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Shawnee Fossil Plant
Coal Combustion Residual Management
Final Supplemental Environmental Impact Statement

Prepared by:
TENNESSEE VALLEY AUTHORITY
Knoxville, TN

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COVER SHEET

Shawnee Fossil Plant
Coal Combustion Residual Management Supplemental EIS

Proposed action:	As part of an effort to manage the disposal of Coal Combustion Residuals (CCR) materials on a dry basis, and to meet new CCR regulations, the Tennessee Valley Authority (TVA) is proposing to cease operations at the existing CCR Landfill (Special Waste Landfill [SWL]) and Ash Impoundment 2 in accordance with the CCR Rule and Commonwealth of Kentucky's regulations.
Type of document:	Final Supplemental Environmental Impact Statement (SEIS)
Lead agency:	Tennessee Valley Authority
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Abstract:

In December 2017, the Tennessee Valley Authority (TVA) issued the *Shawnee Fossil Plant Coal Combustion Residual Management Final Environmental Impact Statement* (Final EIS) (TVA 2017a). The year-long assessment analyzed closing both the Special Waste Landfill (SWL) and Ash Impoundment 2, as well as building and operating a new lined landfill to store dry CCR waste produced by SHF in the future. In the Final EIS, TVA identified its preferred alternative as Alternative B – Construction of an Onsite CCR Landfill, Closure-in-Place of Ash Impoundment 2 with a reduced footprint, and Closure-in-Place of the SWL. On January 16, 2018, TVA issued a record of decision (ROD) to implement construction of the new dry CCR landfill, and elected to further consider the closure alternatives before making a decision. TVA has prepared this supplemental EIS (SEIS) to further analyze the closure alternatives. Additionally, TVA needs to evaluate a new proposed location for a new Process Water Basin (PWB). A preliminary location for the PWB was considered in the 2017 Final EIS; however, upon further investigation, TVA chose to consider additional alternative locations.

TVA has identified Alternative C – Closure-in-Place and Regrading of the SWL and Ash Impoundment 2, and Construction of a New PWB as the preferred alternative. Alternative C would achieve the purpose and need of the project and calls for less movement of CCR material and less dewatering than Alternative B and resulting in greater stability for Alternative C. Alternative C would also have reduced air quality impacts associated with the mobilization of dust and emissions from equipment associated with the movement of CCR material as compared to Alternative B. Consequently, Alternative C could be completed sooner and for a lower cost than Alternative B.

Tennessee Valley Authority
Shawnee Fossil Plant Coal Combustion Residual Management
Final Supplemental Environmental Impact Statement
August 2018
Executive Summary

This Supplemental Environmental Impact Statement (SEIS) addresses the management of Coal Combustion Residuals (CCR) from the Tennessee Valley Authority's (TVA) Shawnee Fossil Plant (SHF). The plant is located in McCracken County, Kentucky, on the south bank of the Ohio River, about 13 miles northwest of Paducah.

In December 2017, the TVA issued the *Shawnee Fossil Plant Coal Combustion Residual Management Final Environmental Impact Statement* (Final EIS) (TVA 2017a). The year-long assessment analyzed closing both the Special Waste Landfill (SWL) and Ash Impoundment 2, as well as building and operating a new lined landfill to store dry CCR waste produced by SHF in the future. In the Final EIS, TVA identified its preferred alternative as Alternative B – Construction of an Onsite CCR Landfill, Closure-in-Place of Ash Impoundment 2 with a reduced footprint, and Closure-in-Place of the SWL. On January 16, 2018, TVA issued a record of decision (ROD) to implement construction of the new dry CCR landfill, and elected to further consider the alternatives regarding the closure of the SWL and Ash Impoundment 2 before making a decision. The Final EIS and ROD can be viewed here: https://www.tva.gov/Environment/Environmental-Stewardship/Environmental-Reviews/Management-of-Coal-Combustion-Residuals-from-the-Shawnee-Fossil-Plant.

TVA has prepared this SEIS to further analyze the alternatives for closure of the SWL and Ash Impoundment 2. Additionally, TVA needs to evaluate a new proposed location for a new Process Water Basin (PWB). A preliminary location for the PWB was considered in the 2017 Final EIS; however, upon further investigation, TVA chose to consider additional alternative locations. This SEIS incorporates the background information and findings of the 2017 Final EIS and presents and evaluates only new and/or significant data made available since publication of the Final EIS in relation to the closure projects, and new information related to the new location for the proposed PWB. The decision supports TVA's goal to eliminate all wet ash storage at its coal plants and comply with the federal CCR Rule, in addition to the Commonwealth of Kentucky's regulations.

Alternatives Considered

During initial project planning, a range of alternatives and specific screening criteria were identified for each of the proposed projects individually: (1) closure of the existing SWL and Ash Impoundment 2, and (2) construction and operation of a new PWB. The various alternatives for closure of the existing SWL and Ash Impoundment 2 are summarized in the 2017 Final EIS and additional considerations and analysis are described in more detail below. In addition, the various alternatives considered for the construction and operation of a new PWB are described below.

Ash Impoundment 2 and Special Waste Landfill Closure Alternatives

During initial project planning, a range of alternatives and specific screening criteria were identified for the closure of both the existing SWL and Ash Impoundment 2, as presented in *Shawnee Fossil Plant SWL and Ash Impoundment 2 Final Closure Projects Project Planning Document* (Closure PPD) and discussed in the Final EIS. After further consideration, TVA reviewed and revised the Closure PPD in 2018 (Stantec 2018a). The majority of the closure alternatives remain eliminated; however, TVA decided to reconsider Alternative 4b Closure-in-Place of both facilities with general grading within permit boundary (as described in Table 2.1-3 of the Final EIS; TVA 2017a). Additionally, TVA has modified Closure-by-Removal and Closure-by-Consolidation to include over-excavation of native materials across the area from which materials are removed/consolidated to confirm complete removal of CCR. Approximately 1 foot of over-excavation is assumed to be necessary. Due to the unknown nature of underlying material, over-excavation of significantly more than 1 foot could be required and could potentially include other remediation measures which cannot be defined at this time.

Waste Treatment/Process Water Basin Alternatives

In January 2018, TVA completed the *Process Water Basin Evaluation, Phase 1, Project Planning Document, Revision 1* (PWB PPD; Stantec 2018b). In the PWB PPD, TVA evaluated alternative wastewater management scenarios associated with the proposed PWB. Alternative configurations included installation of additional solids removal systems, pH adjustment, and wastewater management scenarios for the PWB. Additional solids removal systems for the Coal Yard drainage basin (CYDB) were also evaluated. Alternatives were considered based on design intent; construction feasibility; environmental, health, and safety considerations; capital construction costs; and annual operation and maintenance costs. Ultimately, the wastewater treatment alternative for construction of a new PWB in conjunction with CYDB improvements was selected for further evaluation. TVA determined this alternative would prevent the risk of elevated total suspended solids (TSS) levels, in addition to providing the flexibility for removing sediments in association with a wide range of operational and storm water conditions. Additionally, TVA carried forward the alternative for temporary tank-based treatment as an option in the event the PWB might not be operational by October 31, 2020, the likely date that TVA will have to cease using Ash Impoundment 2 under the CCR Rule.

TVA also considered multiple location alternatives for the PWB. Locations were evaluated based on site characteristics, conveyance considerations, design considerations, constructability, environmental considerations, and economics. Locations were considered at various places within Ash Impoundment 2, the inactive dredge cell, the Coal Yard, and the rail loop. Alternatives where the proposed PWB would have been located on top of CCR materials were ultimately eliminated from consideration. Therefore, TVA selected the rail loop location to carry forward for analysis. Various configurations within the rail loop area were considered.

Alternatives Evaluated in the Supplemental EIS

Based on the analysis and screening criteria described in the Final EIS and the additional analysis described above, TVA has determined that there are three alternatives available to TVA: (A) No Action, which serves as a baseline for comparison; (B) Closure-in-Place by Reduced Footprint of the SWL and Ash Impoundment 2 and Construction of a New PWB; or (C) Closure in-Place of the SWL and Ash Impoundment 2 and Construction of a New PWB.

Alternative B described within this SEIS is a modification to the Alternative B described in Subsection 2.2.2 of the Final EIS for Closure-in-Place and Consolidation of the SWL and Ash Impoundment 2. The description presented in the Final EIS is incorporated by reference. Under the former Alternative B, TVA would remove and consolidate portions of the ash in the northwest corner of Ash Impoundment 2. In this SEIS, Alternative B also includes the over-excavation of an additional approximately 1 foot of underlying native material to confirm CCR removal. The PWB would be constructed in the rail loop area at SHF. This alternative also includes consideration for establishment of temporary tank-based treatment if the PWB cannot be constructed and operational by October 31, 2020, the likely date that TVA will have to cease using Ash Impoundment 2 under the CCR Rule. Temporary tank-based treatment would include an estimated 15 to 25 free-standing tanks (ranging in size from 0.6 to 1.7 million gallons per tank), covering a footprint of approximately 7 to 12 acres. Improvements to the CYDB would be made to provide detention and TSS removal from storm water runoff. To mitigate potential elevated levels of TSS, the CYDB would operate as a storm water detention basin. During normal operating conditions, the CYDB would discharge to the PWB. This discharge could cease during large storm events, detaining the storm water in the CYDB with no release to the PWB. This would allow additional detention time in the CYDB for settling of coal fines and other suspended solids. Storm water would be released to the PWB after TSS concentrations in the CYDB are at appropriate levels.

Alternative C described within this SEIS is similar to the previously eliminated Alternative 4B identified in Table 2.13 of the Final EIS. Upon further evaluation, TVA found that this option was feasible and elected to carry it forward for evaluation. Most activities would be the same under Alternative C, as described previously for Alternative B. However, under Alternative C, the ash in the northwest corner of Ash Impoundment 2 would not be removed and consolidated. Instead, both the SWL and Ash Impoundment 2 would be closed-in-place and regraded with materials redistributed within the existing facilities or using borrow material from the Shawnee East Site (as needed) to establish appropriate drainage and stability. New storm water outfalls would be installed along the perimeter of the facilities to outlet at elevations at or above the 100-year flood elevation.

Public and Agency Involvement

On November 1, 2016, TVA published a Notice of Intent (NOI) in the Federal Register announcing that it planned to prepare an EIS to address the potential environmental effects associated with ceasing operations at both the SWL and Ash Impoundment 2, and constructing, operating, and maintaining a new CCR Landfill at SHF. TVA hosted an open house scoping meeting on November 15, 2016, at the Robert Cherry Civic Center located at 2701 Park Avenue in Paducah, Kentucky. The Draft EIS was issued on June 8, 2017, and TVA hosted a public meeting on June 22, 2017, at the Robert Cherry Civic Center in Paducah, Kentucky. The Final EIS was issued on December 8, 2017, and a ROD was signed on January 16, 2018. Public comments and TVA's responses are included in Appendix I of the Final EIS (TVA 2017a).

TVA released the Draft SEIS on May 4, 2018 and the notice of availability was published in the Federal Register on the same day initiating a 45-day public comment period which concluded on June 18, 2018. In addition to the notice in the Federal Register, TVA sent notification of the availability of the Draft SEIS to local and state government entities and federal agencies, published notices regarding this effort in local newspapers; issued a press release to media; and posted the notice of availability on the TVA Website.

TVA accepted comments submitted through mail and email. TVA received a total of 19 comments from six commenters. Comments were received in relation to the Draft SEIS alternatives analysis, groundwater and surface water resources, PWB location, air quality, waste management, cultural and historic resources, and general Draft SEIS comments. TVA carefully reviewed and responded to all of the substantive comments that were received (Appendix E).

Summary of Alternative Impacts

This SEIS presents a summary of the impacts of each of the alternatives carried forward for detailed analysis. The environmental impacts of Alternatives A, B and C are summarized in Table 2.3-1 in Chapter 2.

Under Alternative B, there would be minor impacts to land use, prime farmlands and soil, groundwater, surface water, vegetation, wildlife, threatened and endangered species, and wetlands. There would be no impacts to cultural resources. Impacts under Alternative C would be slightly less than those described under Alternative B.

Preferred Alternative

TVA has identified Alternative C – Closure-in-Place and Regrading of the SWL and Ash Impoundment 2, and Construction of a new PWB as the preferred alternative. Alternative C would achieve the purpose and need of the project and calls for less movement of CCR material and less dewatering than Alternative B resulting in greater stability under Alternative C. Alternative C would also reduce air quality impacts associated with the mobilization of dust and emissions from equipment associated with the movement of CCR material as compared to Alternative B. Consequently, Alternative C could be completed sooner and for a lower cost than Alternative B.

Mitigation Measures

Mitigation measures designed to minimize or reduce adverse impacts associated with implementation of Alternative C include:

- Final drainage for the temporary treatment basin (if utilized) would be routed to existing or new discharge points and comply with the Kentucky Pollutant Discharge Elimination System (KPDES) permit to ensure that no adverse impacts to surface waters would occur. Mitigation measures would be identified, as needed, to ensure the discharges meet permit limits. This may or may not require a permit modification.

- Prior to disturbing wetland and surface water features within the process water basin project site, TVA would obtain a Clean Water Act Section 404 permit and a Kentucky Division of Water 401 Water Quality Certification. Where impacts to these features cannot be avoided, TVA would mitigate impacts in accordance with the Section 404 permit and/or Water Quality Certification as determined in consultation with the USACE and Kentucky Division of Water.

- Tree removal would occur in winter months outside the breeding season (between November 15 and March 30) and would be tracked, documented, and reported to the US Fish and Wildlife Service (USFWS).

Best Management Practices (BMPs) include:

- TVA would comply with all appropriate local, state, and federal permit requirements.

- All proposed project activities would be conducted in a manner to ensure that waste materials are contained, and the introduction of pollutants to the receiving waters would be minimized and be in accordance with either a project specific storm water pollution prevention plan (SWPPP) or a KPDES BMP Plan.

- Storm water flows would be properly treated with either implementation of proper BMPs or by diverting the storm water discharges to an appropriate storm water outfall or impoundment for co-treatment.

- 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, to minimize construction impacts to surface waters.

- Sanitary wastes generated during construction activities would be collected by the existing sewage treatment system, onsite septic system(s) or portable toilets. These would be pumped out regularly, and the sewage transported by a vacuum truck to a publicly-owned wastewater treatment works that accepts pump out.

- Upon completion of construction, temporarily-disturbed areas, such as the temporary treatment areas and laydown yards, would be restored to their previous state and maintained by TVA.

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Symbols, Acronyms, and Abbreviations

APE	area of potential effect
BMP	Best management practice
CCR	coal combustion residuals
CEQ	Council on Environmental Quality
CYDB	Coal Yard drainage basin
DOE	Department of Energy
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
GIS	Geographic Information System
IPaC	Information for Planning and Conservation
KPDES	Kentucky Pollutant Discharge Elimination System
KSNPC	Kentucky State Nature Preserve Commission
µg/L	micrograms per liter
MCL	maximum contaminant levels
MW	monitoring well
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOI	Notice of Intent
NRCS	National Resource Conservation Service
NRHP	National Register of Historic Places
ORM	Ohio River Mile
pCi/L	picocuries per Liter
PGDP	Paducah Gaseous Diffusion Plant
PPD	Project Planning Document
PWB	Process Water Basin
RGA	Regional Gravel Aquifer
ROD	record of decision
SEIS	supplemental Environmental Impact Statement
SHF	Shawnee Fossil Plant
SHPO	State Historic Preservation Officer
SSI	statistically significant increase(s)
SWL	Special Waste Landfill
SWPPP	Storm Water Pollution Prevention Plan
Tc-99	Technetium 99
TCE	trichloroethylene
TDS	total dissolved solids
TSS	total suspended solids
TVA RAM	TVA Rapid Assessment Method
TVA	Tennessee Valley Authority
UCD	Upper Continental Deposits
USACE	United States Army Corps of Engineers
US	United States
USFWS	United States Fish and Wildlife Service
WKWMA	Western Kentucky Wildlife Management Area
WWC	Wet Weather Conveyance

CHAPTER 1 - PURPOSE AND NEED FOR ACTION

1.1 Introduction and Background

In December 2017, the Tennessee Valley Authority (TVA) issued the *Shawnee Fossil Plant Coal Combustion Residual Management Final Environmental Impact Statement* (Final EIS) (TVA 2017a). The year-long assessment called for closing both the Special Waste Landfill (SWL) and Ash Impoundment 2, as well as building and operating a new lined landfill to store dry coal combustion residual (CCR) waste produced by the Shawnee Fossil Plant (SHF) in the future. In the Final EIS, TVA identified its preferred alternative as Alternative B – Construction of an Onsite CCR Landfill, Closure-in-Place of Ash Impoundment 2 with a Reduced Footprint, and Closure-in-Place of the SWL. On January 16, 2018, TVA issued a record of decision (ROD) to implement construction of the new dry CCR landfill, and elected to further consider the alternatives regarding the closure of the SWL and Ash Impoundment 2 before making a decision. The Final EIS and ROD can be viewed here: https://www.tva.gov/Environment/Environmental-Stewardship/Environmental-Reviews/Management-of-Coal-Combustion-Residuals-from-the-Shawnee-Fossil-Plant.

TVA has prepared this supplemental EIS (SEIS) to further analyze the alternatives for closure of the SWL and Ash Impoundment 2. Additionally, TVA needs to evaluate a new proposed location for a new Process Water Basin (PWB). A preliminary location for the PWB was considered in the 2017 Final EIS; however, upon further investigation, TVA chose to consider additional alternative locations. This SEIS expands on the Final EIS analysis for the proposed closure projects at SHF (Figure 1.1-1) and presents the analysis associated with the new location for the proposed PWB.

