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SHAWNEE FOSSIL PLANT PROJECT PHOENIX ENVIRONMENTAL ASSESSMENT

McCracken County, Kentucky

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Background

TVA is proposing to construct a solar facility, 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 approximately 309-acre area where coal combustion residuals (CCR) are being closed and managed in place, the proposed project would facilitate the repurposing of an industrial brownfield site, provide proof of concept for future development, and procure up to 100 MW of renewable energy. Given its location on a TVA coal plant site, the solar facility would be located near existing transmission lines. The proposed project 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 area of TVA's proposed action (herein referred to as the Project Area) comprises the construction area of the solar panel arrangement, potential BESS, transmission connection infrastructure and construction laydown area.

Project Phoenix is the first of its kind project, which would include the installation of an approximately 100 MW solar cap over approximately 186 acres of the 309-acre coal ash site (Figure 1), which is currently in the process of being closed. The coal ash site closure was assessed in the *Shawnee Fossil Plant Coal Combustion Residual Management Final Environmental Impact Statement* (TVA 2017) and *Shawnee Fossil Plant Coal Combustion Residual Management Final Supplemental Environmental Impact Statement* (TVA 2018). This closure process 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. This proposed solar installation is a pilot project, which would inform and enable potential future deployment of this innovative solar technology at other similarly situated brownfield sites at active and inactive coal-fired power plants across the Tennessee Valley.

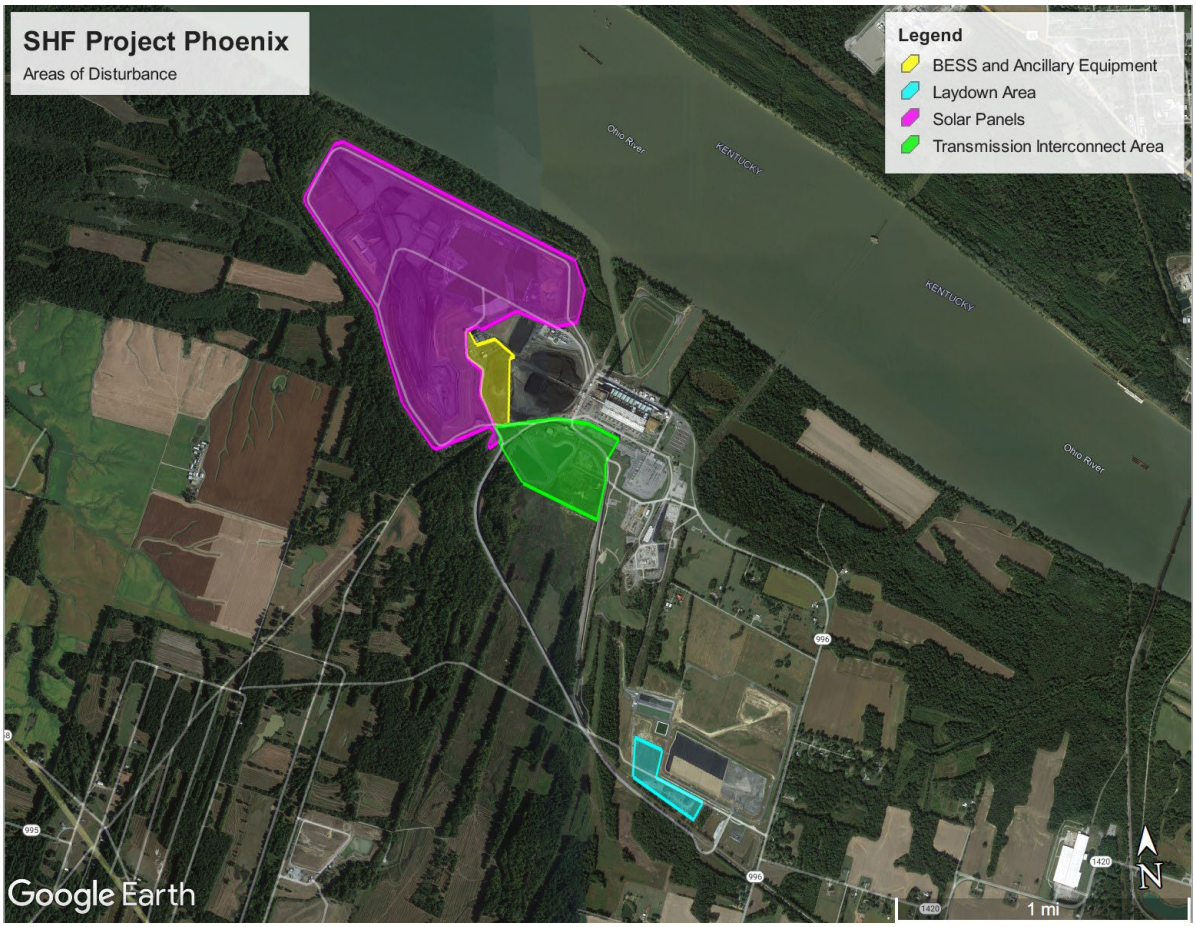

Figure 1. Site map of the proposed solar facility BESS, transmission interconnect area, and construction laydown area.

Purpose and Need for Action

TVA is a corporate agency of the United States and the largest public power provider in the country. Through its 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 power service area includes parts of seven southeastern states. 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 has begun the process of updating its IRP and anticipates issuing an updated 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 2019 IRP and TVA goals.

TVA's purpose and need for the proposed project is to optimize power generation by utilizing the existing transmission infrastructure and by redeveloping brownfield areas on the existing plant property for solar generation and energy storage. The construction of the proposed pilot solar facility is designed to utilize this valuable surface area that is located close to a TVA grid interconnection location. The utilization of the HD ClosureTurf® technology as part of the final cover system of the coal ash site, when paired with the PowerCap® racking system as outlined in the description below, allows for redevelopment of the existing plant property through the proper 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 innovative solar energy production facility would enhance TVA resources by helping to meet energy production needs, provide cost effective renewable energy, and inform and enable potential future deployment at similar brownfield sites. TVA is also considering the construction of a BESS at this location to modernize renewable power production storage. Overall, TVA's purpose and need for this proposed project would be to redevelop this existing brownfield area at the SHF site, use the existing transmission structure for a solar generation facility and possible BESS, and demonstrate and inform the viability of the proof of concept and potential future deployment of this innovative solar technology at other similarly situated brownfield sites at active and inactive coal-fired power plants across the Tennessee Valley.

Proposed Action

TVA is proposing to install an approximately 100 MW alternating current (AC) pilot solar facility, potential BESS, construction laydown area, and associated transmission interconnection infrastructure at SHF. Figure 1 identifies the Project Area, totaling approximately 340 acres. For the 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 potential BESS, the corridor for transmission connection infrastructure from the solar array and BESS to the switchyard, and an approximately 14-acre construction laydown area. Upon completion of the CCR Area closure, the Proposed Action would be cleared to begin, a process that is expected to span a duration of 30 months.

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 (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 models and 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 stability of the system is based on friction. Friction strips are installed on

the HD ClosureTurf® surface, while the railing and photovoltaic panels are mechanically fastened to the strips. The panels would be connected to inverters that would connect to transmission interconnect infrastructure.

Figure 2. Visual rendering of the placement of solar panels

To generate approximately 100 MW of power not utilizing this innovative solar panel racking technology (which is associated with CCR closure), TVA would need up to approximately 1,000 acres on the plant site using traditional racking technologies. At Shawnee, much of the brownfield acreage that has been previously disturbed is being used by other operating infrastructure such as the coal yard, non-CCR process water basins, and transmission related structures. Other available on-site areas large enough to support solar development are located within floodplains and would not be suitable for solar development.

Construction of Battery Energy Storage System (BESS)

Potential construction of a 100-MW lithium-ion BESS is being proposed 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.* New OPGW may 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.

Public and Agency Involvement

The Draft EA was released for a 30-day public comment period on October 6, 2023, and was posted on TVA's website (http://tva.com/nepa). Comments on the Draft EA were accepted through November 6, 2023. To solicit public input, the availability of the Draft EA was announced in newspapers that serve the McCracken County, Kentucky, area. A news release was also issued to the media. TVA's agency involvement includes notification of the Draft EA to local, state, and federal agencies, and federally recognized tribes as part of the review.

TVA accepted comments submitted through mail and email. TVA received a comment letter from the Sierra Club along with 243 digital signatures from members and supporters. Comments were also received from the Southern Alliance for Clean Energy, and five individual members of the public. Across all the comments received, the most frequently mentioned topics were related to the analysis of alternatives, groundwater impacts, project cost, land use, and solar panel durability.

All substantive comments received from the public, agencies and other interested parties were carefully reviewed. Appendix G includes the comments received on the Draft EA and TVA's responses to those comments.

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 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 selected alternative as closure-in-place with capping using either a ClosureTurf® or equivalent system which consists of a special engineered turf and sand fill.

- *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 EPA's 2015 CCR Rule. 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 close the Ash Pond 2/Consolidated Waste Disposal Area in place.

Alternatives

Description of Alternatives

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

Alternative A – The No Action Alternative

Under Alternative A, the pilot solar facility, BESS, and associated transmission interconnection infrastructure would not be constructed and operated at the SHF facility, and TVA would be unable to redevelop the existing plant property for solar generation and energy storage using existing transmission infrastructure. Further, TVA would need to pursue other actions to help achieve its renewable energy goals established in the 2019 IRP (TVA 2019). Under the No Action Alternative, no environmental effects would be anticipated as environmental conditions on the site would remain essentially unchanged for the foreseeable future. The No Action Alternative does not meet the purpose and need to redevelop the plant property using existing transmission infrastructure; however, it serves as the baseline for comparison with the Proposed Action Alternative.

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

Under Alternative B, TVA would install and operate the pilot solar facility, potential BESS, construction laydown area and associated transmission interconnection infrastructure, providing additional carbon free power generation to the TVA electrical grid using existing transmission infrastructure. 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, utilizing the PowerCap® racking system with the HD ClosureTurf technology, to meet energy production needs, provide proof of concept for future development, and cost-effective renewable energy.

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 zoology, prime farmland, archaeological and historic resources, managed and natural areas, parks and recreation, hazardous and solid waste, noise, visual resources, 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	*Atractosteus spatula*	H?		LE (S1)
Black Buffalo	*Ictiobus niger*	E		S (S3)
Chain Pickerel	*Esox niger*	H?		S (S3)
Cypress Minnow	*Hybognathus hayi*	E		LE (S1)
Inland Silverside	*Menidia beryllina*	A		LT (S2)
Lake Chubsucker	*Erimyzon sucetta*	H?		LT (S2)
Mountain Brook Lamprey	*Ichthyomyzon greeleyi*	H?		LT (S2)
Northern Madtom	*Noturus stigmosus*	D		S (S2,S3)
Redspotted Sunfish	*Lepomis miniatus*	D		LT (S2)
Taillight Shiner	*Notropis maculatus*	E		LT (S2,S3)
SNAILS				
Armored Rocksnail	*Lithasia armigera*	C		S (S3,S4)
Onyx Rocksnail	*Leptoxis praerosa*	H		S (S3,S4)
Varicose Rocksnail	*Lithasia verrucosa*	E		S (S3,S4)
MUSSELS				
Clubshell	*Pleurobema clava*		LE	
Fanshell	*Cyprogenia stegaria*		LE	
Fat Pocketbook	*Potamilus capax*	E	LE	LT (S2)
Longsolid	*Fusconaia subrotunda*		LT	
Northern Riffleshell	*Epioblasma rangiana*		LE	
Orange-foot Pimpleback	*Plethobasus cooperianus*	E	LE,XN	LE (S1)
Pink Mucket	*Lampsilis abrupta*	E	LE	LE (S1)
Pocketbook	*Lampsilis ovata*	C		LE (S1)
Rabbitsfoot	*Quadrula cylindrica*	E	LT	LE (S2)
Ring Pink	*Obovaria retusa*		LE	
Rough Pigtoe	*Pleurobema plenum*		LE	
Sheepnose	*Plethobasus cyphyus*	D	LE	LE (S1)
Smooth Rabbitsfoot	*Quadrula cylindrica cylindrica*	U	LT	LT (S2)
Spectaclecase	*Cumberlandia monodonta*		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	*Asclepias hirtella*	T	S2
Water Hickory	*Carya aquatica*	T	S2
Five-lobe Cayaponia	*Cayaponia quinqueloba*	E	S1
Snow Squarestem	*Melanthera nivea*	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 during 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 in Appendix F.

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 Area[1]

Common Name	Scientific Name	Status[2]	
		Federal	State[3] (Rank[3])
Amphibians			
Northern crawfish frog	*Rana areolata circulosa*	--	S(S3)
Birds			
Bald eagle	*Haliaeetus leucocephalus*	DL	S(S3B,S3S 4)N
Bell's vireo	*Vireo bellii*	--	S(S2S3B) (S2S3B)
Fish crow	*Corvus ossifragus*	--	S(S3B)
Hooded merganser	*Lophodytes cucullatus*	--	T(S2B,S3S 4N))
Interior least tern	*Sterna antillarum athaloassos*	DL	E(S1S2B)
Osprey	*Pandion haliaetus*	-	S(S3S4B)
Whooping crane[4]	*Grus americana*	EXPN	SNA
Invertebrates			
Duke's skipper	*Euphyes dukesi*	--	T(S2)
Monarch butterfly[4,5]	*Danaus plexippus*	C	-(S4)
Mammals			
Gray bat[6]	*Myotis grisescens*	E	T(S2)
Indiana bat	*Myotis sodalis*	E	E(S1S2)
Little brown bat	*Myotis lucifugus*	--	T(S2)
Northern long-eared bat	*Myotis septentrionalis*	E	E(S1)
Southeastern bat	*Myotis austroriparius*	--	S(S3)
Tricolored bat	*Perimyotis subflavus*	PE	T(S2)
Reptiles			
Alligator snapping turtle[6]	*Macrochelys temminckii*	PT	E(S1)
Western mud snake	*Farancia abacura reinwardtii*	--	S(S3)

[1]Source: 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.
[2]Status 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
[3]State Ranks: S1 = Critically Imperiled; S2 = Imperiled; S3 = Vulnerable; S4 = Apparently Secure; S#B = Status of Breeding population; S#N = Status of Non-breeding population.
[4]USFWS has determined that this species could occur within the PA.
[5]Historically this species has not been tracked by state or federal heritage programs.
[6]Species 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 most 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**

*National Wetland Inventory (USFWS 1982)

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 TVARAM).

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 5 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
West Kentucky Wildlife Management Area	6425.48	Adjacent west	Adjacent west	0.2 mi west	0.3 mi west

Of the five 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 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 West Kentucky Wildlife Management Area lies adjacent to the proposed Solar Project area. There may be indirect impacts, such as noise or runoff, during the construction phase of this

project, which are expected to be temporary and minimal. These impacts would be minimized using standard BMPs and through coordination with Kentucky Fish and Game. The Proposed Action is not expected to have any long-term or significant 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 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 and 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 and 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 feet 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. Most 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 associated with the BESS 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, NOx, 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. 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 would 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 Resource Conservation and Recovery Act (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 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 the 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 the RCRA, which are regulations that define what constitutes 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. No impacts to hazardous materials are anticipated from the Proposed Action.

