's BMP manual (TVA 2022), to minimize erosion during construction, operation, and maintenance activities.
- To minimize the introduction and spread of invasive species at the Project Site, access roads, and adjacent areas, TVA would follow standard operating procedures consistent with Executive Order (EO) 13112 (Invasive Species) for revegetating the areas with noninvasive plant species as defined by TVA (2022).

The Proposed Action would implement the following minimization and mitigation measures in relation to potentially affected resources:

- Geology and soils:
 - Install silt fencing along the perimeter of areas that would be cleared, consistent with local and state stormwater regulations.
 - Implement other soil stabilization and vegetation management measures to reduce the potential for soil erosion during site operations.
- Water resources:

- Regarding revegetation and restoration following site disturbance, maintain stormwater BMPs in each area according to the TVA BMP Manual (TVA 2022) until stabilization (adequate vegetation regrowth) has been achieved.
- Avoid direct impacts to the maximum extent practicable on perennial and intermittent streams by maintaining a 50-foot riparian buffer at perennial and intermittent streams and wetlands in accordance with TVA BMP Manual (TVA 2022).
- Avoid construction within wetlands and floodplains.
- Use only USEPA-registered and TVA approved herbicides in accordance with label directions designed.
- Biological resources:
 - Plant or seed with noninvasive vegetation and include native and naturalized plant species to create beneficial habitat, reduce erosion, and limit the spread of invasive species.
 - Avoid or minimize direct impacts on nesting and migratory birds and bats, as well as federally listed species, by clearing trees during the winter period (November 15th – March 31st).
 - Install temporary construction fencing around sensitive natural resources that should be avoided.
- Waste management:
 - Develop and implement a variety of plans and programs to ensure safe handling, storage, and use of hazardous materials.
- Public and occupational health and safety:
 - Emphasize BMPs for site safety management to minimize potential risks to workers.
 - Use dust mitigation activities such as watering dry exposed soils and roadways, covering open-body trucks, and establishing a speed limit to minimize fugitive dust.
- Transportation:
 - Should traffic flow become a problem, consider implementation of staggered worker shifts during construction and a flag person along the roadside during deliveries that may coincide with heavy commute times to manage the flow of traffic near the Project Site.

Conclusion and Findings

TVA's purpose and need for this action is to optimize power generation and utilize the transmission related infrastructure present and by redeveloping brownfield areas on the existing plant property for solar generation and potential future energy storage. The construction of a solar facility is designed to utilize this valuable surface area that is located within close proximity to a TVA grid interconnection location. The utilization of the HD ClosureTurf® technology as part of the final cover system which when paired with the PowerCap® racking system, allows for the placement of solar panels without compromising the integrity of the cover system. In an ongoing Valley Wide effort to optimize and update TVA facilities, this opportunity to add additional carbon free power generation in a strategically optimal location is highly sought after. This proposed solar energy production facility would enhance TVA resources, while helping meet energy production needs and meeting potential regulatory requirements. This proposed solar energy production facility

would enhance TVA resources by helping to meet energy production needs and providing cost effective renewable energy.

Based on the findings in this Environmental Assessment, we conclude that the Proposed Action to construct the solar facility along with the installation of accompanying infrastructure including a potential future BESS, transmission interconnect infrastructure, and temporary construction laydown area, would not be a major federal action significantly affecting the environment. Accordingly, an environmental impact statement is not required.

List of Preparers

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Project Role: TVA Water Permitting Specialist

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Permits, Licenses, and Approvals

Kentucky Department of Environmental Protection – Sitewide Permit Update

Kentucky Pollution Discharge Elimination System (KPDES) Permit Number KY0004219

Kentucky Division of Waste Management - Solid Waste Permit #SW07300041, SW07300081

Agencies and Others Consulted

Kentucky State Historic Preservation Office

Kentucky Department of Environmental Protection

List persons, agencies, and organizations consulted.

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Attachments**APPENDIX A: Streams inside the Project Phoenix at Shawnee Plant (TVA Project No. 540087).**

Sequence ID	Stream ID	Stream Type	Streamside Management Zone Category	Stream Name	Field Notes	Cowardin Code	HGM Code	Latitude	Longitude
S001	Asa 010	Intermittent	Category A (50 ft)	NA	Culverted, riprap banks, crayfish burrow, tadpoles in pools	R4	Riverine	37.1487951	-88.78427973
E001	Asa 002	Ephemeral Stream / Wet Weather Conveyance (WWC)	BMP (Best Management Practices)	NA	Run off from one man-made basin to another, 2'x2', artificial flow, flowing probably year-round	R6	Riverine	37.1559874	-88.7851464
E002	Asa 003	Ephemeral Stream / Wet Weather Conveyance (WWC)	BMP (Best Management Practices)	NA	Drains into large man-made basin, 2'x2', wetland veg	R6	Riverine	37.15485312	-88.78575221
E003	Asa 005	Ephemeral Stream / Wet Weather Conveyance (WWC)	BMP (Best Management Practices)	NA	Fed from pipe, run off, 6'x1'	R6	Riverine	37.15501567	-88.7870318
E004	Asa 006	Ephemeral Stream / Wet Weather Conveyance	BMP (Best Management Practices)	NA	1x1 run off	R6	Riverine	37.15235544	-88.78731106

		ance (WWC)							
E005	Asa 009	Epheme ral Stream / Wet Weathe r Convey ance (WWC)	BMP (Best Manageme nt Practices)	NA	Culverted, conveyance 3'x1', riprap	R6	Riveri ne	37.1497 217	- 88.7852 9532
E006	Asa 011	Epheme ral Stream / Wet Weathe r Convey ance (WWC)	BMP (Best Manageme nt Practices)	NA	Dominated by fescue, grassy swale	R6	Riveri ne	37.1497 3218	- 88.7806 3386
E007	Asa 013	Epheme ral Stream / Wet Weathe r Convey ance (WWC)	BMP (Best Manageme nt Practices)	NA	Roadside wwc, 1'x1'	R6	Riveri ne	37.1338 5711	- 88.7778 0006
E008	Asa 014	Epheme ral Stream / Wet Weathe r Convey ance (WWC)	BMP (Best Manageme nt Practices)	NA	Roadside wwc, 3'x1', fescue upland dominated grassy swale	R6	Riveri ne	37.1338 8523	- 88.7775 2421
P001	Asa 001	Pond	BMP (Best Manageme nt Practices)	NA	Man-made basin run off from vehicle cleaning	POW	Depre ss	37.1559 1196	- 88.7861 4384
P002	Asa 004	Pond	BMP (Best Manageme nt Practices)	NA	Shallow man- made basin 1 foot deep	POW	Depre ss	37.1534 542	- 88.7856 4721
P003	Asa 007	Pond	BMP (Best Manageme nt Practices)	NA	Large man- made basin,	POW	Depre ss	37.1493 6868	- 88.7836 5003

			nt Practices)		riprap bank 360° around				
P004	Asa 008	Pond	BMP (Best Management Practices)	NA	Large man-made basin, riprap bank 360° around	POW	Depress	37.1500 4829	- 88.7821 1481

APPENDIX B.**Wetlands located within Project Area**

Wetland Identifier	Wetland Type ¹	TVARAM ² Functional Capacity (score)	Wetland Acreage within the Project Area
W001	PEM1E	Low (11)	<0.01
W002	PEM1E	Low (16)	0.14
W003	PEM1E	Low (17)	0.14
W004	PEM1E	Low (10)	0.01
W005	PEM1E	Low (10)	0.04
Total Acres			0.34

¹Classification codes as defined in Cowardin et al. (1979): P=Palustrine; EM1=Emergent, persistent vegetation; E = Seasonally flooded/saturated.

²TVARAM = Tennessee Valley Authority Rapid Assessment Method that categorizes wetland quality by their functional capacity

APPENDIX C.**Action Alternative Wetlands Impacts on the Project Phoenix**

Wetland Identifier	Impact Type	Acreage of Forested Wetland Clearing (FO)
W001	Avoid	0
W002	Avoid	0
W003	Avoid	0
W004	Avoid	0
W005	Avoid	0
TOTAL ACRES		0.00 Acres

List all attachments; include CE checklist and other materials referenced in the AEA.

APPENDIX D.

TENNESSEE VALLEY AUTHORITY RAPID ASSESSMENT METHOD: Assessing Wetland Condition, Functional Capacity, Quality
TVARAM FIELD FORM

Site:	PN#42589 W001	Rater(s):	FPH	Date:	5/16/23
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0.00	0
max 6 pts.	subtotal

Metric 1. Wetland Area (size)

Notes: BR/CM = adjusted points for Blue Ridge and Cumberland Mountains. If an open water body (excluding aquatic beds and seasonal mudflats) is >20 acres (8 ha), then add only 0.5 acre (0.2 ha) of it to the wetland size for Metric 1.

Select one size class and assign score.

- ☐ >50 acres (>20.2 ha) (6 pts)
☐ 25 to <50 acres (10.1 to <20.2 ha) (5) [BR/CM (6)]
☐ 10 to <25 acres (4 to <10.1 ha) (4) [BR/CM (6)]
☐ 3 to <10 acres (1.2 to <4 ha) (3) [BR/CM (5)]
☐ 0.3 to <3 acres (0.1 to <1.2 ha) (2) [BR/CM (3)]
☐ 0.1 to <0.3 acre (0.04 to <0.1 ha) (1) [BR/CM (2)]
☒ <0.1 acre (0.04 ha) (0)

Sources/assumptions for size estimate (list):

1	1
max 14 pts.	subtotal

Metric 2. Upland Buffers and Surrounding Land Use

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- ☐ WIDE. Buffers average 50 m (164 ft) or more around wetland perimeter (7)
☐ MEDIUM. Buffers average 25 m to <50 m (82 to <164 ft) around wetland perimeter (4)
☐ NARROW. Buffers average 10 m to <25 m (32 ft to <82 ft) around wetland perimeter (1)
☒ VERY NARROW. Buffers average <10 m (<32 ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- ☐ VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
☐ LOW. Old field (>10 years), shrubland, young 2nd growth forest (5)
☐ MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field (3)
☒ High. Urban, industrial, open pasture, row cropping, mining, construction (1)

4	5
max 30 pts.	subtotal

Metric 3. Hydrology

3a. Sources of water. Score all that apply.

- ☐ High pH groundwater (5)
☐ Other groundwater (3) [BR/CM (5)]
☒ Precipitation (1) [unless BR/CM primary source (5)]
☐ Seasonal/intermittent surface water (3)
☐ Perennial surface water (lake or stream) (5)

3c. Maximum water depth. Select only one and assign score.

- ☐ >0.7 m (27.6 in.) (3)
☐ 0.4 to 0.7 m (16 to 27.6 in.) (2) [BR/CM (3)]
☒ <0.4 m (<16 in.) (1) [BR/CM 0.15 to 0.4 m (6 to <16 in.) (2)]

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- ☐ None or none apparent (12)
☐ Recovered (7)
☐ Recovering (3)
☒ Recent or no recovery (1)

3b. Connectivity. Score all that apply.

- ☐ 100-year floodplain (1)
☐ Between stream/lake and other human use (1)
☐ Part of wetland/upland (e.g., forest, complex) (1)
☐ Part of riparian or upland corridor (1)

3d. Duration inundation/saturation. Score one or dbl. check & avg.

- ☐ Semi- to permanently inundated/saturated (4)
☐ Regularly inundated/saturated (3) [BR/CM (4)]
☐ Seasonally inundated (2) [BR/CM (4)]
☒ Seasonally saturated in upper 30 cm (12 in.) (1) [BR/CM (2)]

Check all disturbances observed

- ☒ ditch
☐ tile (including culvert)
☐ dike
☐ weir
☒ stormwater input
☐ point source (nonstormwater)
☐ filling/grading
☐ road bed/RR track
☐ dredging
☒ other nrap

4	9
max 20 pts.	subtotal

Metric 4. Habitat Alteration and Development

4a. Substrate disturbance. Score one or double check and average.

- ☐ None or none apparent (4)
☐ Recovered (3)
☐ Recovering (2)
☒ Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- ☐ Excellent (7)
☐ Very good (6)
☐ Good (5)
☐ Moderately good (4)
☐ Fair (3)
☒ Poor to fair (2)
☐ Poor (1)

4c. Habitat alteration. Score one or double check and average.

- ☐ None or none apparent (9)
☐ Recovered (6)
☐ Recovering (3)
☒ Recent or no recovery (1)

Check all disturbances observed

- ☒ mowing
☐ grazing
☒ clearcutting
☐ selective cutting
☐ farming
☐ toxic pollutants
☐ shrub/sapling removal
☒ herbaceous/aquatic bed removal
☐ woody debris removal
☐ sedimentation
☐ dredging
☐ nutrient enrichment

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Project Phoenix Draft Environmental Assessment

TENNESSEE VALLEY AUTHORITY RAPID ASSESSMENT METHOD: Assessing Wetland Condition, Functional Capacity, Quality
TVARAM FIELD FORM

Site: PN#42589 W001 Rater(s): FPH Date: 5/16/23

9
subtotal previous page

0.00 9
max 10 pts subtotal
0
raw score*

Metric 5. Special Wetlands

*If the documented raw score for Metric 5 is 30 points or higher, the site is automatically considered a Category 3 wetland.

Select all that apply. Where multiple values apply in row, score row as single feature with highest point value. Provide documentation for each selection (photos, checklists, maps, resource specialist concurrence, data sources, references, etc).