TVA has prepared this SEIS pursuant to the National Environmental Policy Act (NEPA) to assess the environmental impacts of the proposed actions. This SEIS incorporates the background information and findings of the 2017 Final EIS and presents and evaluates only new and/or significant data made available since publication of the Final EIS in relation to the closure projects, and new information related to the new location for the proposed PWB. The decision supports TVA's goal to eliminate all wet ash storage at its coal plants and comply with the federal CCR Rule, as well as the Commonwealth of Kentucky's regulations.

1.2 Purpose and Need

The purpose and need of ceasing CCR management operations at both the SWL and Ash Impoundment 2 and closing them was, and continues to be, to manage the disposal of CCR materials on a dry basis and to meet the 2015 CCR regulations, as well as the Commonwealth of Kentucky's regulations.

1.3 Decision to be Made

TVA must decide 1) whether to close both the SWL and Ash Impoundment 2; 2) how to close both the SWL and Ash Impoundment 2; and 3) where to construct a new PWB. TVA's decision

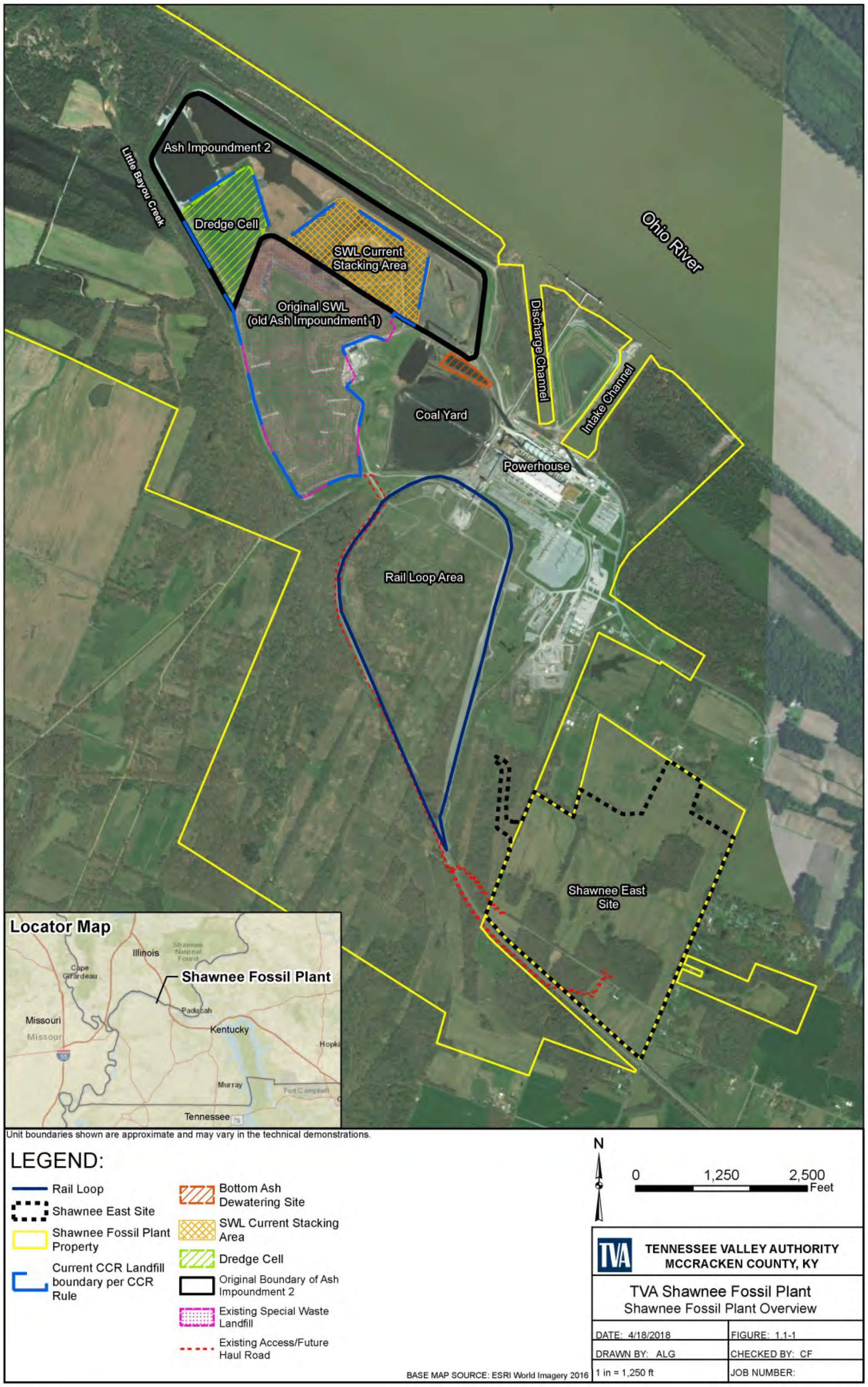

Figure 1.1-1. Shawnee Fossil Plant Overview

will consider factors such as potential environmental impacts, economic issues, availability of resources, and TVA’s long-term goals.

1.4 Related Environmental Reviews

TVA previously conducted the following environmental reviews, which are relevant to this EIS concerning ash management:

- Shawnee Fossil Plant Coal Combustion Residual Management Final Environmental Impact Statement (TVA 2017a)
- Bull Run Fossil Plant Landfill Final Environmental Impact Statement (TVA 2017b)
- Ash Impoundment Closure Part I Programmatic NEPA Review, Final Environmental Impact Statement (TVA 2016a)
- Shawnee Fossil Plant Bottom Ash Process Dewatering Facility Final Environmental Assessment (TVA 2016b)
- TVA’s Integrated Resource Plan (TVA 2015)
- Shawnee Fossil Plant Units 1 and 4 Final Environmental Assessment (TVA 2014)
- NOxOUT Selective Non-catalytic Reduction Demonstration - Shawnee Fossil Plant – Unit 1 Final Environmental Assessment (TVA 2005)

1.5 Scope of the Analyses

TVA previously identified the following resources as having the potential to be affected by the proposed action described in the 2017 Final EIS. However, the analysis presented in the 2017 Final EIS adequately addressed potential impacts to these resources with respect to the actions analyzed in this SEIS. Therefore, the 2017 Final EIS analysis for these resources is incorporated by reference for this SEIS:

- Air Quality
- Climate Change and Greenhouse Gases
- Geology and Seismology
- Floodplains
- Socioeconomics and Environmental Justice
- Natural Areas, Parks and Recreation
- Transportation
- Visual Resources
- Noise
- Solid and Hazardous Waste and Hazardous Materials
- Public Health and Safety

The following resources, also previously evaluated in the 2017 Final EIS, require additional analysis with respect to the proposed actions evaluated in this SEIS. These resources are considered in Chapter 3 of this SEIS.

- Land Use
- Prime Farmland and Soils
- Groundwater
- Surface Water
- Vegetation
- Wildlife
- Threatened and Endangered Species
- Wetlands
- Cultural and Historic Resources

TVA's action would satisfy the requirements of Executive Order (EO) 11988 (Floodplain Management), EO 11990 (Protection of Wetlands), EO 12898 (Environmental Justice), and EO 13751 (Invasive Species); and applicable laws including the National Historic Preservation Act, Endangered Species Act, Clean Water Act, and Clean Air Act.

1.6 Public and Agency Involvement

On November 1, 2016, TVA published a Notice of Intent (NOI) in the Federal Register announcing that it planned to prepare an EIS to address the potential environmental effects associated with ceasing operations at both the SWL and Ash Impoundment 2, and constructing, operating, and maintaining a new CCR Landfill at SHF. TVA hosted an open house scoping meeting on November 15, 2016, at the Robert Cherry Civic Center located at 2701 Park Avenue in Paducah, Kentucky. The Draft EIS was issued on June 8, 2017, and TVA hosted a public meeting on June 22, 2017, at the Robert Cherry Civic Center in Paducah, Kentucky. The Final EIS was issued on December 8, 2017, and a ROD was signed on January 16, 2018. Public comments and TVA's responses are included in Appendix I of the Final EIS (TVA 2017a).

TVA released the Draft SEIS on May 4, 2018 and the notice of availability was published in the Federal Register on the same day initiating a 45-day public comment period which concluded on June 18, 2018. In addition to the notice in the Federal Register, TVA sent notification of the availability of the Draft SEIS to local and state government entities and federal agencies, published notices regarding this effort in local newspapers; issued a press release to media; and posted the notice of availability on the TVA Website.

TVA accepted comments submitted through mail and email. TVA received a total of 19 comments from six commenters. Of the six submissions, five were from federal entities and one was from an environmental organization. Comments were received in relation to the Draft SEIS alternatives analysis, groundwater and surface water resources, PWB location, air quality, waste management, cultural and historic resources, and general Draft SEIS comments.

TVA carefully reviewed all of the substantive comments that were received. Summarized comments and TVA's responses are included in Appendix E of this SEIS. The original comment submissions are included following the responses to comments.

1.7 Necessary Permits and Licenses

Depending on the decisions made regarding the proposed actions, TVA may need to obtain or seek amendments to the following permits:

- A request to modify the Title V air quality operating permit would be submitted prior to beginning construction.
- TVA would evaluate the proposed actions to determine if a modification to the Kentucky Pollutant Discharge Elimination System (KPDES) permit or notification to Kentucky Department of Environmental Protection would be required due to potential alteration of the wastewater stream(s).
- The project would disturb greater than one acre of land. By rule, any construction project that disturbs greater than one acre of land requires a KPDES General Storm Water Construction Permit, which would include incorporating details of the project in the SHF Best Management Practice (BMP) plan or developing a project-specific BMP plan.
- Section 401 and 404 permits could be required for wetlands mitigation depending on the alternative selected.

As described in the 2017 Final EIS, the existing onsite CCR landfill (SWL) was regulated as a CCR Landfill under a Chapter 46 Registered Permit-by-Rule with the Kentucky Division of Waste Management effective September 21, 2017, as well as under the United States (U.S.) Environmental Protection Agency (EPA) 2015 CCR Rule. Ash Impoundment 2 maintains an operating permit in accordance with the Kentucky Division of Water, KPDES Permit No. KY0004219, and it also was transitioned to a Registered Permit-by-Rule under Kentucky's Chapter 46 regulations for coal ash units on September 21, 2017. On January 31, 2018, portions of the Chapter 46 Registered-Permit-by-Rule provision of Kentucky's regulations were overturned by a state court. Consequently, the Kentucky Chapter 45 special waste permit for the SWL has been reinstated and is currently in effect. Because of the change in status, in the Final EIS, the SWL was referred to as the "former SWL." Now, as the SWL permit is reinstated, the "Former" designation has been removed in this SEIS.

CHAPTER 2 - ALTERNATIVES

2.1 Preliminary Alternatives

During initial project planning, a range of alternatives and specific screening criteria were identified for each of the proposed projects individually: (1) closure of the existing SWL and Ash Impoundment 2, and (2) construction and operation of a new PWB. The initial alternatives for closure of the existing SWL and Ash Impoundment 2 are summarized in the 2017 Final EIS, and additional considerations and analysis are described in more detail below, as well as the various alternatives considered for the construction and operation of a new PWB.

2.1.1 Ash Impoundment 2 and Special Waste Landfill Closure Alternatives

Subsection 2.1.3.4 of the Final EIS summarizes the range of alternatives and specific screening criteria that were identified for the closure of both the existing SWL and Ash Impoundment 2 during initial project planning. As a result of the changes in the Kentucky permitting as described in Section 1.7 of this SEIS, TVA reevaluated all of the closure alternatives previously presented in the Final EIS, including those previously eliminated from consideration. The majority of the closure alternatives remain eliminated as evaluated in the Final EIS. However, TVA decided to reconsider previously eliminated Alternative 4b Closure-in-Place of both facilities with general grading within permit boundary as described in Table 2.1-3 of the Final EIS; TVA 2017a.

As described in the Final EIS, Alternative 4b was initially eliminated because it “would not improve stability.” This did not mean that Alternative 4b would cause instability; rather, it merely did not improve stability. Ash Impoundment 2 and the SWL are stable and in full compliance with all standards and regulations; thus closure-in-place with general grading would not destabilize either facility. Though not described in the original EIS, TVA originally anticipated that Alternative 4b would require import of a large quantity of borrow material from an offsite source, more material than was potentially available from the Shawnee East Site. This caused Alternative 4b to be ranked lower on constructability and environmental considerations than other alternatives. Thus, it was eliminated from consideration in the Final EIS.

As TVA continued to review the closure alternatives, TVA identified the potential to beneficially reuse CCR from the SWL for grading the closed facilities. TVA is currently conducting a demonstration study to determine the feasibility of this proposed beneficial reuse of CCR in place of borrow material. The beneficial reuse of CCR for closure would be subject to KDEP approval. TVA also identified the potential for the use of a ClosureTurf® or equivalent system as a cap for Ash Impoundment 2 and SWL. This type of cap system consists of a special engineered turf and sand fill and would, therefore, also require less borrow material.

Additionally, for grading, Alternative 4b would move approximately 1 million cubic yards of CCR less than Alternative B . This CCR would be dry CCR from the SWL as opposed to wet CCR (which would have to be dewatered) from Ash Impoundment 2. Therefore, the closure could be completed with greater simplicity, less risk to workers, more quickly, and with a lower cost than Alternative B. Additionally, because Alternative 4b would involve movement of less CCR, air quality impacts of this alternative would be less than the air quality impacts of Final EIS Alternative B. Thus, the air quality impacts associated with this alternative are less than, and therefore bracketed by, the air quality analysis as presented in the Final EIS for Alternative B.

At the same time that Alternative 4b became a higher scoring alternative in TVA's reanalysis, TVA determined that Final EIS Alternative B Closure-by-Consolidation would require over-excavation of native materials across the area from which materials are removed/consolidated to confirm complete removal of CCR. Approximately 1 foot of over-excavation is assumed to be necessary. This new determination is a product of TVA's over compensation in the face of uncertainty in the industry as to what satisfies "closure by removal" standards under the CCR Rule. Due to the unknown nature of underlying material, over-excavation of significantly more than 1 foot could be required and could potentially include other remediation measures which cannot be defined at this time. This modified Final EIS Alternative B, which includes over-excavation, is included in this SEIS as Alternative B.

For all these reasons, TVA found that Alternative 4b scored better on constructability, design considerations, schedule, and economics than many of the other alternatives, including Final EIS Alternative B. Therefore, TVA elected to carry Alternative 4b forward for analysis in this SEIS. Alternative 4b became the new Alternative C in the SEIS.

2.1.2 Waste Treatment/Process Water Basin Alternatives

In January 2018, TVA evaluated alternative wastewater management scenarios associated with the proposed PWB. Alternative configurations included installation of additional solids removal systems, pH adjustment, and wastewater management scenarios for the PWB. Additional solids removal systems for the Coal Yard drainage basin (CYDB) were also evaluated. Capital construction costs, annual operation and maintenance costs, and treatment performance of the wastewater management systems were developed for each alternative considered.

The alternatives were compared based on the following evaluation criteria:

1. *Design Intent:* Each alternative was analyzed based on the following project goals:
    a. Provide particle removal to reduce total suspended solids (TSS) levels to below 75% of the average monthly levels allowable through KPDES Outfall 001 during average rainfall conditions.
    b. Provide particle removal to reduce TSS levels to below 75% of the maximum daily levels allowable through KPDES Outfall 001 during the 25-year, 24-hour peak storm event.
    c. Prevent the release of pH, oil, and grease outside of the daily average and monthly maximum levels allowable through KPDES Outfall 001.
2. *Construction Feasibility:* Each alternative was analyzed based on the feasibility of construction. This includes evaluation of construction schedules to allow for discontinued use of the existing facilities by October 31, 2020, the likely date that TVA will have to cease using Ash Impoundment 2 under the CCR Rule.

3. *Environmental, Health, and Safety:* Each alternative was analyzed based on the following:
    a. Environmental considerations.
    b. Reduction of risk to Health and Safety during construction and operation of the recommended alternative.
4. *Capital Construction Costs:* Capital construction costs were calculated for the wastewater treatment systems (additional solids removal treatment, pH adjustment, and aeration).
5. *Engineering and Management Costs:* The engineering and management costs associated with Phase 2 (detailed design) and Phase 3 (construction) of each wastewater management alternative were calculated and compared.
6. *Annual Operation and Maintenance Cost:* The costs associated with annual operation and maintenance was calculated for each alternative wastewater management scenario. Costs included the predicted additional solids removal and pH adjustment materials required and sediment removal interval for accumulated solids cleanout.

Table 2.1-1 and presents the wastewater treatment alternatives and analysis.