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. Additionally, with the use of the Federal Aviation Administration (FAA) Notice Criteria Tool, it has been determined that the Project “does not exceed Notice Criteria” (Appendix H). Therefore, 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 approximately 30-months. Most 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 the construction and operation of the proposed pilot solar facility. Public health and safety hazards could result from a fire during the construction or operation of the BESS. If a fire were to occur, flammable and toxic gases could be released. Proper storage, handling, and ventilation would be employed to reduce the risk of potential hazards. Overall, impacts to public health and safety with the completion 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 Area, 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%

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/

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 as a result of the proposed solar facility 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 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, surface water, 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. The SCR system upgrade project overlaps with the proposed BESS placement; 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
The 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 employee 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 that may coincide with heavy commute times to manage the flow of traffic near the Project Site.

Conclusion and Findings

TVA's goal for this action is to optimize power generation, while utilizing the transmission related infrastructure that is currently in place and by redeveloping a brownfield area for solar generation and energy storage. The construction of the proposed pilot solar facility is designed to utilize this valuable surface area, 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 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. The proposed pilot solar facility would enhance TVA resources by helping to meet energy production needs, provide proof of concept for future development, and provide 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.

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Chevales Williams, NEPA Specialist – NEPA Compliance and Document Preparation
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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

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Appendix - Streams within the SHF Project Phoenix project area

Appendices

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Appendices

Appendix A

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 (WWC)	BMP (Best Management Practices)	NA	1x1 run off	R6	Riverine	37.15235544	-88.78731106

Appendices

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, riprap bank 360° around	POW	Depre ss	37.1493 6868	- 88.7836 5003

Appendices

P004	Asa 008	Pond	BMP (Best Management Practices)	NA	Large man-made basin, riprap bank 360° around	POW	Depress	37.15004829	-88.78211481

TVA

B

Appendix B – Wetlands located within project area

Appendices

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Appendices

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**

[1]Classification codes as defined in Cowardin et al. (1979): P=Palustrine; EM1=Emergent, persistent vegetation; E = Seasonally flooded/saturated.
[2]TVARAM = Tennessee Valley Authority Rapid Assessment Method that categorizes wetland quality by their functional capacity

TVA

C

Appendix C – Action Alternative Wetlands Impacts on Project Phoenix

Appendices

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Appendices

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**

TVA

D

Appendix D – Tennessee Valley Authority Rapid Assessment Method

Appendices

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Appendices

Appendix D

TENNESSEE VALLEY AUTHOROITY RAPID ASSESSMENT MEHTOD: Assessing Wetland Condition, Functional Capacity, Quality

TVARAM FIELD FORM

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

Metric 1. Wetland Area (size)

0.00 (max. 6 pts) | 0 (subscore)

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):

Metric 2. Upland Buffers and Surrounding Land Use

1 (max. 14 pts.) | 1 (subscore)

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)

Metric 3. Hydrology

4 (max. 50 pts.) | 5 (subscore)

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)

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)

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)]

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)]

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)

Check all disturbances observed

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

Metric 4. Habitat Alteration and Development

4 (max. 20 pts.) | 9 (subscore)

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

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Appendices

TENNESSEE VALLEY AUTHOROITY RAPID ASSESSMENT MEHTOD: Assessing Wetland Condition, Functional Capacity, Quality
TVARAM FIELD FORM

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

9
subtotal previous page

Metric 5. Special Wetlands

0.00 (max 10 pts.) | 9 (subtotal)

0
raw score*

*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)

Metric 6. Plant Communities, Interspersion, Microtopography

2 (max 20 pts.) | 11 (subtotal)

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

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

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

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)

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 rate, threatened, or endangered species

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)

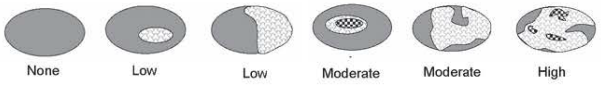
Mudflat and Open Water Class Quality

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 <02 ha (0.5 to 5 acre)]
3 = High 4 ha (9.9 acres) or more [BR/CM 2 ha (5 acres) or more]

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

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

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/dsw/401/401.html

Appendices

TENNESSEE VALLEY AUTHOROITY RAPID ASSESSMENT MEHTOD: Assessing Wetland Condition, Functional Capacity, Quality

TVARAM FIELD FORM

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

Metric 1. Wetland Area (size)

1 (max 6 pts.) | 1 (subtotal)

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):

Metric 2. Upland Buffers and Surrounding Land Use

1 (max 14 pts.) | 2 (subtotal)

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)

Metric 3. Hydrology

7 (max 30 pts.) | 9 (subtotal)

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)

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)

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)]

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)]

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)

Check all disturbances observed

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

Metric 4. Habitat Alteration and Development

6 (max 20 pts.) | 15 (subtotal)

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

15

Appendices

TENNESSEE VALLEY AUTHOROITY RAPID ASSESSMENT MEHTOD: 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 (max 10 pts.) | 15 (subtotal)

Metric 5. Special Wetlands

0
raw score*

*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 (max 20 pts.) | 16 (subtotal)

Metric 6. Plant Communities, Interspersion, Microtopography

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

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

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

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)

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 rate, threatened, or endangered species

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)

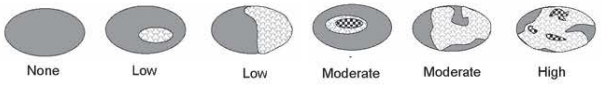
Mudflat and Open Water Class Quality

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 <02 ha (0.5 to 5 acre)]
3 = High 4 ha (9.9 acres) or more [BR/CM 2 ha (5 acres) or more]

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

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

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

Appendices

TENNESSEE VALLEY AUTHOROITY RAPID ASSESSMENT MEHTOD: Assessing Wetland Condition, Functional Capacity, Quality

TVARAM FIELD FORM

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

Metric 1. Wetland Area (size)

1 (max 6 pts.) | 1 (subtotal)

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):

Metric 2. Upland Buffers and Surrounding Land Use

1 (max 14 pts.) | 2 (subtotal)

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)

Metric 3. Hydrology

7 (max 30 pts.) | 9 (subtotal)

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)

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)

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)]

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)]

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)

Check all disturbances observed

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

Metric 4. Habitat Alteration and Development

6 (max 20 pts.) | 15 (subtotal)

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

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Appendices

TENNESSEE VALLEY AUTHOROITY RAPID ASSESSMENT MEHTOD: 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 (max 10 pts.) | 15 (subtotal)

Metric 5. Special Wetlands

0
raw score*

*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 (max 20 pts.) | 17 (subtotal)

Metric 6. Plant Communities, Interspersion, Microtopography

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

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

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

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)

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 rate, threatened, or endangered species

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)

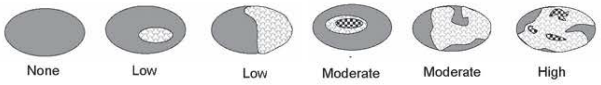
Mudflat and Open Water Class Quality

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 <02 ha (0.5 to 5 acre)]
3 = High 4 ha (9.9 acres) or more [BR/CM 2 ha (5 acres) or more]

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

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

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/dsw/401/401.html

Appendices

TENNESSEE VALLEY AUTHOROITY RAPID ASSESSMENT MEHTOD: Assessing Wetland Condition, Functional Capacity, Quality

TVARAM FIELD FORM

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

Metric 1. Wetland Area (size)

0.00 (max 6 pts.) | 0 (subtotal)

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):

Metric 2. Upland Buffers and Surrounding Land Use

1 (max 14 pts.) | 1 (subtotal)

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)

Metric 3. Hydrology

4 (max 30 pts.) | 5 (subtotal)

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)

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)

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)]

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)]

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)

Check all disturbances observed

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

Metric 4. Habitat Alteration and Development

4 (max 20 pts.) | 9 (subtotal)

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

9

Appendices

TENNESSEE VALLEY AUTHOROITY RAPID ASSESSMENT MEHTOD: Assessing Wetland Condition, Functional Capacity, Quality
TVARAM FIELD FORM

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

9
subtotal previous page

Metric 5. Special Wetlands

0.00 (max 10 pts.) | 9 (subtotal)

0
raw score*

*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)

Metric 6. Plant Communities, Interspersion, Microtopography

1 (max 20 pts.) | 10 (subtotal)

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

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

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

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)

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 rate, threatened, or endangered species

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)

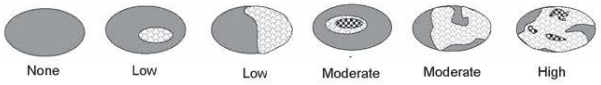
Mudflat and Open Water Class Quality

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 <02 ha (0.5 to 5 acre)]
3 = High 4 ha (9.9 acres) or more [BR/CM 2 ha (5 acres) or more]

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

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

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/dsw/401/401.html

Appendices

TENNESSEE VALLEY AUTHOROITY RAPID ASSESSMENT MEHTOD: Assessing Wetland Condition, Functional Capacity, Quality

TVARAM FIELD FORM

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

Metric 1. Wetland Area (size)

0.00 (max 6 pts.) | 0 (subtotal)

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):

Metric 2. Upland Buffers and Surrounding Land Use

1 (max 14 pts.) | 1 (subtotal)

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)

Metric 3. Hydrology

4 (max 30 pts.) | 5 (subtotal)

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)

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)

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)]

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)]

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)

Check all disturbances observed

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

Metric 4. Habitat Alteration and Development

3 (max 20 pts.) | 8 (subtotal)

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

8

Appendices

TENNESSEE VALLEY AUTHOROITY RAPID ASSESSMENT MEHTOD: 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 — max 10 pts. | 9 — subtotal

Metric 5. Special Wetlands

0 — raw score*

*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 — max 20 pts. | 10 — subtotal

Metric 6. Plant Communities, Interspersion, Microtopography

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

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

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

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)

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 rate, threatened, or endangered species

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)

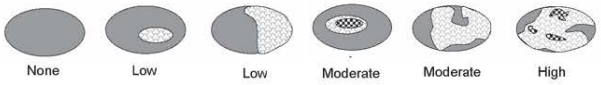
Mudflat and Open Water Class Quality

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 <02 ha (0.5 to 5 acre)]
3 = High 4 ha (9.9 acres) or more [BR/CM 2 ha (5 acres) or more]

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

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

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/dsw/401/401.html

TVA

E

Appendix E – Wetland Determination Data Forms

Appendices

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Appendices

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** [x] **, 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 (●) No ( )	**Is the Sampled Area within a Wetland?** **Yes** (●) **No** ( )
Hydric Soil Present?	Yes ( ) No (●)	
Wetland Hydrology Present?	Yes (●) No ( )	

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)

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

Secondary Indicators (minimum of 2 required)

- [ ] Surface Soil Cracks (B6)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [x] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [x] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) (LRR T, U)

Field Observations:

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

Wetland Hydrology Present? **Yes** (●) **No** ( )

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

Remarks:

Appendices

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	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 0	20% of Total Cover: 0	0	= Total Cover	
Sapling or Sapling/Shrub Stratum (Plot size:)				
1. Salix nigra	50	☑	83.3%	OBL
2. Populus deltoides	10	☐	16.7%	FAC
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 30	20% of Total Cover: 12	60	= Total Cover	
Shrub Stratum (Plot size:)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
50% of Total Cover: 0	20% of Total Cover: 0	0	= Total Cover	
Herb Stratum (Plot size:)				
1. Typha latifolia	5	☐	15.6%	OBL
2. Arundinaria tecta	20	☑	62.5%	FACW
3. Carex vulpinoidea	5	☐	15.6%	FACW
4. Scirpus atrovirens	2	☐	6.3%	OBL
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
11.	0	☐	0.0%	
12.	0	☐	0.0%	
50% of Total Cover: 16	20% of Total Cover: 6.4	32	= Total Cover	
Woody Vine Stratum (Plot size:)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	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: 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	57	x 1 =	57	
FACW species	25	x 2 =	50	
FAC species	10	x 3 =	30	
FACU species	0	x 4 =	0	
UPL species	0	x 5 =	0	
Column Totals:	92	(A)	137	(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 ○

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

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

Appendices

SOIL Sampling Point: W001

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type [1]	Loc [2]	Texture	Remarks

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

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils [3]:

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

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks:

Soil unavailable due to riprap

Appendices

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.): Gulch 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 ◉ No ○	**Is the Sampled Area within a Wetland?** **Yes** ◉ **No** ○
Hydric Soil Present?	Yes ◉ No ○	
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks:
W002 emergent wetland gulch 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)

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

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☑ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☑ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) (LRR T, U)

Field Observations:

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

Wetland Hydrology Present? **Yes** ◉ **No** ○

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

Remarks:

Appendices

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	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 0	20% of Total Cover: 0	0	= Total Cover	
Sapling or Sapling/Shrub Stratum (Plot size:)				
1. Salix nigra	5	☑	50.0%	OBL
2. Populus deltoides	5	☑	50.0%	FAC
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 5	20% of Total Cover: 2	10	= Total Cover	
Shrub Stratum (Plot size:)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
50% of Total Cover: 0	20% of Total Cover: 0	0	= Total Cover	
Herb Stratum (Plot size:)				
1. Schoenoplectus tabernaemontani	5	☐	7.1%	OBL
2. Leersia oryzoides	30	☑	42.9%	OBL
3. Carex vulpinoidea	30	☑	42.9%	FACW
4. Eleocharis acicularis	5	☐	7.1%	OBL
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
11.	0	☐	0.0%	
12.	0	☐	0.0%	
50% of Total Cover: 35	20% of Total Cover: 14	70	= Total Cover	
Woody Vine Stratum (Plot size:)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	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.

Appendices

SOIL Sampling Point: W002

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type [1]	Loc [2]	Texture	Remarks
0-14	10YR	6/3	90	10YR	6/1	10	D	M	Clay Loam	

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

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils [3]:

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

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

Past disturbed soils

Appendices

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 (●) No ( )	**Is the Sampled Area within a Wetland?** **Yes (●) No ( )**
Hydric Soil Present?	Yes (●) No ( )	
Wetland Hydrology Present?	Yes (●) No ( )	

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)

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

Secondary Indicators (minimum of 2 required)

- [ ] Surface Soil Cracks (B6)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [x] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [x] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present?	Yes (●) No ( )	Depth (inches):	3
Water Table Present?	Yes (●) No ( )	Depth (inches):	0
Saturation Present? (includes capillary fringe)	Yes (●) No ( )	Depth (inches):	

Wetland Hydrology Present? **Yes (●) No ( )**

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

Remarks:

Appendices

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	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 0	20% of Total Cover: 0	0	= Total Cover	
Sapling or Sapling/Shrub Stratum (Plot size:)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 0	20% of Total Cover: 0	0	= Total Cover	
Shrub Stratum (Plot size:)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
50% of Total Cover: 0	20% of Total Cover: 0	0	= Total Cover	
Herb Stratum (Plot size:)				
1. Typha latifolia	1	☐	1.4%	OBL
2. Juncus effusus	5	☐	7.0%	OBL
3. Carex vulpinoidea	50	☑	70.4%	FACW
4. Eleocharis acicularis	10	☐	14.1%	OBL
5. Scirpus atrovirens	5	☐	7.0%	OBL
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
11.	0	☐	0.0%	
12.	0	☐	0.0%	
50% of Total Cover: 35.5	20% of Total Cover: 14.2	71	= Total Cover	
Woody Vine Stratum (Plot size:)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	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 hydrophydic carex sp. present and dominate - could not ID

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

Appendices

SOIL Sampling Point: W003

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type [1]	Loc [2]	Texture	Remarks
0-12	10YR	4/1	80	10YR	5/6	20	D	M	Clay Loam	

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

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils [3]:

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

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

Past disturbed soils

Appendices

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** [x] **, 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 (●) No ( )	**Is the Sampled Area within a Wetland?** **Yes** (●) **No** ( )
Hydric Soil Present?	Yes ( ) No (●)	
Wetland Hydrology Present?	Yes (●) No ( )	