- ☐ Bog, fen, wet prairie (10); acidophilic veg., mossy substrate >10 sq.m, sphagnum or other moss (5); muck, organic soil layer (3)
- ☐ Assoc. forest (wetl. &/or adj. upland) incl. >0.25 acre (0.1 ha); old growth (10); mature >18 in. (45 cm) dbh (5) [exclude pine plantation]
- ☐ Sensitive geologic feature such as spring/seep, sink, losing/underground stream, cave, waterfall, rock outcrop/cliff (5)
- ☐ Vernal pool (5); isolated, perched, or slope wetland (4); headwater wetland [1st order perennial or above] (3)
- ☐ Island wetland >0.1 acre (0.04 ha) in reservoir, river, or perennial water >6 ft (2 m) deep (5)
- ☐ Braided channel or floodplain/terrace depressions (floodplain pool, slough, oxbow, meander scar, etc.) (3)
- ☐ Gross morph. adapt. in >5 trees >10 in. (25 cm) dbh: buttress, multitrunk/stool, stilted, shallow roots/tip-up, or pneumatophores (3)
- ☐ Ecological community with global rank (NatureServe): G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier]
- ☐ Known occurrence state/federal threatened/endangered species (10); other rare species with global rank G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier] [exclude records which are only "historic"]
- ☐ Superior/enhanced habitat/use: migratory songbird/waterfowl (5); in-reservoir buttonbush (4); other fish/wildlife management/designation (3)
- ☐ Cat. 1 (very low quality): <1 acre (0.4 ha) AND EITHER >80% cover of invasives OR nonvegetated on mined/excavated land (-10)

2 11
max 20 pts subtotal

Metric 6. Plant Communities, Interspersion, Microtopography

6a. Wetland vegetation communities.
Score all present using 0 to 3 scale.

- ☐ Aquatic bed
- ☐ Emergent
- ☐ Shrub
- ☐ Forest
- ☐ Mudflats
- ☐ Open water <20 acres (8 ha)
- ☐ Moss/lichen. Other _____

6b. Horizontal (plan view) interspersion.
Select only one.

- ☐ High (5)
- ☐ Moderately high (4) [BR/CM (5)]
- ☐ Moderate (3) [BR/CM (5)]
- ☐ Moderately low (2) [BR/CM (3)]
- ☒ Low (1) [BR/CM (2)]
- ☐ None (0)

6c. Coverage of invasive plants.
Add or deduct points for coverage.

- ☐ Extensive >75% cover (-5)
- ☐ Moderate 25-75% cover (-3)
- ☐ Sparse 5-25% cover (-1)
- ☒ Nearly absent <5% cover (0)
- ☐ Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

- ☐ Vegetated hummocks/bulldocks
- ☐ Coarse woody debris >15 cm (6 in.)
- ☐ Standing dead >25 cm (10 in.) dbh
- ☒ Amphibian breeding pools

Vegetation Community Cover Scale

- 0 = Absent or <0.1 ha (0.25 acre) contiguous acre [For BR/CM <0.04 ha (0.1 acre)]
- 1 = Present and either comprises a small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
- 2 = Present and either comprises a significant part of wetland's vegetation and is of moderate quality, or comprises a small part and is of high quality
- 3 = Present and comprises a significant part or more of wetland's vegetation and is of high quality

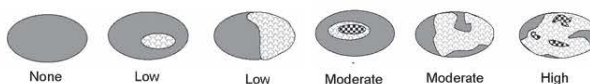
Narrative Description of Vegetation Quality

- low = Low species diversity &/or dominance of nonnative or disturbance tolerant native species
- mod = Native species are dominant component of the vegetation, although nonnative &/or disturbance tolerant native species can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare, threatened or endangered species
- high = A predominance of native species with nonnative sp &/or disturbance tolerant native sp absent or virtually absent, and high sp diversity and often but not always, the presence of rare, threatened, or endangered species

Mudflat and Open Water Class Quality

- 0 = Absent <0.1 ha (0.25 acres) [For BR/CM <0.04 ha (0.1 acre)]
- 1 = Low 0.1 to <1 ha (0.25 to 2.5 acres) [BR/CM 0.04 to <0.2 ha (0.1 to 0.5 acre)]
- 2 = Moderate 1 to <4 ha (2.5 to 9.9 acres) [BR/CM 0.2 to <0.2 ha (0.5 to 5 acre)]
- 3 = High 4 ha (9.9 acres) or more [BR/CM 2 ha (5 acres) or more]

Hypothetical Wetland for Estimating Degree of Interspersion



Microtopography Cover Scale

- 0 = Absent
- 1 = Present in very small amounts or if more common of marginal quality
- 2 = Present in moderate amounts, but not of highest quality or in small amounts of highest quality
- 3 = Present in moderate or greater amounts and of highest quality

11

GRAND TOTAL
(max 100 pts)

- 0- 29 = Category 1, low wetland function, condition, quality**
- 30- 59 = Category 2, good/moderate wetland function, condition, quality**
- 60-100 = Category 3, superior wetland function, condition, quality**

**Based on ORAM Score Calibration Report for the scoring breakpoints between wetland categories: <http://www.epa.state.oh.us/daw/401/401.html>

TENNESSEE VALLEY AUTHORITY RAPID ASSESSMENT METHOD: Assessing Wetland Condition, Functional Capacity, Quality
TVARAM FIELD FORM

Site:	PN#42589 W002	Rater(s):	FPH	Date:	5/16/23
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1	1
max 6 pts.	subtotal

Metric 1. Wetland Area (size)

Notes: BR/CM = adjusted points for Blue Ridge and Cumberland Mountains. If an open water body (excluding aquatic beds and seasonal mudflats) is >20 acres (8 ha), then add only 0.5 acre (0.2 ha) of it to the wetland size for Metric 1.

Select one size class and assign score.

- ☐ >50 acres (>20.2 ha) (6 pts)
☐ 25 to <50 acres (10.1 to <20.2 ha) (5) [BR/CM (6)]
☐ 10 to <25 acres (4 to <10.1 ha) (4) [BR/CM (6)]
☐ 3 to <10 acres (1.2 to <4 ha) (3) [BR/CM (5)]
☐ 0.3 to <3 acres (0.1 to <1.2 ha) (2) [BR/CM (3)]
☒ 0.1 to <0.3 acre (0.04 to <0.1 ha) (1) [BR/CM (2)]
☐ <0.1 acre (0.04 ha) (0)

Sources/assumptions for size estimate (list):

1	2
max 14 pts.	subtotal

Metric 2. Upland Buffers and Surrounding Land Use

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- ☐ WIDE. Buffers average 50 m (164 ft) or more around wetland perimeter (7)
☐ MEDIUM. Buffers average 25 m to <50 m (82 to <164 ft) around wetland perimeter (4)
☐ NARROW. Buffers average 10 m to <25 m (32 ft to <82 ft) around wetland perimeter (1)
☒ VERY NARROW. Buffers average <10 m (<32 ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- ☐ VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
☐ LOW. Old field (>10 years), shrubland, young 2nd growth forest (5)
☐ MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field (3)
☒ High. Urban, industrial, open pasture, row cropping, mining, construction (1)

7	9
max 30 pts.	subtotal

Metric 3. Hydrology

3a. Sources of water. Score all that apply.

- ☐ High pH groundwater (5)
☐ Other groundwater (3) [BR/CM (5)]
☒ Precipitation (1) [unless BR/CM primary source (5)]
☐ Seasonal/intermittent surface water (3)
☐ Perennial surface water (lake or stream) (5)

3c. Maximum water depth. Select only one and assign score.

- ☐ >0.7 m (27.6 in.) (3)
☐ 0.4 to 0.7 m (16 to 27.6 in.) (2) [BR/CM (3)]
☒ <0.4 m (<16 in.) (1) [BR/CM 0.15 to 0.4 m (6 to <16 in.) (2)]

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- ☐ None or none apparent (12)
☐ Recovered (7)
☒ Recovering (3)
☐ Recent or no recovery (1)

3b. Connectivity. Score all that apply.

- ☐ 100-year floodplain (1)
☐ Between stream/lake and other human use (1)
☐ Part of wetland/upland (e.g., forest, complex) (1)
☐ Part of riparian or upland corridor (1)

3d. Duration inundation/saturation. Score one or dbl. check & avg.

- ☐ Semi- to permanently inundated/saturated (4)
☐ Regularly inundated/saturated (3) [BR/CM (4)]
☒ Seasonally inundated (2) [BR/CM (4)]
☐ Seasonally saturated in upper 30 cm (12 in.) (1) [BR/CM (2)]

Check all disturbances observed

- ☐ ditch
☐ tile (including culvert)
☐ dike
☐ weir
☐ stormwater input
☐ point source (nonstormwater)
☐ filling/grading
☐ road bed/RR track
☐ dredging
☒ other ROW

6	15
max 20 pts.	subtotal

Metric 4. Habitat Alteration and Development

4a. Substrate disturbance. Score one or double check and average.

- ☐ None or none apparent (4)
☐ Recovered (3)
☒ Recovering (2)
☐ Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- ☐ Excellent (7)
☐ Very good (6)
☐ Good (5)
☐ Moderately good (4)
☒ Fair (3)
☐ Poor to fair (2)
☐ Poor (1)

4c. Habitat alteration. Score one or double check and average.

- ☐ None or none apparent (9)
☐ Recovered (6)
☐ Recovering (3)
☒ Recent or no recovery (1)

Check all disturbances observed

- ☒ mowing
☐ grazing
☒ clearcutting
☐ selective cutting
☐ farming
☐ toxic pollutants
☐ shrub/sapling removal
☐ herbaceous/aquatic bed removal
☐ woody debris removal
☐ sedimentation
☐ dredging
☐ nutrient enrichment

15

Project Phoenix Draft Environmental Assessment

TENNESSEE VALLEY AUTHORITY RAPID ASSESSMENT METHOD: Assessing Wetland Condition, Functional Capacity, Quality
TVARAM FIELD FORM

Site: PN#42589 W002 Rater(s): FPH Date: 5/16/23

15
subtotal previous page

0.00 15
max 10 pts subtotal
0
raw score*

Metric 5. Special Wetlands

*If the documented raw score for Metric 5 is 30 points or higher, the site is automatically considered a Category 3 wetland.

Select all that apply. Where multiple values apply in row, score row as single feature with highest point value. Provide documentation for each selection (photos, checklists, maps, resource specialist concurrence, data sources, references, etc).

- ☐ Bog, fen, wet prairie (10); acidophilic veg., mossy substrate >10 sq.m, sphagnum or other moss (5); muck, organic soil layer (3)
- ☐ Assoc. forest (wetl. &/or adj. upland) incl. >0.25 acre (0.1 ha); old growth (10); mature >18 in. (45 cm) dbh (5) [exclude pine plantation]
- ☐ Sensitive geologic feature such as spring/seep, sink, losing/underground stream, cave, waterfall, rock outcrop/cliff (5)
- ☐ Vernal pool (5); isolated, perched, or slope wetland (4); headwater wetland [1st order perennial or above] (3)
- ☐ Island wetland >0.1 acre (0.04 ha) in reservoir, river, or perennial water >6 ft (2 m) deep (5)
- ☐ Braided channel or floodplain/terrace depressions (floodplain pool, slough, oxbow, meander scar, etc.) (3)
- ☐ Gross morph. adapt. in >5 trees >10 in. (25 cm) dbh: buttress, multitrunk/stool, stilted, shallow roots/tip-up, or pneumatophores (3)
- ☐ Ecological community with global rank (NatureServe): G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier]
- ☐ Known occurrence state/federal threatened/endangered species (10); other rare species with global rank G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier] [exclude records which are only "historic"]
- ☐ Superior/enhanced habitat/use: migratory songbird/waterfowl (5); in-reservoir buttonbush (4); other fish/wildlife management/designation (3)
- ☐ Cat. 1 (very low quality): <1 acre (0.4 ha) AND EITHER >80% cover of invasives OR nonvegetated on mined/excavated land (-10)

1 16
max 20 pts subtotal

Metric 6. Plant Communities, Interspersion, Microtopography

6a. Wetland vegetation communities.
Score all present using 0 to 3 scale.

- ☐ Aquatic bed
- ☐ Emergent
- ☐ Shrub
- ☐ Forest
- ☐ Mudflats
- ☐ Open water <20 acres (8 ha)
- ☐ Moss/lichen. Other _____

6b. Horizontal (plan view) interspersion.
Select only one.

- ☐ High (5)
- ☐ Moderately high (4) [BR/CM (5)]
- ☐ Moderate (3) [BR/CM (5)]
- ☐ Moderately low (2) [BR/CM (3)]
- ☒ Low (1) [BR/CM (2)]
- ☐ None (0)

6c. Coverage of invasive plants.
Add or deduct points for coverage.