Table 2.1-1. Wastewater Treatment Alternatives (Stantec 2018b)

Alternative	Description	Analysis Recommendation
Alternative 1 – Construct New PWB Without Additional Solids Removal Treatment	TVA would construct a new PWB consisting of two equal-area cells without additional solids removal prior to wastewater and storm water reaching the PWB. During normal operation, flows from one cell would flow to the other before discharging through KPDES Outfall 001.	• The potential advantages of this alternative include saving capital construction/operation and maintenance costs that would be required with either tank-based or chemical injection solids removal systems. • Potential disadvantages of this alternative include the risks of exceeding KPDES permitted discharges for TSS. Alternatives evaluated with additional solids removal systems may remove TSS over a larger range of TSS levels than this alternative. • **Due to uncertainty associated with TSS levels, TVA eliminated Alternative 1 from further consideration.**
Alternative 2 – Construct PWB with Additional Treatment	TVA would construct a new PWB consisting of two equal-area cells as described in Alternative 1 with additional treatment to remove solids and oil and grease prior to the wastewater and storm water reaching the PWB.	• The potential advantages of this Alternative include mitigation of uncertainty associated with high levels of TSS in discharges that could be routed to the PWB. Additional solids removal measures allow for a wider range of TSS removal. • Potential disadvantages of this alternative include additional capital construction/operation and maintenance costs associated with building and operating additional solids removal systems. Renewal of KPDES discharge permits may be somewhat more difficult due to permitting the additional coagulant/flocculent chemicals. Annual operation and maintenance costs may also be relatively higher. • In addition, Alternative 2 does not address storm water runoff from the Coal Yard discharged to the PWB (the current process). Since the PWB will be much smaller than Ash Impoundment 2, there is a potential that an objectionable color contrast in the receiving stream may result due to release from the PWB. • **Due to the uncertain TSS levels and additional costs, TVA eliminated Alternative 2 from further consideration.**

Table 2.1-1. Wastewater Treatment Alternatives (Stantec 2018b)

Alternative	Description	Analysis Recommendation
Alternative 3 – PWB and CYDB Improvements	Under Alternative 3, TVA would construct a new PWB with two, equal-area cells as described in Alternative 1, including additional treatment for solids and oil and grease. The sediment removal measures would reduce solids prior to the water's entry to the CYDB or PWB. This alternative also includes improvements for the CYDB such as: • Lowering the operational pool depth for additional storm water detention. • Routing general plant flows currently discharging to the CYDB directly to the PWB. • Installation and/or upgrade of additional sediment removal systems.	• This Alternative improves upon advantages discussed for Alternative 2 by further reducing the TSS load (through the installation of additional sediment removal measures prior to the water's entry to the CYDB or PWB) discharged from the CYDB to the PWB during storm water runoff events. The additional storm water storage volume available in the CYDB would be utilized for extended detention during storm events. Additional sediment removal systems installed in the CYDB could further improve TSS removal during storm events. • This Alternative resulted in the second highest capital construction costs for wastewater treatment systems relative to the other Alternatives analyzed. Construction of two additional sediment removal systems (one for the PWB and one for CYDB) and operation of these systems may result in more overall costs than all other alternatives except for Alternative 5. • **TVA selected Alternative 3 for further consideration in order to prevent the risk of elevated TSS levels released through permitted KPDES discharge pathways. The flexibility of the wastewater treatment systems selected would remove sediments from a wide range of operational and storm water conditions.**
Alternative 4 – Single PWB and CYDB Improvements	Alternative 4 is similar to Alternative 3 except that a PWB with one cell is proposed instead of a PWB with two cells. All other elements of Alternative 3 are included in this Alternative.	• This Alternative resulted in the highest operation and maintenance costs potentially outweighing any capital construction savings associated with the single basin Alternative. During the normal maintenance of this Alternative, rental treatment equipment would be required to treat wastewater streams before discharge through KPDES permitted outfalls. • **Due to these operational costs, TVA eliminated this alternative from further consideration.**
Alternative 5 – PWB Partition Within CYDB Footprint	This Alternative is similar to Alternative 3 with the addition of constructing a third, smaller PWB partition within the footprint of the CYDB. All other elements of Alternative 3 are included in this Alternative.	• Capital construction costs for Alternative 5 would likely be greater than all other Alternatives evaluated because of the construction of a third PWB partition. • **Because this alternative is similar to Alternative 3 and due to these potentially excessive costs, TVA eliminated Alternative 5 from further consideration.**

Table 2.1-1. Wastewater Treatment Alternatives (Stantec 2018b)

Alternative	Description	Analysis Recommendation
Temporary Tank-Based Treatment (Figure 2.1-1)	This alternative considered the use of rented temporary fractionation tanks to manage the storm water and general plant process water flows at the site. Options assessed included field-erected settling tanks, skid-mounted chemical injection, and/or sludge dewatering equipment.	• An estimated 15 to 25 tanks (ranging in size from 0.6 to 1.7 million gallons per tank), covering a footprint of approximately 10 to 12 acres, would be required. • Preliminary sizing of the temporary treatment options indicated a required footprint between 7 to 9 acres and assumes the CYDB storm water can be discharged to Ash Impoundment 2 prior to PWB completion. • Estimated capital costs, including installation, startup, and monthly rental, and weekly operational costs are greater than the estimated costs associated with constructing and maintaining the PWB onsite. • **TVA has retained this alternative as a contingency option to be used in the interim if the PWB cannot be constructed and operational by October 31, 2020, the likely date that TVA will have to cease using Ash Impoundment 2 under the CCR Rule. (Figure 2.1-1).**

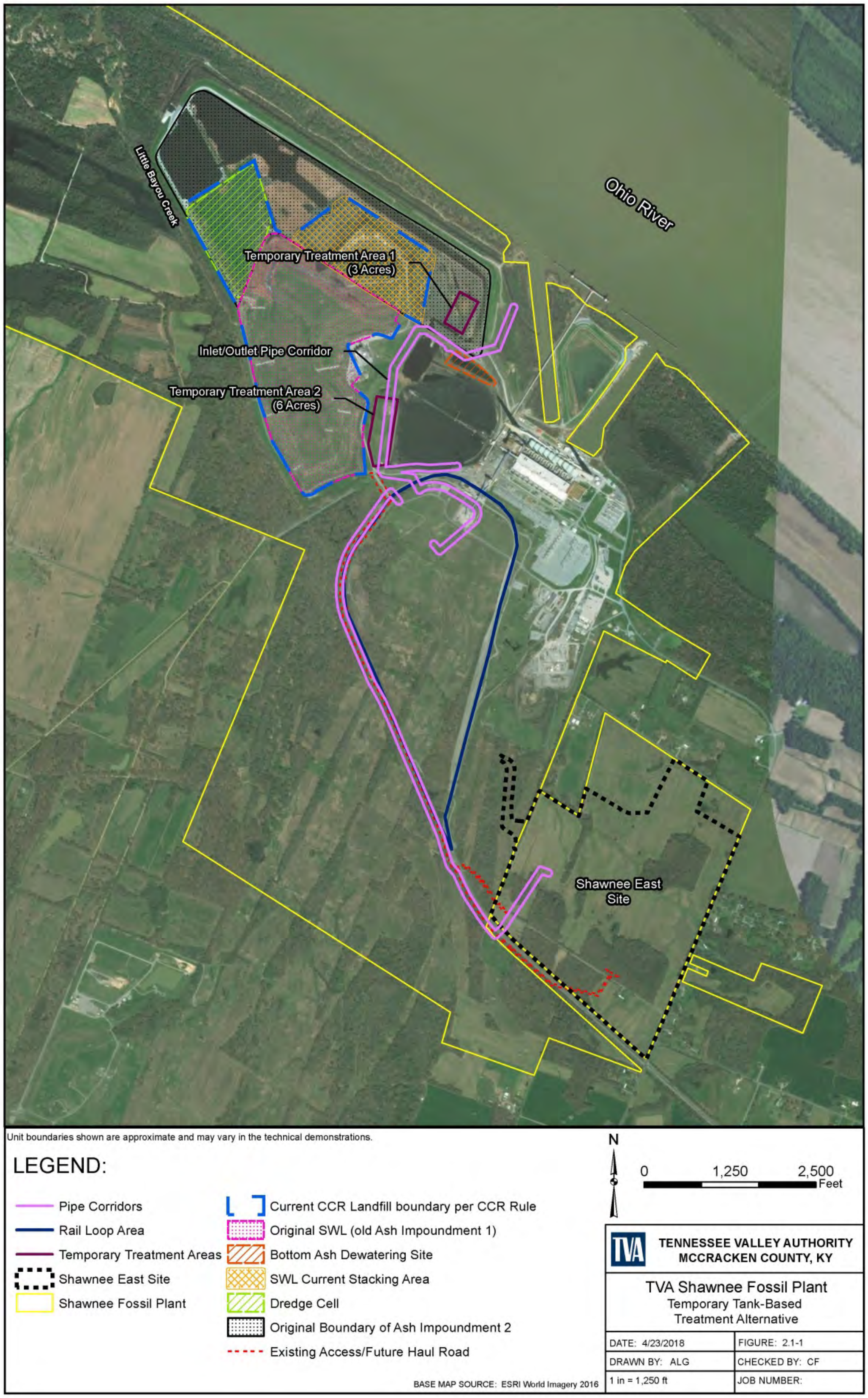

Figure 2.1-1. Temporary Tank-Based Treatment Alternative

2.1.2.1 Wastewater Treatment Alternatives Considered but Eliminated from Further Consideration

Additional alternatives were considered by TVA, but not evaluated in detail due to the potential flaws associated with these alternatives. These alternatives are briefly described below.

- *Construct Smaller PWB for Maintenance*: This alternative included construction of one larger PWB cell for normal operational use and one smaller PWB cell for interim use during maintenance and cleaning operations on the main cell. This alternative would require a smaller footprint for construction of the basin. However, use of the smaller cell in the interim would likely require additional sediment removal during operation and more frequent sediment cleanout. This alternative was eliminated from further evaluation due to the likely additional operation and maintenance efforts and costs.

- *Construct Small PWB for General Plant Flows*: This alternative included construction of a small PWB to detain general plant flows currently discharging to the CYDB (the Units 1 through 10 station sump flows). Since rerouting the Units 1 through 10 station sump flows via a permanent pump station is included in the recommended Alternative 3, this alternative was not significantly different than Alternative 3 and therefore was removed from further consideration. This assumes the pump station will be designed to provide access for intermittent removal of sediment build up.

- *Construction of a Permanent Tank-Based Treatment Plant*: This would be in lieu of the PWB and would require a footprint of approximately 5 to 7 acres. Estimated capital construction and annual maintenance costs are greater than estimated costs of constructing and maintaining the PWB. For this reason, this alternative was removed from consideration.

2.1.2.2 Wastewater Treatment Alternatives Conclusion

As described in Table 2.1-1, TVA selected Wastewater Treatment Alternative 3 for further consideration to prevent the risk of elevated TSS levels released through permitted KPDES discharge pathways. The flexibility of the wastewater treatment system selected would remove sediments from a wide range of operational and storm water conditions. Wastewater Treatment Alternative 3, therefore, formed the basis for analysis of the PWB Alternatives. TVA additionally selected Temporary Tank-Based Treatment to carry forward as a contingency alternative to be used in the interim if the PWB cannot be constructed and operational by October 31, 2020, the likely date that TVA will have to cease using Ash Impoundment 2 under the CCR Rule.

2.1.3 Process Water Basin Alternatives

TVA considered alternatives for the location of the proposed PWB as well as alternatives for the various support systems for the proposed PWB. The following sections summarize the various PWB location and system alternatives evaluated.

Each siting and configuration alternative evaluated for the construction of the PWB included the following project elements:

- Two new equal-area cells would be constructed with an operational pool depth of approximately 10 feet. The cells would be designed such that they operate in series during normal operating conditions. An inflow diversion structure would be included to allow either cell to receive inflows while the other cell is taken offline for maintenance. The basin cells would be approximately 6 to 10 acres each to satisfy design intent and a 3- to 5-year sediment cleanout frequency.
- General plant process flows (including Powerhouse Units 1 through 10 Station Sumps, Baghouse Sump, Filter Plant Backwash Sump, Reverse Osmosis Reject Sump, and Ash Transfer Building Sump) would be rerouted to the new basin inlet header pipe. Effluent from the new Bottom Ash Dewatering Facility and the CYDB would also be routed to the new basin inlet header pipe. Lowering the pool in the CYDB is also included for each alternative.
- Pre-treated Plant Outage Washes would be routed to the proposed PWB.
- The new CCR Landfill Leachate force main would be routed to the new PWB inlet header pipe.
- The PWB would outlet to the KPDES Outfall 001 and then would be discharged to the Ohio River via Outfall 002.
- The PWB would include a liner system assumed to consist of 6 inches of compacted sand, geosynthetic clay liner, 60 mil linear low-density polyethylene geomembrane, non-woven geotextile cushion, and 24 inches of protective cover.
- It is assumed construction activities can be performed in the dry for alternatives that do not include construction over the active portion of Ash Impoundment 2 or Closure-by-Removal (i.e. Alternatives 1A, 1B, 2A, 4, 5, and 6A listed below).
- Cut/fill slopes for excavation and construction of new clay dikes would be slope ratio 3H:1V (height to side slope). The new clay perimeter and divider dikes would include a 20-foot wide access road along the crest.
- The PWB would not be designed to receive or store CCR. It is expected that plant outage washes would receive pre-treatment before discharging to the PWB.
- If present, any CCR materials would be removed from within the proposed PWB footprint prior to construction of the proposed PWB.
- Proposed locations for the PWB outside the footprint of existing CCR disposal areas were given preference.

The PWB location and configuration alternatives were compared relative to one another based on the following criteria:

- Site location (i.e., easily accessible, not located over CCR material)

- Conveyance (i.e., proximity of alternative relative to points of effluent sources, treatment, and discharge)
- Design Considerations (i.e., seismic concerns, construction of dikes, existing utilities)
- Constructability (i.e., schedule, ability to construct on dry land)
- Environmental (i.e., location relative to cultural and natural resources, permitting requirements)
- Costs (i.e., construction costs, operation and maintenance costs)

2.1.3.1 Process Water Basins Location and Configuration Alternatives

TVA considered several location and configuration alternatives for the proposed PWB. These alternatives are summarized in Table 2.1-3 and shown on Figure 2.1-2.

Table 2.1-3. Process Water Basin Location and Configuration Alternatives (Stantec 2018b)

<table>
<tr><th>Alternative</th><th>Description</th><th>Analysis Recommendation</th></tr>
<tr><td>1A/1B – Ash Impoundment 2 East</td><td>Alternative 1A/1B consists of construction of the PWB in the east portion of Ash Impoundment 2. Two subset configurations within this area were considered.</td><td rowspan="2">The new PWB would be constructed over an existing CCR facility and stabilization of the CCR will be required. This alternative would have minor operational impacts during construction and minor impacts to the SWL and Ash Impoundment 2 closure design grades.
Due to the height of the new clay dikes and the maximum impounding capacity, the structures would be subject to the TVA Dam Safety program. Since the dikes would not be impounding CCR material, it is assumed they would be classified as low hazard dams and seismic design would not be required. However, the basin would have a greater potential for release due to failure since the new clay dikes would extend above the existing Ash Impoundment 2 perimeter dikes.
This proposed location of the new basin is the alternative closest to the CYDB, new Bottom Ash Dewatering Facility, and general plant flows, reducing the length of pipe rerouting required.
These alternatives were eliminated from consideration due to the significant constructability, safety, and stability concerns and CCR rule implications associated with construction of the basin over CCR materials.</td></tr>
<tr><td>2A – Inactive Dredge Cell</td><td>Alternative 2A consists of construction of the PWB within the current footprint of the Inactive Dredge Cell.</td></tr>
<tr><td>1C – Ash Impoundment 2 East (CCR Removal)</td><td>Alternative 1C is similar to Alternative 1A/1B with the exception that the CCR material within the footprint of the basin would be excavated and removed prior to the basin construction.</td><td rowspan="2">This alternative avoids constructing the new basin over an existing CCR facility. However, the effort required to dewater and excavate the CCR material adjacent to the existing stack slopes introduces significant additional costs and presents stability concerns.
The operational impacts, including flow rerouting required during and following construction, and impacts to the SWL and Ash Impoundment 2 closure design grades are similar to Alternative 1B/2A respectively.
This alternative was eliminated from consideration due to the significant constructability, safety, and stability concerns, and extended construction schedule associated with dewatering and CCR removal. Its location within the footprint of the existing CCR disposal area was also not preferred.</td></tr>
<tr><td>2B – Inactive Dredge Cell (CCR Removal)</td><td>Alternative 2B is similar to Alternative 2A with the exception that the CCR material within the footprint of the basin would be excavated and removed prior to the basin construction.</td></tr>
</table>

Table 2.1-3. Process Water Basin Location and Configuration Alternatives (Stantec 2018b)

Alternative	Description	Analysis Recommendation
3A – Ash Impoundment 2 West Including Stilling Impoundment 3B – Ash Impoundment 2 West Excluding Stilling Impoundment	Alternatives 3A/3B consists of constructing the PWB within the current Ash Impoundment 2 and the Stilling Impoundment footprint. Construction of the two 10-acre cells would be performed in two stages. This proposed location of the new basin is the farthest alternative from the CYDB, new Bottom Ash Dewatering Facility, and general plant flows, increasing the length of pipe rerouting and pumping required.	• The new PWB would be constructed over an existing CCR facility and stabilization of the wet CCR would be required. The effort required to dewater and stabilize the CCR material presents significant constructability and stability concerns. • This alternative would have both significant operational impacts during construction and significant impacts to the SWL and Ash Impoundment 2 closure design grades. • **Alternatives 3A/3B were eliminated from consideration due to the significant constructability, safety and stability concerns, and CCR implications associated with construction of the basin over CCR materials.**
3C – Ash Impoundment 2: West (CCR Removal) Including Stilling Impoundment 3D – Ash Impoundment 2: West (CCR Removal)Excluding Stilling Impoundment	These alternatives are similar to Alternatives 3A/3B with the exception that the CCR material within the footprint of the basin would be excavated and removed prior to the basin construction.	• These alternatives avoid constructing the new basin over an existing CCR facility. However, the effort required to dewater and excavate the wet CCR material presents significant constructability and stability concerns. • The operational impacts, including flow rerouting required during and following construction, and impacts to the SWL and Ash Impoundment 2 closure design grades are similar to Alternatives 3A/3B. • **These alternatives were eliminated from consideration and further evaluation due to the significant constructability, safety, and stability concerns, and the extended construction schedule associated with dewatering and CCR removal. The location within the footprint of the existing CCR disposal area was also not preferred.**
4 – Coal Yard	Alternative 4 consists of constructing the new PWB adjacent to the Coal Yard.	• The subsurface conditions of the area adjacent to the Coal Yard are unknown. The location may overlap the old Ash Impoundment 1 location and CCR material may be encountered during excavation. Depending on the material encountered, stabilization may be required prior to construction of the new basin. • This alternative would have no operational impacts during construction and no impacts to the SWL and Ash Impoundment 2 closure design grades. • **Alternative 4 was eliminated from consideration and further evaluation due to the limited area available. The area of the basin cells would decrease to less than five acres each to account for the expansion of the coal pile.** • Additionally, the area adjacent to the current Coal Yard expansion may be needed for future coal storage or other plant uses.