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)

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

Secondary Indicators (minimum of 2 required)

- [ ] Surface Soil Cracks (B6)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [x] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [x] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) (LRR T, U)

Field Observations:

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

Wetland Hydrology Present? **Yes** (●) **No** ( )

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

Remarks:

Appendices

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 (●) No ( )	**Is the Sampled Area within a Wetland?** **Yes (●) No ( )**
Hydric Soil Present?	Yes (●) No ( )	
Wetland Hydrology Present?	Yes (●) No ( )	

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)

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

Secondary Indicators (minimum of 2 required)

- [✓] Surface Soil Cracks (B6)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [✓] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [✓] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) (LRR T, U)

Field Observations:

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

Wetland Hydrology Present? **Yes (●) No ( )**

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

Remarks:

Appendices

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	0.0%	
2.	0	0.0%	
3.	0	0.0%	
4.	0	0.0%	
5.	0	0.0%	
6.	0	0.0%	
7.	0	0.0%	
8.	0	0.0%	
50% of Total Cover: 0	20% of Total Cover: 0	0 = Total Cover	
Sapling or Sapling/Shrub Stratum (Plot size:)			
1.	0	0.0%	
2.	0	0.0%	
3.	0	0.0%	
4.	0	0.0%	
5.	0	0.0%	
6.	0	0.0%	
7.	0	0.0%	
8.	0	0.0%	
50% of Total Cover: 0	20% of Total Cover: 0	0 = Total Cover	
Shrub Stratum (Plot size:)			
1.	0	0.0%	
2.	0	0.0%	
3.	0	0.0%	
4.	0	0.0%	
5.	0	0.0%	
6.	0	0.0%	
50% of Total Cover: 0	20% of Total Cover: 0	0 = Total Cover	
Herb Stratum (Plot size:)			
1. Festuca arundinacea	5	16.7%	FAC
2. Eleocharis acicularis	5	16.7%	OBL
3. Carex vulpinoidea	20	☑ 66.7%	FACW
4.	0	0.0%	
5.	0	0.0%	
6.	0	0.0%	
7.	0	0.0%	
8.	0	0.0%	
9.	0	0.0%	
10.	0	0.0%	
11.	0	0.0%	
12.	0	0.0%	
50% of Total Cover: 15	20% of Total Cover: 6	30 = Total Cover	
Woody Vine Stratum (Plot size:)			
1.	0	0.0%	
2.	0	0.0%	
3.	0	0.0%	
4.	0	0.0%	
5.	0	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	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 ○

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

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

Appendices

SOIL Sampling Point: W004

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type [1]	Loc [2]	Texture	Remarks
0-10	10YR	6/1	60	10YR	6/6	10	D	M	Clay Loam	+ 30% 10YR 5/2

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

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils [3]:

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

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

Past disturbed soils

Appendices

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 (●) No ( )	**Is the Sampled Area within a Wetland?** **Yes (●) No ( )**
Hydric Soil Present?	Yes (●) No ( )	
Wetland Hydrology Present?	Yes (●) No ( )	

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)

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

Secondary Indicators (minimum of 2 required)

- [✓] Surface Soil Cracks (B6)
- [✓] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry Season Water Table (C2)
- [✓] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [✓] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [✓] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) (LRR T, U)

Field Observations:

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

Wetland Hydrology Present? **Yes (●) No ( )**

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

Remarks:

Appendices

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	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 0	20% of Total Cover: 0	0	= Total Cover	
Sapling or Sapling/Shrub Stratum (Plot size:)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
50% of Total Cover: 0	20% of Total Cover: 0	0	= Total Cover	
Shrub Stratum (Plot size:)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
50% of Total Cover: 0	20% of Total Cover: 0	0	= Total Cover	
Herb Stratum (Plot size:)				
1. **Eleocharis acicularis**	90	☑	100.0%	OBL
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
11.	0	☐	0.0%	
12.	0	☐	0.0%	
50% of Total Cover: 45	20% of Total Cover: 18	90	= Total Cover	
Woody Vine Stratum (Plot size:)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	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	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 hydrophydic carex sp. present and dominate - could not ID

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

Appendices

SOIL Sampling Point: W005

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type [1]	Loc [2]	Texture	Remarks
0-12	10YR	6/1	60	10YR	6/8	10	D	PL	Clay Loam	

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

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils [3]:

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

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

Past disturbed soils

TVA

F

Appendix F – Terrestrial Zoology (Affected Environment)

Appendices

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Appendices

Appendix F

Affected Environment

Terrestrial Ecology (wildlife)

The Project area was surveyed on June 13, 2023, and consists of a heavily disturbed area with little to no unaltered natural habitat. The Project Area consists of areas 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 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, Fowler's 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 are in the process of being closed and no large areas of standing water remain in the western half of the Project Area. One small channel of water that was temporarily created as a result of dewatering activities 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 within the CCR Area. 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 temporarily being used for closure activities, 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 stilling 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 small channel of water that was temporarily created as a result of dewatering activities.

Ospreys are raptors that are typically associated with water since thus 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.

Duke's 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). The 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 exists 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 area 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 turtle 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.

TVA

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Appendix G – Public Comment Response Matrix

Appendices

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Appendices

Appendix G

TVA INVITES PUBLIC TO PARTICIPATE IN COMMENT PERIOD RELATED TO PROPOSED RENEWABLE ENERGY PROJECT AT SHAWNEE FOSSIL PLANT

The Tennessee Valley Authority (TVA) is preparing an environmental assessment under the National Environmental Policy Act (NEPA) to consider an option for building a solar generation facility at the Shawnee Fossil Plant near Paducah Kentucky.

The proposed solar project, known as Project Phoenix, would use a portion of the nearly 309-acre area where coal combustion residuals (CCR) are being closed and managed in place. Project Phoenix would facilitate the repurposing of a coal ash storage site to produce up to 100 MW of renewable energy.

TVA invites the public to provide input from October 6 – November 6, 2023 on the draft Environmental Assessment (EA) for the Shawnee Fossil Plant Project Phoenix near Paducah, Kentucky.

Comments may be submitted online, or by mail to the address below or via email to nepa@tva.gov. To ensure your comments are correctly dispositioned, please specify the project ("Shawnee Project Phoenix EA") with your submission. Comments must be received or postmarked **no later than November 6, 2023**. Any comments received, including names and addresses, will become part of the administrative record and subject to public inspection. More information on this Environmental Assessment can be found at www.tva.gov/nepa.

Send Comments to:
Neil Schock
Tennessee Valley Authority
400 West Summit Hill Drive, WT-11B-K
Knoxville, TN 37902

Appendices

Comment Number	Name/ Organization	Comment	Response
1	Michael Lowry	I support TVA's initiative to convert the Shawnee site into a solar farm. TVA needs to become a leader in sustainable energy production and this is a step in the right direction.	Thank you for your comment.
2	Kenneth Davis	An interest that was not addressed in the NEPA documentation was the durability of the solar panels. What is the anticipated working life of the solar panels that are proposed for the Shawnee Project Phoenix?	Conceivably the solar panels could last beyond 50 years, but we have a 12-year product warranty and a 30-year performance warranty. Both have limitations but we expect the panels to be in service for 30 years unless we elect to upgrade them sooner.
3	Jimmie Johnson	I believe it is incumbent upon the TVA to bring modern renewable power to the Shawnee Steam Plant in Paducah. It has become clear, by reading recent literature from my local power company, that local leaders of Jackson Purchase Electric have no plans to use renewable power. Numerous companies have tried to build Solar Farms in McCracken County only to be squelched by layers of "Grid Management" stacked against them. I hope TVA will approve the Project Phoenix Solar Field as soon as possible to bring Western Kentucky and our power grid into the 21st century.	Thank you for your comment.
4	Robert Johnson	Where is the money coming from to finance this boondoggle? From the ratepayer? From the employees? From the retirees? Or maybe from China, where all the materials come from? You need to read the newspaper article from https://gcc02.safelinks.protection.outlook.com/?url=http%3A%2F%2Fwww.ky-news.com%2F&data=05%7C01%7Cnepa%40tva.gov%7C4fe24ec03c594415ce4608dbdcb7c28d%7C270992cd9003497184ded1640c0bffc5%7C0%7C0%7C638346454019432429%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=oV4KrvegS6xOGPwSezMu1COGyJK4x4c3MXZwU1veuYg%3D&reserved=0, west Ky B J	The Tennessee Valley Authority is a self-funded corporate agency of the United States that provides electricity for business customers and local power distributors serving nearly 10 million people in parts of seven southeastern states. TVA receives no taxpayer funding, deriving virtually all its revenues from sales of electricity. In addition to operating and investing its revenues in its electric system, TVA provides flood control, navigation and land management for the Tennessee River system and assists local power companies and state and local governments with economic development and job creation. This solar installation is consistent with the target supply mix in the 2019 IRP that is consistent with least-cost planning principles.

Appendices

		dated Oct. 2023, written by D. McCowan Refer to Rick Honaker, professor	
5	Diana Hook	In response to your request for public input to the proposed renewable energy project, let us assure you we understand the concern for "greener" energy. Our concern is our rich farmland. Solar panels and windmills take up too many acres of rich farmland that cannot be replaced. Our Good Lord is not making any more land! We need to conserve all the land we can. Our Jackson Purchase ECC has suggested, and we agree that right now the best way to have dependable energy is still with fossil fuels. Solar panels and windmills are in the future. Right now we want to protect our farmland for our future generations.	Based on the analysis conducted by TVA, no Prime Farmlands would be impacted by the proposed project. The Project Site is situated at TVA's Shawnee Plant that is currently utilized for industrial purposes, in an area currently being utilized as a CCR landfill. This project would provide an opportunity to generate renewable energy by repurposing industrial land and without impacting farmland. Redeveloping an existing brownfield site for solar generation and battery storage also helps TVA utilize the existing transmission infrastructure.
6	Southern Alliance for Clean Energy	The Southern Alliance for Clean Energy (SACE) appreciates the opportunity to comment on the draft Environmental Assessment for the proposed "Project Phoenix" solar installation at the Shawnee Fossil Plant near Paducah, Kentucky. Both solar and battery storage are key resources in the reliable, cost effective, and carbon-free grid we are already building across the globe. It is important that TVA do everything it can to accelerate the additions of solar and battery storage to its resource mix. Project Phoenix has the opportunity to consolidate new clean energy resources onto existing TVA properties, using/re-using existing transmission infrastructure and, thereby, reducing the need for solar development on greenfield sites. The Coal Combustion Residual (CCR, "coal ash") landfill at Shawnee is presently being closed-in-place with a patented, ClosureTurf® system. Project Phoenix will install a companion PowerCap® system on approximately 186 acres of the 309-acre CCR landfill site. The solar PV (photovoltaic) capacity will be approximately 100 MW. There is also	Thank you for your comment.

		potential for this pilot project to integrate a Battery Energy Storage System (BESS) on approximately 13 acres. SACE understands that a successful 100 MW pilot at the Shawnee Fossil Plant could lead to expansion exceeding 1,000 MW of solar at similar CCR sites throughout the TVA region. Until now, TVA has relied primarily on third-party Power Purchase Agreements (PPAs) for solar commissioned in the Tennessee Valley. Enactment of the Inflation Reduction Act (IRA) has created new opportunities for TVA to expand its portfolio of directly owned solar assets, including Project Phoenix. Most notably, tax-exempt utilities like TVA can now take advantage of the "elective pay" option for the Investment Tax Credit (ITC) and/or Production Tax Credit (PTC) to receive a direct payment from the Federal government for value that was previously only available to tax paying entities. Project Phoenix can also benefit from another element from the Inflation Reduction Act. Because the pilot project and subsequent installations will be co-located with existing or former coal-fired power plants, they should be eligible for a 10 percent bonus credit created through the IRA for projects in "energy communities." Installing solar atop landfills has traditionally been more expensive than developing solar on greenfield sites. This bonus credit makes landfill solar projects more cost-competitive. Other cost considerations for solar development include transmission interconnection and network upgrades. In its review of replacement options for the Cumberland coal plant, TVA cited transmission as a key barrier to getting solar and storage on its grid in a timely manner. Because the Project Phoenix pilot is located adjacent to the Shawnee Fossil Plant, existing transmission infrastructure can be utilized for the interconnection. One generating unit at the Shawnee Fossil Plant has already been retired and SACE understands that the entire plant operates at much lower capacity that originally designed, so existing	

		transmission has sufficient bandwidth to interconnect the Project Phoenix pilot without additional upgrade expense. A TVA representative shared some details about Project Phoenix at the recent Tennessee Valley Solar Conference (Oct/18-19). Many in the audience were genuinely surprised by the solar density this pilot will achieve. Traditional utility-scale solar projects typically require between 5 to 10 acres per megawatt (MW). As indicated above, Project Phoenix will result in 100 MW on 186 acres (1.86 acres per MW). This appears to be a combination of site preparation (TVA contoured the landfill with suitable slopes) plus the way the PowerCap® technology adheres to the surface with minimal racking. Another key consideration is land use change. University of Tennessee researchers released a report earlier this year quantifying the potential land use impacts of TVA's target to deploy 10 gigawatts (10,000 MW) of solar by 2035 – concluding that it could require "0.53 to 0.96% of Tennessee farmland if exclusively placed on farmland" and all within the state of Tennessee. While there are many other, and more significant drivers of land use change (e.g., housing development), this land use issue deserves attention. Every MW of solar installed on landfills or other brownfield sites represents a MW of solar that does not need to be sited onto greenfield property. Roughly 10 percent of TVA's solar ambition could be sited onto CCR landfills across the Tennessee Valley. The draft Environmental Assessment does not seem to reveal any substantive increase to the risk profile of the CCR site closure itself through the addition of solar PowerCap®. For all these reasons, SACE supports the proposed Project Phoenix solar pilot at the Shawnee Fossil Plant site. We appreciate that TVA is taking this step to explore options for adding solar and batteries to its resource mix. We look forward to gauging how Project Phoenix and other clean energy	

		opportunities can be accelerated across the Tennessee Valley through the Integrated Resource Planning process that is presently underway.	
7	Sierra Club	The Sierra Club respectfully submits these comments regarding the Tennessee Valley Authority's ("TVA") draft environmental assessment for a proposed solar generation facility located atop an existing coal ash site at TVA's Shawnee Fossil Plant (TVA's "Project Phoenix"). The Sierra Club has more than 5,500 Kentucky members, many of whom reside near the Shawnee Fossil Plant ("Shawnee") and experience the adverse effects of Shawnee's pollution. Sierra Club supports the general goal of repurposing brownfield sites for renewable energy generation. Sierra Club likewise supports repurposing existing fossil transmission infrastructure for renewables. However, the Club is concerned that TVA has failed to adequately examine the implications of constructing extensive generation resources atop a coal ash impoundment. Particularly since TVA elected to "close in place" its Shawnee coal ash impoundments, adding further infrastructure atop that cap could complicate or render extremely difficult subsequent coal ash remediation in compliance with federal requirements in the event that, for example, Shawnee's coal ash is improperly in contact with groundwater—as Sierra Club noted in prior comments on TVA's closure-in-place NEPA process.	TVA is executing the closure of Ash Pond 2/Consolidated Waste Disposal Area in accordance with the applicable state and federal environmental laws and regulations, including those for groundwater corrective measures and CCR unit closure. Any additional actions for groundwater corrective measures, if deemed necessary in future, can be implemented with little to no disruption of the solar generating facility as proposed on top of the unit cap.
8	Sierra Club	Information from that coal combustion residual ("CCR") environmental impact statement analysis at Shawnee indicates that existing CCR at Shawnee is currently not in compliance with federal CCR regulations, 40 C.F.R. Part 257, Subpart D—as discussed in more detail below. Especially in light of this apparent noncompliance, siting solar panels there requires a full analysis of the interplay between the proposed solar facility and the existing coal ash site, including the effect of Project Phoenix on any subsequent coal ash remediation efforts. This analysis may	TVA does not agree with the comment that the existing CCR at Shawnee is out of compliance with federal CCR regulations. TVA is executing the closure of Ash Pond 2/Consolidated Waste Disposal Area in accordance with the applicable state and federal environmental laws and regulations, including those for groundwater corrective measures and CCR unit closure. The method of closure was evaluated in the 2017 Final EIS and 2018 Final Supplemental EIS. This EA appropriately analyzes the environmental effects of the construction and operation of the proposed solar facility on top of the closed coal ash site and finds that there are no