- ☐ Extensive >75% cover (-5)
- ☐ Moderate 25-75% cover (-3)
- ☐ Sparse 5-25% cover (-1)
- ☒ Nearly absent <5% cover (0)
- ☐ Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

- ☐ Vegetated hummocks/bulldocks
- ☐ Coarse woody debris >15 cm (6 in.)
- ☐ Standing dead >25 cm (10 in.) dbh
- ☐ Amphibian breeding pools

Vegetation Community Cover Scale

0 = Absent or <0.1 ha (0.25 acre) contiguous acre
[For BR/CM <0.04 ha (0.1 acre)]

1 = Present and either comprises a small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality

2 = Present and either comprises a significant part of wetland's vegetation and is of moderate quality, or comprises a small part and is of high quality

3 = Present and comprises a significant part or more of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low = Low species diversity &/or dominance of nonnative or disturbance tolerant native species

mod = Native species are dominant component of the vegetation, although nonnative &/or disturbance tolerant native species can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare, threatened or endangered species

high = A predominance of native species with nonnative sp &/or disturbance tolerant native sp absent or virtually absent, and high sp diversity and often but not always, the presence of rare, threatened, or endangered species

Mudflat and Open Water Class Quality

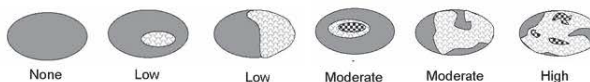
0 = Absent <0.1 ha (0.25 acres) [For BR/CM <0.04 ha (0.1 acre)]

1 = Low 0.1 to <1 ha (0.25 to 2.5 acres) [BR/CM 0.04 to <0.2 ha (0.1 to 0.5 acre)]

2 = Moderate 1 to <4 ha (2.5 to 9.9 acres) [BR/CM 0.2 to <0.2 ha (0.5 to 5 acre)]

3 = High 4 ha (9.9 acres) or more [BR/CM 2 ha (5 acres) or more]

Hypothetical Wetland for Estimating Degree of Interspersion



Microtopography Cover Scale

0 = Absent

1 = Present in very small amounts or if more common of marginal quality

2 = Present in moderate amounts, but not of highest quality or in small amounts of highest quality

3 = Present in moderate or greater amounts and of highest quality

16

GRAND TOTAL
(max 100 pts)

0- 29 = Category 1, low wetland function, condition, quality**
30- 59 = Category 2, good/moderate wetland function, condition, quality**
60-100 = Category 3, superior wetland function, condition, quality**

**Based on ORAM Score Calibration Report for the scoring breakpoints between wetland categories: <http://www.epa.state.oh.us/dsw/401/401.html>

TENNESSEE VALLEY AUTHORITY RAPID ASSESSMENT METHOD: Assessing Wetland Condition, Functional Capacity, Quality
TVARAM FIELD FORM

Site:	PN#42589 W003	Rater(s):	FPH	Date:	5/16/23
-------	---------------	-----------	-----	-------	---------

1	1
max 6 pts.	subtotal

Metric 1. Wetland Area (size)

Notes: BR/CM = adjusted points for Blue Ridge and Cumberland Mountains. If an open water body (excluding aquatic beds and seasonal mudflats) is >20 acres (8 ha), then add only 0.5 acre (0.2 ha) of it to the wetland size for Metric 1.

Select one size class and assign score.

- ☐ >50 acres (>20.2 ha) (6 pts)
☐ 25 to <50 acres (10.1 to <20.2 ha) (5) [BR/CM (6)]
☐ 10 to <25 acres (4 to <10.1 ha) (4) [BR/CM (6)]
☐ 3 to <10 acres (1.2 to <4 ha) (3) [BR/CM (5)]
☐ 0.3 to <3 acres (0.1 to <1.2 ha) (2) [BR/CM (3)]
☒ 0.1 to <0.3 acre (0.04 to <0.1 ha) (1) [BR/CM (2)]
☐ <0.1 acre (0.04 ha) (0)

Sources/assumptions for size estimate (list):

1	2
max 14 pts.	subtotal

Metric 2. Upland Buffers and Surrounding Land Use

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- ☐ WIDE. Buffers average 50 m (164 ft) or more around wetland perimeter (7)
☐ MEDIUM. Buffers average 25 m to <50 m (82 to <164 ft) around wetland perimeter (4)
☐ NARROW. Buffers average 10 m to <25 m (32 ft to <82 ft) around wetland perimeter (1)
☒ VERY NARROW. Buffers average <10 m (<32 ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- ☐ VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
☐ LOW. Old field (>10 years), shrubland, young 2nd growth forest (5)
☐ MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field (3)
☒ High. Urban, industrial, open pasture, row cropping, mining, construction (1)

7	9
max 30 pts.	subtotal

Metric 3. Hydrology

3a. Sources of water. Score all that apply.

- ☐ High pH groundwater (5)
☐ Other groundwater (3) [BR/CM (5)]
☒ Precipitation (1) [unless BR/CM primary source (5)]
☐ Seasonal/intermittent surface water (3)
☐ Perennial surface water (lake or stream) (5)

3c. Maximum water depth. Select only one and assign score.

- ☐ >0.7 m (27.6 in.) (3)
☐ 0.4 to 0.7 m (16 to 27.6 in.) (2) [BR/CM (3)]
☒ <0.4 m (<16 in.) (1) [BR/CM 0.15 to 0.4 m (6 to <16 in.) (2)]

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- ☐ None or none apparent (12)
☐ Recovered (7)
☒ Recovering (3)
☐ Recent or no recovery (1)

3b. Connectivity. Score all that apply.

- ☐ 100-year floodplain (1)
☐ Between stream/lake and other human use (1)
☐ Part of wetland/upland (e.g., forest, complex) (1)
☐ Part of riparian or upland corridor (1)

3d. Duration inundation/saturation. Score one or dbl. check & avg.

- ☐ Semi- to permanently inundated/saturated (4)
☐ Regularly inundated/saturated (3) [BR/CM (4)]
☒ Seasonally inundated (2) [BR/CM (4)]
☐ Seasonally saturated in upper 30 cm (12 in.) (1) [BR/CM (2)]

Check all disturbances observed

- ☐ ditch
☐ tile (including culvert)
☐ dike
☐ weir
☐ stormwater input
☐ point source (nonstormwater)
☐ filling/grading
☐ road bed/RR track
☐ dredging
☒ other mowed

6	15
max 20 pts.	subtotal

Metric 4. Habitat Alteration and Development

4a. Substrate disturbance. Score one or double check and average.

- ☐ None or none apparent (4)
☐ Recovered (3)
☒ Recovering (2)
☐ Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- ☐ Excellent (7)
☐ Very good (6)
☐ Good (5)
☐ Moderately good (4)
☒ Fair (3)
☐ Poor to fair (2)
☐ Poor (1)

4c. Habitat alteration. Score one or double check and average.

- ☐ None or none apparent (9)
☐ Recovered (6)
☐ Recovering (3)
☒ Recent or no recovery (1)

Check all disturbances observed

- ☒ mowing
☐ grazing
☐ clearcutting
☐ selective cutting
☐ farming
☐ toxic pollutants
☐ shrub/sapling removal
☐ herbaceous/aquatic bed removal
☐ woody debris removal
☐ sedimentation
☐ dredging
☐ nutrient enrichment

15

Project Phoenix Draft Environmental Assessment

TENNESSEE VALLEY AUTHORITY RAPID ASSESSMENT METHOD: Assessing Wetland Condition, Functional Capacity, Quality
TVARAM FIELD FORM

Site: PN#42589 W003 Rater(s): FPH Date: 5/16/23

15
subtotal previous page

0.00 15
max 10 pts subtotal
0
raw score*

Metric 5. Special Wetlands

*If the documented raw score for Metric 5 is 30 points or higher, the site is automatically considered a Category 3 wetland.

Select all that apply. Where multiple values apply in row, score row as single feature with highest point value. Provide documentation for each selection (photos, checklists, maps, resource specialist concurrence, data sources, references, etc).

- ☐ Bog, fen, wet prairie (10); acidophilic veg., mossy substrate >10 sq.m, sphagnum or other moss (5); muck, organic soil layer (3)
- ☐ Assoc. forest (wetl. &/or adj. upland) incl. >0.25 acre (0.1 ha); old growth (10); mature >18 in. (45 cm) dbh (5) [exclude pine plantation]
- ☐ Sensitive geologic feature such as spring/seep, sink, losing/underground stream, cave, waterfall, rock outcrop/cliff (5)
- ☐ Vernal pool (5); isolated, perched, or slope wetland (4); headwater wetland [1st order perennial or above] (3)
- ☐ Island wetland >0.1 acre (0.04 ha) in reservoir, river, or perennial water >6 ft (2 m) deep (5)
- ☐ Braided channel or floodplain/terrace depressions (floodplain pool, slough, oxbow, meander scar, etc.) (3)
- ☐ Gross morph. adapt. in >5 trees >10 in. (25 cm) dbh: buttress, multitrunk/stool, stilted, shallow roots/tip-up, or pneumatophores (3)
- ☐ Ecological community with global rank (NatureServe): G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier]
- ☐ Known occurrence state/federal threatened/endangered species (10); other rare species with global rank G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier] [exclude records which are only "historic"]
- ☐ Superior/enhanced habitat/use: migratory songbird/waterfowl (5); in-reservoir buttonbush (4); other fish/wildlife management/designation (3)
- ☐ Cat. 1 (very low quality): <1 acre (0.4 ha) AND EITHER >80% cover of invasives OR nonvegetated on mined/excavated land (-10)

2 17
max 20 pts subtotal

Metric 6. Plant Communities, Interspersion, Microtopography

6a. Wetland vegetation communities.
Score all present using 0 to 3 scale.

- ☐ Aquatic bed
- ☐ Emergent
- ☐ Shrub
- ☐ Forest
- ☐ Mudflats
- ☐ Open water <20 acres (8 ha)
- ☐ Moss/lichen. Other _____

6b. Horizontal (plan view) interspersion.
Select only one.

- ☐ High (5)
- ☐ Moderately high (4) [BR/CM (5)]
- ☐ Moderate (3) [BR/CM (5)]
- ☐ Moderately low (2) [BR/CM (3)]
- ☒ Low (1) [BR/CM (2)]
- ☐ None (0)

6c. Coverage of invasive plants.
Add or deduct points for coverage.

- ☐ Extensive >75% cover (-5)
- ☐ Moderate 25-75% cover (-3)
- ☐ Sparse 5-25% cover (-1)
- ☒ Nearly absent <5% cover (0)
- ☐ Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

- ☐ Vegetated hummocks/bulldocks
- ☐ Coarse woody debris >15 cm (6 in.)
- ☐ Standing dead >25 cm (10 in.) dbh
- ☐ Amphibian breeding pools

Vegetation Community Cover Scale

- 0 = Absent or <0.1 ha (0.25 acre) contiguous acre [For BR/CM <0.04 ha (0.1 acre)]
- 1 = Present and either comprises a small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
- 2 = Present and either comprises a significant part of wetland's vegetation and is of moderate quality, or comprises a small part and is of high quality
- 3 = Present and comprises a significant part or more of wetland's vegetation and is of high quality

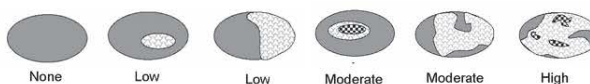
Narrative Description of Vegetation Quality

- low = Low species diversity &/or dominance of nonnative or disturbance tolerant native species
- mod = Native species are dominant component of the vegetation, although nonnative &/or disturbance tolerant native species can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare, threatened or endangered species
- high = A predominance of native species with nonnative sp &/or disturbance tolerant native sp absent or virtually absent, and high sp diversity and often but not always, the presence of rare, threatened, or endangered species

Mudflat and Open Water Class Quality

- 0 = Absent <0.1 ha (0.25 acres) [For BR/CM <0.04 ha (0.1 acre)]
- 1 = Low 0.1 to <1 ha (0.25 to 2.5 acres) [BR/CM 0.04 to <0.2 ha (0.1 to 0.5 acre)]
- 2 = Moderate 1 to <4 ha (2.5 to 9.9 acres) [BR/CM 0.2 to <0.2 ha (0.5 to 5 acre)]
- 3 = High 4 ha (9.9 acres) or more [BR/CM 2 ha (5 acres) or more]

Hypothetical Wetland for Estimating Degree of Interspersion



Microtopography Cover Scale

- 0 = Absent
- 1 = Present in very small amounts or if more common of marginal quality
- 2 = Present in moderate amounts, but not of highest quality or in small amounts of highest quality
- 3 = Present in moderate or greater amounts and of highest quality

17

GRAND TOTAL
(max 100 pts)

- 0- 29 = Category 1, low wetland function, condition, quality**
- 30- 59 = Category 2, good/moderate wetland function, condition, quality**
- 60-100 = Category 3, superior wetland function, condition, quality**

**Based on ORAM Score Calibration Report for the scoring breakpoints between wetland categories: <http://www.epa.state.oh.us/daw/401/401.html>

TENNESSEE VALLEY AUTHORITY RAPID ASSESSMENT METHOD: Assessing Wetland Condition, Functional Capacity, Quality
TVARAM FIELD FORM

Site:	PN#42589 W004	Rater(s):	FPH	Date:	5/16/23
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0.00	0
max 6 pts.	subtotal

Metric 1. Wetland Area (size)

Notes: BR/CM = adjusted points for Blue Ridge and Cumberland Mountains. If an open water body (excluding aquatic beds and seasonal mudflats) is >20 acres (8 ha), then add only 0.5 acre (0.2 ha) of it to the wetland size for Metric 1.

Select one size class and assign score.