Table 2.1-3. Process Water Basin Location and Configuration Alternatives (Stantec 2018b)

Alternative	Description	Analysis Recommendation
5 – Rail Loop	Alternative 5 consists of constructing the new PWB within the rail loop. Several locations and configurations of the PWB within the rail loop were considered but were eliminated from further consideration due to conflicts including transmission lines and towers, the 100-year floodplain, wooded areas, rail lines, and an old asbestos landfill. The selected configuration of the basin is two approximate 6-acre cells located in the northwest portion of the rail loop and includes a 100-foot buffer from the rail lines.	• This alternative does not require construction of the basin over CCR materials. Geotechnical investigations of the subsurface conditions of the area within the rail loop have been conducted and will be incorporated into the design plan of the PWB. The area has been used as a construction laydown and disposal area in the past. • The risk matrix assumed that approximately half of the material excavated during construction would be required to be hauled to an offsite landfill. The site is also partially located within the documented Trichloroethylene (TCE) plume of contamination of the Paducah Gaseous Diffusion Plant based on 2015 data. • This alternative would have no operational impacts during construction and no impacts to the SWL and Ash Impoundment 2 closure design grades. • This proposed location of the new basin is the alternative farthest from the discharge channel and KPDES Outfall 001, increasing the length of pipe and pumping required. However, this proposed location is the alternative closest to the new CCR Landfill Leachate Impoundment. • **Alternative 5 was selected as the recommended option to avoid construction over CCR materials as well as the expense, difficulty, and risks associated with removing CCR materials.**
6A – Ash Impoundment 2: East and Coal Yard	Alternative 6A consists of constructing the two operational PWB cells in the east portion of Ash Impoundment 2 and adjacent to the Coal Yard.	• Cell 1 of the PWB would be constructed over an existing CCR facility and stabilization of the CCR would be required. • Due to the height of the new clay dikes and the maximum impounding capacity, the structures would be subject to the TVA Dam Safety program. Since the dikes would not be impounding CCR material, it is assumed they would classify as low hazard dams and seismic design would not be required. • This alternative would have minor operational impacts during construction and minor impacts to the SWL and Ash Impoundment 2 closure design grades. • The subsurface conditions of the area adjacent to the Coal Yard are unknown. The proposed Cell 2 location may overlap the old Ash Impoundment 1 location and CCR material may be encountered during excavation. Depending on the material encountered, stabilization may be required prior to construction of the new basin cell. • **This alternative was eliminated from consideration to avoid construction of the basin over CCR materials. In addition, the area adjacent to the current Coal Yard expansion may be needed for future coal storage or other plant uses.**

Table 2.1-3. Process Water Basin Location and Configuration Alternatives (Stantec 2018b)

Alternative	Description	Analysis Recommendation
6B – Ash Impoundment 2: East and Coal Yard (CCR Removal)	This alternative is similar to Alternative 6A with the exception that the CCR material within the footprint of Cell 1 of the basin would be excavated and removed prior to the basin construction.	• This alternative avoids constructing the new basin over an existing CCR facility. However, the effort required to dewater and excavate the wet CCR material adjacent to the existing stack slopes introduces significant costs, constructability, and stability concerns. • During construction, the flows from the CYDB, bottom ash sluice lines, and general plant flows would be rerouted around the new basin to the Bottom Ash Sluice Channel. The flow rerouting required following construction and the impacts to the SWL and Ash Impoundment 2 closure design grades are similar to Alternative 6A. • **This alternative was eliminated from consideration due to the significant constructability, safety, and stability concerns, and extended construction schedule associated with dewatering and CCR removal. Its location within the footprint of the existing CCR disposal area was also not preferred. In addition, the area adjacent to the current Coal Yard expansion may be needed for future coal storage or other plant uses.**

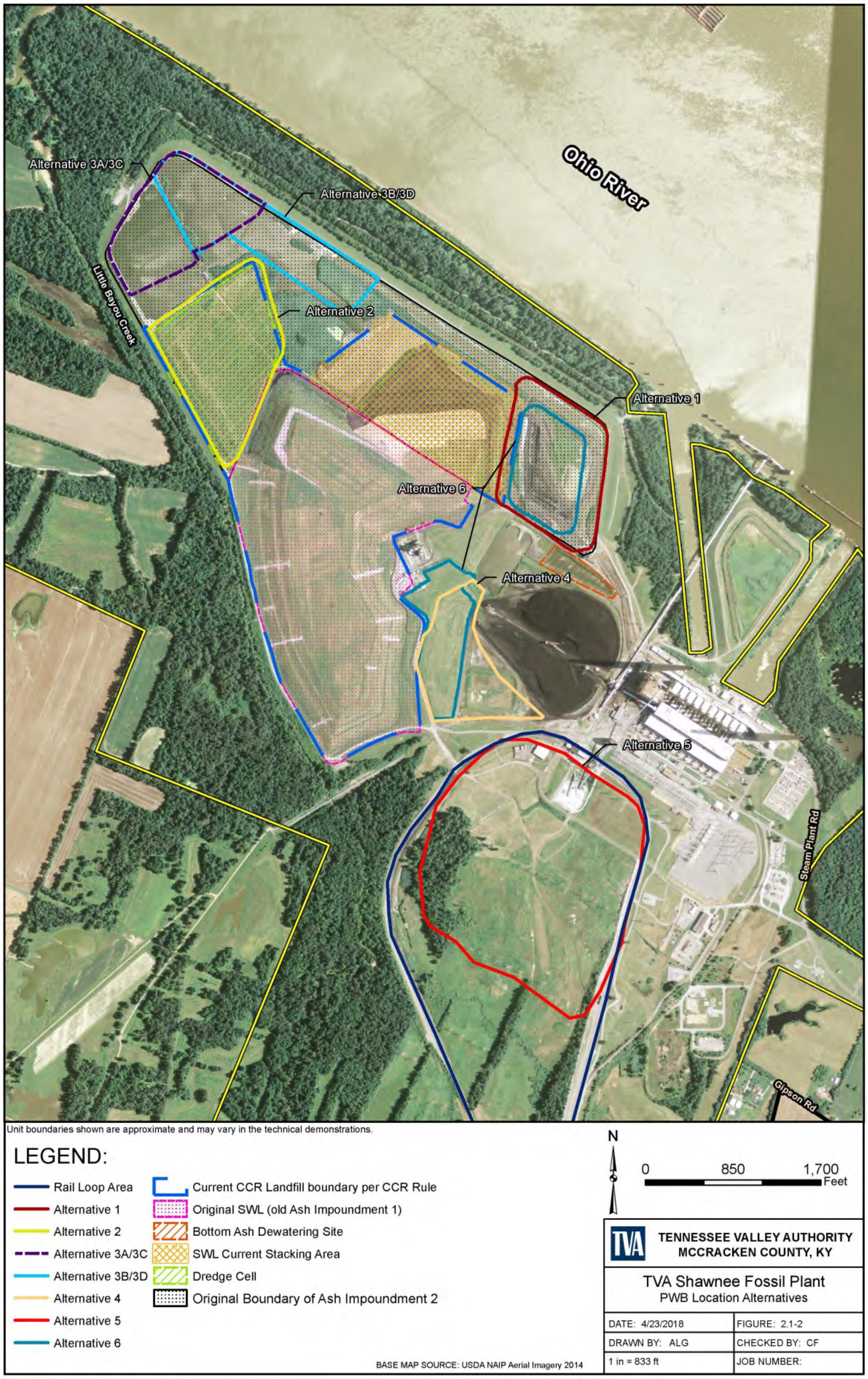

Figure 2.1-2. Process Water Basin Location Alternatives

Alternative 5 was the preferred location alternative and the only alternative available to accommodate the PWB outside the limits of the existing disposal facilities. Therefore, the selected subset of this alternative is carried forward for consideration in this SEIS.

2.2 Project Alternatives Retained for Detailed Analysis

Based on the analysis and screening criteria described in the Final EIS and additional analysis included above, TVA has determined that there are three alternatives available to TVA: (A) No Action; (B) Closure-in-Place by Reduced Footprint of the SWL and Ash Impoundment 2 and Construction of a New PWB; or (C) Closure in-Place and Regrading of the SWL and Ash Impoundment 2 and Construction of a New PWB.

2.2.1 Alternative A – No Action

As described in Subsection 2.2.1 of the Final EIS, under the No Action Alternative, TVA would continue current plant operations and not cease operations at its SWL and Ash Impoundment 2 (i.e., neither facility would be closed). Additionally, TVA would not construct and operate a new PWB. No closure activities (i.e., cover system construction) would occur under the No Action Alternative. The impoundments would continue to receive the storm water and other process wastewaters that they currently receive. TVA would continue safety inspections of berms to maintain stability and all impoundments would be subject to continued care and maintenance activities.

TVA would continue to dispose of wet bottom ash in onsite impoundments until completion of the dewatering facility. The existing associated impoundments would continue to be operated as currently permitted until completion of the new CCR landfill. TVA's 2015 Integrated Resource Plan (TVA 2015) identifies SHF as a facility that will continue to operate as part of its balanced portfolio of energy resources in the near term. However, SHF cannot continue to operate its ash units if they are not compliant with the CCR Rule. Compliance with the CCR Rule would likely require the closure of Ash Impoundment 2, and the construction of a new PWB. Under the No Action Alternative, SHF's operations likely would not comply with the CCR Rule; therefore, this alternative would not meet the Purpose and Need for the proposed actions and is not considered viable or reasonable. It does, however, provide a benchmark for comparing the environmental impacts of implementation of Action Alternatives B and C.

2.2.2 Alternative B –Closure-in-Place by Reduced Footprint of the Special Waste Landfill and Ash Impoundment 2 and Construction of a New Process Water Basin

2.2.2.1 Special Waste Landfill and Ash Impoundment 2

This alternative is a modification to Final EIS Alternative B described in Subsection 2.2.2 of the Final EIS for Closure-in-Place and Consolidation of the SWL and Ash Impoundment 2. The description presented in the Final EIS is incorporated by reference. Under Alternative B, TVA would remove and consolidate portions of the ash in the northwest corner of Ash Impoundment 2. In this SEIS, this alternative also includes the over-excavation of an additional approximately 1 foot of underlying native material and potential additional remediation to confirm CCR

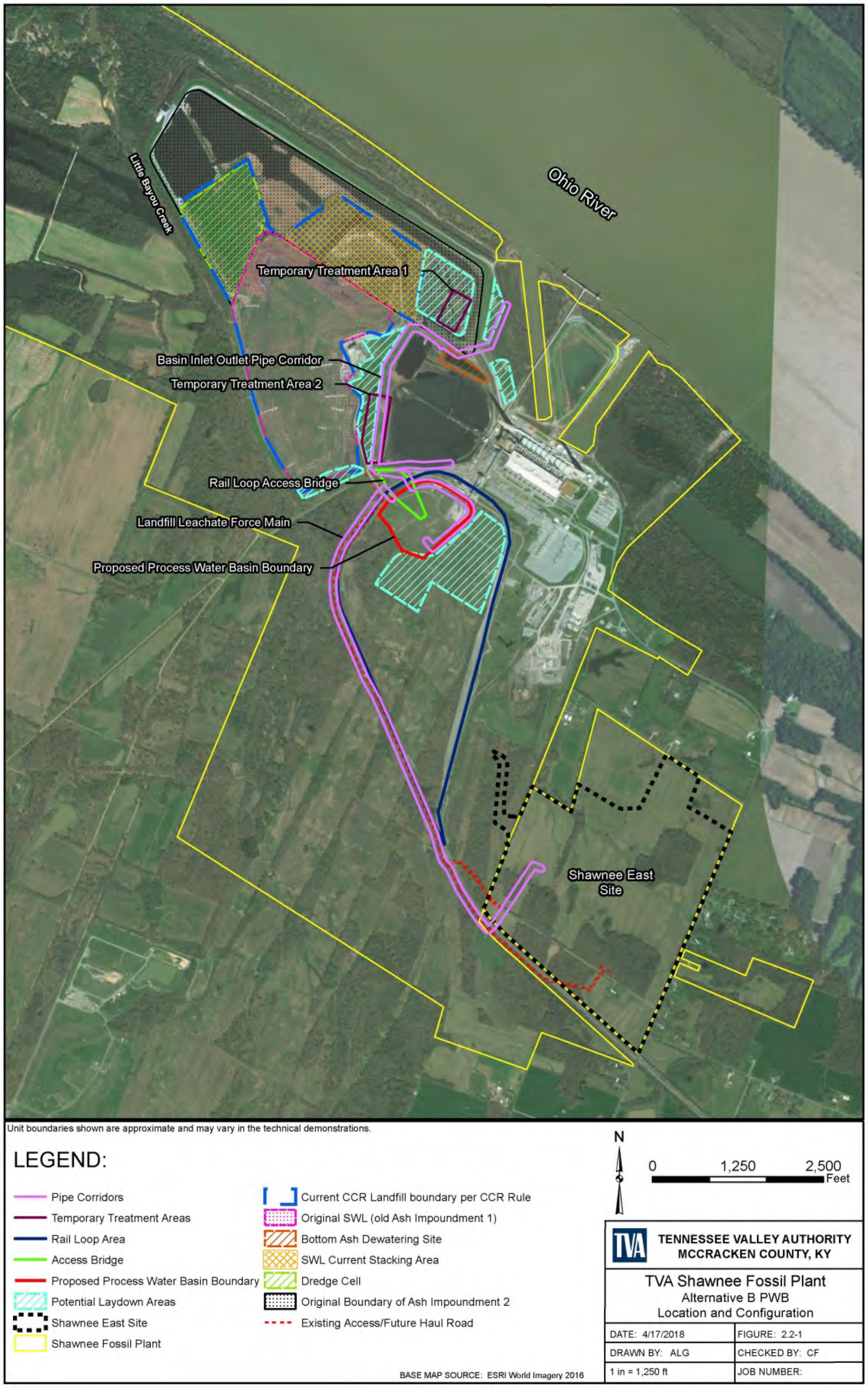

Figure 2.2-1. Alternative B Closure-in-Place by Reduced Footprint of the Special Waste Landfill and Ash Impoundment 2 and Construction of a New Process Water Basin

removal. Under Alternative B (Figure 2.2-1), TVA would undertake a series of actions to close the SWL and Ash Impoundment 2 at SHF including:

- Construction of PWB(s) to receive plant flows and allow for operations to cease at Ash Impoundment 2 once the dewatering system is constructed. (See Section 2.4.4.2)
- Cease operations in Ash Impoundment 2.
- Remove portions of the ash in Ash Impoundment 2 to allow for construction of a new perimeter dike along the northern boundary of the dredge cell and adjacent to the SWL.
- Remove and consolidate the ash in the northwest corner of Ash Impoundment 2.
- Cover the SWL and remaining Ash Impoundment 2 (including the dredge cell) with either a traditional geomembrane cap system with a protective soil and vegetation layer or a ClosureTurf® or equivalent system which consists of a special engineered turf and sand fill. The preferred closure plan would be subject to meeting all applicable local, state, and federal requirements.
- Extract borrow materials from the Shawnee East Site to place on the SWL and Ash Impoundment 2 (including the dredge cell) as part of the closure cap system if needed for the traditional geomembrane cap system.
- Remove the remaining Ash Impoundment 2 dikes and support structures on the north side of the impoundment.
- Utilize temporary laydown yards/storage areas as needed.
- Over-excavation of native materials across the area from which materials are removed/consolidated to confirm complete removal of CCR. Approximately 1 foot of over-excavation is assumed to be necessary. Due to the unknown nature of underlying material, over-excavation of significantly more than 1 foot could be required and could potentially include other remediation measures which cannot be defined at this time.

2.2.2.2 Process Water Basin

The PWB would be constructed within the Rail Loop Site (Figures 2.2-1 and 2.2-2), identified as a subset of Alternative 5 as described in Table 2.1-3, and would consist of:

- Construction of a new PWB consisting of two equal-area (approximately 6 acres each) operational, lined basin cells and rerouting existing general plant process flows away from the CYDB directly to the PWB.
- Diversion of an existing wet weather conveyance (WWC) around the PWB site.
- Improving the CYDB through lowering the pool and dredging to reduce solids loading to the PWB.
- Additional treatment improvements such as:
    - Installation of additional treatment systems (coagulant, flocculent, and polymer injection and mixing) to provide additional TSS removal of flows routed to the PWB.