		require a full environmental impact statement ("EIS"). In the absence of analysis of the effects of siting Project Phoenix on existing CCR at Shawnee, put forward for new comment by all stakeholders, TVA should not move forward with the project. I. TVA's Environmental Assessment Is Deficient Because It Fails to Evaluate the Implications of Solar Siting on a Coal Ash Impoundment that May Require Further Remediation. The federal National Environmental Policy Act ("NEPA") mandates a set of action forcing procedures that require all federal agencies to take a hard look at the environmental consequences of their proposed actions and disclose the relevant information to the public. Although NEPA's requirements are procedural, "these procedures are almost certain to affect the agency's substantive decision." *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350 (1989). As such, NEPA and its implementing regulations require federal agencies to provide a detailed statement on proposals for major federal actions significantly affecting the quality of the human environment. 42 U.S.C. § 4332(C); 40 C.F.R. § 1500.1(a). TVA's Project Phoenix draft environmental assessment is deficient, as it fails to take into account the impact of siting the new solar project on coal ash impoundment or to evaluate an obvious available alternative: siting the project in a commensurate location that is *not* a coal ash storage location. An environmental assessment requires a consideration of "any environmental issues that are of public concern." 40 C.F.R. § 6.205(d). It "must include . . . discussion of" possible "alternatives" and of "[t]he affected environment, including baseline conditions that may be impacted by the proposed action and alternatives." *Id.* § 6.205(e)(1)(ii)-(iii). The environmental assessment analysis also contemplates evaluation of "compliance with applicable laws	impacts to groundwater. Due to the design and utilization of the Closure Turf the panels and other solar infrastructure would not disturb the CCR cap. Additionally, TVA determined there are minimal impacts to other identified resources that were evaluated in the EA. This evaluation confirms that TVA has taken a hard look at the environmental consequences of its proposed action. Since the proposed action does not significantly affect the quality of the human environment, an EIS is not required. The proposed Project Phoenix solar development is the first of its kind project which would generate approximately 100 MW of renewable solar energy on top of a closed coal ash site at the Shawnee Fossil Plant. This pilot project would inform and enable potential future deployment of this innovative solar technology at other similarly situated brownfield sites at active and inactive coal-fired power plants across the Tennessee Valley. This clarification has been added to the Final EA in the "Background" section. See response to comment 9. At the Shawnee Fossil Plant, the closed coal ash site would allow for the use of innovative Closure Turf® and Solar Power Cap™ technologies to enable the generation of approximately 100 MW of renewable energy on approximately 300 acres. To generate approximately 100 MW of power by not utilizing this innovative solar panel racking technology (which is associated with CCR closure), TVA would need up to approximately 1,000 acres on the plant site using traditional racking technologies. At Shawnee, much of the brownfield acreage that has been previously disturbed is being used by other operating infrastructure such as the coal yard, non-CCR process water basins, and transmission related structures. Other available on-site areas large enough to support solar development are located within floodplains and would not be suitable for solar development. This information has been added to the Final EA in the "Proposed Action" section.

		and executive orders." *Id.* § 6.205(e)(2).	
9	Sierra Club	Here, TVA has not demonstrated in the draft environmental assessment that its CCR management at Shawnee, on the same land where proposed solar generation is contemplated, is consistent with federal regulatory requirements. Nor has it evaluated the pro and cons of siting the proposed solar generation on the coal ash storage area rather than in another location. The core problem is that TVA's analysis focuses on the effects of Project Phoenix on the environment, not the effects of risk associated with the existing CCR on Project Phoenix and, ultimately, the environment. For example, TVA discusses the effects of the project on groundwater in a total of five sentences, concluding that "no impacts to groundwater are anticipated."[1] But TVA does not analyze: (1) Whether the existing CCR where it wishes to build Project Phoenix has effects on groundwater; (2) If so, whether the existing CCR's effects on groundwater are currently not in compliance or pose a risk for compliance with existing or reasonably likely federal CCR regulation, or otherwise are significantly environmentally problematic; and (3) If so, whether bringing the existing CCR into compliance with existing or reasonably likely regulation, or otherwise dealing with environmental problems related to the existing CCR, will affect the anticipated timeline, cost, and/or practical feasibility of Project Phoenix. In other words, TVA is essentially currently evaluating only half of the proposed project—the effects of new solar panels. It is not evaluating the effects of choosing to site those panels *on an impoundment*, and the potential effects that may have on further coal ash remediation. Federal regulation requires more. TVA must, consistent with § 6.205, evaluate this option as compared to the placement of the solar	TVA's purpose and need for this action is to optimize power generation by utilizing the transmission related infrastructure present at the SHF site and by redeveloping brownfield areas on the existing plant property for solar generation and energy storage. The proposed solar facility would also serve as a pilot for demonstrating the deployment of solar facilities at existing brownfield locations that include a CCR site. 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 innovative solar energy production facility would enhance TVA resources by helping to meet energy production needs, providing cost effective renewable energy, and inform and enable potential future deployment at similar brownfield sites. 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. Due to the scope of the Purpose and Need of this project to implement this pilot project, the "Action/No Action" alternative is the only comparison relevant to this review. Consideration of constructing the solar facility on a greenfield site or other location without the existing infrastructure does not fit the scope of the stated purpose and need. Such alternative sites would not meet the purposes of redeveloping an existing brownfield site, conserving resources by opportunistically using existing transmission infrastructure, and demonstrating "proof of concept that leads to the deployment of solar and storage at sites typified by the SHF facility". At Shawnee, much of the brownfield acreage that has been previously disturbed is being used by other operating infrastructure such as the coal yard, non-CCR process water basins, and transmission related structures. Other available on-site areas large enough to support solar development are located within floodplains and would not be suitable for solar development. TVA is evaluating greenfield solar facilities in a variety of other reviews which have independent purpose and needs as they relate to the 2019 IRP goals.

		panels at a different location, not on top of Shawnee CCR storage—and not just evaluate placing the solar panels here as compared to the option of no solar panels whatsoever. The placement of the solar panels in a different location is an obvious, reasonable alternative. Yet TVA has not provided any hint of looking into such an alternative, or explained why a brownfield would be preferable to a different area. *Compare City of Crossgate v. U.S. Dep't of Veterans Affairs*, 526 F. Supp. 3d 239, 260 (W.D. Ky. 2021) (holding that a federal agency had evaluated reasonable alternatives for purposes of environmental analysis where the agency "took reasonable alternatives into account" by looking at five possibilities and "explain[ing] its reasons for preferring undeveloped 'greenfield' sites"). Indeed, the Shawnee site has significant acreage that is not a location for CCR storage.	Based on the analysis of available information, the construction of the proposed solar facility poses no impact to groundwater and does not impact TVA's ability to meet any environmental regulatory requirements associated with the CCR or any other governing statute.
10	Sierra Club	As Sierra Club's technical expert Mark Quarles noted in July 2017, in technical comments provided to TVA regarding TVA's June 2017 Draft Environmental Impact Statement for the Shawnee Fossil Plant's Coal Combustion Residual Management, Shawnee's "Ash Impoundment 2 was constructed *without a liner* that complies with the CCR rule."[2] Further, "given that TVA constructed Ash Impoundment 1 before constructing Impoundment 2, one can assume that Ash Impoundment [1] was also constructed without a liner."[3] Sierra Club and partners explained at the time that TVA's plans did "not eliminate the ash's contact with groundwater" at Ash Impoundment 2, and its plan for closure-in-place did not "satisfy the closure performance standards for surface impoundments legally required by the CCR Rule."[4] The Project Area for Project Phoenix includes Ash Pond 2,5 the impoundment constructed without a CCR-compliant liner and at which ash has been in contact with groundwater. TVA's Project Phoenix analysis does not take into account	See response to comment 7 and comment 8.

		regulatory issues, or the distinct possibility that the Shawnee coal ash impoundments remain in contact with groundwater. It is foreseeable, and likely, that future coal ash remediation at Shawnee will necessitate physical actions relating to Ash Pond 2. Such actions would likely cause disruption to the solar facility and/or transmission interconnection infrastructure that TVA proposes to place on its CCR management site, including Ash Pond 2. But the draft environmental assessment does not evaluate whether anticipable future coal ash remediation would be likely to disrupt the installed facility and, if so, what that disruption would be and for how long it would last. Is groundwater at Ash Pond 2 still in physical contact with ash? Is it possible for TVA to engage in coal ash remediation while leaving the solar facility fully in place? Were coal ash remediation to require TVA to disrupt the solar facility in some way, how long would such a disruption likely last, and what would be the likely scope and cost? Would there be issues for the long-term viability of the site given the likelihood of needed further remediation of Ash Pond 2? The draft environmental assessment does not address any of these issues.	
11	Sierra Club	II. Full Consideration of All Aspects of the Problem and Potential Alternatives is Needed in a New Environmental Assessment, and Possibly in a Full Environmental Impact Statement. TVA has failed to conduct the required analysis of reasonable alternatives by failing to examine *any other sites* for its proposed solar project. Absent a meaningful analysis of the choice of siting location, and its potential implications, TVA has not shown that the project does not have the potential to cause significant environmental impacts. Nor has it examined the different implications posed by siting a solar facility in this location, rather than in a different one that might not pose complications related to future coal ash remediation efforts or ongoing groundwater contamination. TVA should fully analyze the issues associated with placement of Project	See response to comments 8 and 9.

		Phoenix on the Shawnee CCR site, including Ash Pond 2. Absent such analysis, and an additional opportunity for public comment, TVA should not move forward with Project Phoenix. The requirements of an environmental assessment have not been met. TVA has not considered significant "environmental issues that are of public concern." 40 C.F.R. § 6.205(d). It has not "include[d] discussion of" possible alternatives" and of "[t]he affected environment, including baseline conditions that may be impacted by the proposed action and alternatives." *Id.* § 6.205(e)(1)(ii)- (iii). Crucially, TVA has not analyzed the baseline condition of location on Shawnee's CCR management site, including Ash Pond 2, and associated complications for the solar facility. Nor has TVA contemplated evaluation of "compliance with applicable laws and executive orders"— namely the CCR regulations flowing from statute. *Id.* § 6.205(e)(2). All of these steps are necessary for an environmental assessment, and TVA did not engage in them. Further, in its new analysis, TVA should consider whether a full environmental impact statement is necessary. It is possible that the interplay of the proposed Project Phoenix solar facility and the existing coal ash site "[i]s likely to have significant effects and is therefore appropriate for an environmental impact statement." 40 C.F.R. § 1501.3(a)(3). Particularly if movement of the solar facility for coal ash remediation would be complex or have significant environmental ramifications, a full environmental impact statement is warranted. Sierra Club appreciates the opportunity to comment and would be happy to discuss further the Club's concerns and potential next steps in TVA's analysis, including alternative locations. Please do not hesitate to contact the undersigned regarding any of the above, or any other aspect of Project Phoenix and/or CCR management at Shawnee.	

Appendices

12	Amy Kelly	TVA administrators, you need to be more environmentally aware. Please do the correct thing by doing an environmental impact study before attempting to put solar panels over the Shawnee coal ash pit. Solar panels are a great idea but placing them over an unlined coal ash pit allows contamination of ground water---you know better. Do remediation to the coal ash pit, cap it and then do the solar panels. Thanks.	See response to comment 8.
13	Andrea Claxton	Please don't rotect our water and environment fro coal ash.	Thank you for your comment.
14	Anelisse Westmeyer	Please keep our fresh water clean and thriving! The state is already in a drought, and we all need clean and safe drinking water. What a disadvantage for everyone it would be if more groundwater were to become polluted. Keep Alabama beautiful!	Thank you for your comment.
15	Ann Cover	Please folks, let's do the right thing in properly restoring these ash deposits and protect all those who will need clean water now and in years to come!	Thank you for your comment.
16	Anna Safarik	Please take the time and courage to fully understand all the possible consequences of the project before proceeding.	Thank you for your comment.
17	Barbara Migliara	Please consider the effect on future generations of the actions you take today & in the future.	Thank you for your comment.
18	Barbara Wolff	We need to protect the earth and our waterways.	Thank you for your comment.
19	Billie Lynn Denzik	Stop polluting the air with coal, and start being environmentally friendly by using renewable energy resources the correct way.	Thank you for your comment.
20	Brenda Mercier	The southeast is a great provider of wonderful clean water. We do not need to jeopardize this amazing resource available to us. TVS needs to do everything necessary to assure that it stays not polluted from the ash and as an additional note not the fracking either. Please keep our water as clean as possible, it is so important for our future generations.	Thank you for your comment.

Appendices

21	Carol Plasil	We live near the Kingston coal ash disaster. Enough!! Protect all of us ...get to SMALL MIDULAR (NUCLEAR) REACTORS, FAST!!	Thank you for your comment.
22	Catherine Dixon	I am increasingly concerned that TVA take every precaution to safeguard our ground water there are far too many cautionary tales from other states that demonstrate what happens when proactive measures are not in place. I support the current proposed coal ash rule. The public has the right to full transparency. The only way to address past failures to protect communities is to demonstrate your commitment to the proper handling of toxins that can contaminate our water. Thank you for your consideration of these concerns.	See response to comment 8.
23	Chris Chapman	I love Solar, but do the right thing and clean up the coal ash CORRECTLY first!! Be the good guys! Lead us to the future, don't be the corporate Grinch who Greenwashes and cheats to save a buck! Don't poison our children and Grandchildren and leave them with a mess to clean up 50-100 years from now.	Thank you for your comment.
24	Chris Hinerman	It's TVA's responsibility to ensure that Any source of water isn't tainted with coal ash waste. Not only does it supply water for human consumption, but is also a source for wildlife to come to. I'd greatly appreciate TVA taking into consideration that All American's are looking for reliable & clean sources of water now & in the future, so please see to it that coal ash doesn't seep into them. Cleaning up the planet is the responsibility of everyone & Big Corporations are not exempt, so do your part. Thank you.	Thank you for your comment.
25	Cynthia Hintz	I applaud the conversion to renewable power that will add to climate change, but want a reputable appraisal of the coal ash site to ensure it will not endanger nearby communities.	See response to comment 8.
26	Cynthia Willett	Solar is a great addition and we are taught to clean up after ourselves, otherwise the mess festers and grows.	Thank you for your comment.