- ☐ >50 acres (>20.2 ha) (6 pts)
☐ 25 to <50 acres (10.1 to <20.2 ha) (5) [BR/CM (6)]
☐ 10 to <25 acres (4 to <10.1 ha) (4) [BR/CM (6)]
☐ 3 to <10 acres (1.2 to <4 ha) (3) [BR/CM (5)]
☐ 0.3 to <3 acres (0.1 to <1.2 ha) (2) [BR/CM (3)]
☐ 0.1 to <0.3 acre (0.04 to <0.1 ha) (1) [BR/CM (2)]
☒ <0.1 acre (0.04 ha) (0)

Sources/assumptions for size estimate (list):

1	1
max 14 pts.	subtotal

Metric 2. Upland Buffers and Surrounding Land Use

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- ☐ WIDE. Buffers average 50 m (164 ft) or more around wetland perimeter (7)
☐ MEDIUM. Buffers average 25 m to <50 m (82 to <164 ft) around wetland perimeter (4)
☐ NARROW. Buffers average 10 m to <25 m (32 ft to <82 ft) around wetland perimeter (1)
☒ VERY NARROW. Buffers average <10 m (<32 ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- ☐ VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
☐ LOW. Old field (>10 years), shrubland, young 2nd growth forest (5)
☐ MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field (3)
☒ High. Urban, industrial, open pasture, row cropping, mining, construction (1)

4	5
max 30 pts.	subtotal

Metric 3. Hydrology

3a. Sources of water. Score all that apply.

- ☐ High pH groundwater (5)
☐ Other groundwater (3) [BR/CM (5)]
☒ Precipitation (1) [unless BR/CM primary source (5)]
☐ Seasonal/intermittent surface water (3)
☐ Perennial surface water (lake or stream) (5)

3c. Maximum water depth. Select only one and assign score.

- ☐ >0.7 m (27.6 in.) (3)
☐ 0.4 to 0.7 m (16 to 27.6 in.) (2) [BR/CM (3)]
☒ <0.4 m (<16 in.) (1) [BR/CM 0.15 to 0.4 m (6 to <16 in.) (2)]

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- ☐ None or none apparent (12)
☐ Recovered (7)
☐ Recovering (3)
☒ Recent or no recovery (1)

3b. Connectivity. Score all that apply.

- ☐ 100-year floodplain (1)
☐ Between stream/lake and other human use (1)
☐ Part of wetland/upland (e.g., forest, complex) (1)
☐ Part of riparian or upland corridor (1)

3d. Duration inundation/saturation. Score one or dbl. check & avg.

- ☐ Semi- to permanently inundated/saturated (4)
☐ Regularly inundated/saturated (3) [BR/CM (4)]
☐ Seasonally inundated (2) [BR/CM (4)]
☒ Seasonally saturated in upper 30 cm (12 in.) (1) [BR/CM (2)]

Check all disturbances observed

- ☐ ditch
☐ tile (including culvert)
☐ dike
☐ weir
☐ stormwater input
☐ point source (nonstormwater)
☐ filling/grading
☐ road bed/RR track
☐ dredging
☒ other mowed

4	9
max 20 pts.	subtotal

Metric 4. Habitat Alteration and Development

4a. Substrate disturbance. Score one or double check and average.

- ☐ None or none apparent (4)
☐ Recovered (3)
☒ Recovering (2)
☐ Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- ☐ Excellent (7)
☐ Very good (6)
☐ Good (5)
☐ Moderately good (4)
☐ Fair (3)
☐ Poor to fair (2)
☒ Poor (1)

4c. Habitat alteration. Score one or double check and average.

- ☐ None or none apparent (9)
☐ Recovered (6)
☐ Recovering (3)
☒ Recent or no recovery (1)

Check all disturbances observed

- ☒ mowing
☐ grazing
☐ clearcutting
☐ selective cutting
☐ farming
☐ toxic pollutants
☐ shrub/sapling removal
☐ herbaceous/aquatic bed removal
☐ woody debris removal
☐ sedimentation
☐ dredging
☐ nutrient enrichment

9

Project Phoenix Draft Environmental Assessment

TENNESSEE VALLEY AUTHORITY RAPID ASSESSMENT METHOD: Assessing Wetland Condition, Functional Capacity, Quality
TVARAM FIELD FORM

Site: PN#42589 W004 Rater(s): FPH Date: 5/16/23

9
subtotal previous page

0.00 9
max 10 pts subtotal
0
raw score*

Metric 5. Special Wetlands

*If the documented raw score for Metric 5 is 30 points or higher, the site is automatically considered a Category 3 wetland.

Select all that apply. Where multiple values apply in row, score row as single feature with highest point value. Provide documentation for each selection (photos, checklists, maps, resource specialist concurrence, data sources, references, etc).

- ☐ Bog, fen, wet prairie (10); acidophilic veg., mossy substrate >10 sq.m, sphagnum or other moss (5); muck, organic soil layer (3)
- ☐ Assoc. forest (wetl. &/or adj. upland) incl. >0.25 acre (0.1 ha); old growth (10); mature >18 in. (45 cm) dbh (5) [exclude pine plantation]
- ☐ Sensitive geologic feature such as spring/seep, sink, losing/underground stream, cave, waterfall, rock outcrop/cliff (5)
- ☐ Vernal pool (5); isolated, perched, or slope wetland (4); headwater wetland [1st order perennial or above] (3)
- ☐ Island wetland >0.1 acre (0.04 ha) in reservoir, river, or perennial water >6 ft (2 m) deep (5)
- ☐ Braided channel or floodplain/terrace depressions (floodplain pool, slough, oxbow, meander scar, etc.) (3)
- ☐ Gross morph. adapt. in >5 trees >10 in. (25 cm) dbh: buttress, multitrunk/stool, stilted, shallow roots/tip-up, or pneumatophores (3)
- ☐ Ecological community with global rank (NatureServe): G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier]
- ☐ Known occurrence state/federal threatened/endangered species (10); other rare species with global rank G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier] [exclude records which are only "historic"]
- ☐ Superior/enhanced habitat/use: migratory songbird/waterfowl (5); in-reservoir buttonbush (4); other fish/wildlife management/designation (3)
- ☐ Cat. 1 (very low quality): <1 acre (0.4 ha) AND EITHER >80% cover of invasives OR nonvegetated on mined/excavated land (-10)

1 10
max 20 pts subtotal

Metric 6. Plant Communities, Interspersion, Microtopography

6a. Wetland vegetation communities.
Score all present using 0 to 3 scale.

- ☐ Aquatic bed
- ☐ Emergent
- ☐ Shrub
- ☐ Forest
- ☐ Mudflats
- ☐ Open water <20 acres (8 ha)
- ☐ Moss/lichen. Other _____

6b. Horizontal (plan view) interspersion.
Select only one.

- ☐ High (5)
- ☐ Moderately high (4) [BR/CM (5)]
- ☐ Moderate (3) [BR/CM (5)]
- ☐ Moderately low (2) [BR/CM (3)]
- ☒ Low (1) [BR/CM (2)]
- ☐ None (0)

6c. Coverage of invasive plants.
Add or deduct points for coverage.

- ☐ Extensive >75% cover (-5)
- ☐ Moderate 25-75% cover (-3)
- ☐ Sparse 5-25% cover (-1)
- ☒ Nearly absent <5% cover (0)
- ☐ Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

- ☐ Vegetated hummocks/bulldocks
- ☐ Coarse woody debris >15 cm (6 in.)
- ☐ Standing dead >25 cm (10 in.) dbh
- ☐ Amphibian breeding pools

Vegetation Community Cover Scale

0 = Absent or <0.1 ha (0.25 acre) contiguous acre
[For BR/CM <0.04 ha (0.1 acre)]

1 = Present and either comprises a small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality

2 = Present and either comprises a significant part of wetland's vegetation and is of moderate quality, or comprises a small part and is of high quality

3 = Present and comprises a significant part or more of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low = Low species diversity &/or dominance of nonnative or disturbance tolerant native species

mod = Native species are dominant component of the vegetation, although nonnative &/or disturbance tolerant native species can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare, threatened or endangered species

high = A predominance of native species with nonnative sp &/or disturbance tolerant native sp absent or virtually absent, and high sp diversity and often but not always, the presence of rare, threatened, or endangered species

Mudflat and Open Water Class Quality

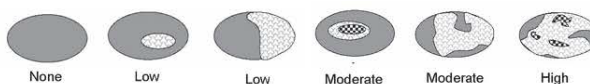
0 = Absent <0.1 ha (0.25 acres) [For BR/CM <0.04 ha (0.1 acre)]

1 = Low 0.1 to <1 ha (0.25 to 2.5 acres) [BR/CM 0.04 to <0.2 ha (0.1 to 0.5 acre)]

2 = Moderate 1 to <4 ha (2.5 to 9.9 acres) [BR/CM 0.2 to <0.2 ha (0.5 to 5 acre)]

3 = High 4 ha (9.9 acres) or more [BR/CM 2 ha (5 acres) or more]

Hypothetical Wetland for Estimating Degree of Interspersion



Microtopography Cover Scale

0 = Absent

1 = Present in very small amounts or if more common of marginal quality

2 = Present in moderate amounts, but not of highest quality or in small amounts of highest quality

3 = Present in moderate or greater amounts and of highest quality

10

GRAND TOTAL
(max 100 pts)

0-29 = Category 1, low wetland function, condition, quality**
30-59 = Category 2, good/moderate wetland function, condition, quality**
60-100 = Category 3, superior wetland function, condition, quality**

**Based on ORAM Score Calibration Report for the scoring breakpoints between wetland categories: <http://www.epa.state.oh.us/daw/401/401.html>

TENNESSEE VALLEY AUTHORITY RAPID ASSESSMENT METHOD: Assessing Wetland Condition, Functional Capacity, Quality
TVARAM FIELD FORM

Site:	PN#42589 W005	Rater(s):	FPH	Date:	5/16/23
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0.00	0
max 6 pts.	subtotal

Metric 1. Wetland Area (size)

Notes: BR/CM = adjusted points for Blue Ridge and Cumberland Mountains. If an open water body (excluding aquatic beds and seasonal mudflats) is >20 acres (8 ha), then add only 0.5 acre (0.2 ha) of it to the wetland size for Metric 1.

Select one size class and assign score.

- ☐ >50 acres (>20.2 ha) (6 pts)
☐ 25 to <50 acres (10.1 to <20.2 ha) (5) [BR/CM (6)]
☐ 10 to <25 acres (4 to <10.1 ha) (4) [BR/CM (6)]
☐ 3 to <10 acres (1.2 to <4 ha) (3) [BR/CM (5)]
☐ 0.3 to <3 acres (0.1 to <1.2 ha) (2) [BR/CM (3)]
☐ 0.1 to <0.3 acre (0.04 to <0.1 ha) (1) [BR/CM (2)]
☒ <0.1 acre (0.04 ha) (0)

Sources/assumptions for size estimate (list):

1	1
max 14 pts.	subtotal

Metric 2. Upland Buffers and Surrounding Land Use

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- ☐ WIDE. Buffers average 50 m (164 ft) or more around wetland perimeter (7)
☐ MEDIUM. Buffers average 25 m to <50 m (82 to <164 ft) around wetland perimeter (4)
☐ NARROW. Buffers average 10 m to <25 m (32 ft to <82 ft) around wetland perimeter (1)
☒ VERY NARROW. Buffers average <10 m (<32 ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- ☐ VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
☐ LOW. Old field (>10 years), shrubland, young 2nd growth forest (5)
☐ MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field (3)
☒ High. Urban, industrial, open pasture, row cropping, mining, construction (1)

4	5
max 30 pts.	subtotal

Metric 3. Hydrology

3a. Sources of water. Score all that apply.

- ☐ High pH groundwater (5)
☐ Other groundwater (3) [BR/CM (5)]
☒ Precipitation (1) [unless BR/CM primary source (5)]
☐ Seasonal/intermittent surface water (3)
☐ Perennial surface water (lake or stream) (5)

3c. Maximum water depth. Select only one and assign score.

- ☐ >0.7 m (27.6 in.) (3)
☐ 0.4 to 0.7 m (16 to 27.6 in.) (2) [BR/CM (3)]
☒ <0.4 m (<16 in.) (1) [BR/CM 0.15 to 0.4 m (6 to <16 in.) (2)]

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- ☐ None or none apparent (12)
☐ Recovered (7)
☐ Recovering (3)
☒ Recent or no recovery (1)

3b. Connectivity. Score all that apply.

- ☐ 100-year floodplain (1)
☐ Between stream/lake and other human use (1)
☐ Part of wetland/upland (e.g., forest, complex) (1)
☐ Part of riparian or upland corridor (1)

3d. Duration inundation/saturation. Score one or dbl. check & avg.

- ☐ Semi- to permanently inundated/saturated (4)
☐ Regularly inundated/saturated (3) [BR/CM (4)]
☐ Seasonally inundated (2) [BR/CM (4)]
☒ Seasonally saturated in upper 30 cm (12 in.) (1) [BR/CM (2)]

Check all disturbances observed

- ☐ ditch
☐ tile (including culvert)
☐ dike
☐ weir
☐ stormwater input
☐ point source (nonstormwater)
☐ filling/grading
☐ road bed/RR track
☐ dredging
☒ other mowed

3	8
max 20 pts.	subtotal

Metric 4. Habitat Alteration and Development

4a. Substrate disturbance. Score one or double check and average.

- ☐ None or none apparent (4)
☐ Recovered (3)
☐ Recovering (2)
☒ Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- ☐ Excellent (7)
☐ Very good (6)
☐ Good (5)
☐ Moderately good (4)
☐ Fair (3)
☐ Poor to fair (2)
☒ Poor (1)

4c. Habitat alteration. Score one or double check and average.