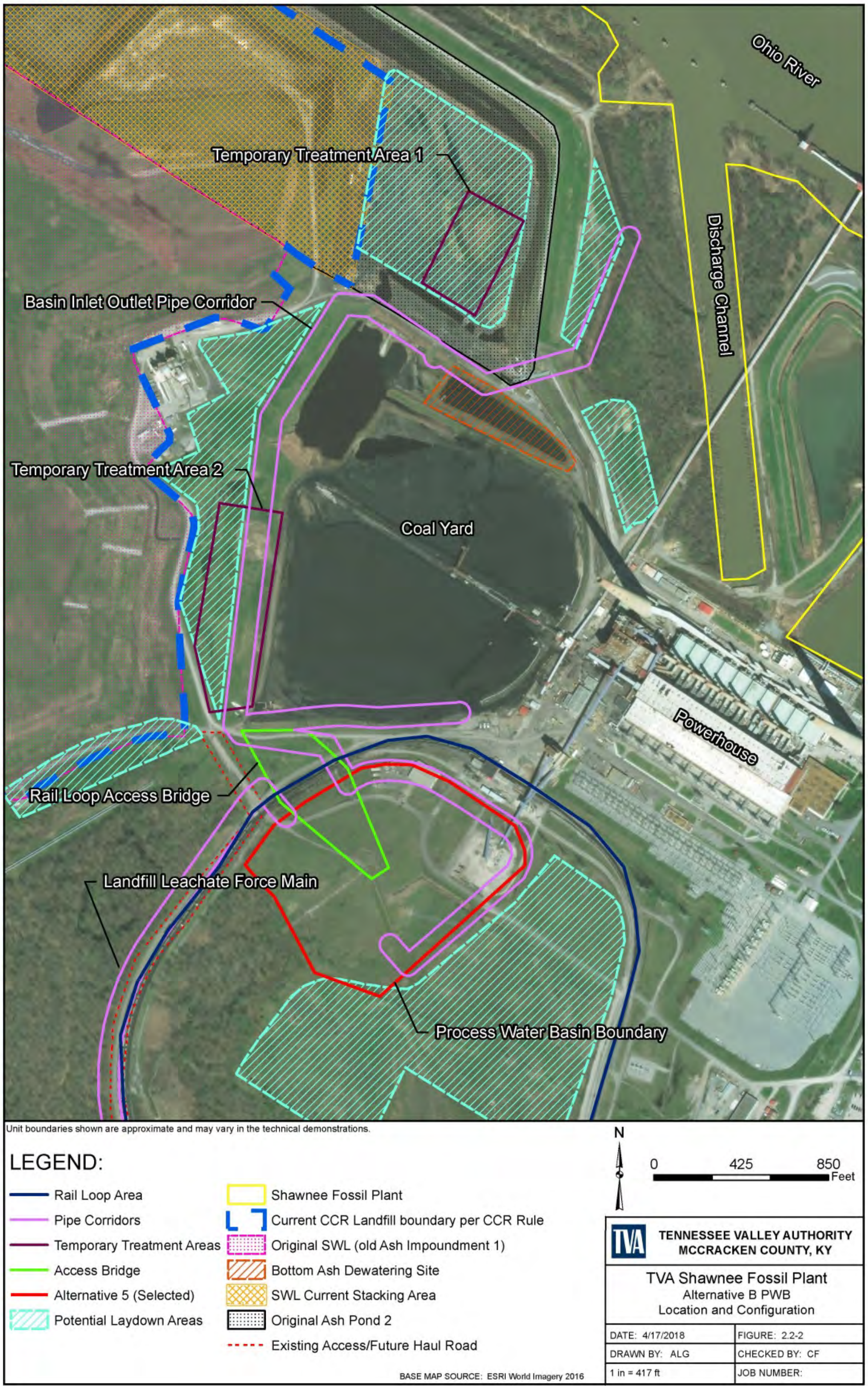

Figure 2.2-2. Alternative B Process Water Basin Location and Configuration

  - Installation of pH adjustment and aeration in the PWB.
  - Installation/upgrade of an additional treatment system to provide additional TSS removal in flows routed to the CYDB.

This alternative also includes consideration for establishment of temporary tank-based treatment if the PWB cannot be constructed and operational by October 31, 2020, the likely date that TVA will have to cease using Ash Impoundment 2 under the CCR Rule. Temporary tank-based treatment would include an estimated 15 to 25 free-standing tanks (ranging in size from 0.6 to 1.7 million gallons per tank), covering a footprint of approximately 7 to 12 acres.

Improvements to the CYDB would be made to provide detention and TSS removal from storm water runoff. During large storm discharge events, coal fines eroded from the Coal Yard Storage Area can deposit in the CYDB. These fines could increase the sediment load discharged to the PWB, requiring additional sediment removal in the PWB to prevent discharge of TSS concentrations above existing KPDES permit limits.

To mitigate potential elevated concentrations of TSS, the CYDB would operate as a storm water detention basin. During normal operating conditions, the CYDB would discharge to the PWB. This discharge could be ceased during large storm events, detaining the storm water in the CYDB with no release to the PWB. This would allow additional detention time in the CYDB for settling of coal fines. Storm water would be released to the PWB after TSS concentrations in the CYDB are acceptable.

The following improvements would be implemented for the CYDB:

- The operational pool would be lowered from 7 feet to 4 feet using the existing pump system.
- Approximately 3 feet of coal fines and sediment material would be dredged from the bottom of the basin to increase the storage capacity. This material would be placed in the Coal Yard.
- Depending on the location of new pump stations for rerouting the Unit 1-10 station sumps, additional BMPs may be required to route Coal Yard storm water runoff away from the existing CYDB ditch.
- An additional sediment removal system would be installed to provide polymer, coagulant, or flocculent injection and mixing in the CYDB.

2.2.3 Alternative C – Closure-in-Place and Regrading of the Special Waste Landfill and Ash Impoundment 2 and Construction of a New Process Water Basin

Alternative C described within this SEIS is similar to the previously eliminated Alternative 4B identified in Table 2.13 of the Final EIS. Upon further evaluation, TVA found that this option was feasible and elected to carry it forward for evaluation. Most activities would be the same under Alternative C as described previously for Alternative B. However, under Alternative C, the remaining ash in the northwest corner of Ash Impoundment 2 would not be removed and consolidated. Instead, both the SWL and Ash Impoundment 2 would be closed-in-place and regraded with materials redistributed to establish appropriate drainage and stability. New storm water outfalls would be installed along the perimeter of the facilities to outlet at elevations at or above the 100-year flood elevation.

2.3 Summary of Alternative Impacts

The environmental impacts of Alternatives A, B, and C are analyzed in detail in Chapter 3 and are summarized in Table 2.3-1. These summaries are derived from the information and analyses provided in the Affected Environment and Environmental Consequences sections of each resource in Chapter 3.

Table 2.3-1. Summary and Comparison of Alternatives by Resource Area

Resource	Alternative A – No Action	Alternative B – Closure-in-Place by Reduced Footprint of the SWL and Ash Impoundment 2 and Construction of a New PWB	Alternative C – Closure-in-Place and Regrading of the SWL and Ash Impoundment 2 and Construction of a New PWB
Land Use	No impact.	Minor impacts associated with closure activities. Minor impacts due to the conversion of land use from undeveloped to industrial at the PWB site. No cumulative effects.	Minor impacts associated with closure activities. Minor impacts due to the conversion of land use from undeveloped to industrial at the PWB site. No cumulative effects.
Prime Farmland and Soils	No impact.	Minor, potentially beneficial impacts to soils as a result of over-excavation of Ash Impoundment 2. Minor cumulative effects.	Minor impacts to soils as more borrow material may be required to complete closure of Ash Impoundment 2 since consolidation would not be conducted. Minor cumulative effects.
Groundwater	No impact.	Minor temporary impacts during construction. Minor beneficial permanent impacts due to reduction of potential for CCR constituents to move into groundwater after closure. Minor cumulative effects.	Minor temporary impacts during construction. Minor beneficial permanent impacts due to reduction of potential for CCR constituents to move into groundwater after closure. Minor cumulative effects.
Surface Water	No impact.	Minor impacts associated with alterations of the onsite WWC and storm water flow and construction related storm water runoff at the PWB site. Minor cumulative effects.	Minor impacts associated with alterations of the onsite WWC and storm water flow and construction related storm water runoff at the PWB site. Minor cumulative effects.

Table 2.3-1. Summary and Comparison of Alternatives by Resource Area

Resource	Alternative A – No Action	Alternative B – Closure-in-Place by Reduced Footprint of the SWL and Ash Impoundment 2 and Construction of a New PWB	Alternative C – Closure-in-Place and Regrading of the SWL and Ash Impoundment 2 and Construction of a New PWB
Vegetation	No impact.	Minor impacts due to changes in species composition during closure, clearing, construction and operation of the PWB; revegetation post-closure. Minor cumulative effects.	Minor impacts due to changes in species composition during closure, clearing, construction and operation of the PWB; revegetation post-closure. Minor cumulative effects.
Wildlife	No impact.	Minor impacts due to habitat changes at the ash impoundment, SWL, and PWB locations. Minor cumulative effects.	Minor impacts due to habitat changes at the ash impoundment, SWL, and PWB locations. Minor cumulative effects.
Threatened and Endangered Species	No impact.	With application of appropriate Avoidance and Minimization measures for bat habitat, no significant impacts to federally listed species. Potential minor impacts to state status species. Minor cumulative effects.	With application of appropriate Avoidance and Minimization measures for bat habitat, no significant impacts to federally listed species. Potential minor impacts to state status species. Minor cumulative effects.
Wetlands	No impact.	Minor direct and indirect impacts. No cumulative effects.	Minor direct and indirect impacts. No cumulative effects.
Cultural and Historic Resources	No impact.	No impacts. No cumulative effects.	No impacts. No cumulative effects.

2.4 Identification of Mitigation Measures and Best Management Practices

TVA's analysis includes mitigation, as required, to reduce or avoid adverse effects. Mitigation measures identified in Chapter 3 to avoid, minimize, or reduce adverse impacts to the environment and project specific BMPs are summarized below.

Mitigation Measures:

- Final drainage for the temporary treatment basin (if utilized) would be routed to existing or new discharge points and comply with the KPDES permit to ensure that no adverse impacts to surface waters would occur. Mitigation measures would be identified, as needed, to ensure the discharges meet permit limits. This may or may not require a permit modification.

- Prior to disturbing wetland and surface water features within the process water basin project site, TVA would obtain a Clean Water Act Section 404 permit and a Kentucky Division of

Water 401 Water Quality Certification. Where impacts to these features cannot be avoided, TVA would mitigate impacts in accordance with the Section 404 permit and/or Water Quality Certification as determined in consultation with the USACE and Kentucky Division of Water.

- Tree removal would occur in winter months (between November 15 and March 30) and would be tracked, documented, and reported to the U.S. Fish and Wildlife Service (USFWS).

Best Management Practices (BMPs):

- TVA would comply with all appropriate local, state, and federal permit requirements.
- All proposed project activities would be conducted in a manner to ensure that waste materials are contained, and the introduction of pollutants to the receiving waters would be minimized and be in accordance with storm water pollution prevention plan (SWPPP) limits.
- Storm water flows would be properly treated with either implementation of proper BMPs or by diverting the storm water discharges to an appropriate storm water outfall or impoundment for co-treatment.
- 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 to minimize construction impacts to surface waters.
- Sanitary wastes generated during construction activities would be collected by the existing sewage treatment system, onsite septic system(s) or portable toilets. These would be pumped out regularly, and the sewage transported by a vacuum truck to a publicly-owned wastewater treatment works that accepts pump out.
- Upon completion of construction, temporarily-disturbed areas, such as the temporary treatment areas and laydown yards, would be restored to their previous state or maintained by TVA.

2.5 Preferred Alternative

TVA has identified Alternative C – Closure-in-Place and Regrading of the SWL and Ash Impoundment 2 and Construction of a New PWB as the preferred alternative. Alternative C would achieve the purpose and need of the project and calls for less movement of CCR material and less dewatering than Alternative B resulting in greater stability for Alternative C as well. Alternative C would also have reduced air quality impacts associated with the mobilization of dust and emissions from equipment associated with the movement of CCR material as compared to Alternative B. Consequently, Alternative C could be completed sooner and for a lower cost than Alternative B.

CHAPTER 3 - AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Section 1.4, Chapter 3 of the 2017 Final EIS described the baseline environmental conditions (affected environment) of resources in the project area and the anticipated environmental consequences that would occur from implementation of the alternatives described in Chapter 2 of the Final EIS. TVA considered all environmental factors potentially influenced by the proposed project as part of this analysis. TVA has determined that the analysis presented in the 2017 Final EIS adequately addressed potential impacts to air quality; climate change and greenhouse gases; geology and seismology; floodplains; socioeconomics and environmental justice; natural areas, parks, and recreation; transportation; visual resources; noise; solid and hazardous waste and hazardous materials; and public health and safety. Therefore, the 2017 Final EIS analysis for these resources is incorporated by reference for this SEIS.

The remaining resources previously evaluated in the 2017 Final EIS, require additional analysis with respect to the proposed actions evaluated in this SEIS. These remaining resources include: land use, prime farmland and soils, groundwater, surface water, vegetation, wildlife, threatened and endangered species, wetlands, and cultural and historic resources. The baseline environmental conditions (affected environment) of these remaining resources in the project area and the anticipated environmental consequences that would occur from implementation of the alternatives described in Chapter 2 of this SEIS are presented in this Chapter.

3.1 Land Use

3.1.1 Affected Environment

No residential or commercial land uses occur in the immediate vicinity of the proposed closure activities or proposed PWB and associated pipelines. Residential land uses occur approximately 1800 feet southeast of the proposed disturbance area at the closest point. Section 3.3 in the Final EIS describes existing land use and impacts associated with the SWL and Ash Impoundment 2 closure activities. That analysis is incorporated by reference in this SEIS. The following paragraphs describe the land use within the proposed PWB and associated construction areas.

The project disturbance area associated with the construction of a new PWB includes a total of approximately 118.5 acres. This total includes approximately 97 acres of temporarily-disturbed areas and approximately 22 acres of permanently disturbed areas. The project location is zoned for heavy industrial use (McCracken County and Paducah Geographic Information System 2016). The proposed PWB construction activities would be located within previously-disturbed lands at SHF. Although the area is zoned for heavy industry, current site conditions reflect a variety of active and passive land uses. The proposed PWB footprint is located in an area previously used for borrow material. The PWB site is currently partially comprised of grassy fields and partially occupied by storage areas scheduled for demolition in 2018.

Land use/land covers based on the National Land Cover Database (Homer et al. 2015) within the PWB project areas, including the proposed PWB pond location, the temporary treatment areas, the potential laydown areas and pipe corridors, are identified in Table 3.1-1 and shown in Figure 3.1-1. Though the National Land Cover Database classifies a portion of the project area as “cultivated crops”, no cultivated crops are present within these areas, nor have they been for many years. (Wetlands are discussed in Section 3.8 of this SEIS.)

Table 3.1-1. Land Cover at the Proposed PWB Site, Temporary Treatment Areas, Potential Laydown Areas and Pipe Corridors

National Land Cover Database Classification	Temporary Treatment Areas	Pipe Corridors	Potential Laydown Areas	Proposed PWB
Open Water	0.0	0.0	1.0	0.0
Developed, Open Space	0.0	1.1	10.2	1.5
Developed, Low Intensity	0.2	0.5	2.9	0.5
Developed, Medium Intensity	0.7	1.3	3.0	1.7
Developed, High Intensity	0.4	0.1	0.9	0.2
Barren Land	1.6	1.9	9.7	7.6
Deciduous Forest	0.0	2.6	1.9	2.2
Evergreen Forest	0.0	0.0	0.0	0.0
Shrub/Scrub	0.0	0.0	0.0	0.0
Grassland/Herbaceous	0.0	0.0	0.0	0.0
Pasture/Hay	0.0	0.0	0.0	0.0
Cultivated Crops	5.7	12.8	24.9	6.0
Woody Wetlands	0.2	0.5	1.0	0.0
Emergent Herbaceous Wetlands	0.1	1.9	9.8	2.0
Total	**8.9**	**22.7**	**65.2**	**21.8**

Source: Homer et al. 2015

Land use in the vicinity of SHF includes agricultural, residential, and industrial areas as described in Section 3.3 of the Final EIS. Land use within the region around the project sites as classified by the National Land Cover Database is mostly agriculture (cultivated crops) and deciduous forest (Figure 3.1-1). Other common land use types include hay/pasture land, various developed lands, and open water.

Industrial developed lands in the vicinity include the SHF plant site and the former Paducah Gaseous Diffusion Plant (PGDP) located approximately 3 miles to the south of the proposed PWB project areas. However, the PGDP ceased operations in 2013 and is currently being decommissioned by the U.S. Department of Energy (DOE). Non-industrial developed lands consist of moderately developed lands associated with the City of Metropolis, Illinois.