Appendices

27	Donald Keyser	I fear the secure containment of the coal ash while putting this site to admittedly good use	See response to comment 8.
28	Doris Cella	A recipient of TVA electricity, I appreciate your commitment to inexpensive electricity, but our health is more important than cheap power. Please do the right thing and clean up the dangerous coal ash pit before adding solar to the Shawnee site. Thank you.	See response to comment 8.
29	Douglas Hodnett	We must protect or rivers, lakes and wetlands.	Thank you for your comment.
30	Eric Swartz	Please protect pur natural resources. Clean water is necessary for life. The cancers associated with coal ash are a horrible way to die.	Thank you for your comment.
31	Gwen Eguiluz	Be Responsible! Provide a good positive example!	Thank you for your comment.
32	Ilyn Reyes	I have to worry about how my loved ones might contract a disease from an issue that could've been prevented. This needs to be stopped.	Thank you for your comment.
33	James Billings	WE HAVE TO DRINK THAT WATER	Thank you for your comment.
34	Jan Lapides	TVA was established with good intentions. It has since become a highly polluting government entity. Unfortunately, it is now so highly entrenched that it is not embracing solar forms of energy .	Thank you for your comment.
35	Jan Meiners	Why take risks of polluting so close to our natural resources? Our rivers, lakes, streams and yes our ground water are all valuable to all life, humans and wildlife.	Thank you for your comment.
36	Janet Braun	Thank you for including solar in this project, but also it is imperative that the project itself is safe and incorporates the necessary safeguards for those who drink the water and live on the land where coal ash can invade their lives and families health!	Thank you for your comment.

Appendices

37	Jason Smith	It seems you don't care about people in Tennessee	Thank you for your comment.
38	Jason Dmuchowski	We appreciate the investment in clean energy. As a proud TN resident this is reassuring. Please conduct a full review of the site to make sure the project lives up to modern day environmental standards	See response to comment 8.
39	Jean Zeller	Why NOT do this environmental review? Are you afraid you will have to do what they say?	See response to comment 8.
40	Jenna Williams	We need full environmental review	See response to comment 8.
41	Jeri Burgdorf	If you want your children to be able to breathe in their lives, you must not do this! It will be on you!	Thank you for your comment.
42	Jim Wohlgemuth	Do the right thing	Thank you for your comment.
43	Jodi Mcdaniel	Now, more than ever, it is imperative that TVA be guardians of the environment, resources, and communities as it moves toward sustainable energy development.	Thank you for your comment.
44	Joe Barton	Think of the future!! Please	Thank you for your comment.
45	John Ratay	Don't y'all have kids and grandkids and pets too?	Thank you for your comment.
46	John Michalik	Protect OUR water.	Thank you for your comment.
47	Judith Eckert	We need to ensure clean drinking water for future generations!!! Please take care of the environment like your life (and your children's lives) depends on it, because it does!!!!	Thank you for your comment.

Appendices

48	Julie Bledose	You know better! Clean up the coal ash. Stop polluting!	Thank you for your comment.
49	Kara Dulac	We can't all buy reverse-osmosis filters to ensure safe drinking water in our homes. The environment is finite, and we must stop despoiling it before we have nothing left to eat, drink, or breathe.	Thank you for your comment.
50	Kathleen O'Donohue	I am a Physician Assistant and Teacher. I care about your health, mine, and our children.	Thank you for your comment.
51	Kathy Koehler	PLEASE Let this matter to you as it does to all of us and to generations to come!	Thank you for your comment.
52	Kent Minault	Many friends who live near me experience serious health problems which they attribute to the presence of coal ash in the community. It's hard not to credit them when the coal ash is so haphazardly treated. We see fly ash blowing off near a playground and coal ash exposed under a swing set used by children. The stuff needs to be encapsulated - lined, capped, high and dry - and away from people.	See response to comment 8.
53	Kimberly Ferran	This issue is of grave importance to the communities, families, and future generations. The potential risk of groundwater contamination is too great and all aspects of this project should be considered to reduce that risk.	Thank you for your comment.
54	Laura Denison	It is wonderful that TVA is planning solar power collection but please don't ignore the urgency to make coal ash piles completely safe. We can move the green economy forward and also remediate the coal ash.	Thank you for your comment.
55	Lea Alexander	I'm grateful that TVA is investing in more solar, but please ensure that coal ash sites are contained. Our communities deserve clean water.	Thank you for your comment.
56	Lecil McGlocklin	STOP USING FOSSIL FUELS AND USE RENEWABLE ENERGY to PRODUCE ELECTRICITY , DO NOT RISK ENVIRONMENTAL DISASTERS.!!@!!	Thank you for your comment.
57	Linda Elswick	Make a difference - go. beyond what it takes to do it right and get a thorough review before proceeding.	See response to comment 8.

Appendices

58	Lisa Schaeffer	TVA needs to clean up it's act. So much contamination has happened over the years. It's time to do the right thing and clean up the mess of the past. TVA needs to be a good neighbor for the future. Now is the time to make a big impact on a clean, healthy future. We need TVA, but we also need to live in a safe, healthy, nontoxic environment.	Thank you for your comment.
59	Mary Lou Reed	Without safe, clean water all life, including humans, will die. Quit polluting our waters.	Thank you for your comment.
60	Maureen Steffek	All life needs clean water to live.	Thank you for your comment.
61	Maureen May	While applauding adding solar, placing in above a dirty Ash Pond may be a problem. Please assess and proceed with care. Thank you	Thank you for your comment.
62	Melody Conner	I don't want coal ash in my water!!!	Thank you for your comment.
63	Michelle Haverland	The redevelopment of cool ash sites must be undertaken carefully, and with great consideration of public safety. I demand a full environmental review, and a public hearing on the Phoenix project.	See response to comment 8.
64	Michelle Robinson	Unlined pits are disasters waiting to happen! Remediate the area properly, and protect hundreds or thousands of people from contaminated water. Water IS life!	See response to comment 8.
65	Mike Robinson	Control your coal ash and save our water ways.	Thank you for your comment.
66	Nancy Anne Bailey	Clean water is essential to all life. Keeping toxic materials out of water supplies should be a given.	Thank you for your comment.
67	Nicholas Orrick	Do we need another Kingston?	Thank you for your comment.

Appendices

68	Pamela Claybaker	Please do the most responsible thing in this instance.	Thank you for your comment.
69	Pamela Andrews	Safety for our water soil and air matter to all of us. Please not another coal ash environmental disaster !! Think of the future !	Thank you for your comment.
70	Pamela F. Cox	Would YOU want to drink water with Coal Ash in it?	Thank you for your comment.
71	Patricia Cataldi	The health and welfare of my fellow Kentuckians is important to me as a physician	Thank you for your comment.
72	Patrick Kriser	Stop coal ash pollution in are state and America too!!	Thank you for your comment.
73	Paul Klein	You must do an environmental review first, and allow for public input on this important decision! In Memphis your coal ash has already leeched arsenic into our drinking water aquifer. You must remediate and remove the coal ash before installing solar arrays on it.	See response to comment 8.
74	Peggy Maher	I fully concur with the following message.	Thank you for your comment.
75	Phil Huss	Keep our kids safe from toxins	Thank you for your comment.
76	Polly Partridge	Please protect the people who is served by TVA!	Thank you for your comment.
77	Rebecca Vance	Please, STOP POISONING our water, SOME of Us like it here.	Thank you for your comment.
78	Rita Tinsley	Don’t keep trying to kill us with toxins, please	Thank you for your comment.
79	Robbie Manuais	Environmental rights are human rights, especially because they have a major impact on our health.	Thank you for your comment.

Appendices

80	Russell Vance	I am glad to see that the TVA is not only finding a way to make use of land they killed but that it is renewable . The problem I see is that you are starting with an uncontained ash site. Please make sure you don't destroy your good work by not taking the necessary precautions!	See response to comment 8.
81	Sara Fineman	Solar project is excellent idea. BUT you must deal with the unlined coal ash ponds. We expect that this generation take care of potential and actual groundwater contamination now, not in the future.	See response to comment 8.
82	Seth Haynes	Please remember clean up is extremely expensive and recovery is not guaranteed once our resources are destroyed. Preserve the nature that sustains all of us. Protect yourselves and fellow citizens from short sighted decisions based on convenience or cost.	Thank you for your comment.
83	Shelly Bryant	I am asking you to do the right thing and protect our aquifers and water ways. Do not dump toxic Coal ash in or jar any water source. To do so would cause irreparable harm to people, wildlife and fragile water sources.	Thank you for your comment.
84	Sonja Hunter	Coal ash is toxic waste. You must protect Tennesseans from coal ash leaching toxins into our drinking water!!!	Thank you for your comment.
85	Sylvia Lupton	No more coal ash disasters	Thank you for your comment.
86	Terri Multz	I applauded the efforts that are being made to incorporate clean energy in areas that once produced toxic byproducts. It great to hear. I ask that you take every precaution available for a safe transition while accomplishing your goals. Thank you	Thank you for your comment.
87	Timothy Berarducci	Remember what happened in Kingston TN	Thank you for your comment.
88	Tommy Stewart	I live downstream. Our drinking water is taken from that stream. I do not want to drink your poison!	Thank you for your comment.

Appendices

89	Victoria Touati	Allowing toxic coal ash to sit in a floodplain poses a serious risk to everyone. Please abide by the 2015 Coal Ash Rule & the currently proposed coal ash rule by removing this hazard from contaminating our groundwater.	See response to comment 8.
90	Winifred Silvers	TVA has already done way too much damage with their cavalier "storage" of coal ash. The residents of Kingston, TN, and surrounding area can certainly attest to that fact. Please do the necessary and critical assessments before proceeding with the Phoenix solar farm.	See response to comment 8.

Appendices

[redacted]

Wufoo <no-reply@wufoo.com>
To nepa

Reply | Reply All | Forward
Tue 10/10/2023 2:56 PM

Click here to download pictures. To help protect your privacy, Outlook prevented automatic download of some pictures in this message.

This is an EXTERNAL EMAIL from outside TVA. THINK BEFORE you CLICK links or OPEN attachments. If suspicious, please click the "Report Phishing" button located on the Outlook Toolbar at the top of your screen.

Name	Michael Lowry
City	Chattanooga
State	TN
Email	[redacted]
Phone Number	[redacted]
Please provide your comments by uploading a file or by entering them below. *	I support TVA's initiative to convert the Shawnee site into a solar farm. TVA needs to be come a leader in sustainable energy production and this is a step in the right direction.

Shawnee Project Phoenix EA

AD [redacted]
To nepa

Reply | Reply All | Forward
Sun 10/15/2023 1:00 PM

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This is an EXTERNAL EMAIL from outside TVA. THINK BEFORE you CLICK links or OPEN attachments. If suspicious, please click the "Report Phishing" button located on the Outlook Toolbar at the top of your screen.

An interest that was not addressed in the NEPA documentation was the durability of the solar panels. What is the anticipated working life of the solar panels that are proposed for the Shawnee Project Phoenix?

Kenneth Davis

Sent from Mail for Windows

Appendices

Shawnee Project Phoenix EA

JJ [redacted]
To nepa

Reply | Reply All | Forward
Wed 11/1/2023 4:06 PM

You don't often get email from [redacted] Learn why this is important

This is an EXTERNAL EMAIL from outside TVA. THINK BEFORE you CLICK links or OPEN attachments. If suspicious, please click the "Report Phishing" button located on the Outlook Toolbar at the top of your screen.

Dear Mr. Shock,

I believe it is incumbent upon the TVA to bring modern renewable power to the Shawnee Steam Plant in Paducah. It has become clear, by reading recent literature from my local power company, that local leaders of Jackson Purchase Electric have no plans to use renewable power. Numerous companies have tried to build Solar Farms in McCracken County only to be squelched by layers of "Grid Management" stacked against them.

I hope TVA will approve the Project Phoenix Solar Field as soon as possible to bring Western Kentucky and our power grid into the 21st century.

Sincerely,

Jimmie Johnson
[redacted]

Proposed RE project@shawnee FP

RJ Robert Johnson [redacted]
To nepa

Reply | Reply All | Forward
Fri 11/3/2023 5:57 PM

[You don't often get email from [redacted] Learn why this is important at https://aka.ms/LearnAboutSenderIdentification]

This is an EXTERNAL EMAIL from outside TVA. THINK BEFORE you CLICK links or OPEN attachments. If suspicious, please click the "Report Phishing" button located on the Outlook Toolbar at the top of your screen.

Where is the money coming from to finance this boondoggle? From the ratepayer? From the employees? From the retirees? Or maybe from China, where all the materials come from? You need to read the newspaper article from https://gcc02.safelinks.protection.outlook.com/?url=http%3A%2F%2Fwww.ky-news.com%2F&data=05%7C01%7Cnepa%40tva.gov%7C4fe24ec03c594415ce4608dbdcb7c28d%7C270992cd9003497184ded1640c0bffc5%7C0%7C0%7C638346454019432429%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=oV4KrvegS6xOGPwSezMu1COGyJK4x4c3MXZwU1veuYg%3D&reserved=0, west Ky B J dated Oct. 2023, written by D. McCowan Refer to Rick Honaker, professor at UK! He makes sense and has very strong points! Green Deal is a fraud to us the public!

Sent from my iPhone

Shawnee Project Phoenix EA

DH diana hook [redacted]
To nepa

Reply | Reply All | Forward
Sun 11/5/2023 5:16 PM

You don't often get email from [redacted] Learn why this is important

This is an EXTERNAL EMAIL from outside TVA. THINK BEFORE you CLICK links or OPEN attachments. If suspicious, please click the "Report Phishing" button located on the Outlook Toolbar at the top of your screen.

In response to your request for public input to the proposed renewable energy project, let us assure you we understand the concern for "greener" energy. Our concern is our rich farmland. Solar panels and wind mills take up too many acres of rich farmland that cannot be replaced. Our Good Lord is not making any more land! We need to conserve all the land we can. Our Jackson Purchase ECC has suggested and we agree that right now the best way to have dependable energy is still with fossil fuels. Solar panels and wind mills are in the future. Right now we want to protect our farmland for our future generations.

Appendices

SACE comments on SHAWNEE FOSSIL PLANT PROJECT PHOENIX ENVIRONMENTAL ASSESSMENT

BJ Bryan Jacob [redacted]
To Schock, Neil Thomas

Reply | Reply All | Forward

Mon 11/6/2023 9:17 AM

TVA NEPA comments on Project Phoenix draft EA.pdf
236 KB

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This is an EXTERNAL EMAIL from outside TVA. THINK BEFORE you CLICK links or OPEN attachments. If suspicious, please click the "Report Phishing" button located on the Outlook Toolbar at the top of your screen.

Dear Mr. Schock,

Attached, please find SACE comments on the SHAWNEE FOSSIL PLANT PROJECT PHOENIX ENVIRONMENTAL ASSESSMENT. (Also submitted via online portal.)

Best regards,
Bryan Jacob
Southern Alliance for Clean Energy

--

Appendices

cleanenergy.org
Southern Alliance for Clean Energy

November 6, 2023

Neil Schock
NEPA Compliance
400 West Summit Hill Drive, WT 11B-K
Knoxville, TN 37902

Re: SACE comments on SHAWNEE FOSSIL PLANT PROJECT PHOENIX ENVIRONMENTAL ASSESSMENT

Dear Mr. Schock:

The Southern Alliance for Clean Energy (SACE) appreciates the opportunity to comment on the draft Environmental Assessment for the proposed "Project Phoenix" solar installation at the Shawnee Fossil Plant near Paducah, Kentucky. Both solar and battery storage are key resources in the reliable, cost-effective, and carbon-free grid we are already building across the globe. It is important that TVA do everything it can to accelerate the additions of solar and battery storage to its resource mix. Project Phoenix has the opportunity to consolidate new clean energy resources onto existing TVA properties, using/re-using existing transmission infrastructure and, thereby, reducing the need for solar development on greenfield sites.