- ☐ None or none apparent (9)
☐ Recovered (6)
☐ Recovering (3)
☒ Recent or no recovery (1)

Check all disturbances observed

- ☒ mowing
☐ grazing
☐ clearcutting
☐ selective cutting
☐ farming
☐ toxic pollutants
☐ shrub/sapling removal
☐ herbaceous/aquatic bed removal
☐ woody debris removal
☐ sedimentation
☐ dredging
☐ nutrient enrichment

8

Project Phoenix Draft Environmental Assessment

TENNESSEE VALLEY AUTHORITY RAPID ASSESSMENT METHOD: Assessing Wetland Condition, Functional Capacity, Quality
TVARAM FIELD FORM

Site: PN#42589 W005 Rater(s): FPH Date: 5/16/23

8
subtotal previous page

0.00 9
max 10 pts subtotal
0
raw score*

Metric 5. Special Wetlands

*If the documented raw score for Metric 5 is 30 points or higher, the site is automatically considered a Category 3 wetland.

Select all that apply. Where multiple values apply in row, score row as single feature with highest point value. Provide documentation for each selection (photos, checklists, maps, resource specialist concurrence, data sources, references, etc).

- ☐ Bog, fen, wet prairie (10); acidophilic veg., mossy substrate >10 sq.m, sphagnum or other moss (5); muck, organic soil layer (3)
- ☐ Assoc. forest (wetl. &/or adj. upland) incl. >0.25 acre (0.1 ha); old growth (10); mature >18 in. (45 cm) dbh (5) [exclude pine plantation]
- ☐ Sensitive geologic feature such as spring/seep, sink, losing/underground stream, cave, waterfall, rock outcrop/cliff (5)
- ☐ Vernal pool (5); isolated, perched, or slope wetland (4); headwater wetland [1st order perennial or above] (3)
- ☐ Island wetland >0.1 acre (0.04 ha) in reservoir, river, or perennial water >6 ft (2 m) deep (5)
- ☐ Braided channel or floodplain/terrace depressions (floodplain pool, slough, oxbow, meander scar, etc.) (3)
- ☐ Gross morph. adapt. in >5 trees >10 in. (25 cm) dbh: buttress, multitrunk/stool, stilted, shallow roots/tip-up, or pneumatophores (3)
- ☐ Ecological community with global rank (NatureServe): G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier]
- ☐ Known occurrence state/federal threatened/endangered species (10); other rare species with global rank G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier] [exclude records which are only "historic"]
- ☐ Superior/enhanced habitat/use: migratory songbird/waterfowl (5); in-reservoir buttonbush (4); other fish/wildlife management/designation (3)
- ☐ Cat. 1 (very low quality): <1 acre (0.4 ha) AND EITHER >80% cover of invasives OR nonvegetated on mined/excavated land (-10)

1 10
max 20 pts subtotal

Metric 6. Plant Communities, Interspersion, Microtopography

6a. Wetland vegetation communities.
Score all present using 0 to 3 scale.

- ☐ Aquatic bed
- ☐ Emergent
- ☐ Shrub
- ☐ Forest
- ☐ Mudflats
- ☐ Open water <20 acres (8 ha)
- ☐ Moss/lichen. Other _____

6b. Horizontal (plan view) interspersion.
Select only one.

- ☐ High (5)
- ☐ Moderately high (4) [BR/CM (5)]
- ☐ Moderate (3) [BR/CM (5)]
- ☐ Moderately low (2) [BR/CM (3)]
- ☒ Low (1) [BR/CM (2)]
- ☐ None (0)

6c. Coverage of invasive plants.
Add or deduct points for coverage.

- ☐ Extensive >75% cover (-5)
- ☐ Moderate 25-75% cover (-3)
- ☐ Sparse 5-25% cover (-1)
- ☒ Nearly absent <5% cover (0)
- ☐ Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

- ☐ Vegetated hummocks/bulldocks
- ☐ Coarse woody debris >15 cm (6 in.)
- ☐ Standing dead >25 cm (10 in.) dbh
- ☐ Amphibian breeding pools

Vegetation Community Cover Scale

0 = Absent or <0.1 ha (0.25 acre) contiguous acre
[For BR/CM <0.04 ha (0.1 acre)]

1 = Present and either comprises a small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality

2 = Present and either comprises a significant part of wetland's vegetation and is of moderate quality, or comprises a small part and is of high quality

3 = Present and comprises a significant part or more of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low = Low species diversity &/or dominance of nonnative or disturbance tolerant native species

mod = Native species are dominant component of the vegetation, although nonnative &/or disturbance tolerant native species can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare, threatened or endangered species

high = A predominance of native species with nonnative sp &/or disturbance tolerant native sp absent or virtually absent, and high sp diversity and often but not always, the presence of rare, threatened, or endangered species

Mudflat and Open Water Class Quality

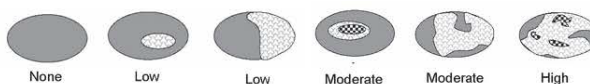
0 = Absent <0.1 ha (0.25 acres) [For BR/CM <0.04 ha (0.1 acre)]

1 = Low 0.1 to <1 ha (0.25 to 2.5 acres) [BR/CM 0.04 to <0.2 ha (0.1 to 0.5 acre)]

2 = Moderate 1 to <4 ha (2.5 to 9.9 acres) [BR/CM 0.2 to <0.2 ha (0.5 to 5 acre)]

3 = High 4 ha (9.9 acres) or more [BR/CM 2 ha (5 acres) or more]

Hypothetical Wetland for Estimating Degree of Interspersion



Microtopography Cover Scale

0 = Absent

1 = Present in very small amounts or if more common of marginal quality

2 = Present in moderate amounts, but not of highest quality or in small amounts of highest quality

3 = Present in moderate or greater amounts and of highest quality

10

GRAND TOTAL
(max 100 pts)

0-29 = Category 1, low wetland function, condition, quality**
30-59 = Category 2, good/moderate wetland function, condition, quality**
60-100 = Category 3, superior wetland function, condition, quality**

**Based on ORAM Score Calibration Report for the scoring breakpoints between wetland categories: <http://www.epa.state.oh.us/daw/401/401.html>

APPENDIX E.

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: 42589 Project Phoenix City/County: McCracken County Sampling Date: 16-May-23
 Applicant/Owner: Tennessee Valley Authority State: KY Sampling Point: W001
 Investigator(s): Fallon Parker Hutcheon Section, Township, Range: S T R
 Landform (hillslope, terrace, etc.): Gulch or Gully Local relief (concave, convex, none): concave Slope: 0.0 % / 0.0°
 Subregion (LRR or MLRA): LRR P Lat.: 37.1499346°N Long.: 88.7851389°W Datum: NAD83
 Soil Map Unit Name: Dumps NWI classification: PEM1E

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)
 Are Vegetation ☐ , Soil ☒ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐
 Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <input checked="" type="radio"/> No <input type="radio"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="radio"/> No <input type="radio"/>
Hydric Soil Present? Yes <input type="radio"/> No <input checked="" type="radio"/>	
Wetland Hydrology Present? Yes <input checked="" type="radio"/> No <input type="radio"/>	
Remarks: W001 emergent wetland with riprap substrate. Hydrology possible from underground stormwater source. < 0.01 acres. FPH_Photos#DSCN6259. TVARAM Score = Low 11.	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one required; check all that apply) <input type="checkbox"/> Surface Water (A1) <input checked="" type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Marl Deposits (B15) (LRR U) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9)		Secondary Indicators (minimum of 2 required) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input checked="" type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input checked="" type="checkbox"/> FAC-Neutral Test (D5) <input type="checkbox"/> Sphagnum moss (D8) (LRR T, U)
Field Observations: Surface Water Present? Yes <input type="radio"/> No <input checked="" type="radio"/> Depth (inches): _____ Water Table Present? Yes <input type="radio"/> No <input checked="" type="radio"/> Depth (inches): _____ Saturation Present? (includes capillary fringe) Yes <input checked="" type="radio"/> No <input type="radio"/> Depth (inches): _____	Wetland Hydrology Present? Yes <input checked="" type="radio"/> No <input type="radio"/>	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		

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VEGETATION (Five/Four Strata) - Use scientific names of plants.

Sampling Point: W001

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species? Rel. Strat. Cover	Indicator Status
1. _____	0	<input type="checkbox"/> 0.0%	
2. _____	0	<input type="checkbox"/> 0.0%	
3. _____	0	<input type="checkbox"/> 0.0%	
4. _____	0	<input type="checkbox"/> 0.0%	
5. _____	0	<input type="checkbox"/> 0.0%	
6. _____	0	<input type="checkbox"/> 0.0%	
7. _____	0	<input type="checkbox"/> 0.0%	
8. _____	0	<input type="checkbox"/> 0.0%	
50% of Total Cover: <u>0</u> 20% of Total Cover: <u>0</u>	<u>0</u>	= Total Cover	

Sapling or Sapling/Shrub Stratum (Plot size: _____)	Absolute % Cover	Dominant Species? Rel. Strat. Cover	Indicator Status
1. <u>Salix nigra</u>	50	<input checked="" type="checkbox"/> 83.3%	OBL
2. <u>Populus deltoides</u>	10	<input type="checkbox"/> 16.7%	FAC
3. _____	0	<input type="checkbox"/> 0.0%	
4. _____	0	<input type="checkbox"/> 0.0%	
5. _____	0	<input type="checkbox"/> 0.0%	
6. _____	0	<input type="checkbox"/> 0.0%	
7. _____	0	<input type="checkbox"/> 0.0%	
8. _____	0	<input type="checkbox"/> 0.0%	
50% of Total Cover: <u>30</u> 20% of Total Cover: <u>12</u>	<u>60</u>	= Total Cover	

Shrub Stratum (Plot size: _____)	Absolute % Cover	Dominant Species? Rel. Strat. Cover	Indicator Status
1. _____	0	<input type="checkbox"/> 0.0%	
2. _____	0	<input type="checkbox"/> 0.0%	
3. _____	0	<input type="checkbox"/> 0.0%	
4. _____	0	<input type="checkbox"/> 0.0%	
5. _____	0	<input type="checkbox"/> 0.0%	
6. _____	0	<input type="checkbox"/> 0.0%	
50% of Total Cover: <u>0</u> 20% of Total Cover: <u>0</u>	<u>0</u>	= Total Cover	

Herb Stratum (Plot size: _____)	Absolute % Cover	Dominant Species? Rel. Strat. Cover	Indicator Status
1. <u>Typha latifolia</u>	5	<input type="checkbox"/> 15.6%	OBL
2. <u>Arundinaria tecta</u>	20	<input checked="" type="checkbox"/> 62.5%	FACW
3. <u>Carex vulpinoidea</u>	5	<input type="checkbox"/> 15.6%	FACW
4. <u>Scirpus atrovirens</u>	2	<input type="checkbox"/> 6.3%	OBL
5. _____	0	<input type="checkbox"/> 0.0%	
6. _____	0	<input type="checkbox"/> 0.0%	
7. _____	0	<input type="checkbox"/> 0.0%	
8. _____	0	<input type="checkbox"/> 0.0%	
9. _____	0	<input type="checkbox"/> 0.0%	
10. _____	0	<input type="checkbox"/> 0.0%	
11. _____	0	<input type="checkbox"/> 0.0%	
12. _____	0	<input type="checkbox"/> 0.0%	
50% of Total Cover: <u>16</u> 20% of Total Cover: <u>6.4</u>	<u>32</u>	= Total Cover	

Woody Vine Stratum (Plot size: _____)	Absolute % Cover	Dominant Species? Rel. Strat. Cover	Indicator Status
1. _____	0	<input type="checkbox"/> 0.0%	
2. _____	0	<input type="checkbox"/> 0.0%	
3. _____	0	<input type="checkbox"/> 0.0%	
4. _____	0	<input type="checkbox"/> 0.0%	
5. _____	0	<input type="checkbox"/> 0.0%	
50% of Total Cover: <u>0</u> 20% of Total Cover: <u>0</u>	<u>0</u>	= Total Cover	

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

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

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	<u>57</u>	x 1 =	<u>57</u>
FACW species	<u>25</u>	x 2 =	<u>50</u>
FAC species	<u>10</u>	x 3 =	<u>30</u>
FACU species	<u>0</u>	x 4 =	<u>0</u>
UPL species	<u>0</u>	x 5 =	<u>0</u>
Column Totals:	<u>92</u>	(A)	<u>137</u> (B)

Prevalence Index = B/A = 1.489

Hydrophytic Vegetation Indicators:

☒ 1 - Rapid Test for Hydrophytic Vegetation

☒ 2 - Dominance Test is > 50%

☒ 3 - Prevalence Index is ≤ 3.0 ¹

☐ Problematic Hydrophytic Vegetation ¹ (Explain)

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

Definition of Vegetation Strata:

Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

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

Shrub - Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb - All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine - All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ☒ No ☐

[illegible]

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: 42589 Project Phoenix City/County: McCracken County Sampling Date: 16-May-23
 Applicant/Owner: Tennessee Valley Authority State: KY Sampling Point: W002
 Investigator(s): Fallon Parker Hutcheon Section, Township, Range: S T R
 Landform (hillslope, terrace, etc.): Gully or Gully Local relief (concave, convex, none): concave Slope: 0.0 % / 0.0 °
 Subregion (LRR or MLRA): LRR P Lat.: 37.1488887°N Long.: 88.7804570°W Datum: NAD83
 Soil Map Unit Name: Dumps NWI classification: PEM1E

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)
 Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐
 Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <input checked="" type="radio"/> No <input type="radio"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="radio"/> No <input type="radio"/>
Hydric Soil Present? Yes <input checked="" type="radio"/> No <input type="radio"/>	
Wetland Hydrology Present? Yes <input checked="" type="radio"/> No <input type="radio"/>	
Remarks: W002 emergent wetland gully in TL ROW. 0.14 acres. FPH_Photos#DSCN6259. TVARAM Score = Low 16.	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (minimum of 2 required)
<input checked="" type="checkbox"/> Surface Water (A1) <input checked="" type="checkbox"/> High Water Table (A2) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input checked="" type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Marl Deposits (B15) (LRR U) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Surface Soil Cracks (B6) <input checked="" type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry Season Water Table (C2) <input checked="" type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input checked="" type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input checked="" type="checkbox"/> FAC-Neutral Test (D5) <input type="checkbox"/> Sphagnum moss (D8) (LRR T, U)
Field Observations: Surface Water Present? Yes <input checked="" type="radio"/> No <input type="radio"/> Depth (inches): <u>4</u> Water Table Present? Yes <input checked="" type="radio"/> No <input type="radio"/> Depth (inches): _____ Saturation Present? (includes capillary fringe) Yes <input checked="" type="radio"/> No <input type="radio"/> Depth (inches): _____		Wetland Hydrology Present? Yes <input checked="" type="radio"/> No <input type="radio"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		

VEGETATION (Five/Four Strata) - Use scientific names of plants.