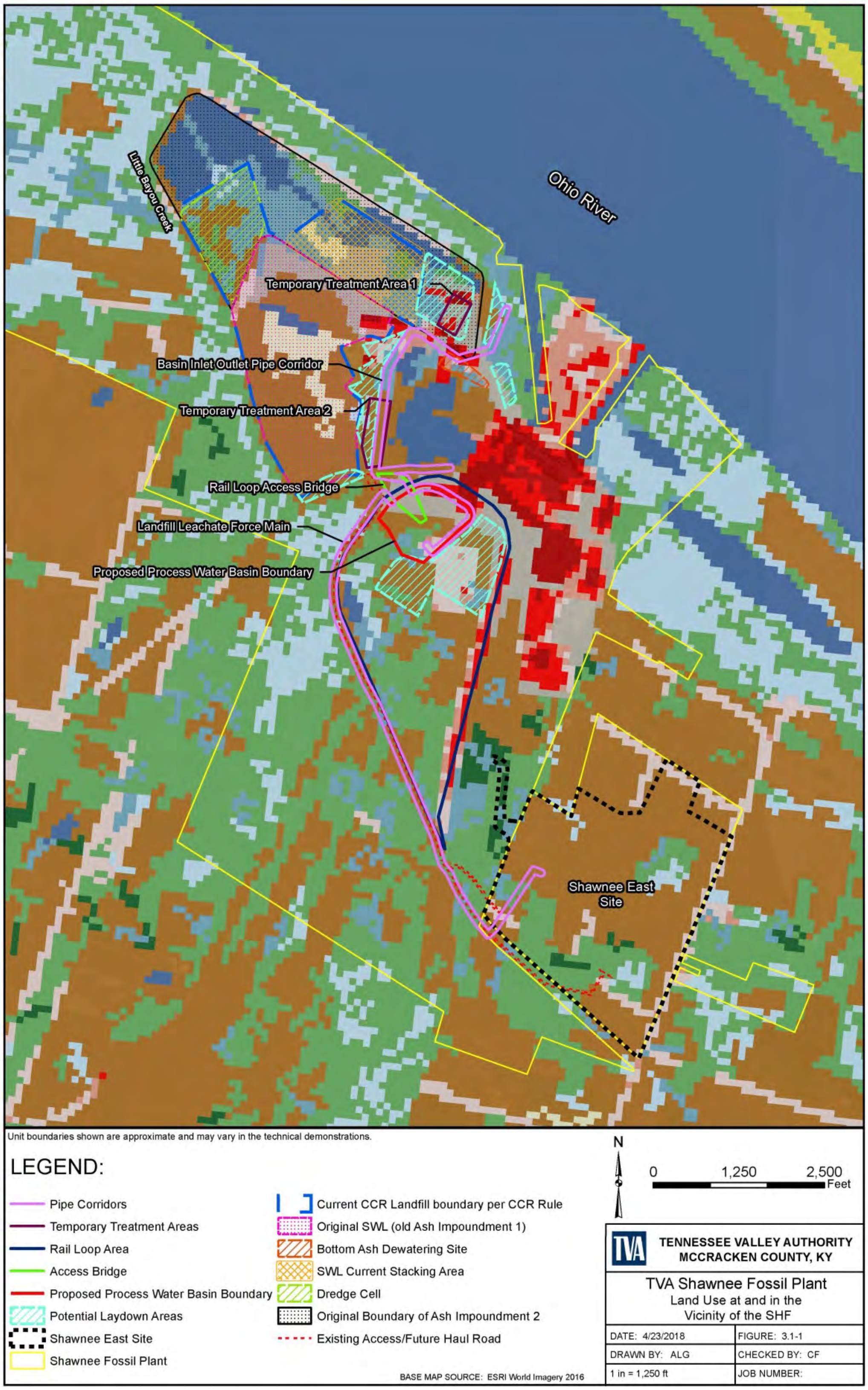

Figure 3.1-1. Land Use at and in the Vicinity of SHF

3.1.2 Environmental Consequences

3.1.2.1 Alternative A – No Action

Under the No Action Alternative, TVA would continue current plant operations and not cease operations at its SWL and Ash Impoundment 2 or close either of those facilities. Additionally, TVA would not construct and operate the proposed PWB. Without changes to plant operations, no changes to land use at SHF or in the vicinity would occur; therefore, there would be no impacts to land use associated with the No Action Alternative.

Once the dewatering system has been constructed and the new CCR landfill is operational, new CCR would no longer be stored in the SWL or Ash Impoundment 2. This alternative would not be consistent with the project's purpose and need and it does not align with current CCR regulations.

3.1.2.2 Alternative B – Closure-in-Place by Reduced Footprint of the Special Waste Landfill and Ash Impoundment 2 and Construction of a New Process Water Basin

As described in Subsection 3.3.2.2 of the Final EIS, because closure of the Ash Impoundment 2 and the SWL has only been modified to include the over-excavation of CCR material and is proposed to occur within an existing industrial area, construction would not result in conversion of any land uses with respect to zoning and would not change the impacts associated with the proposed closure activities as analyzed in the Final EIS.

Under Alternative B, TVA would also construct a PWB in the Rail Loop and install the associated piping to the new CCR landfill leachate pond and the connection to the existing permitted NPDES outfall. Temporary treatment areas may be used in the event that the PWB is not complete by October 31, 2020, the likely date that TVA will have to cease using Ash Impoundment 2 under the CCR Rule. Construction impacts include potential temporary impacts to approximately 97 acres of partially developed land. These acres include temporary treatment areas (8.9 acres), pipe corridors (22.7 acres), and potential laydown areas (65.2 acres). The temporary treatment areas and laydown areas would either be maintained by TVA or allowed to return to their current state once construction of the PWB is complete. As with the SWL and Ash Impoundment 2, the PWB project areas are already zoned for heavy industrial use; the construction of a PWB would not impact this zoning classification. Current land cover in the PWB project areas is a mix of developed and undeveloped land. Land cover in the approximately 21.8 acre PWB footprint would change permanently; however, the change is consistent with the industrial land use of the site. All areas associated with the proposed PWB construction have also already been disturbed by previous industrial and construction activities. Although there are some natural areas within the potential PWB project footprint, these areas are surrounded by industrial activity and are disconnected from less disturbed natural areas nearby. Due to the current zoning designation (heavy industrial) and because construction and operation of the PWB would not result in any major conversion of land uses, only minor direct and indirect impacts to land use would occur.

3.1.2.3 Alternative C – Closure-in-Place and Regrading of the Special Waste Landfill and Ash Impoundment 2 and Construction of a New Process Water Basin

Under Alternative C, changes to land use would be the same as those under Alternative B. The same amount of disturbance would occur under both alternatives. The PWB would be constructed in the same place and the associated piping and laydown areas would be the same as described under Alternative B. Therefore, direct and indirect impacts to land use from Alternative C would be minor.

3.2 Prime Farmlands and Soils

3.2.1 Affected Environment

As described in Section 3.4 of the Final EIS, the Farmland Protection Policy Act was passed by Congress in 1981 as part of the Agriculture and Food Act (Public Law 97-98). It is intended to minimize the amount of farmland that is irreversibly converted from agricultural uses by federal activities. Prime farmland includes federally recognized prime farmland, unique farmland, and farmland of statewide or local importance. Projects are subject to Farmland Protection Policy Act requirements if they may irreversibly convert farmland (directly or indirectly) to nonagricultural use and are completed by a Federal agency or with assistance from a Federal agency.

Under the Farmland Protection Policy Act, federal agencies are required to consult with the NRCS regarding impacts. Prime farmlands associated with the closure of the SWL and Ash Impoundment 2 are discussed in Section 3.4 in the Final EIS. That analysis is incorporated by reference in this SEIS. Ash Impoundment 2 and the SWL areas are not considered prime farmland (National Resource Conservation Service [NRCS] 2018).

According to the NRCS soil data mapper, the PWB project areas are not considered either prime farmland or farmland of statewide importance (NRCS 2018). Figure 3.2-1 shows the soil types and farmland designation for the soils at the PWB project areas. Soils in the PWB project areas have been previously disturbed and have been used for borrow material collection. These soils may be of poor quality due to these disturbances and may not be useful for any non-industrial applications.

3.2.2 Environmental Consequences

3.2.2.1 Alternative A – No Action

Under the No Action Alternative, TVA would continue current plant operations and not cease operations at its SWL and Ash Impoundment 2 or close either of those facilities. Additionally, TVA would not construct and operate the proposed PWB and associated ancillary infrastructure. With no changes to plant operations, no impacts to prime farmlands or soils at SHF (or in the vicinity) would occur. Once the dewatering system has been constructed and the new CCR landfill is operational, new CCR would no longer be stored in the SWL or Ash Impoundment 2. This alternative would not be consistent with the project’s purpose and need and it does not align with current CCR regulations.

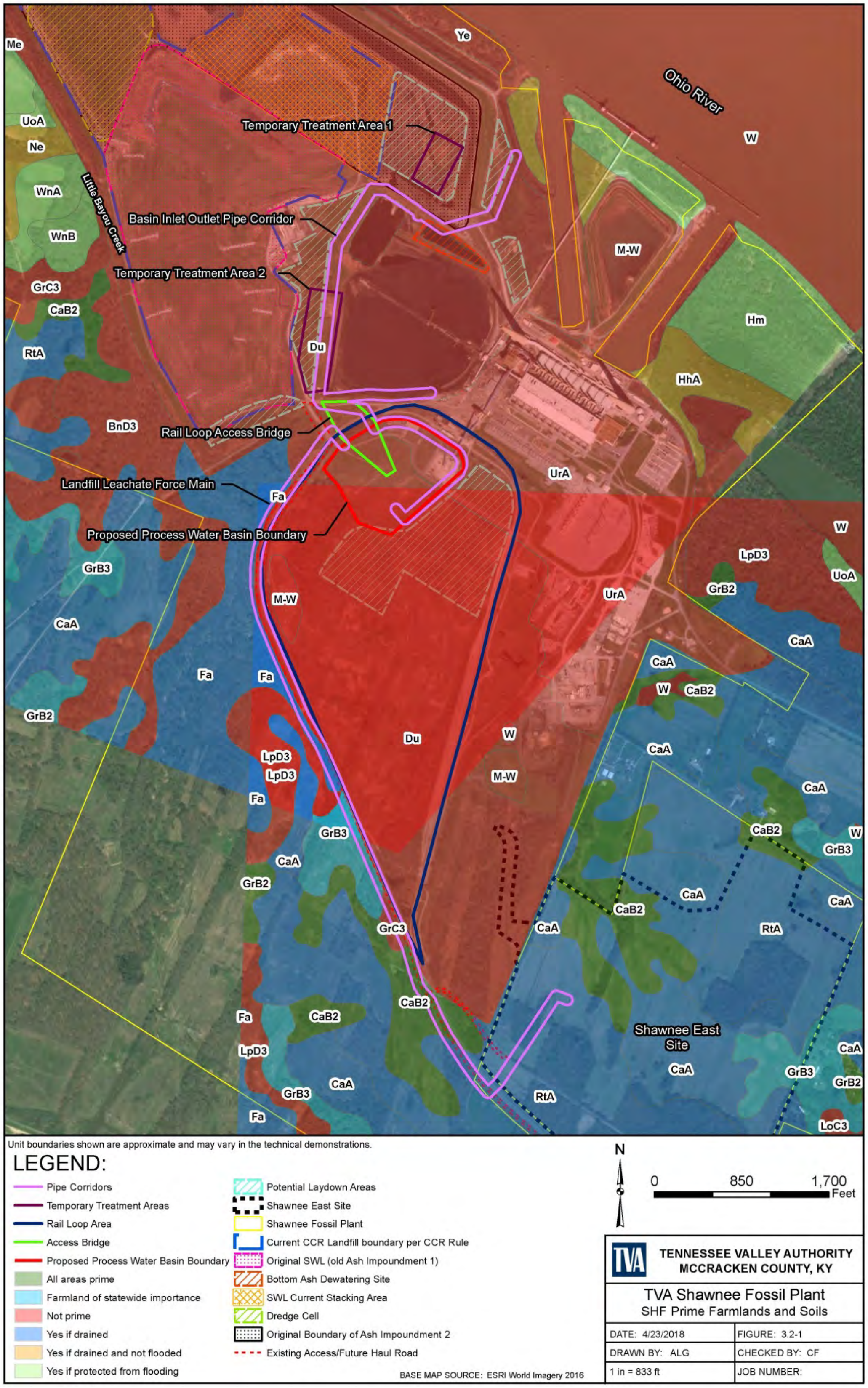

Figure 3.2-1. Prime Farmlands and Soils on the PWB Project Areas

3.2.2.2 Alternative B – Closure-in-Place by Reduced Footprint of the Special Waste Landfill and Ash Impoundment 2 and Construction of a New Process Water Basin

As described in Subsection 3.4.2.2 of the Final EIS, there would be no impacts to prime farmland associated with the closure of Ash Impoundment 2 and the SWL. Similarly, since there is no prime farmland within the PWB project areas, no impacts to prime farmland would occur in association with the construction of the proposed PWB. Depending on the results of soil testing, soils may be removed from the PWB location, stockpiled onsite, and later be used to cover Ash Impoundment 2 and the SWL during closure activities (if necessary). Impacts to soils would consist of formerly developed industrial soils being moved to another industrial area, or being disposed in a landfill. As the soil is already disturbed and possibly impacted, and is merely being moved from one disturbed industrial place to another, impacts to soils are anticipated to be minor.

The over-excavation of the Ash Impoundment 2 area to ensure complete removal of CCR would not impact prime farmland, as this area is already unsuitable for farming. The over-excavation would also be a minor, long-term beneficial impact to soils as all potentially CCR impacted soils in the excavated area would be removed, leaving only un-impacted soils in place. The excavated soils under these facilities are already impacted, would not be used for any other application, and would be contained in the final closed SWL and impoundment area. The over-excavation could potentially result in minor beneficial impacts to soils because all CCR-impacted soils would be removed and the excavated area could return to a more natural state over time.

3.2.2.3 Alternative C – Closure-in-Place and Regrading of the Special Waste Landfill and Ash Impoundment 2 and Construction of a New Process Water Basin

Impacts to prime farmland and soils under Alternative C would be the same as those under Alternative B with respect to the closure activities and PWB construction and operation. However, since CCR materials would not be consolidated during the closure activities, more borrow material may be needed under this alternative in order to construct a cover for the unconsolidated Ash Impoundment 2 and the SWL. TVA would identify existing commercial borrow sources in the vicinity should the borrow material from the Shawnee East Site be deemed insufficient. Under Alternative C, the same soils would be used for closure activities at Ash Impoundment 2 and the SWL as described under Alternative B, therefore, the direct and indirect impacts to soils would be similar to those described under Alternative B (i.e. minor). Additionally, impacts to prime farmland would not occur.

3.3 Groundwater

3.3.1 Affected Environment

Regionally significant aquifers and water-bearing units that occur near SHF are the Paleozoic bedrock, McNairy Formation, Lower Wilcox Aquifer, Pliocene and Pleistocene sands and gravel deposits, and Quaternary alluvial deposits. Regional aquitards include the Porters Creek Clay and Upper Continental Deposits (UCD). The lower gravel unit and associated sand layers are commonly referred to as the Regional Gravel Aquifer (RGA), the principal aquifer in the site region. Section 3.6.1 in the Final EIS describes the regional aquifers, the SHF groundwater and groundwater quality in detail. This local and regional discussion is relevant to the proposed new location of the PWB due to the proximity of the project areas in the Final EIS and this SEIS. No significant changes to this information have occurred since the publication of the Final EIS, therefore, this information is incorporated by reference in this SEIS.

Following the 2015 CCR Rule, TVA issued the following information regarding groundwater monitoring at SHF:

> In addition to ongoing groundwater monitoring required under State regulations, TVA enhanced the monitoring well network at the Shawnee Fossil Plant to comply with the CCR Rule requirements. Additional wells were installed downgradient of the CCR management units as needed and TVA implemented a baseline sampling program. After completion of the baseline sampling, the CCR Rule requires TVA to begin monitoring groundwater in a step that is called 'Detection Monitoring'. The constituents specified by the CCR Rule for Detection Monitoring are boron, calcium, chloride, fluoride, pH, sulfate, and [total dissolved solids] TDS. These seven constituents occur naturally in soils, rock, groundwater and surface water, and they are also present in coal and in CCR. They were selected by EPA because they can indicate groundwater conditions that may require further evaluation. (TVA 2018)

The additional wells included a new background well (in addition to those already present), and new wells downgradient of the areas where CCR is managed (TVA 2018). Figure 3.3-1 shows the locations of the CCR monitoring well network at SHF.

Until September 21, 2017, when the SWL and Ash Impoundment 2 were transferred to a Kentucky Chapter 46 Registered Permit-by-Rule for coal ash units, reports were prepared semi-annually. On January 31, 2018, the Registered-Permit-by-Rule provision was overturned. Therefore, the Chapter 45 special waste permits for the SWL and Ash Impoundment 2 have been reinstated and are currently in effect. Groundwater would be monitored in accordance with applicable local, state, and federal regulations. As reported in the Final EIS, May 2017 groundwater monitoring results included statistical exceedances of limits for gross alpha, aluminum, boron, calcium, cobalt, fluoride, iron, magnesium, manganese, molybdenum, nickel, pH, potassium, specific conductance, strontium, sulfate, total organic carbon, and TDS in the downgradient wells from the SWL groundwater monitoring program (TVA 2017a).

The latest available groundwater report is for 2017. The final 2017 annual groundwater report for the SWL, and Ash Impoundment 2 details TVA's groundwater monitoring activities in 2017, which included:

- The required groundwater quality monitoring network was established and certified by a qualified Professional Engineer as required by 40 CFR 257.91.

- Monitoring wells were video-logged and resurveyed to confirm accuracy in the documented well construction records.
- A groundwater quality sampling and analysis program was developed and implemented as required by 40 CFR 257.90.
- The required baseline monitoring of network wells was initiated and independent baseline samples, as required by 40 CFR 257.94(b), were collected.
- The sampling and analysis for the first detection monitoring event was completed in October 2017 in accordance with the CCR Rule [40 CFR 257.93 and 257.94(a)].
- Statistical analysis of baseline data was performed in accordance with the CCR Rule (Stantec 2018c).

Figure 3.3-1. Locations of the CCR Monitoring Well Network at SHF

In January 2018, TVA evaluated the 2017 groundwater monitoring data for statistically significant increases (SSIs) over background levels for boron, calcium, chloride, fluoride, pH, sulfate, and TDS. The groundwater analytical results from the initial round of detection monitoring indicated SSIs of boron, calcium, pH, sulfate and TDS at the downgradient monitoring wells. TVA plans to perform confirmation of the SSIs via retesting procedures and error checking and investigate whether the SSI over background levels resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. TVA also plans to perform investigations to determine whether a source other than the CCR materials contained in the Ash Impoundment 2 and SWL are the cause of any verified SSI over background levels. If TVA is unable to demonstrate that the SSI was a result of error or another source, then an Assessment Monitoring Program will be established and implemented (Stantec 2018c).

TVA's planned 2018 groundwater monitoring activities include:

- Perform confirmation of SSIs via retesting procedures and error checking. Investigate whether the SSI over background levels resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality as specified in 40 CFR 257.94(e)(2).
- Perform an alternate source demonstration in accordance with 40 CFR 257.94(e)(2).
- Establish an assessment monitoring program in accordance with 40 CFR 257.94(e)(1), where applicable, if unable to establish that SSIs were the result of another source or the result of an error.
- Perform further field and desktop Site Characterization Investigations to improve the SHF Conceptual Site Model.
- Continue semi-annual detection monitoring at the certified groundwater monitoring network consistent with 40 CFR 257.94 for the 2018 Annual Groundwater Monitoring and Corrective Action Report.
- Continue and improve TVA's third-party Quality Assurance Program to evaluate groundwater analytical data using best practices concerning field methods and validation techniques, as well as the application of the most appropriate statistical methods.
- Review new data as it becomes available and implement changes to the groundwater monitoring program as necessary to maintain compliance with 40 CFR 257.90 through 257.98.
- Comply with recordkeeping requirements specified in 40 CFR 257.105(h), notification requirements specified in 40 CFR 257.106(h), and internet requirements specified in 40 CFR 257.107(h) (Stantec 2018c).