The Coal Combustion Residual (CCR, "coal ash") landfill at Shawnee is presently being closed-in-place with a patented, ClosureTurf® system. Project Phoenix will install a companion PowerCap® system on approximately 186 acres of the 309 acre CCR landfill site. The solar PV (photovoltaic) capacity will be approximately 100 MW. There is also potential for this pilot project to integrate a Battery Energy Storage System (BESS) on approximately 13 acres. SACE understands that a successful 100 MW pilot at the Shawnee Fossil Plant could lead to expansion exceeding 1,000 MW of solar at similar CCR sites throughout the TVA region.

Until now, TVA has relied primarily on third-party Power Purchase Agreements (PPAs) for solar commissioned in the Tennessee Valley. Enactment of the Inflation Reduction Act (IRA) has created new opportunities for TVA to expand its portfolio of directly owned solar assets, including Project Phoenix. Most notably, tax-exempt utilities like TVA can now take advantage of the "elective pay" option for the Investment Tax Credit (ITC) and/or Production Tax Credit (PTC) to receive a direct payment from the Federal government for value that was previously only available to tax paying entities.

Project Phoenix can also benefit from another element from the Inflation Reduction Act. Because the pilot project and subsequent installations will be co-located with existing or former coal-fired power plants, they should be eligible for a 10 percent bonus credit created through the IRA for projects in "energy communities." Installing solar atop landfills has traditionally been more expensive than developing solar on greenfield sites. This bonus credit makes landfill solar projects more cost-competitive.

Appendices

Other cost considerations for solar development include transmission interconnection and network upgrades. In its review of replacement options for the Cumberland coal plant, TVA cited transmission as a key barrier to getting solar and storage on its grid in a timely manner. Because the Project Phoenix pilot is located adjacent to the Shawnee Fossil Plant, existing transmission infrastructure can be utilized for the interconnection. One generating unit at the Shawnee Fossil Plant has already been retired and SACE understands that the entire plant operates at much lower capacity that originally designed, so existing transmission has sufficient bandwidth to interconnect the Project Phoenix pilot without additional upgrade expense.

A TVA representative shared some details about Project Phoenix at the recent Tennessee Valley Solar Conference (Oct/18-19). Many in the audience were genuinely surprised by the solar density this pilot will achieve. Traditional utility-scale solar projects typically require between 5 to 10 acres per megawatt (MW). As indicated above, Project Phoenix will result in 100 MW on 186 acres (1.86 acres per MW). This appears to be a combination of site preparation (TVA contoured the landfill with suitable slopes) plus the way the PowerCap® technology adheres to the surface with minimal racking.

Another key consideration is land use change. University of Tennessee researchers released a report[1] earlier this year quantifying the potential land use impacts of TVA's target to deploy 10 gigawatts (10,000 MW) of solar by 2035 – concluding that it could require "0.53 to 0.96% of Tennessee farmland if exclusively placed on farmland" and all within the state of Tennessee. While there are many other, and more significant drivers of land use change (e.g., housing development), this land use issue deserves attention. Every MW of solar installed on landfills or other brownfield sites represents a MW of solar that does not need to be sited onto greenfield property. Roughly 10 percent of TVA's solar ambition could be sited onto CCR landfills across the Tennessee Valley.

The draft Environmental Assessment does not seem to reveal any substantive increase to the risk profile of the CCR site closure itself through the addition of solar PowerCap®. For all these reasons, SACE supports the proposed Project Phoenix solar pilot at the Shawnee Fossil Plant site.[2]

We appreciate that TVA is taking this step to explore options for adding solar and batteries to its resource mix. We look forward to gauging how Project Phoenix and other clean energy opportunities can be accelerated across the Tennessee Valley through the Integrated Resource Planning process that is presently underway.

[1] https://tenneseiasolar.com/wp-content/uploads/2023/07/Solar-Industry-Report.2023_FINAL.pdf

[2] SACE support for the Project Phoenix solar installation should not be misconstrued to reverse, override or vacate prior comments regarding the CCR closure approach itself. Our examination of the present proposal focused exclusively on whether or not we find it appropriate to add solar as the landfill closure is completed.

Appendices

Mr. Neil Schock
Page 3
November 6, 2023

Sincerely,

Bryan Jacob
Solar Program Director
Southern Alliance for Clean Energy

Appendices

November 6, 2023

Neil Schock
NEPA Compliance
ntschock@tva.gov
400 West Summit Hill Drive, WT 11B-K
Knoxville, TN 37902

Re: Sierra Club Comments on TVA's "Project Phoenix" Draft Environmental Assessment

Via Electronic Mail

Dear Mr. Schock:

The Sierra Club respectfully submits these comments regarding the Tennessee Valley Authority's ("TVA") draft environmental assessment for a proposed solar generation facility located atop an existing coal ash site at TVA's Shawnee Fossil Plant (TVA's "Project Phoenix"). The Sierra Club has more than 5,500 Kentucky members, many of whom reside near the Shawnee Fossil Plant ("Shawnee") and experience the adverse effects of Shawnee's pollution.

Sierra Club supports the general goal of repurposing brownfield sites for renewable energy generation. Sierra Club likewise supports repurposing existing fossil transmission infrastructure for renewables. However, the Club is concerned that TVA has failed to adequately examine the implications of constructing extensive generation resources atop a coal ash impoundment. Particularly since TVA elected to "close in place" its Shawnee coal ash impoundments, adding further infrastructure atop that cap could complicate or render extremely difficult subsequent coal ash remediation in compliance with federal requirements in the event that, for example, Shawnee's coal ash is improperly in contact with groundwater—as Sierra Club noted in prior comments on TVA's closure-in-place NEPA process.

Information from that coal combustion residual ("CCR") environmental impact statement analysis at Shawnee indicates that existing CCR at Shawnee is currently not in compliance with federal CCR regulations, 40 C.F.R. Part 257, Subpart D—as discussed in more detail below. Especially in light of this apparent noncompliance, siting solar panels there requires a full analysis of the interplay between the proposed solar facility and the existing coal ash site, including the effect of Project Phoenix on any subsequent coal ash remediation efforts. This analysis may require a full environmental impact statement ("EIS"). In the absence of analysis of the effects of siting Project Phoenix on existing CCR at Shawnee, put forward for new comment by all stakeholders, TVA should not move forward with the project.

Appendices

I. TVA's Environmental Assessment Is Deficient Because It Fails to Evaluate the Implications of Solar Siting on a Coal Ash Impoundment that May Require Further Remediation.

The federal National Environmental Policy Act ("NEPA") mandates a set of action-forcing procedures that require all federal agencies to take a hard look at the environmental consequences of their proposed actions and disclose the relevant information to the public. Although NEPA's requirements are procedural, "these procedures are almost certain to affect the agency's substantive decision." *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350 (1989). As such, NEPA and its implementing regulations require federal agencies to provide a detailed statement on proposals for major federal actions significantly affecting the quality of the human environment. 42 U.S.C. § 4332(C); 40 C.F.R. § 1500.1(a).

TVA's Project Phoenix draft environmental assessment is deficient, as it fails to take into account the impact of siting the new solar project on coal ash impoundment or to evaluate an obvious available alternative: siting the project in a commensurate location that is *not* a coal ash storage location. An environmental assessment requires a consideration of "any environmental issues that are of public concern." 40 C.F.R. § 6.205(d). It "must include . . . discussion of" possible "alternatives" and of "[t]he affected environment, including baseline conditions that may be impacted by the proposed action and alternatives." *Id.* § 6.205(e)(1)(ii)-(iii). The environmental assessment analysis also contemplates evaluation of "compliance with applicable laws and executive orders." *Id.* § 6.205(e)(2).

Here, TVA has not demonstrated in the draft environmental assessment that its CCR management at Shawnee, on the same land where proposed solar generation is contemplated, is consistent with federal regulatory requirements. Nor has it evaluated the pro and cons of siting the proposed solar generation on the coal ash storage area rather than in another location. The core problem is that TVA's analysis focuses on the effects of Project Phoenix on the environment, not the effects of risk associated with the existing CCR on Project Phoenix and, ultimately, the environment. For example, TVA discusses the effects of the project on groundwater in a total of five sentences, concluding that "no impacts to groundwater are anticipated."[1] But TVA does not analyze:

> (1) Whether the existing CCR where it wishes to build Project Phoenix has effects on groundwater;
> (2) If so, whether the existing CCR's effects on groundwater are currently not in compliance or pose a risk for compliance with existing or reasonably likely federal CCR regulation, or otherwise are significantly environmentally problematic; and
> (3) If so, whether bringing the existing CCR into compliance with existing or reasonably likely regulation, or otherwise dealing with environmental problems related to the existing CCR, will affect the anticipated timeline, cost, and/or practical feasibility of Project Phoenix.

[1] TVA, Project Phoenix Draft Environmental Assessment at 26.

Appendices

In other words, TVA is essentially currently evaluating only half of the proposed project—the effects of new solar panels. It is not evaluating the effects of choosing to site those panels *on an impoundment*, and the potential effects that may have on further coal ash remediation. Federal regulation requires more. TVA must, consistent with § 6.205, evaluate this option as compared to the placement of the solar panels at a different location, not on top of Shawnee CCR storage—and not just evaluate placing the solar panels here as compared to the option of no solar panels whatsoever. The placement of the solar panels in a different location is an obvious, reasonable alternative. Yet TVA has not provided any hint of looking into such an alternative, or explained why a brownfield would be preferable to a different area. *Compare City of Crossgate v. U.S. Dep't of Veterans Affairs*, 526 F. Supp. 3d 239, 260 (W.D. Ky. 2021) (holding that a federal agency had evaluated reasonable alternatives for purposes of environmental analysis where the agency "took reasonable alternatives into account" by looking at five possibilities and "explain[ing] its reasons for preferring undeveloped 'greenfield' sites"). Indeed, the Shawnee site has significant acreage that is not a location for CCR storage.

As Sierra Club's technical expert Mark Quarles noted in July 2017, in technical comments provided to TVA regarding TVA's June 2017 Draft Environmental Impact Statement for the Shawnee Fossil Plant's Coal Combustion Residual Management, Shawnee's "Ash Impoundment 2 was constructed *without a liner* that complies with the CCR rule."[2] Further, "given that TVA constructed Ash Impoundment 1 before constructing Impoundment 2, one can assume that Ash Impoundment 1 was also constructed without a liner."[3] Sierra Club and partners explained at the time that TVA's plans did "not eliminate the ash's contact with groundwater" at Ash Impoundment 2, and its plan for closure-in-place did not "satisfy the closure performance standards for surface impoundments legally required by the CCR Rule."[4]

The Project Area for Project Phoenix includes Ash Pond 2,[5] the impoundment constructed without a CCR-compliant liner and at which ash has been in contact with groundwater. TVA's Project Phoenix analysis does not take into account regulatory issues, or the distinct possibility that the Shawnee coal ash impoundments remain in contact with groundwater. It is foreseeable, and likely, that future coal ash remediation at Shawnee will necessitate physical actions relating to Ash Pond 2. Such actions would likely cause disruption to the solar facility and/or transmission interconnection infrastructure that TVA proposes to place on its CCR management site, including Ash Pond 2. But the draft environmental assessment does not evaluate whether anticipable future coal ash remediation would be likely to disrupt the installed

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[2] Mark Quarles, Technical Comments Regarding the Draft Environmental Impact Statement (v. June 2017), Tennessee Valley Authority's Shawnee Fossil Plant Coal Combustion Residual Management (July 2017) at 6. Sierra Club's and partners' Comments on TVA's June 2017 Draft Environmental Impact Statement for the Shawnee Fossil Plant's Coal Combustion Residual Management, including Mr. Quarles' technical comments, are attached as Exhibit A. Sierra Club's comments today are limited to the Project Phoenix draft environmental assessment and are not comments on the entirety of CCR management at Shawnee.

[3] *Id.*

[4] Sierra Club et al., Comments on TVA's June 2017 Draft Environmental Impact Statement for the Shawnee Fossil Plant's Coal Combustion Residual Management at 2.

[5] TVA, Project Phoenix Draft Environmental Assessment at 3.

Appendices

facility and, if so, what that disruption would be and for how long it would last. Is groundwater at Ash Pond 2 still in physical contact with ash? Is it possible for TVA to engage in coal ash remediation while leaving the solar facility fully in place? Were coal ash remediation to require TVA to disrupt the solar facility in some way, how long would such a disruption likely last, and what would be the likely scope and cost? Would there be issues for the long-term viability of the site given the likelihood of needed further remediation of Ash Pond 2? The draft environmental assessment does not address any of these issues.

II. Full Consideration of All Aspects of the Problem and Potential Alternatives is Needed in a New Environmental Assessment, and Possibly in a Full Environmental Impact Statement.

TVA has failed to conduct the required analysis of reasonable alternatives by failing to examine *any other sites* for its proposed solar project. Absent a meaningful analysis of the choice of siting location, and its potential implications, TVA has not shown that the project does not have the potential to cause significant environmental impacts. Nor has it examined the different implications posed by siting a solar facility in this location, rather than in a different one that might not pose complications related to future coal ash remediation efforts or ongoing groundwater contamination.

TVA should fully analyze the issues associated with placement of Project Phoenix on the Shawnee CCR site, including Ash Pond 2. Absent such analysis, and an additional opportunity for public comment, TVA should not move forward with Project Phoenix. The requirements of an environmental assessment have not been met. TVA has not considered significant "environmental issues that are of public concern." 40 C.F.R. § 6.205(d). It has not "include[d] . . . discussion of" possible alternatives" and of "[t]he affected environment, including baseline conditions that may be impacted by the proposed action and alternatives." *Id.* § 6.205(e)(1)(ii)-(iii). Crucially, TVA has not analyzed the baseline condition of location on Shawnee's CCR management site, including Ash Pond 2, and associated complications for the solar facility. Nor has TVA contemplated evaluation of "compliance with applicable laws and executive orders"—namely the CCR regulations flowing from statute. *Id.* § 6.205(e)(2).

All of these steps are necessary for an environmental assessment, and TVA did not engage in them. Further, in its new analysis, TVA should consider whether a full environmental impact statement is necessary. It is possible that the interplay of the proposed Project Phoenix solar facility and the existing coal ash site "[i]s likely to have significant effects and is therefore appropriate for an environmental impact statement." 40 C.F.R. § 1501.3(a)(3). Particularly if movement of the solar facility for coal ash remediation would be complex or have significant environmental ramifications, a full environmental impact statement is warranted.

Sierra Club appreciates the opportunity to comment and would be happy to discuss further the Club's concerns and potential next steps in TVA's analysis, including alternative locations. Please do not hesitate to contact the undersigned regarding any of the above, or any other aspect of Project Phoenix and/or CCR management at Shawnee.

Appendices

Sincerely,

/s/ *Kathryn Huddleston*
Kathryn Huddleston
Sierra Club Environmental Law Program
6406 N I-35 Frontage Rd.
Austin, TX 78752
[redacted]
[redacted]

5

Appendices

SIERRA CLUB

November 6, 2023

The Sierra Club submits the following 243 digital signatures on the behalf of our members and supporters with the following petition language and personalized messages:

I write to you today in response to the environmental assessment TVA is currently conducting on the proposed solar capping of TVA's Shawnee Ash Pond 2. While we appreciate the consideration of integrating large-scale solar as a component of this project in order to create beneficial re-use of a brownfield site, this should not be a substitute for proper handling, monitoring and remediation of the coal ash on this site.

I support the 2015 coal ash rule and the current proposed coal ash rule. Allowing toxic coal ash to remain in a floodplain creates an unreasonable and unacceptable risk to our groundwater and surface waters. And TVA's past history with the mishandling of coal ash demands that the community should have the opportunity to provide comments in a public hearing. Furthermore, TVA needs to conduct a full environmental impact statement, particularly in light of the fact that this will be considered a "demonstration" site. TVA's previous mishandling of coal ash led to the largest industrial spill in US history harming rivers, public drinking water, demolishing homes, and leading to deaths of workers. Due to this questionable history, higher level of public scrutiny and documentation is required.