Sampling Point: W002

Tree Stratum (Plot size: _____)		Absolute % Cover	Dominant Species? Rel. Strat. Cover	Indicator Status
1.		0	<input type="checkbox"/> 0.0%	
2.		0	<input type="checkbox"/> 0.0%	
3.		0	<input type="checkbox"/> 0.0%	
4.		0	<input type="checkbox"/> 0.0%	
5.		0	<input type="checkbox"/> 0.0%	
6.		0	<input type="checkbox"/> 0.0%	
7.		0	<input type="checkbox"/> 0.0%	
8.		0	<input type="checkbox"/> 0.0%	
50% of Total Cover: 0 20% of Total Cover: 0		0	= Total Cover	
Sapling or Sapling/Shrub Stratum (Plot size: _____)		Absolute % Cover	Dominant Species? Rel. Strat. Cover	Indicator Status
1.	<i>Salix nigra</i>	5	<input checked="" type="checkbox"/> 50.0%	OBL
2.	<i>Populus deltoides</i>	5	<input checked="" type="checkbox"/> 50.0%	FAC
3.		0	<input type="checkbox"/> 0.0%	
4.		0	<input type="checkbox"/> 0.0%	
5.		0	<input type="checkbox"/> 0.0%	
6.		0	<input type="checkbox"/> 0.0%	
7.		0	<input type="checkbox"/> 0.0%	
8.		0	<input type="checkbox"/> 0.0%	
50% of Total Cover: 5 20% of Total Cover: 2		10	= Total Cover	
Shrub Stratum (Plot size: _____)		Absolute % Cover	Dominant Species? Rel. Strat. Cover	Indicator Status
1.		0	<input type="checkbox"/> 0.0%	
2.		0	<input type="checkbox"/> 0.0%	
3.		0	<input type="checkbox"/> 0.0%	
4.		0	<input type="checkbox"/> 0.0%	
5.		0	<input type="checkbox"/> 0.0%	
6.		0	<input type="checkbox"/> 0.0%	
50% of Total Cover: 0 20% of Total Cover: 0		0	= Total Cover	
Herb Stratum (Plot size: _____)		Absolute % Cover	Dominant Species? Rel. Strat. Cover	Indicator Status
1.	<i>Schoenoplectus tabernaemontani</i>	5	<input type="checkbox"/> 7.1%	OBL
2.	<i>Leersia oryzoides</i>	30	<input checked="" type="checkbox"/> 42.9%	OBL
3.	<i>Carex vulpinoidea</i>	30	<input checked="" type="checkbox"/> 42.9%	FACW
4.	<i>Eleocharis acicularis</i>	5	<input type="checkbox"/> 7.1%	OBL
5.		0	<input type="checkbox"/> 0.0%	
6.		0	<input type="checkbox"/> 0.0%	
7.		0	<input type="checkbox"/> 0.0%	
8.		0	<input type="checkbox"/> 0.0%	
9.		0	<input type="checkbox"/> 0.0%	
10.		0	<input type="checkbox"/> 0.0%	
11.		0	<input type="checkbox"/> 0.0%	
12.		0	<input type="checkbox"/> 0.0%	
50% of Total Cover: 35 20% of Total Cover: 14		70	= Total Cover	
Woody Vine Stratum (Plot size: _____)		Absolute % Cover	Dominant Species? Rel. Strat. Cover	Indicator Status
1.		0	<input type="checkbox"/> 0.0%	
2.		0	<input type="checkbox"/> 0.0%	
3.		0	<input type="checkbox"/> 0.0%	
4.		0	<input type="checkbox"/> 0.0%	
5.		0	<input type="checkbox"/> 0.0%	
50% of Total Cover: 0 20% of Total Cover: 0		0	= 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 45 x 1 = 45

FACW species 30 x 2 = 60

FAC species 5 x 3 = 15

FACU species 0 x 4 = 0

UPL species 0 x 5 = 0

Column Totals: 80 (A) 120 (B)

Prevalence Index = B/A = 1.500

Hydrophytic Vegetation Indicators:

☐ 1 - Rapid Test for Hydrophytic Vegetation

☒ 2 - Dominance Test is > 50%

☒ 3 - Prevalence Index is ≤ 3.0 ¹

☐ Problematic Hydrophytic Vegetation ¹ (Explain)

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

Definition of Vegetation Strata:

Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

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

Shrub - Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb - All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine - All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ☒ No ☐

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

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Project Phoenix Draft Environmental Assessment

SOIL

Sampling Point: W002

[illegible]

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: 42589 Project Phoenix City/County: McCracken County Sampling Date: 16-May-23
 Applicant/Owner: Tennessee Valley Authority State: KY Sampling Point: W003
 Investigator(s): Fallon Parker Hutcheon Section, Township, Range: S T R
 Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): concave Slope: 0.0 % / 0.0°
 Subregion (LRR or MLRA): LRR P Lat.: 37.1329219°N Long.: 88.7764425°W Datum: NAD83
 Soil Map Unit Name: Routon NWI classification: PEM1E

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <input checked="" type="radio"/> No <input type="radio"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="radio"/> No <input type="radio"/>
Hydric Soil Present? Yes <input checked="" type="radio"/> No <input type="radio"/>	
Wetland Hydrology Present? Yes <input checked="" type="radio"/> No <input type="radio"/>	
Remarks: W003 emergent wetland. 0.14 acres. TVARAM Score = Low 17.	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (minimum of 2 required)
<input checked="" type="checkbox"/> Surface Water (A1) <input checked="" type="checkbox"/> High Water Table (A2) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input checked="" type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9)	<input checked="" type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Marl Deposits (B15) (LRR U) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input checked="" type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input checked="" type="checkbox"/> FAC-Neutral Test (D5) <input type="checkbox"/> Sphagnum moss (D8) (LRR T, U)
Field Observations: Surface Water Present? Yes <input checked="" type="radio"/> No <input type="radio"/> Depth (inches): 3 Water Table Present? Yes <input checked="" type="radio"/> No <input type="radio"/> Depth (inches): 0 Saturation Present? (includes capillary fringe) Yes <input checked="" type="radio"/> No <input type="radio"/> Depth (inches):		Wetland Hydrology Present? Yes <input checked="" type="radio"/> No <input type="radio"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		

Project Phoenix Draft Environmental Assessment

VEGETATION (Five/Four Strata) - Use scientific names of plants.

Sampling Point: W003

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species? Rel. Strat. Cover	Indicator Status
1. _____	0	<input type="checkbox"/> 0.0%	
2. _____	0	<input type="checkbox"/> 0.0%	
3. _____	0	<input type="checkbox"/> 0.0%	
4. _____	0	<input type="checkbox"/> 0.0%	
5. _____	0	<input type="checkbox"/> 0.0%	
6. _____	0	<input type="checkbox"/> 0.0%	
7. _____	0	<input type="checkbox"/> 0.0%	
8. _____	0	<input type="checkbox"/> 0.0%	
50% of Total Cover: 0 20% of Total Cover: 0	0	= Total Cover	
Sapling or Sapling/Shrub Stratum (Plot size: _____)			
1. _____	0	<input type="checkbox"/> 0.0%	
2. _____	0	<input type="checkbox"/> 0.0%	
3. _____	0	<input type="checkbox"/> 0.0%	
4. _____	0	<input type="checkbox"/> 0.0%	
5. _____	0	<input type="checkbox"/> 0.0%	
6. _____	0	<input type="checkbox"/> 0.0%	
7. _____	0	<input type="checkbox"/> 0.0%	
8. _____	0	<input type="checkbox"/> 0.0%	
50% of Total Cover: 0 20% of Total Cover: 0	0	= Total Cover	
Shrub Stratum (Plot size: _____)			
1. _____	0	<input type="checkbox"/> 0.0%	
2. _____	0	<input type="checkbox"/> 0.0%	
3. _____	0	<input type="checkbox"/> 0.0%	
4. _____	0	<input type="checkbox"/> 0.0%	
5. _____	0	<input type="checkbox"/> 0.0%	
6. _____	0	<input type="checkbox"/> 0.0%	
50% of Total Cover: 0 20% of Total Cover: 0	0	= Total Cover	
Herb Stratum (Plot size: _____)			
1. <i>Typha latifolia</i>	1	<input type="checkbox"/> 1.4% OBL	
2. <i>Juncus effusus</i>	5	<input type="checkbox"/> 7.0% OBL	
3. <i>Carex vulpinoidea</i>	50	<input checked="" type="checkbox"/> 70.4% FACW	
4. <i>Eleocharis acicularis</i>	10	<input type="checkbox"/> 14.1% OBL	
5. <i>Scirpus atrovirens</i>	5	<input type="checkbox"/> 7.0% OBL	
6. _____	0	<input type="checkbox"/> 0.0%	
7. _____	0	<input type="checkbox"/> 0.0%	
8. _____	0	<input type="checkbox"/> 0.0%	
9. _____	0	<input type="checkbox"/> 0.0%	
10. _____	0	<input type="checkbox"/> 0.0%	
11. _____	0	<input type="checkbox"/> 0.0%	
12. _____	0	<input type="checkbox"/> 0.0%	
50% of Total Cover: 35.5 20% of Total Cover: 14.2	71	= Total Cover	
Woody Vine Stratum (Plot size: _____)			
1. _____	0	<input type="checkbox"/> 0.0%	
2. _____	0	<input type="checkbox"/> 0.0%	
3. _____	0	<input type="checkbox"/> 0.0%	
4. _____	0	<input type="checkbox"/> 0.0%	
5. _____	0	<input type="checkbox"/> 0.0%	
50% of Total Cover: 0 20% of Total Cover: 0	0	= 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 21 x 1 = 21

FACW species 50 x 2 = 100

FAC species 0 x 3 = 0

FACU species 0 x 4 = 0

UPL species 0 x 5 = 0

Column Totals: 71 (A) 121 (B)

Prevalence Index = B/A = 1.704

Hydrophytic Vegetation Indicators:

☒ 1 - Rapid Test for Hydrophytic Vegetation

☒ 2 - Dominance Test is > 50%

☒ 3 - Prevalence Index is ≤ 3.0 ¹

☐ Problematic Hydrophytic Vegetation ¹ (Explain)

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

Definition of Vegetation Strata:

Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

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

Shrub - Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb - All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine - All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks: (If observed, list morphological adaptations below).
another hydrophytic carex sp. present and dominate - could not ID

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

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

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

Indicators for Problematic Hydric Soils³:

- ☐ 1 cm Muck (A9) (LRR O)
☐ 2 cm Muck (A10) (LRR S)
☐ Reduced Vertic (F18) (outside MLRA 150A,B)
☐ Piedmont Floodplain Soils (F19) (LRR P, S, T)
☐ Anomalous Bright Loamy Soils (F20) (MLRA 153B)
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

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

Hydric Soil Present? Yes ☒ No ☐

Past disturbed soils

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: 42589 Project Phoenix City/County: McCracken County Sampling Date: 16-May-23
 Applicant/Owner: Tennessee Valley Authority State: KY Sampling Point: W001
 Investigator(s): Fallon Parker Hutcheon Section, Township, Range: S T R
 Landform (hillslope, terrace, etc.): Gully or Gully Local relief (concave, convex, none): concave Slope: 0.0 % / 0.0 °
 Subregion (LRR or MLRA): LRR P Lat.: 37.1499346°N Long.: 88.7851389°W Datum: NAD83
 Soil Map Unit Name: Dumps NWI classification: PEM1E

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)
 Are Vegetation ☐ , Soil ☒ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐
 Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <input checked="" type="radio"/> No <input type="radio"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="radio"/> No <input type="radio"/>
Hydric Soil Present? Yes <input type="radio"/> No <input checked="" type="radio"/>	
Wetland Hydrology Present? Yes <input checked="" type="radio"/> No <input type="radio"/>	
Remarks: W001 emergent wetland with riprap substrate. Hydrology possible from underground stormwater source. < 0.01 acres. FPH_Photos#DSCN6259. TVARAM Score = Low 11.	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (minimum of 2 required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9)	<input checked="" type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Marl Deposits (B15) (LRR U) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input checked="" type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input checked="" type="checkbox"/> FAC-Neutral Test (D5) <input type="checkbox"/> Sphagnum moss (D8) (LRR T, U)
Field Observations: Surface Water Present? Yes <input type="radio"/> No <input checked="" type="radio"/> Depth (inches): _____ Water Table Present? Yes <input type="radio"/> No <input checked="" type="radio"/> Depth (inches): _____ Saturation Present? (includes capillary fringe) Yes <input checked="" type="radio"/> No <input type="radio"/> Depth (inches): _____		Wetland Hydrology Present? Yes <input checked="" type="radio"/> No <input type="radio"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: 42589 Project Phoenix City/County: McCracken County Sampling Date: 16-May-23
 Applicant/Owner: Tennessee Valley Authority State: KY Sampling Point: W004
 Investigator(s): Fallon Parker Hutcheon Section, Township, Range: S T R
 Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): concave Slope: 0.0 % / 0.0°
 Subregion (LRR or MLRA): LRR P Lat.: 37.1335894°N Long.: 88.7777133°W Datum: NAD83
 Soil Map Unit Name: Routon NWI classification: PEM1E