As described in Subsection 3.6.1.4 of the Final EIS, the DOE PGDP is upgradient of the SWL, Ash Impoundment 2, and the proposed PWB project areas, and has had a contaminant plume in the RGA which has moved into the SHF reservation. At one time, several wells reflected impact by the plume with leading edge contaminants of Technetium 99 (Tc-99) and TCE. Currently, due to pump-and-treat remedial work occurring, the TCE plume has receded and now affects only one well at the main plant and two wells at the Shawnee East Site. DOE has a Water Policy Boundary executed, which requires that no one within the boundary use the groundwater. The SHF reservation in its entirety falls within this boundary. Due to the proximity of the PGDP, groundwater in the immediate vicinity is not used for drinking water and private wells in the area have been capped and sealed (DOE 2014a).

Progress in the long-term cleanup at the DOE PGDP from continued, active groundwater remediation is modeled every two years. The primary constituents modeled for the PGDP plume in the RGA are TCE and Tc-99. For TCE, the Safe Drinking Water Act Maximum Contaminant Level (MCL) of 5 micrograms per liter (µg/L) is the isoconcentration contour that defines the limit of the plume. For Tc-99, 900 picocuries per liter (pCi/L) defines the plume limit. In the 2014 PGDP report, the modeled groundwater plumes of these contaminants were similar to 2010 results, with notable exceptions in the Northwestern Plume. For this plume, the TCE contamination was projected to have reduced in areal extent near the extraction wells. These changes indicate continued, active groundwater remediation at the PGDP is making progress (DOE 2014a). The most recent (2016) TCE plume map shows that the 5 µg/L plume edge is on TVA property in the proposed PWB location (in the Rail Loop). The plume is smaller in this location than it was on the 2014 map, but is still on TVA property. The 2016 Tc-99 plume (exceeding 900 pCi/L) is entirely on PGDP property and does not extend onto TVA property in the lower RGA (DOE 2014b and 2017).

3.3.2 Environmental Consequences

3.3.2.1 Alternative A – No Action

Under the No Action Alternative, TVA would continue current plant operations and not cease operations at its SWL and Ash Impoundment 2 or close either of those facilities. Additionally, TVA would not construct and operate the proposed PWB and associated ancillary infrastructure. With no changes to plant operations and no new construction, no impacts to groundwater use or quality would occur under the No Action Alternative. Once the dewatering system has been constructed and the new CCR landfill is operational, new CCR would no longer be stored in the SWL or Ash Impoundment 2. However, this alternative would not be consistent with the Project's purpose and need and it does not align with current CCR regulations.

3.3.2.2 Alternative B – Closure-in-Place by Reduced Footprint of the Special Waste Landfill and Ash Impoundment 2 and Construction of a New Process Water Basin

During closure activities and construction of the proposed PWB and associated piping connecting the PWB to the new CCR landfill leachate impoundment, the CYDB, and the existing NPDES outfall, BMPs would be utilized to minimize soil and vegetation disturbances and soil runoff; thus minimizing potential impacts to groundwater from construction activities. Upon completion of construction, temporarily-disturbed areas, such as the temporary treatment areas and laydown yards, would be restored to their previous state or maintained by TVA; therefore, direct and indirect construction-related effects to groundwater would be minor, temporary, and localized.

As discussed in Section 3.6.2.2 of the Final EIS, the overall impacts from closure activities associated with the SWL and Ash Impoundment 2 would be beneficial to groundwater. The reduction of the hydraulic head by decanting surface water, in addition to the removal of potential additional hydraulic inputs from precipitation, surface water runoff, or other water additions to the impoundment, would effectively reduce the potential release of CCR constituents to groundwater. Therefore, the direct and indirect impacts with respect to closure of the SWL and Ash Impoundment 2 are minor but beneficial as compared to the No Action Alternative.

The over-excavation of the Ash Impoundment 2 during closure activities would be an additional, but minor benefit to groundwater at SHF. The removal of any potentially CCR impacted soils would further reduce the possibility of seepage of CCR material into groundwater. The elevation of the ground surface at the Rail Loop site is approximately 337 to 360 feet above mean sea level. Excavation activities in association with construction of the proposed PWB would not exceed beyond elevation 322 feet. There is one well monitored by the Department of Energy located within the footprint of the proposed PWB footprint, within the RGA (Well MW-152). Well MW-152 shows non-detect for plume contaminants. Well MW-152 shows the uppermost elevation of the RGA to be between 311 to 312 feet. With the excavation of the PWB planned to extend to an elevation of 322 feet there should be no contact with the RGA, and impacts associated with the TCE contaminated groundwater would not be anticipated. The proposed PWB design would incorporate a geomembrane liner system that would utilize a synthetic liner in combination with a compacted clay liner. The liner system would minimize potential impacts to local groundwater in association with operation of the PWB. Therefore, with the use of BMPs, impacts to groundwater associated with construction of the proposed PWB and associated piping would be minor, temporary, and localized.

The proposed PWB design would incorporate a geomembrane liner system that would utilize a synthetic liner in combination with a compacted clay liner. The liner system would minimize potential impacts to local groundwater in association with operation of the PWB. Therefore, with the use of BMPs, impacts to groundwater associated with construction of the proposed PWB and associated piping would be minor, temporary, and localized.

Overall, the implementation of Alternative B would be beneficial to groundwater as compared to Alternative A – No Action. With respect to the closure activities, reduction of the hydraulic head by decanting surface water, in addition to the removal of potential additional hydraulic inputs from precipitation, surface water runoff, or other water additions to the impoundment, would effectively reduce potential release of CCR constituents to groundwater. Therefore, in consideration of 1) the beneficial effects of removal of the hydraulic head from a closed ash impoundment, 2) the associated reduction in infiltration from the ash impoundment, 3) the commitment to supplemental mitigation measures if necessary, 4) the over-excavation of potentially CCR-impacted soils at the Ash Impoundment 2, and 5) the construction of a lined PWB, the direct and indirect impacts of Alternative B on groundwater use and quality with respect to closure of the SWL and Ash Impoundment 2 and the construction and operation of a new PWB are minor but beneficial as compared to the No Action Alternative.

3.3.2.3 Alternative C – Closure-in-Place and Regrading of the Special Waste Landfill and Ash Impoundment 2 and Construction of a New Process Water Basin

Under Alternative C, impacts to groundwater would be similar to those under Alternative B. Because Alternative B involves consolidation and over-excavation of CCR, Alternative B could have slightly greater beneficial impacts to groundwater than Alternative C. Therefore, as under

Alternative B, slightly smaller direct and indirect minor beneficial impacts would occur under Alternative C with respect to groundwater use and quality.

3.4 Surface Water

3.4.1 Affected Environment

As described in Section 3.7 of the Final EIS, the SHF site is located on the Ohio River, 35 miles upstream of its confluence with the Mississippi River (Ohio River Mile 946). The plant is bordered by the Ohio River and Little Bayou Creek, which are both classified as warm water aquatic habitat, primary con-tact recreation, secondary contact recreation and domestic water supply (Figure 3.4-1). No new information has been identified since the Final EIS was published regarding the surface water conditions at and surrounding the SHF site and the existing SHF wastewater stream and wastewater treatment facilities; therefore, these existing conditions are incorporated by reference in this SEIS.

Jurisdictional and non-jurisdictional streams and wetlands were delineated/characterized within the PWB project areas in January 2018 (Jackson Group 2018a). A total of 2,061.3 linear feet of stream were identified as having the potential to be impacted by the construction of the PWB, pipe corridors, and potential laydown areas. No stream features were identified within the temporary treatment areas. The stream features impacted by construction of the PWB are identified in Table 3.4-1 and Figure 3.4-1.

Table 3.4-1. Stream features Identified within the Proposed PWB Project Areas

Stream Feature	Type of Feature	Pipe Corridors (Linear Feet)	Potential Laydown Areas (Linear Feet)	Proposed PWB (Linear Feet)	Total (Linear Feet)
UT-B	Perennial	103.5	113.7	1,079.6	1,296.8
UT-C	Perennial	118.2	503.8	0.00	622.1
UT-D	Perennial	117.9	0.00	0.00	117.9
UT-E	Ephemeral	24.5	0.00	0.00	24.5
Total (Linear Feet)		**364.1**	**617.5**	**1,079.6**	**2,061.3**

After publication of the draft SEIS, TVA completed consultation with the USACE for a preliminary Jurisdictional Determination for the PWB project areas to determine wetlands and stream features that would require mitigation. The USACE concluded that the drainage features previously identified as perennial streams are actually upland swales/WWCs and are non-jurisdictional (Garrett 2018a). Refer to Section 3.7 for a separate discussion of wetland resources.

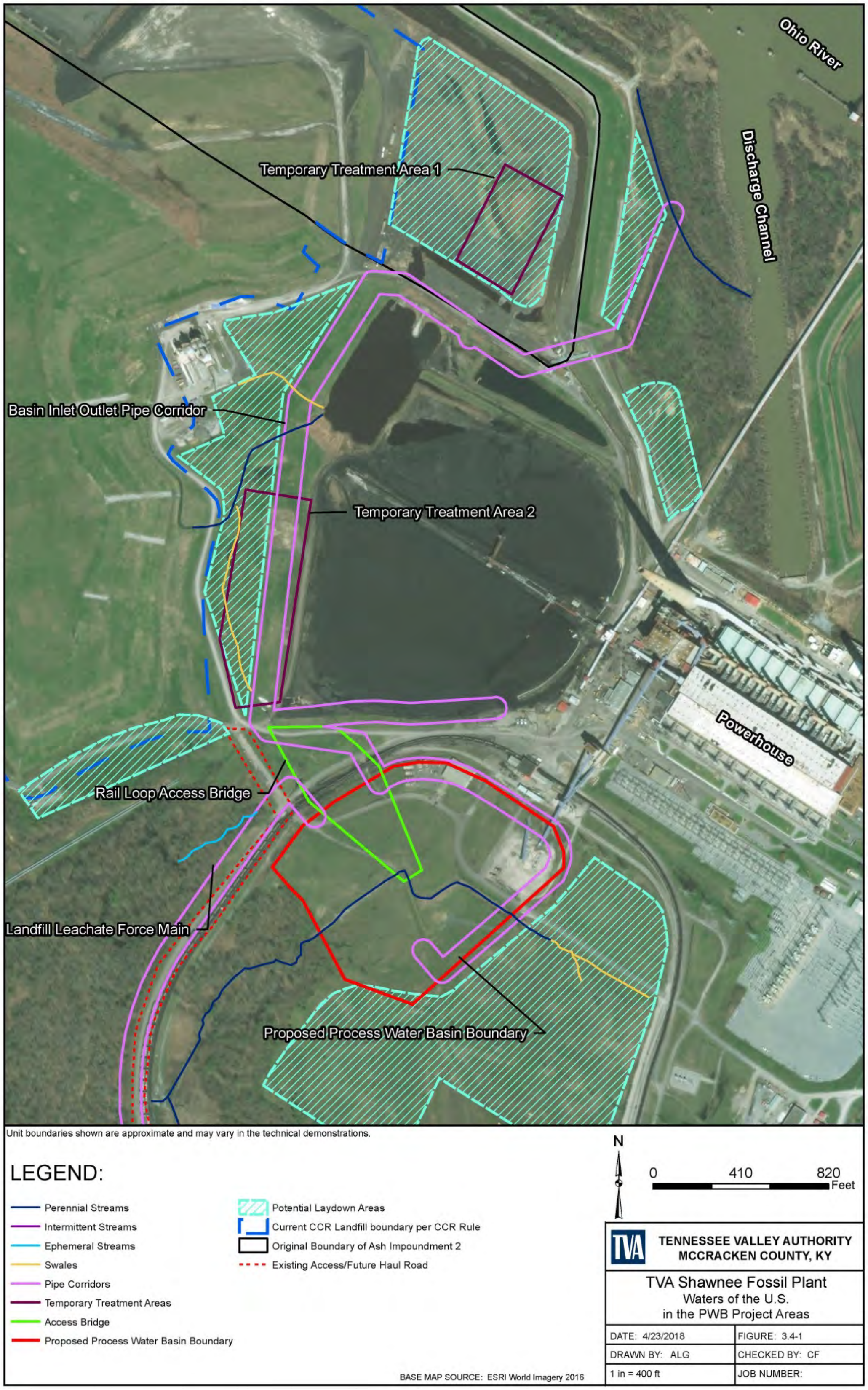

Figure 3.4-1. Waters of the U.S. in the PWB Project Areas

3.4.2 Environmental Consequences

3.4.2.1 Alternative A – No Action

Under the No Action Alternative, TVA would continue current plant operations and not cease operations at its SWL and Ash Impoundment 2 or close either of those facilities. Additionally, TVA would not construct and operate the proposed PWB and associated ancillary infrastructure. With no changes to plant operations and no construction, no impacts to surface water use or quality would occur. Once the dewatering system has been constructed and the new CCR landfill is operational, new CCR would no longer be stored in the SWL or Ash Impoundment 2. This alternative would not be consistent with the project's purpose and need and it does not align with current CCR regulations.

3.4.2.2 Alternative B – Closure-in-Place by Reduced Footprint of the Special Waste Landfill and Ash Impoundment 2 and Construction of a New Process Water Basin

As described in Subsection 3.7.2.2 of the Final EIS, during closure activities and construction of the proposed PWB and associated piping connecting the PWB to the new CCR landfill leachate impoundment, the CYDB, and the existing NPDES outfall, TVA would comply with all appropriate state and federal permit requirements. Appropriate BMPs would be followed, all proposed project activities would be conducted in a manner to ensure that waste materials are contained, and the introduction of pollutants to the receiving waters would be minimized and be in accordance with KPDES limits and Kentucky Water Quality Standards. 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 storm water impacts. Storm water flows would be properly treated either through implementation of proper BMPs or by diverting the storm water discharges to an appropriate storm water outfall or impoundment for co-treatment. 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 to minimize construction impacts to surface waters.

Sanitary wastes generated during construction activities would be collected by the existing sewage treatment system, onsite septic system(s), or portable toilets. These would be pumped out regularly, and the sewage transported by a vacuum truck to a publicly-owned wastewater treatment works that accepts pump out. Upon completion of construction, temporarily-disturbed areas, such as the temporary treatment areas and laydown yards, would be restored to their previous state, or would be maintained by TVA. With the implementation of appropriate BMPs, only temporary, minor, impacts to surrounding surface waters would be expected from construction activities associated with the closure activities and construction of the proposed PWB.

Prior to consultation with the USACE, and discussed in the draft SEIS, TVA had originally identified a minor impact on the streams shown on Figure 3.4-1 (Jackson Group 2018a). As described above, during consultation, the USACE concluded the identified streams in the project area are non-jurisdictional upland swales/WWCs (Garrett 2018a). TVA would reroute the

WWC crossing the PWB footprint around the southern portion of the PWB to continue to provide general drainage for the surrounding areas. A Kentucky Division of Water 401 Water Quality Certification would be required. Therefore, impacts to surface water as a result of WWC relocation would be minor.

As described in Table 2.1-1, an estimated 15 to 25 tanks (ranging in size from 0.6 to 1.7 million gallons per tank), covering a footprint of approximately 10 to 12 acres, would be required for a temporary treatment area in the event that the PWB is not complete by October 31, 2020. Final drainage would be routed to existing or new discharge points and comply with the KPDES permit to ensure that no adverse impacts to surface waters would occur. Mitigation measures would be identified (as needed) to ensure the discharges meet permit limits. This may or may not require a permit modification. With the application of such mitigation measures, the use of temporary treatment tanks would not be anticipated to result in adverse impacts to surface water. Characterization of this new discharge stream would be evaluated to ensure compliance with the KPDES permit. Therefore, direct and indirect impacts to surface water under Alternative B would be minor.

3.4.2.3 Alternative C – Closure-in-Place and Regrading of the Special Waste Landfill and Ash Impoundment 2 and Construction of a New Process Water Basin

Under Alternative C, impacts to surface water would be the same as those under Alternative B. As the same areas would be disturbed and the same incidental hydrology would be altered during the closure activities, impacts would also be minimized through BMPs and avoidance. Therefore, as under Alternative B, direct and indirect impacts to surface water would be minor.

3.5 Vegetation

3.5.1 Affected Environment

SHF is located within the Wabash-Ohio Bottomlands Level IV ecoregion (Woods et al. 2002). This unglaciated, level floodplain along the Ohio River was historically a southern floodplain forest, a mix of oaks, cypress, and hardwood species. This region has been largely drained and converted for commercial and agricultural use. SHF is primarily an intensely developed site that has been heavily disturbed by the construction, maintenance, and operation of the existing facility. As a result of this previous alteration of the physical landscape, most areas within SHF no longer support natural plant communities. Land use and land cover within the SHF project area is described in Section 3.1 of the Final EIS and in Section 3.1 of this SEIS. Vegetation and the potential impacts associated with the closure of the SWL and Ash Impoundment 2 are discussed in detail in Section 3.9 of the Final EIS and are incorporated by reference in this SEIS. Within the PWB project areas, the land cover is classified as developed, low intensity, and the vegetation consists of plants typical of disturbed or landscaped areas. Vegetation within 5 miles of the project area is primarily cultivated crops, deciduous forest, and pasture land.

A field survey was conducted by Jackson Group in January 2018 to evaluate vegetation, threatened and endangered species, and forest composition within a 283-acre survey area, which included the PWB project areas. The survey report is included in Appendix A of this SEIS.