TVA has the opportunity to rectify its poor history with the handling of coal ash and its impact on our communities. Don't disregard the residents of these impacted communities by ignoring our comments. You owe it to the residents of the Tennessee Valley and to Kentucky.

Thank you for carefully considering my comment.

Appendices

1. **AB Miller**,
   Knoxville, TN,
   37918

2. **Alan Hall**,
   Brentwood, TN,
   37027

3. **Albert Lewis**,
   Kingston, TN,
   37763

4. **Allison Stillman**,
   Nashville, TN,
   37211

5. **Amanda Hawkins**,
   Bartlett, TN,
   38133

6. **Amy Kelly**,
   Murray, KY,
   37917
   TVA administrators, you need to be more environmentally aware. Please do the correct thing by doing an environmental impact study before attempting to put solar panels over the Shawnee coal ash pit. Solar panels are a great idea but placing them over an unlined coal ash pit allows contamination of ground water---you know better. Do remediation to the coal ash pit, cap it and then do the solar panels. Thanks.

7. **Amy Hoskins**,
   Nashville, TN,
   37210

8. **Andrea Claxton**,
   Seymour, TN,
   37865
   Please don't rotect our water and environment fro coal ash.

9. **Anelisse Westmeyer**,
   Madison, AL,
   35756
   Please keep our fresh water clean and thriving! The state is already in a drought, and we all need clean and safe drinking water. What a disadvantage for everyone it would be if more groundwater were to become polluted. Keep Alabama beautiful!

10. **Ann Cover**,
    Nashville, TN,
    37212
    Please folks, let's do the right thing in properly restoring these ash deposits and protect all those who will need clean water now and in years to come!

11. **Anna Safarik**,
    Memphis, TN,
    38119
    Please take the time and courage to fully understand all the possible consequences of the project before proceeding.

12. **Anne Autry**,
    Villa Hills, KY,
    41017

13. **Anne Hill**,
    Brentwood, TN,
    37027

14. **Annetta Smith**,
    Memphis, TN,
    38119

15. **Barbara Migliara**,
    Memphis, TN,

Appendices

38117
Please consider the effect on future generations of the actions you take today & in the future.

16. **Barbara Wolff**,
Telford, TN,
37690
We need to protect the earth and our waterways.

17. **Belinda Hedge**,
Lenoir City, TN,
37771

18. **Belinda Sellari**,
Brownsville, TN,
38012

19. **Bettina Bowers**,
Nashville, TN,
37216

20. **Billie Lynn Denzik**,
Louisville, KY,
40214
Stop polluting the air with coal, and start being environmentally friendly by using renewable energy resources the correct way.

21. **Bo Townsend**,
Knoxville, TN,
37919

22. **Bobbi Morgan**,
Memphis, TN,
38105

23. **Bonita Kimbrell**,
Columbia, TN,
38401

24. **Bonnie Swinford**,
Knoxville, TN,
37917

25. **Bowers Bettina**,
Nashville, TN,
37216

26. **Brenda Mercier**,
Ashland City, TN,
37015
The southeast is a great provider of wonderful clean water. We do not need to jeopardize this amazing resource available to us. TVS needs to do everything necessary to assure that it stays not polluted from the ash and as an additional note not the fracking either. Please keep our water as clean as possible, it is so important for our future generations.

27. **Brian Doherty**,
Antioch, TN,
37013

28. **Bronda Watson**,
Hillsboro, TN,
37342

29. **C Rivas**,
Hermitage, TN,
37076

30. **C. Cook**,
Lexington, KY,
40511

31. **C. Allen**,
Franklin, KY,
42134

32. **Caleb Haynes**,
Nashville, TN,
37210

Appendices

33. **Carla Holder**,
Harvest, AL,
35749
Why invest in a dirty, unsafe location?

34. **Carol Plasil**,
Oak Ridge, TN,
37830
We live near the Kingston coal ash disaster. Enough!! Protect all of us ...get to SMALL MIDULAR (NUCLEAR) REACTORS, FAST!!

35. **Carol Mackey**,
Gainesboro, TN,
38562

36. **Catherine Dixon**,
Memphis, TN,
38112
I am increasingly concerned that TVA take every precaution to safeguard our ground water there are far too many cautionary tales from other states that demonstrate what happens when proactive measures are not in place. I support the current proposed coal ash rule. The public has the right to full transparency. The only way to address past failures to protect communities is to demonstrate your commitment to the proper handling of toxins that can contaminate our water.

Thank you for your consideration of these concerns.

37. **Catherine Gonzales**,
Cleveland, TN,
37323

38. **Cathy Root**,
Knoxville, TN,
37902

39. **Charles & Dinah Crow**,
Cumberland City, TN,
37050

40. **Charlotte Wuichet**,
Amory, MS,
38821

41. **Chellie Bowman**,
Memphis, TN,
38104

42. **Cherie Martinez**,
Chattanooga, TN,
37405
It's time to finally take care of this.

43. **Cheryl Beckley**,
Bowling Green, KY,
42104
Think of the people who will be affected by this decision.

44. **Cheryl Schinski**,
Beech Creek, KY,
42321

45. **Chris Chapman**,
Murray, KY,
42071
I love Solar, but do the right thing and clean up the coal ash CORRECTLY first!! Be the good guys! Lead us to the future, don't be the corporate Grinch who Greenwashes and cheats to save a buck! Don't poison our children and Grandchildren and leave them with a mess to clean up 50-100 years from now.

46. **Chris Hinerman**,
Cornersville, TN,

Appendices

37047
It's TVA's responsibility to ensure that Any source of water isn't tainted with coal ash waste. Not only does it supply water for human consumption, but is also a source for wildlife to come to. I'd greatly appreciate TVA taking into consideration that All American's are looking for reliable & clean sources of water now & in the future, so please see to it that coal ash doesn't seep into them. Cleaning up the planet is the responsibility of everyone & Big Corporations are not exempt, so do your part. Thank you.

47. **Chris Dacus**,
Bell Buckle, TN,
37020

48. **Chris and Miranda O'Shields**,
Fort Payne, AL,
35967

49. **Christine Cespedes**,
Millington, TN,
38053

50. **Chuck Pfaff**,
Nashville, TN,
37214

51. **Cindy Hatcher**,
Bumpus Mills, TN,
37028

52. **Cliff Hoy**,
Jonesborough, TN,
37659

53. **Coleman Harwell**,
Nashville, TN,
37215

54. **Corry Paul**,
Nashville, TN,
37206

55. **Craig Drew**,
Chattanooga, TN,
37421

56. **Curtis Tomlin**,
Chattanooga, TN,
37421
CLEAN UP YOUR MESSES NOW!

57. **Cynthia Hintz**,
Johnson city, TN,
37604
I applaud the conversion to renewable power that will add to climate change, but want a reputable appraisal of the coal ash site to ensure it will not endanger nearby communities.

58. **Cynthia Willett**,
Smyrna, TN,
37167
Solar is a great addition and we are taught to clean up after ourselves, otherwise the mess festers and grows.

59. **Cynthia Carlton**,
Greenbrier, TN,
37073

60. **Dallas pulver**,
Lynnville, TN,
38472

61. **Dan Fernandez**,
Madison, TN,
37115

62. **David Runge**,
Louisville, KY,
40205

Appendices

63. **David Lindsey**,
Beaver Dam, KY,
42320

64. **Debra Kaufman**,
Iuka, MS,
38852

65. **Diane Paolazzi**,
Louisville, KY,
40218

66. **Dixie Stevens**,
Park Hills, KY,
41011

67. **Don Owen**,
Murfreesboro, TN,
37128

68. **Donald Keyser**,
Johnson City, TN,
37604
I fear the secure containment of the coal ash while putting this site to admittedly good use

69. **Doris Cella**,
Murray, KY,
42071
A recipient of TVA electricity, I appreciate your commitment to inexpensive electricity, but our health is more important than cheap power. Please do the right thing and clean up the dangerous coal ash pit before adding solar to the Shawnee site. Thank you.

70. **Doug Franklin**,
Waynesville, NC,
28786

71. **Douglas Hodnett**,
Florence, KY,
41042
We must protect or rivers, lakes and wetlands.

72. **Elaine Schermer**,
Nicholasville, KY,
40356

73. **Elise Jardine**,
Lebanon, TN,
37090

74. **Elizabeth Green**,
Pigeon Forge, TN,
37863

75. **Elyssa Looney**,
Maryville, TN,
37803

76. **Emilie Fauchet**,
Brentwood, TN,
37027

77. **Emily Boone**,
Louisville, KY,
40206

78. **Emily Cathcart**,
Nashville, TN,
37219

79. **Eric Swartz**,
Memphis, TN,
38112
Please protect pur natural resources. Clean water is necessary for life. The cancers associated with coal ash are a horrible way to die.

80. **Eric Robinson**,
Memphis, TN,

Appendices

38104

81. **Fran Armsttong**,
Crossville, TN,
38558
Clean water is life.

82. **Gayle Simon**,
Waynesville, NC,
28786

83. **Gene Hoke**,
Winchester, TN,
37398

84. **Gerald Gonyea**,
Greenbrier, TN,
37073

85. **Gina Turner**,
Memphis, TN,
38117

86. **Gwen Eguiluz**,
Knoxville, TN,
37934
Be Responsible! Provide a good positive example!

87. **Harold Burrows**,
Williston, TN,
38076

88. **Heather Doncaster**,
Knoxville, TN,
37932

89. **Heidemarie Weidner**,
Cookeville, TN,
38506

90. **Hiasaura Rubenstein**,
Nashville, TN,
37205

91. **Hiedi Tan**,
Knoxville, TN,
37934

92. **Hiediliza Tan**,
Knoxville, TN,
37934

93. **Ilyn Reyes**,
Memphis, TN,
38115
I have to worry about how my loved ones might contract a disease from an issue that could've been prevented. This needs to be stopped.

94. **Jack Mckinney**,
Lexington, KY,
40510

95. **James Billings**,
Oak Ridge, TN,
37830
WE HAVE TO DRINK THAT WATER

96. **James Fischer**,
East Ridge, TN,
37422

97. **Jan Lapides**,
Gatlinburg, TN,
37738
TVA was established with good intentions. It has since become a highly polluting government entity. Unfortunately, it is now so highly entrenched that it is not embracing solar forms of energy .

98. **Jan Meiners**,
union, KY,
41091

Appendices

Why take risks of polluting so close to our natural resources? Our rivers, lakes, streams and yes our ground water are all valuable to all life, humans and wildlife.

99. **janet Braun**,
Lexington, KY,
40503
Thank you for including solar in this project, but also it is imperative that the project itself is safe and incorporates the necessary safeguards for those who drink the water and live on the land where coal ash can invade their lives and families health!

100. **Janet Falcone**,
Louisville, KY,
40207

101. **Jason Smith**,
Knoxville, TN,
37921
It seems you don't care about people in Tennessee

102. **Jason Dmuchowski**,
Gallatin, TN,
37066
We appreciate the investment in clean energy. As a proud TN resident this is reassuring. Please conduct a full review of the site to make sure the project lives up to modern day environmental standards

103. **Jean Zeller**,
Harrison, TN,
37341
Why NOT do this environmental review? Are you afraid you will have to do what they say?

104. **Jenna Williams**,
Powell, TN,
37849
We need full environmental review

105. **Jeri Burgdorf**,
Nashville, TN,
37211
If you want your children to be able to breathe in their lives, you must not do this! It will be on you!

106. **Jessica Claudio**,
Hixson, TN,
37343

107. **Jim Wohlgemuth**,
Nashville, TN,
37221
Do the right thing

108. **JIMMY STEPHENS**,
Winchester, TN,
37398

109. **Jo Tilley Dortch**,
Paducah, KY,
42001

110. **JoAnn McIntosh**,
Clarksville, TN,
37043

111. **Jodi Mcdaniel**,
Ashland City, TN,
37015
Now, more than ever, it is imperative that TVA be guardians of the environment, resources, and communities as it moves toward sustainable energy development.

112. **Joe Barton**,
Mt Juliet, TN,

Appendices

37122
Think of the future!! Please

113. **John Ratay**,
Nashville, TN,
37216
Don't y'all have kids and grandkids and pets too?

114. **John Michalik**,
Somerset, KY,
42501
Protect OUR water.

115. **John Rice**,
Crossville, TN,
38572

116. **JOHN FISHMAN**,
Huntsville, AL,
35803

117. **Jonathan Mitchell**,
Madison, AL,
35757

118. **Joseph Farone**,
Canton, NC,
28716

119. **Joshua Seff**,
Lexington, KY,
40509

120. **Joslyn Primicias**,
Cordova, TN,
38016

121. **Judith Eckert**,
crossville, TN,
38558
We need to ensure clean drinking water for future generations!!! Please take care of the environment like your life (and your children's lives) depends on it, because it does!!!!

122. **Julia Hartman**,
Alexander, NC,
28701

123. **Julie Bledsoe**,
Powell, TN,
37849
You know better! Clean up the coal ash. Stop polluting!

124. **Julie Arledge**,
Hixson, TN,
37343

125. **K Ca**,
Pewee Valley, KY,
40056
Clean up your mess first !

126. **Kara Dulac**,
Knoxville, TN,
37931
We can't all buy reverse-osmosis filters to ensure safe drinking water in our homes. The environment is finite, and we must stop despoiling it before we have nothing left to eat, drink, or breathe.

127. **Karen Spradlin**,
Jacksonville, AL,
36265

128. **Karen Blanco**,
Harrison, TN,
37341

129. **Kathleen O'Donohue**,
Huntsville, AL,
35804

Appendices

I am a Physician Assistant and Teacher. I care about your health, mine, and our children.

130. **Kathleen Mohning**,
Franklin, TN,
37067

131. **Kathy Koehler**,
Hendersonville, TN,
37075
PLEASE Let this matter to you as it does to all of us and to generations to come!

132. **Keely Chow**,
Huntsville, AL,
35802

133. **Kelly V Johnson**,
Bulls Gap, TN,
37711

134. **Kent Minault**,
Knoxville, TN,
37917
Many friends who live near me experience serious health problems which they attribute to the presence of coal ash in the community. It's hard not to credit them when the coal ash is so haphazardly treated. We see fly ash blowing off near a playground and coal ash exposed under a swing set used by children. The stuff needs to be encapsulated - lined, capped, high and dry - and away from people.

135. **Kevin Vaught**,
Antioch, TN,
37013

136. **Kevin Riley**,
Cookeville, TN,
38506

137. **Kimberly Ferran**,
Cookeville, TN,
38501
This issue is of grave importance to the communities, families, and future generations. The potential risk of groundwater contamination is too great and all aspects of this project should be considered to reduce that risk.

138. **Kristina Lamons**,
Powell, TN,
37849

139. **LaDonna Howard Cloutier**,
Ooltewah, TN,
37363

140. **Lamb Little**,
Nashville, TN,
37216

141. **Larry Kown**,
Nashville, TN,
37215

142. **Laura Denison**,
Nashville, TN,
37212
It is wonderful that TVA is planning solar power collection but please don't ignore the urgency to make coal ash piles completely safe. We can move the green economy forward and also remediate the coal ash.

143. **Laura Truelove**,
Culleoka, TN,
38451

144. **Lauren Kallmeyer**,
Berea, KY,
40403

Appendices

145. **Lea Alexander**,
Kodak, TN,
37764
I'm grateful that TVA is investing in more solar, but please ensure that coal ash sites are contained. Our communities deserve clean water.