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)
 Are Vegetation ☒ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐
 Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <input checked="" type="radio"/> No <input type="radio"/>	Is the Sampled Area
Hydric Soil Present? Yes <input checked="" type="radio"/> No <input type="radio"/>	within a Wetland? Yes <input checked="" type="radio"/> No <input type="radio"/>
Wetland Hydrology Present? Yes <input checked="" type="radio"/> No <input type="radio"/>	
Remarks: W004 emergent wetland, mowed. 0.01 acres. TVARAM Score = Low 10.	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one required; check all that apply) <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Marl Deposits (B15) (LRR U) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9)		Secondary Indicators (minimum of 2 required) <input checked="" type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input checked="" type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input checked="" type="checkbox"/> FAC-Neutral Test (D5) <input type="checkbox"/> Sphagnum moss (D8) (LRR T, U)
Field Observations: Surface Water Present? Yes <input type="radio"/> No <input checked="" type="radio"/> Depth (inches): _____ Water Table Present? Yes <input type="radio"/> No <input checked="" type="radio"/> Depth (inches): _____ Saturation Present? (includes capillary fringe) Yes <input checked="" type="radio"/> No <input type="radio"/> Depth (inches): _____	Wetland Hydrology Present? Yes <input checked="" type="radio"/> No <input type="radio"/>	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		

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VEGETATION (Five/Four Strata) - Use scientific names of plants.

Sampling Point: W004

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Rel. Strat. Cover	Indicator Status
1. _____	0	<input type="checkbox"/>	0.0%	
2. _____	0	<input type="checkbox"/>	0.0%	
3. _____	0	<input type="checkbox"/>	0.0%	
4. _____	0	<input type="checkbox"/>	0.0%	
5. _____	0	<input type="checkbox"/>	0.0%	
6. _____	0	<input type="checkbox"/>	0.0%	
7. _____	0	<input type="checkbox"/>	0.0%	
8. _____	0	<input type="checkbox"/>	0.0%	
50% of Total Cover: 0 20% of Total Cover: 0	0	= Total Cover		

Sapling or Sapling/Shrub Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Rel. Strat. Cover	Indicator Status
1. _____	0	<input type="checkbox"/>	0.0%	
2. _____	0	<input type="checkbox"/>	0.0%	
3. _____	0	<input type="checkbox"/>	0.0%	
4. _____	0	<input type="checkbox"/>	0.0%	
5. _____	0	<input type="checkbox"/>	0.0%	
6. _____	0	<input type="checkbox"/>	0.0%	
7. _____	0	<input type="checkbox"/>	0.0%	
8. _____	0	<input type="checkbox"/>	0.0%	
50% of Total Cover: 0 20% of Total Cover: 0	0	= Total Cover		

Shrub Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Rel. Strat. Cover	Indicator Status
1. _____	0	<input type="checkbox"/>	0.0%	
2. _____	0	<input type="checkbox"/>	0.0%	
3. _____	0	<input type="checkbox"/>	0.0%	
4. _____	0	<input type="checkbox"/>	0.0%	
5. _____	0	<input type="checkbox"/>	0.0%	
6. _____	0	<input type="checkbox"/>	0.0%	
50% of Total Cover: 0 20% of Total Cover: 0	0	= Total Cover		

Herb Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Rel. Strat. Cover	Indicator Status
1. <i>Festuca arundinacea</i>	5	<input type="checkbox"/>	16.7%	FAC
2. <i>Eleocharis acicularis</i>	5	<input type="checkbox"/>	16.7%	OBL
3. <i>Carex vulpinoidea</i>	20	<input checked="" type="checkbox"/>	66.7%	FACW
4. _____	0	<input type="checkbox"/>	0.0%	
5. _____	0	<input type="checkbox"/>	0.0%	
6. _____	0	<input type="checkbox"/>	0.0%	
7. _____	0	<input type="checkbox"/>	0.0%	
8. _____	0	<input type="checkbox"/>	0.0%	
9. _____	0	<input type="checkbox"/>	0.0%	
10. _____	0	<input type="checkbox"/>	0.0%	
11. _____	0	<input type="checkbox"/>	0.0%	
12. _____	0	<input type="checkbox"/>	0.0%	
50% of Total Cover: 15 20% of Total Cover: 6	30	= Total Cover		

Woody Vine Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Rel. Strat. Cover	Indicator Status
1. _____	0	<input type="checkbox"/>	0.0%	
2. _____	0	<input type="checkbox"/>	0.0%	
3. _____	0	<input type="checkbox"/>	0.0%	
4. _____	0	<input type="checkbox"/>	0.0%	
5. _____	0	<input type="checkbox"/>	0.0%	
50% of Total Cover: 0 20% of Total Cover: 0	0	= Total Cover		

Remarks: (If observed, list morphological adaptations below).
 another hydrophytic carex sp. present and dominate - could not ID

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

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	20	x 2 =	40
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	30	(A)	60 (B)

Prevalence Index = B/A = 2.000

Hydrophytic Vegetation Indicators:

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

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

Definition of Vegetation Strata:

Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

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

Shrub - Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb - All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine - All woody vines, regardless of height.

Hydrophytic Vegetation Present?

Yes ☒ No ☐

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

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

Indicators for Problematic Hydric Soils³:

- ☐ 1 cm Muck (A9) (LRR O)
☐ 2 cm Muck (A10) (LRR S)
☐ Reduced Vertic (F18) (outside MLRA 150A,B)
☐ Piedmont Floodplain Soils (F19) (LRR P, S, T)
☐ Anomalous Bright Loamy Soils (F20) (MLRA 153B)
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

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

Type: _____

Depth (inches): _____

Remarks:

US Army Corps of Engineers

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: 42589 Project Phoenix City/County: McCracken County Sampling Date: 16-May-23
Applicant/Owner: Tennessee Valley Authority State: KY Sampling Point: W005
Investigator(s): Fallon Parker Hutcheon Section, Township, Range: S T R
Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): concave Slope: 0.0 % / 0.0 °
Subregion (LRR or MLRA): LRR P Lat.: 37.1340431°N Long.: 88.7779554°W Datum: NAD83
Soil Map Unit Name: Routon NWI classification: PEM1E

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)
Are Vegetation ☒ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐
Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <input checked="" type="radio"/> No <input type="radio"/>	Is the Sampled Area
Hydric Soil Present? Yes <input checked="" type="radio"/> No <input type="radio"/>	within a Wetland? Yes <input checked="" type="radio"/> No <input type="radio"/>
Wetland Hydrology Present? Yes <input checked="" type="radio"/> No <input type="radio"/>	
Remarks: W005 emergent linear wetland, mowed. 0.04 acres. FPH_Photo#DSCN6278-80. TVARAM Score = Low 10.	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (minimum of 2 required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Aquatic Fauna (B13)	<input checked="" type="checkbox"/> Surface Soil Cracks (B6)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Marl Deposits (B15) (LRR U)	<input checked="" type="checkbox"/> Sparsely Vegetated Concave Surface (B8)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	<input type="checkbox"/> Moss Trim Lines (B16)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Dry Season Water Table (C2)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input checked="" type="checkbox"/> Crayfish Burrows (C8)
<input checked="" type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Other (Explain in Remarks)	<input checked="" type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)		<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Water-Stained Leaves (B9)		<input checked="" type="checkbox"/> FAC-Neutral Test (D5)
		<input type="checkbox"/> Sphagnum moss (D8) (LRR T, U)
Field Observations:		
Surface Water Present? Yes <input type="radio"/> No <input checked="" type="radio"/>	Depth (inches): _____	
Water Table Present? Yes <input type="radio"/> No <input checked="" type="radio"/>	Depth (inches): _____	
Saturation Present? (includes capillary fringe) Yes <input type="radio"/> No <input checked="" type="radio"/>	Depth (inches): _____	
Wetland Hydrology Present? Yes <input checked="" type="radio"/> No <input type="radio"/>		
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		

VEGETATION (Five/Four Strata) - Use scientific names of plants.

Sampling Point: W005

Tree Stratum (Plot size: _____)		Absolute % Cover	Dominant Species? Rel. Strat. Cover	Indicator Status
1.		0	<input type="checkbox"/> 0.0%	
2.		0	<input type="checkbox"/> 0.0%	
3.		0	<input type="checkbox"/> 0.0%	
4.		0	<input type="checkbox"/> 0.0%	
5.		0	<input type="checkbox"/> 0.0%	
6.		0	<input type="checkbox"/> 0.0%	
7.		0	<input type="checkbox"/> 0.0%	
8.		0	<input type="checkbox"/> 0.0%	
50% of Total Cover: 0 20% of Total Cover: 0		0	= Total Cover	
Sapling or Sapling/Shrub Stratum (Plot size: _____)		Absolute % Cover	Dominant Species? Rel. Strat. Cover	Indicator Status
1.		0	<input type="checkbox"/> 0.0%	
2.		0	<input type="checkbox"/> 0.0%	
3.		0	<input type="checkbox"/> 0.0%	
4.		0	<input type="checkbox"/> 0.0%	
5.		0	<input type="checkbox"/> 0.0%	
6.		0	<input type="checkbox"/> 0.0%	
7.		0	<input type="checkbox"/> 0.0%	
8.		0	<input type="checkbox"/> 0.0%	
50% of Total Cover: 0 20% of Total Cover: 0		0	= Total Cover	
Shrub Stratum (Plot size: _____)		Absolute % Cover	Dominant Species? Rel. Strat. Cover	Indicator Status
1.		0	<input type="checkbox"/> 0.0%	
2.		0	<input type="checkbox"/> 0.0%	
3.		0	<input type="checkbox"/> 0.0%	
4.		0	<input type="checkbox"/> 0.0%	
5.		0	<input type="checkbox"/> 0.0%	
6.		0	<input type="checkbox"/> 0.0%	
50% of Total Cover: 0 20% of Total Cover: 0		0	= Total Cover	
Herb Stratum (Plot size: _____)		Absolute % Cover	Dominant Species? Rel. Strat. Cover	Indicator Status
1.	<i>Eleocharis acicularis</i>	90	<input checked="" type="checkbox"/> 100.0%	OBL
2.		0	<input type="checkbox"/> 0.0%	
3.		0	<input type="checkbox"/> 0.0%	
4.		0	<input type="checkbox"/> 0.0%	
5.		0	<input type="checkbox"/> 0.0%	
6.		0	<input type="checkbox"/> 0.0%	
7.		0	<input type="checkbox"/> 0.0%	
8.		0	<input type="checkbox"/> 0.0%	
9.		0	<input type="checkbox"/> 0.0%	
10.		0	<input type="checkbox"/> 0.0%	
11.		0	<input type="checkbox"/> 0.0%	
12.		0	<input type="checkbox"/> 0.0%	
50% of Total Cover: 45 20% of Total Cover: 18		90	= Total Cover	
Woody Vine Stratum (Plot size: _____)		Absolute % Cover	Dominant Species? Rel. Strat. Cover	Indicator Status
1.		0	<input type="checkbox"/> 0.0%	
2.		0	<input type="checkbox"/> 0.0%	
3.		0	<input type="checkbox"/> 0.0%	
4.		0	<input type="checkbox"/> 0.0%	
5.		0	<input type="checkbox"/> 0.0%	
50% of Total Cover: 0 20% of Total Cover: 0		0	= 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: 90 Multiply by: 1

OBL species 90 x 1 = 90

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: 90 (A) 90 (B)

Prevalence Index = B/A = 1.000

Hydrophytic Vegetation Indicators:

☒ 1 - Rapid Test for Hydrophytic Vegetation

☒ 2 - Dominance Test is > 50%

☒ 3 - Prevalence Index is ≤ 3.0 ¹

☐ Problematic Hydrophytic Vegetation ¹ (Explain)

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

Definition of Vegetation Strata:

Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

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

Shrub - Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb - All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine - All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks: (If observed, list morphological adaptations below).
another hydrophytic carex sp. present and dominate - could not ID

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

APPENDIX F. Affected Environment

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US Army Corps of Engineers

Atlantic and Gulf Coastal Plain Region - Version 2.0

The Project area consists of a heavily disturbed area with little to no unaltered natural habitat. The Project Area is primarily large expanses of capped landfills now covered in mowed grass, man-made settling ponds, roads, paved areas, or otherwise mowed grassy areas under transmission lines or along roads. Only a small area of secondary forest remains on the edge of the project. One intermittent stream and one small emergent wetland occur in the project boundary.

Mowed herbaceous fields and the CCR Area does not offer suitable habitat for rare wildlife species but can be used by many common species. Birds that utilize these grassy areas include Canada goose, eastern meadowlark, grasshopper sparrow, killdeer, European starling, and red-tailed hawk (National Geographic 2002). Small mammals that can be found in these grassy areas including eastern cottontail, eastern mole, white-footed mouse, deer mouse, meadow jumping mouse, southeastern shrew, woodland vole, meadow vole, eastern gray squirrel, eastern fox squirrel, and eastern chipmunk (Whitaker 1996). Other mammals that may be located in the vicinity of SHF include, striped skunk, opossum, raccoon, red fox, gray fox, coyote, bobcat, woodchuck, beaver, muskrat and mink (Whitaker 1996). Mist netting in the nearby WKWMA has identified the presence of the common and rare bats. The stream and wetland areas within the project boundary may provide habitat for American toad, Fowlers toad, spring peeper and upland chorus frog.

Small patches of disturbed forest adjacent to industrialized areas are often used by the American crow, American robin, American goldfinch, blue jay, eastern towhee, northern cardinal, northern mockingbird, red-winged blackbird, red shouldered hawk, and wild turkey (National Geographic 2002). Reptiles that may use these habitats in this region include eastern box turtle and eastern kingsnake (Powell et al. 2016).

The large ash impoundments that used to mimic natural shorebird habitat have all been closed and no standing water remains in the western half of the Project Area. One small channel of water draining from an ash pond through ash mimics natural shoreline habitat in the Action area. This could be used by migrating shorebirds as stopover habitat. Remaining ponds have graveled or heavily vegetated edges that do not provide desirable shorebird stopover habitats. Wading birds such as double-crested cormorants, great blue herons, and green herons as well as other species such as mallards and Canada geese may use the remaining ponded areas. Common turtles such as the common snapping turtle, red-eared slider, and river cooter may also use these ponds (Buhlmann et al. 2008). The nearby WKWMA is considered a birding hotspot, with 183 species recorded there (eBird 2023). No colonies of wading birds are known within three miles of the Project Area.

No cave records are known within three miles of the Project Area. No caves were observed during the field survey.

Review of the U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Consultation (IPaC) tool in June 2023, identified 14 migratory bird species of conservation concern that have the potential to occur within the Project Area: bald eagle, black-billed cuckoo, bobolink, cerulean warbler, chimney swift, field sparrow, Henslow's sparrow, Kentucky warbler, lesser yellowlegs, prairie warbler, prothonotary warbler, red-headed woodpecker, rusty blackbird, and wood thrush.

See Threatened and Endangered Species (Terrestrial Animals) section for discussion on bald eagles.

Breeding habitat for black billed cuckoos are found in forest edges and thickets, often near water (Hughes 2020). Suitable habitat for black-billed cuckoos does exist in the small, forested area of the Project Area. The Project Area falls within the breeding range of this species.

Bobolinks are typically found in lush grasslands or fields of clover, wheat, and alfalfa (Nicholson 1997). No habitat for bobolink exists in the Project Area. Cerulean warblers area found in moist, hardwood forests (Nicholson 1997). No suitable habitat for cerulean warblers in the Project Area.

Chimney swifts use chimneys in more urban areas as nesting sites and communal roosts (Palmer-Ball 1996). No chimney-like structures exist within the Project Area.

Field sparrows are found in brushy fields (Nicholson 1997). Suitable habitat for field sparrow exists in periodically mowed areas under existing ROWs.

Henslow's sparrows utilize somewhat large fields with tall, dense grasses with little to no woody vegetation (Herkert et al. 2020). The Project Area falls within the breeding range of this species. Suitable habitat for the species may exist in the periodically mowed ROWs of the action area.

Kentucky warblers are found in woodlands with dense understories (Nicholson 1997). No suitable habitat for Kentucky warblers in the Project Area.

Lesser yellowlegs migrate through Alabama using wet muddy areas and areas of shallow open water as stopover sites (Tibbitts and Moskoff 2020). One small channel of water draining from an ash pond through ash mimics natural shoreline habitat in the Action area. This could be used by lesser yellowlegs as stopover habitat.

Prairie warblers are found in dry secondary growth forests with abundant shrubs and an open canopy (Nicholson 1997). Suitable habitat for prairie warbler does not occur in the Project Area.

Prothonotary warblers are found in mature bottomland hardwood forests and swamps (Nicholson 1997). Suitable habitat for prothonotary warbler does not occur in the Project Area.

Red-headed woodpeckers use a variety of treed habitats but show preference for forested areas exhibiting more openness and a high number of tree snags available (Frei et al. 2020). Lower quality red-headed woodpecker habitat is present as edge habitat in the action area. No nesting holes or large snags were identified and trees are smaller diameter trees.

Rusty blackbirds overwinter in the region and use wet areas such as swamps, pond edges, or hardwood bottomlands woodlands (Avery 2020). Suitable habitat for rusty blackbird does not exist in the Project Area.

Wood thrushes are associated with larger tracts of mature mixed-deciduous forests with open forest floors (Evans et al. 2020). A small amount of lower quality wood thrush habitat is present as edge habitat in the action area.

Threatened and Endangered Species (Terrestrial Animals)

Northern crawfish frogs are found in flood plains, and wet pastures, prairies, and pine scrub areas (Powell et al. 2016). The closest record of this species is approximately 1.3 miles away. The existing ROW may provide suitable habitat for this species.

Bald eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d). This species is associated with large mature trees capable of supporting their nests that can weigh several hundred pounds and are typically built near larger waterways where they forage primarily for fish (USFWS 2007a). One bald eagle nest is known from McCracken County, Kentucky, approximately 0.6 miles away. Field reviews of the Project Area confirmed the presence of the nest. It was active in 2022. Low quality foraging habitat may be present within the Project Area over man-made ponds should large fish persist there; however, high quality habitat is available immediately adjacent to the Project Area over the Ohio River.

Bell's vireo requires shrub/scrub, dense brush, in brushland, old fields, or woodlands. They are not typically found in fields devoid of woody species or woodlands (Kus et al 2022). In 1980 this species was observed at the Shawnee Fossil Plant on what is now a capped landfill. Suitable habitat for this species no longer exists in the Project Area.

Fish crow are typically found near water including riverine forests, marshes and estuaries. They have also been documented using inland habitats such as agricultural areas and more developed urban areas near trash dumps and feed lots (McGowan 2020). The closest record of this species is approximately 0.6 miles away. Given the proximity of the action area to the Ohio River and man-made channels alongside the former ash ponds, fish crow could be found in the Project Area.

The hooded merganser, a species of waterfowl, requires bodies of water such as streams, rivers, and lakes, and typically utilizes both deep and shallow water habitats (Dugger et al 2020). The closest known record of this species is approximately 0.3 miles away from the Project Area. Suitable nesting habitat for this species does not occur within Project Area; however low quality foraging habitat is present in created ponds within the Action Area. The interior least tern nests and forages on open shorelines, riverine sandbars and mudflats throughout the Mississippi river drainage (USFWS 1990). Suitable nesting habitat is sparsely vegetated with sand or gravel substrate and located near an adequate food supply. Fidelity exhibited by terns across years to a particular site is strongly influenced by the dynamic nature of river hydrology, which may change island size and vegetative cover annually. Least terns also have been documented using inland sites created by humans such as dredge spoil and stalling impoundments associated with coal plants, where site characteristics mimic (to some degree) natural habitat (TVA 2019). The closest record of this species is from a spoils island in the Ohio River, approximately 0.5 miles away. Large areas of potential habitat surrounding settling ponds no longer exist in the Project Area. Only a small amount of habitat remains adjacent to a created pond where a channel of water cuts through ash.

Ospreys are raptors that are typically associated with water since this species forages exclusively for fish. In Kentucky, ospreys arrive on the landscape in early March to late April begin their breeding season, building nests and hatching young. Ospreys build nests in trees or man-made structures (e.g., transmission structures) near or over water (Bierregaard et al. 2020) One osprey nest record is known within the Project Area on a

lighting structure. Poor quality foraging habitat is present within the Project Area in the man-made ash ponds. High quality foraging habitat is present adjacent to the Project Area over the Ohio River.

Whooping cranes migrate through Kentucky twice per year in small flocks of three- five birds. During this migration they stop to feed and rest in wetland complexes, marshes, ponds, lakes, rivers, and agricultural fields (USFWS 2023a). The Project Area does not provide suitable habitat for whooping crane and no records are known from the Project Area.

Dukes skippers can be found in open wetlands however, their primary habitat is forested wetland dominated by red maple and/or bald cypress with sedge patches (NatureServe 2023). They have been found in woodland edges and fields. The closest record of this species is approximately 0.3 miles away. Suitable habitat for this species may exist along the stream adjacent to the woodland edge, and in the wetlands in the existing ROW. The monarch butterfly is a highly migratory species, with eastern United States (U.S.) populations overwintering in Mexico. Monarch populations typically return to the eastern U.S. in April (Davis and Howard 2005). Summer breeding habitat requires milkweed plant species, on which adults exclusively lay eggs for larvae to develop and feed on. Adults will drink nectar from other blooming wildflowers when milkweeds are not in bloom (NatureServe 2023). Periodically mowed fields within existing ROWs may periodically contain suitable foraging habitat for Monarchs within the Project Area. Milkweed was not anywhere in the Project Area. Though this species has not been historically tracked by state or federal heritage programs, the USFWS IPaC tool determined that this species could occur within the Project Area.

Gray bats roost in caves year-round and migrate between summer and winter roosts during spring and fall (Brady et al. 1982, Tuttle 1976a,b). Bats disperse over bodies of water at dusk where they forage for insects emerging from the surface of the water (Harvey et al. 2011). There is one known gray bat record from McCracken County, Kentucky, approximately 18.6 miles away. No caves are known within three miles of the Project Area. Aquatic foraging habitat is present within the Project Area over streams, wetlands, and man-made ponds. Indiana bats hibernate in caves in winter and use areas around them in fall and spring (for swarming and staging), prior to migration back to summer habitat. During the summer, Indiana bats roost under the exfoliating bark of dead and living trees in mature forests with an open understory, often near sources of water. Indiana bats are known to change roost trees frequently throughout the season, yet still maintain site fidelity, returning to the same summer roosting areas in subsequent years. This species forages over forest canopies, along forest edges and tree lines, and occasionally over bodies of water (Kurta et al. 2002, USFWS 2007b). The nearest known Indiana bat record is from 1999 and was documented approximately 1.2 miles from the Project Area in the West Kentucky Wildlife Management Area.

Little brown bats are found in caves and mines during winter. In summer they inhabit buildings with hot attics where maternity colonies are formed. They forage in forests as well as over water (Harvey et al. 2011). The nearest little brown bat record is known from 1999 and was a summer mist-net capture site approximately 0.7 miles from the Project Area. The northern long-eared bat predominantly overwinters in large hibernacula such as caves, abandoned mines, and cave-like structures. During the fall and spring, they utilize entrances of caves and the surrounding forested areas for swarming and staging. In the summer, northern long-eared bats roost individually or in colonies beneath exfoliating bark or in

crevices of both live and dead trees. Roost selection by northern long-eared bat is similar to that of Indiana bat, however northern long-eared bats are thought to be more opportunistic in roost site selection. This species also roosts in abandoned buildings and under bridges. Northern long-eared bats emerge at dusk to forage below the canopy of mature forests on hillsides and roads, and occasionally over forest clearings and along riparian areas (USFWS 2014). The nearest northern long-eared bat record is known from 1999 and was a summer mist-net capture site approximately 1.3 miles from the Project Area.

Tricolored bats hibernate in caves or man-made structures such as culverts or bridges (Fujita and Kunz 1984, Newman et al. 2021). During the summer, tricolored bats roosting in clumps of tree foliage, often in oak and hickory trees (Veilleux et al. 2003, O'Keefe et al. 2009, Schaefer 2017, Thames 2020). Foraging studies of tricolored bats are lacking, but it is believed they typically forage near their roost trees in forested areas and riparian corridors. The nearest tricolored bat record is known from 1999 and was a summer mist-net capture site approximately 1.4 miles from the Project Area.

Southeastern bats are primarily associated with caves, though they are also known to roost in buildings and hollow trees. They forage over water, flying close to the surface to catch insects (Harvey et al. 2011). The nearest southeastern bat record is known from 2007 and was a summer mist-net capture site approximately 0.3 miles from the Project Area.

No caves are known within three miles of the Project Area. A small, wooded section comprised of approximately ten trees is proposed for removal as part of the project actions. Trees were assessed for potential summer roosting and foraging sites for state and federally listed bat species following the Range Wide Indiana Bat and Northern Long-eared Bat Survey Guidelines (USFWS 2023b). Trees proposed for removal do not provide suitable summer roosting habitat for Indiana bat, northern long-eared, little brown bat, or southeastern bat. Trees may provide low quality roosting habitat for tricolored bat. Trees are primarily hackberry and black walnut, are under 12" dbh, and are covered by various species of vines and bushy invasive plant species blocking access to the lower third of the trunks of the trees. Foraging habitat for all six bat species over ponds, wetlands, and the stream within the Project Area, as well as along the wooded edge.

Alligator snapping turtles are an almost entirely aquatic turtle. Only nesting females are known to leave the water. Alligator snapping turtles use large, deep bodies of water such as lakes, rivers, and deep sloughs. They are often found among submerged logs and root snags in areas with muddy substrate (Buhlmann et al 2008). The closest record of alligator snapping turtle is approximately 11.2 miles away. No suitable habitat for Alligator snapping turtle exists in the Project Area.

Western mud snakes are found in swamps or wet lowlands (Powell et al. 2016). The closest known record of this species is approximately 0.3 miles away. Small amounts of potential habitat for this species exists along the stream and wetlands within the Project Area.