146. **Lecil McGlocklin**,
Bluff City, TN,
37618
STOP USING FOSSIL FUELS AND USE RENEWABLE ENERGY to PRODUCE ELECTRICITY , DO NOT RISK ENVIRONMENTAL DISASTERS.!!@!!

147. **Linda Elswick**,
Knoxville, TN,
37920
Make a difference - go. beyond what it takes to do it right and get a thorough review before proceeding.

148. **Linda Sunger**,
Huntsville, AL,
35801

149. **Lisa Schaeffer**,
White Bluff, TN,
37187
TVA needs to clean up it's act. So much contamination has happened over the years. It's time to do the right thing and clean up the mess of the past. TVA needs to be a good neighbor for the future. Now is the time to make a big impact on a clean, healthy future. We need TVA, but we also need to live in a safe, healthy, nontoxic environment.

150. **Lorie Buford**,
Cookeville, TN,
38506

151. **Marcella Hudson**,
Whites Creek, TN,
37189

152. **Mari Lana Teska Echevarria**,
Knoxville, TN,
37909

153. **Maria Crenshaw**,
Knoxville, TN,
37923
Please do the right thing.

154. **Mark Blazer**,
Seymour, TN,
37865

155. **Marshall Ward**,
Murray, KY,
42071

156. **Mary Reed**,
Lancing, TN,
37770

157. **mary Walton**,
Spring Hill, TN,
37174

158. **Mary Skirving**,
Franklin, TN,
37064

159. **Mary Charles Lasater**,
Franklin, TN,
37064

160. **Mary Lou Reed**,
Chattanooga, TN,
37411
Without safe, clean water all life, including humans, will die. Quit polluting our waters.

Appendices

161. **Matthew Carroll**,
Maryville, TN,
37803

162. **Maureen Steffek**,
Memphis, TN,
39119
All life needs clean water to live.

163. **Maureen May**,
Nashville, TN,
37212
While applauding adding solar, placing in above a dirty Ash Pond may be a problem. Please assess and proceed with care. Thank you

164. **Mel Lencioni**,
Humboldt, TN,
38343

165. **Melanie Young**,
Waterford, MS,
38685

166. **Melanie Mcbroom**,
Bristol, TN,
37620

167. **Melissa Pearson**,
Kingsport, TN,
37660

168. **Melissa Claborn**,
Baxter, TN,
38544

169. **Melody Conner**,
Arlington, TN,
38002
I don't want coal ash in my water!!!

170. **Michelle Haverland**,
Thorn Hill, TN,
37881
The redevelopment of cool ash sites must be undertaken carefully, and with great consideration of public safety. I demand a full environmental review, and a public hearing on the Phoenix project.

171. **Michelle Robinson**,
Taft, TN,
38488
Unlined pits are disasters waiting to happen! Remediate the area properly, and protect hundreds or thousands of people from contaminated water. Water IS life!

172. **Michelle Prince**,
Old Hickory, TN,
37138

173. **Mike Robinson**,
Owensboro, KY,
42301
Control your coal ash and save our water ways.

174. **Nancy Anne Bailey**,
Lobelville, TN,
37097
Clean water is essential to all life. Keeping toxic materials out of water supplies should be a given.

175. **Neil Smith**,
Kingsport, TN,
37664

176. **Nellie Medlin**,
Holly Springs, MS,
38635

177. **Nicholas Orrick**,

Appendices

Oak Ridge, TN,
37830
Do we need another Kingston?

178. **Pam Moss**,
Pam, TN,
38139

179. **Pamela Claybaker**,
Nashville, TN,
37203
Please do the most responsible thing in this instance.

180. **Pamela Andrews**,
Knoxville, TN,
37912
Safety for our water soil and air matter to all of us. Please not another coal ash environmental disaster !! Think of the future !

181. **Pamela F Cox**,
Oak Ridge, TN,
37830
Would YOU want to drink water with Coal Ash in it?

182. **Patricia Cataldi**,
Louisa, KY,
41230
The health and welfare of my fellow Kentuckians is important to me as a physician

183. **Patricia Green**,
Nashville, TN,
37221

184. **Patricia Hreen**,
Nashville, TN,
37221

185. **Patricia Weithofer**,
Portland, TN,
37148

186. **Patricia Tillman**,
Somerville, AL,
35670

187. **Patrick Kriser**,
Canton, NC,
28716
Stop coal ash pollution in are state and America too!!

188. **Paul Klein**,
Cordova, TN,
38016
You must do an environmental review first, and allow for public input on this important decision!
In Memphis your coal ash has already leeched arsenic into our drinking water aquifer. You must remediate and remove the coal ash before installing solar arrays on it.

189. **Paula Simmons**,
Cookeville, TN,
38501

190. **Paulette Denton**,
Kodak, TN,
37764

191. **Peggy Maher**,
Louisville, TN,
37777
I fully concur with the following message.

192. **Pete Pryfogle**,
Hillsboro, TN,
37342

193. **Phil huss**,

Appendices

Rockvale, TN,
37153
Keep our kids safe from toxins

194. **Polly Partridge**,
Decatur, AL,
35601
Please protect the people who is served by TVA!

195. **R R**,
Louisville, KY,
40202

196. **Rebecca Vance**,
Edmonton, KY,
42129
Please, STOP POISONING our water, SOME of Us like it here.

197. **Rhetta Sapp**,
Antioch, TN,
37013

198. **Richard Gillaspie**,
White Bluff, TN,
37187

199. **Richard Helton**,
Wartburg, TN,
37887

200. **Ricky Newsom**,
Dickson, TN,
37055

201. **Rita Tinsley**,
Dover, TN,
37058
Don't keep trying to kill us with toxins, please

202. **Robbie Manauis**,
Robbie, TN,
37211
Environmental rights are human rights, especially because they have a major impact on our health.

203. **Rocquelle Woods**,
Huntsville, AL,
35824

204. **Ronald Whitmore**,
Alvaton, KY,
42122

205. **Russell Vance**,
Hopkinsville, KY,
42240
I am glad to see that the TVA is not only finding a way to make use of land they killed but that it is renewable . The problem I see is that you are starting with an uncontained ash site. Please make sure you don't destroy your good work by not taking the necessary precautions!

206. **Ruth Jackson**,
Knoxville, TN,
37920

207. **Sara Fineman**,
Murray, KY,
42071
Solar project is excellent idea. BUT you must deal with the unlined coal ash ponds. We expect that this generation take care of potential and actual groundwater contamination now, not in the future.

208. **Sara Fernandez**,
Nashville, TN,
37220

209. **Sarah Russell**,

Appendices

Nashville, TN,
37211

210. **Sarah Keith**,
Morristown, TN,
37813

211. **Scott Banbury**,
McMinnville, TN,
37110

212. **Scott Richmond**,
Lake Junaluska, NC,
28745

213. **Seth Haynes**,
Johnson City, TN,
37601
Please remember clean up is extremely expensive and recovery is not guaranteed once our resources are destroyed. Preserve the nature that sustains all of us. Protect yourselves and fellow citizens from short sighted decisions based on convenience or cost.

214. **Shelby Hood**,
Franklin, TN,
37064

215. **Shelly Bryant**,
Memphis, TN,
38018
I am asking you to do the right thing and protect our aquifers and water ways. Do not dump toxic
Coal ash in or jar any water source. To do so would cause irreparable harm to people, wildlife and fragile water sources.

216. **sonja hunter**,
Lebanon, TN,
37090
Coal ash is toxic waste. You must protect Tennesseans from coal ash leaching toxins into our drinking water!!!

217. **Stacey Holliday**,
Chattanooga, TN,
37412

218. **Stephen Dutschke**,
Louisville, KY,
40207

219. **Steven Kenneth Tyler**,
Franklin, TN,
37067

220. **Susan Ilgner**,
Lenoir City, TN,
37771

221. **Susan Francis**,
Hopkinsville, KY,
42240

222. **Suzannah Smith**,
Franklin, TN,
37064

223. **Suzanne Alexander**,
Brentwood, TN,
37027

224. **Sylvia Lupton**,
Sylvia, TN,
37725
No more coal ash disasters

225. **Tammy kelly**,
Chattanooga, TN,
37416
EARTH

226. **Teresa McNeely**,

Appendices

Kingston, TN,
37763

227. **Terri Multz**,
Vonore, TN,
37885
I applauded the efforts that are being made to incorporate clean energy in areas that once produced toxic byproducts. It great to hear. I ask that you take every precaution available for a safe transition while accomplishing your goals.
Thank you

228. **Thomas Valencia**,
Goodlettsville, TN,
37072

229. **Tim Hacker**,
Fulton, KY,
42041

230. **TIMOTHY BERARDUCCI**,
Farragut, TN,
37934
Remember what happened in Kingston TN

231. **Tisha Dehart**,
Lexington, KY,
40517

232. **Tommy Stewart**,
Arab, AL,
35016
I live downstream. Our drinking water is taken from that stream. I do not want to drink your poison!

233. **Tonda Bailey**,
Knoxville, TN,
37931

234. **Tracy Cheek Cannell**,
Huntsville, AL,
35810

235. **Travis Donoho**,
Knoxville, TN,
37938

236. **Verne Bailey**,
Chattanooga, TN,
37421

237. **Veronica Bourassa**,
Rossville, GA,
30741

238. **Vicki Carbone**,
Jackson, TN,
38305

239. **Victoria Touati**,
Johnson City, TN,
37601
Allowing toxic coal ash to sit in a floodplain poses a serious risk to everyone. Please abide by the 2015 Coal Ash Rule & the currently proposed coal ash rule by removing this hazard from contaminating our groundwater.

240. **William Shirey**,
Decatur, AL,
35601

241. **William Warren**,
Germantown, TN,
38138

242. **Winifred Silvers**,
Knoxville, TN,
37922
TVA has already done way too much damage with their cavalier "storage" of coal ash. The residents of Kingston, TN,

Appendices

and surrounding area can certainly attest to that fact. Please do the necessary and critical assessments before proceeding with the Phoenix solar farm.

243. **Yvonne Griffth,**
Kingsport, TN,
37660

TVA

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Appendix H – Federal Aviation Administration (FAA) Notice Criteria Tool

Appendices

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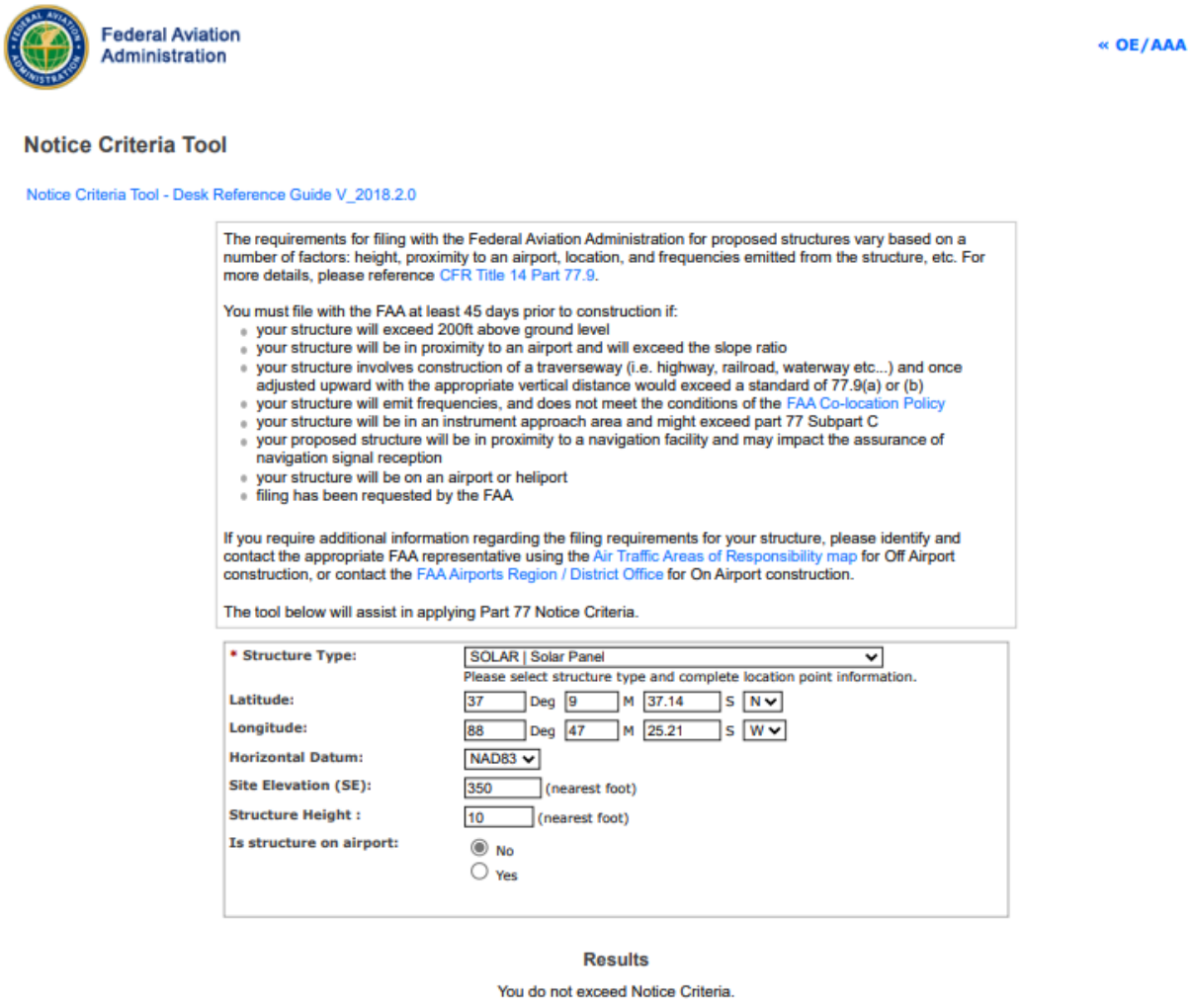
Appendices

Appendix H



Federal Aviation Administration

« OE/AAA

Notice Criteria Tool

Notice Criteria Tool - Desk Reference Guide V_2018.2.0

The requirements for filing with the Federal Aviation Administration for proposed structures vary based on a number of factors: height, proximity to an airport, location, and frequencies emitted from the structure, etc. For more details, please reference CFR Title 14 Part 77.9.

You must file with the FAA at least 45 days prior to construction if:

- your structure will exceed 200ft above ground level
- your structure will be in proximity to an airport and will exceed the slope ratio
- your structure involves construction of a traverseway (i.e. highway, railroad, waterway etc...) and once adjusted upward with the appropriate vertical distance would exceed a standard of 77.9(a) or (b)
- your structure will emit frequencies, and does not meet the conditions of the FAA Co-location Policy
- your structure will be in an instrument approach area and might exceed part 77 Subpart C
- your proposed structure will be in proximity to a navigation facility and may impact the assurance of navigation signal reception
- your structure will be on an airport or heliport
- filing has been requested by the FAA

If you require additional information regarding the filing requirements for your structure, please identify and contact the appropriate FAA representative using the Air Traffic Areas of Responsibility map for Off Airport construction, or contact the FAA Airports Region / District Office for On Airport construction.

The tool below will assist in applying Part 77 Notice Criteria.

* Structure Type:	SOLAR | Solar Panel
	Please select structure type and complete location point information.
Latitude:	37 Deg 9 M 37.14 S N
Longitude:	88 Deg 47 M 25.21 S W
Horizontal Datum:	NAD83
Site Elevation (SE):	350 (nearest foot)
Structure Height :	10 (nearest foot)
Is structure on airport:	(•) No ( ) Yes

Results

You do not exceed Notice Criteria.

Appendices