Vegetation observed within the site boundary was primarily bottomland hardwoods, herbaceous wetlands, forested wetlands, upland grasslands, scrub/shrub, and mixed oak forest (Jackson Group 2018b).

There are two types of bottomland hardwoods in the project areas, one of which is dominated by American sycamore, black willow, button bush, eastern cottonwood, and green ash. The other type is dominated by sweet gum. Herbaceous wetland areas are dominated by various *Carex, Festuca, Juncus*, and *Polygonum* species, as well as common barnyard grass, and common reed grass. Upland grassland areas consist of species mostly associated with managed grassland areas around industrial sites. These species include various *Festuca* species, Bermuda, and common barnyard grasses. Scrub/shrub areas onsite are managed areas to support wildlife conservation. These areas consist of multiflora rose and a variety of upland grass species. Mixed oak forests onsite are primarily comprised of blackjack oak, Northern red oak, and white oak. Figure 3.5-1 illustrates the vegetation categories at the proposed PWB project areas (Jackson Group 2018b).

3.5.1.1 Invasive Species

An invasive species is defined as a species that is not native to the local ecosystem and whose introduction does or is likely to cause economic or environmental harm or harm to human health (USDA 2016 [EO 13112]). Invasive plants can include trees, shrubs, vines, grasses, ferns, and forbs (Jackson Group 2018b).

EO 13751 (Invasive Species), and EO 13112 as amended, call upon executive departments and agencies to take steps to prevent the introduction and spread of invasive species, and to support efforts to eradicate and control invasive species that are established. TVA implements the executive order, to the extent practicable, through BMPs. For example, TVA has developed lists of non-native plant species that are non-invasive and can be used for erosion control and other situations (Muncy 2012), thereby minimizing the spread of invasive species in disturbed areas (Jackson Group 2018b).

Most lands in and around the TVA power service area have been affected by introduced, non-native plant species. According to NatureServe (2016), invasive, non-native species are the second leading threat to imperiled native species. EO 13112 defines invasive species as non-native to the environment into which they have been introduced, and where the introduction of these non-native species is likely to cause economic or environmental harm to human, animal, or plant health in their new environment. Some invasive species have been introduced into this country accidentally; others were introduced as ornamentals or for livestock forage. Without their natural predators and diseases that tend to keep native plants in natural balance, invasive species can out-compete native vegetation for available resources, such as nutrients, space, and water (Freibott 2018).

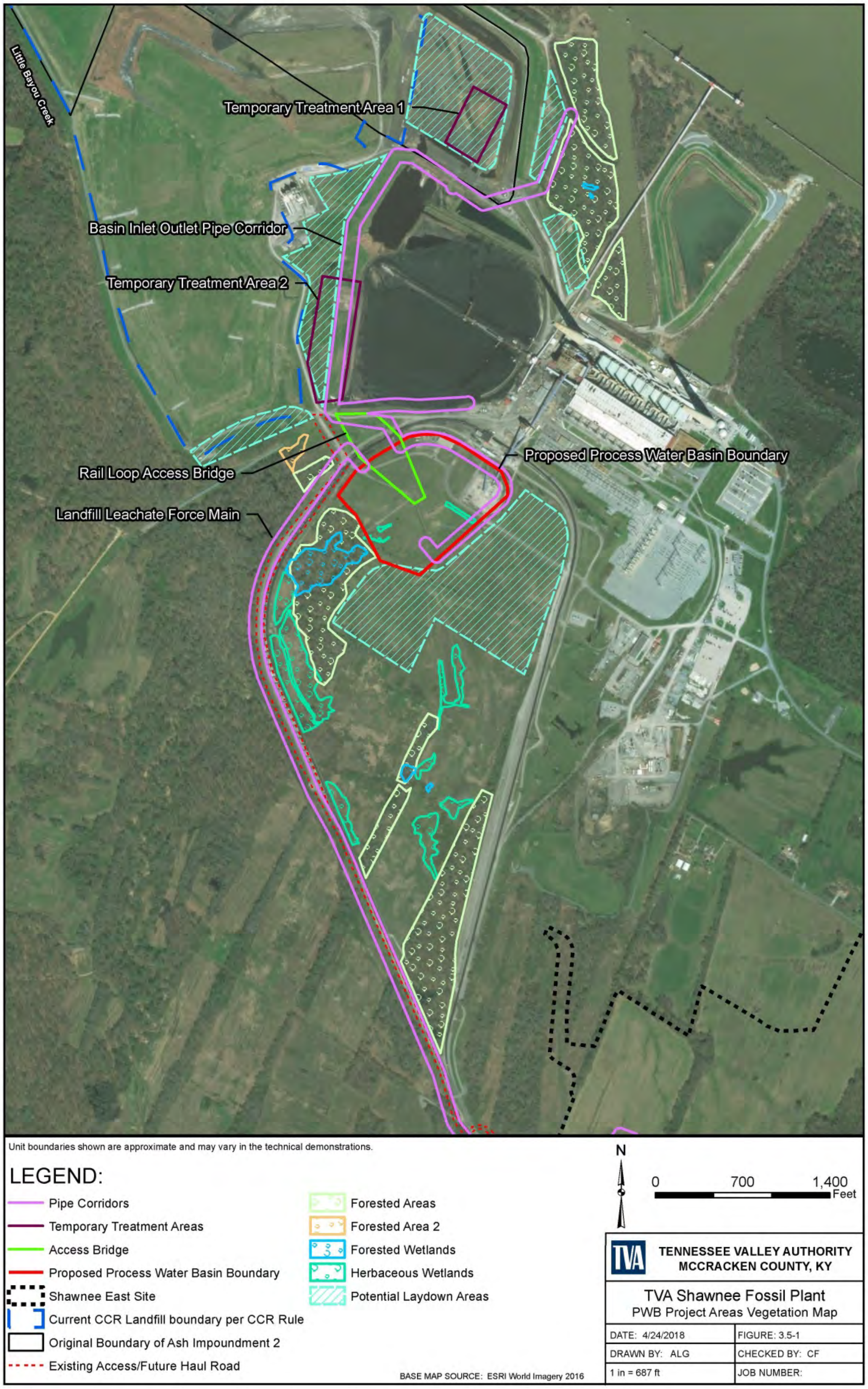

Figure 3.5-1. PWB Project Areas Vegetation Map

The PWB project areas have been either intensely developed or heavily-disturbed, and as a result of these alterations, the areas no longer support a natural plant community. The most common invasive species encountered during the field survey were common reed grass, multiflora rose, and Japanese honeysuckle. These species were sparsely distributed throughout the proposed PWB project areas (Jackson Group 2018b).

3.5.2 Environmental Consequences

3.5.2.1 Alternative A – No Action

Under the No Action Alternative, TVA would continue current plant operations and not cease operations at its SWL and Ash Impoundment 2 or close either of those facilities. Additionally, TVA would not construct and operate the proposed PWB and associated ancillary infrastructure. With no changes to plant operations and no construction, no impacts to vegetation would occur. Once the dewatering system has been constructed and the new CCR landfill is operational, new CCR would no longer be stored in the SWL or Ash Impoundment 2. This alternative would not be consistent with the project's purpose and need and it does not align with current CCR regulations.

3.5.2.2 Alternative B – Closure-in-Place by Reduced Footprint of the Special Waste Landfill and Ash Impoundment 2 and Construction of a New Process Water Basin

Section 3.9 in the Final EIS discusses potential impacts to vegetation with respect to the closure of the SWL and Ash Impoundment 2. No significant changes have occurred in these areas and the previous analysis is incorporated by reference in this SEIS. The over-excavation of soils from Ash Impoundment 2 would have no impact on vegetation as this area is not currently vegetated.

As described in Subsection 2.2.2.1, the SWL and Ash Impoundment 2 may be closed with either a traditional geomembrane cap system with a protective soil and vegetation layer or a ClosureTurf® or equivalent system which consists of a special engineered turf and sand fill. The use of the traditional system as evaluated in the Final EIS would result in the re-establishment of a grassy, maintained habitat in these areas. Inactive portions of the SWL are currently maintained with a grassy cover, while Ash Impoundment 2 is largely unvegetated. Therefore, extending this vegetative cap over Ash Impoundment 2 would constitute a beneficial impact to vegetation because it would increase the areal extent of vegetation cover in this area. Conversely, the use of the ClosureTurf® or equivalent system would reduce the amount of vegetation across the SWL and preclude the establishment of vegetation on Ash Impoundment 2. This engineered turf would be installed and maintained as a permanent artificial cover; thus, the amount of vegetation in the area that is covered would be reduced for the life of this system.

The construction of the PWB under Alternative B would result in the disturbance of vegetation from approximately 118.5 acres of land. These acres include temporary treatment areas, pipe corridors, potential laydown areas, and the proposed PWB. Approximately 97 acres would be temporarily disturbed and approximately 22 acres would be permanently disturbed. Figure 3.5-1 shows the existing vegetation in the vicinity of the proposed PWB project areas. As shown in the figure, the temporary treatment areas, laydown areas and proposed PWB locations are all located in previously disturbed or impacted areas with respect to vegetation. Portions of the pipeline corridors would be placed in locations which have some forested vegetative cover; however, the corridors would be placed along the edges of the forested areas, minimally impacting mature trees. Overall, vegetation in the proposed PWB project areas is already highly disturbed and consists mostly of upland grasslands and scrub/shrub.

All of the minimal, naturally-occurring vegetative communities in the PWB project areas are common in the adjacent Western Kentucky Wildlife Management Area (WKWMA) and in the larger region. The acreage of vegetation that would be lost in constructing the PWB would be minor in comparison to the extensive areas in which these vegetation types occur elsewhere in the vicinity. The areas to be directly impacted by clearing for the proposed PWB are predominantly former agricultural fields that have been intensively altered by SHF and other industrial activities, including the former use of the proposed PWB location for borrow material.

Alternative B includes revegetation as part of the cover system for both the closure of Ash Impoundment 2 and the SWL. Placement of fill material and the establishment of vegetation will result in a shift in cover at Ash Impoundment 2 and the SWL from its current condition to a turf grass community. The temporary treatment areas and laydown areas would either be allowed to return to a natural state or would be maintained as turf grass by TVA. The proposed PWB would not be revegetated until closure of the facility at an unknown future date.

Construction activities associated with the closure of Ash Impoundment 2 and the SWL and construction of the proposed PWB could also result in the introduction and/or spread of invasive plant species from borrow material and heavy equipment operation. However, the generalized transformation of the Ash Impoundment 2 impoundment, SWL, and the proposed PWB project areas from a highly-disturbed environment to a stable, controlled, and vegetated landscape likely would reduce the potential for invasive species to become established. Additionally, TVA BMPs for erosion control and use of native and/or non-invasive species would promote the rapid establishment of desirable vegetation and further minimize invasive plant impacts.

Overall, direct and indirect impacts on vegetation under Alternative B would be minor.

3.5.2.3 Alternative C – Closure-in-Place and Regrading of the Special Waste Landfill and Ash Impoundment 2 and Construction of a New Process Water Basin

Under Alternative C, impacts to vegetation would be the same as under Alternative B. The same areas would be disturbed or cleared under both action alternatives. Therefore, direct and indirect impacts to vegetation would be minor.

3.6 Wildlife

3.6.1 Affected Environment

The potentially affected environment at SHF is shown in Figure 2.2-1. This map includes the areas discussed in the Final EIS, as well as a small additional area located in the Rail Loop and along the proposed pipeline corridors. The surrounding area includes the coal stockpile and other plant facilities to the north, and forested and agricultural areas to the west, east and south. Aquatic habitats adjoining the SHF property include the Ohio River to the north and Little Bayou Creek to the west and south. An early successional, hardwood-forested area is located near the proposed PWB piping on the river side of the perimeter dike that surrounds the existing ash management area. Other forested areas are located to the south and west of the proposed PWB location (Figure 3.5-1). A small portion of these forested habitats may be impacted by the pipeline corridors. None of the riparian or aquatic habitat along the Ohio River or Little Bayou Creek would be impacted by the proposed action or alternatives. Mowed fields of grass and other herbaceous vegetation in the area of the SWL, proposed PWB location, and/or the bottom ash trench are used by many common wildlife species. Section 3.10 of the Final EIS discusses wildlife at SHF and the surrounding area and the potential impacts associated with closure of the SWL and Ash Impoundment 2. No significant changes to wildlife have occurred since the Final EIS was published; therefore, this analysis is incorporated by reference in this SEIS.

The construction of the PWB under Alternative B would result in the disturbance of vegetation from approximately 118.5 acres of land. These acres include temporary treatment areas, pipe corridors, potential laydown areas, and the proposed PWB. Approximately 97 acres would be temporarily disturbed and approximately 22 acres would be permanently disturbed. The approximately 118.5-acre PWB project areas are less disturbed than the Ash Impoundment 2 and SWL areas, and provide far more diverse habitat than the industrial area of SHF. The PWB project areas contain bottomland hardwoods, herbaceous wetlands, forested wetlands, upland grasslands, scrub/shrub, and mixed oak forest. Most of the potentially-disturbed areas consist of upland grasslands and shrub/scrub. As described in the Final EIS, these areas would be used by several avian species including the Canada goose, eastern meadowlark, grasshopper sparrow, killdeer, European starling, and red-tailed hawk (Palmer-Ball 1996, National Geographic Society 2002). A few of the small mammals that may inhabit these grassy areas include the eastern cottontail, eastern mole, deer mouse, prairie vole, southeastern shrew, and eastern chipmunk. Small patches of disturbed forest adjacent to the industrialized areas of SHF 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, wild turkey, and other birds (National Geographic Society 2002).

As of October 2016, the TVA Regional Natural Heritage database included no records of caves within 5 miles of SHF, and no caves were identified on the project site during field surveys conducted in either October 2016 or January 2018. One large colony of great blue herons has been reported approximately 3.7 miles east of SHF. No additional heron rookeries, osprey nests, or aggregations of other migratory birds were observed within the project area, and none are recorded within 5 miles of SHF.

Table 3.10-1 in the Final EIS contains a listing of migratory birds that might be affected by the project (USFWS 2016a). A total of 22 species of migratory birds considered by USFWS to be of conservation concern were identified in the Information for Planning and Conservation (IPaC) search as having the potential to occur in the area of SHF and/or be affected by activities there. The habitat preferences and seasonal occurrence of the birds of conservation concern identified by the IPaC search were also provided in Table 3.10-1 of the Final EIS. The table also provides an indication of whether habitats in the project area potentially may satisfy the habitat preferences of each species and which seasons those species may be present within the project areas. Of the 22 species, 16 had potential habitat either on SHF or on the new CCR landfill site. In the proposed PWB project areas, potential for the Bald Eagle, the Prothonotary warbler, and the Swainson’s warbler may exist in the forested areas adjacent to the Ohio River.

3.6.2 Environmental Consequences

3.6.2.1 Alternative A – No Action

Under the No Action Alternative, TVA would continue current plant operations and not cease operations at its SWL and Ash Impoundment 2 or close either of those facilities. Additionally, TVA would not construct and operate the proposed PWB and associated ancillary infrastructure. With no changes to plant operations and no new construction, no adverse impacts to wildlife or their habitats would be expected to occur. Once the dewatering system has been constructed and the new CCR landfill is operational, new CCR would no longer be stored in the SWL or Ash Impoundment 2. This alternative would not be consistent with the project’s purpose and need and it does not align with current CCR regulations.

3.6.2.2 Alternative B – Closure-in-Place by Reduced Footprint of the Special Waste Landfill and Ash Impoundment 2 and Construction of a New Process Water Basin

As discussed in the Final EIS, no natural habitat would be affected in the Ash Impoundment 2 and SWL area on the SHF facility under Alternative B. The modification of Alternative B to include the over-excavation of additional materials in Ash Impoundment 2 would not result in any additional impacts to wildlife.

As described in Subsection 2.2.2.1, the SWL and Ash Impoundment 2 may be closed with either a traditional geomembrane cap system with a protective soil and vegetation layer or a ClosureTurf® or equivalent system which consists of a special engineered turf and sand fill. The use of the traditional system as evaluated in the Final EIS would result in the establishment of a maintained area of short grass, which could be used as habitat by wildlife that forage in such open habitats. Conversely, the use of the ClosureTurf® or equivalent system would reduce the amount of vegetation across the SWL and preclude the establishment of vegetation on Ash Impoundment 2. Wildlife would not be able to utilize the area for food or shelter. However, ample areas for food and shelter are available in the surrounding area, thus there would be no impacts to wildlife from the use of the ClosureTurf® or equivalent system.

Under Alternative B, with respect to the construction of the PWB, approximately 22 acres of grassland would be permanently converted to open water, maintained vegetation, and some industrial surfaces such as equipment/structures and roads. Approximately 97 acres of temporary disturbance may be maintained by TVA or allowed to return to a shrub/scrub state, depending on operational constraints. The construction and operation of the proposed PWB would create approximately 10 acres of open water habitat. This would be marginal habitat, but could be used by migrating birds intermittently. Due to the large expanse of similar habitat in the vicinity of SHF, these changes to habitats available to wildlife would be minor.

Proposed actions at the PWB locations may result in direct impacts to individuals of some wildlife species, depending on the timing of vegetation removal and the mobility of the species. Mobile wildlife, including migratory birds, would be displaced to other habitats in the vicinity. However, wildlife populations would not be substantially reduced, the habitats that would be affected are not rare in the vicinity, and impacts to wildlife in the region would not be noticeable and would be considered minor. Therefore, overall direct and indirect impacts on wildlife from this alternative would be minor.

3.6.2.3 Alternative C – Closure-in-Place and Regrading of the Special Waste Landfill and Ash Impoundment 2 and Construction of a New Process Water Basin

Under Alternative C, impacts to wildlife would be the same as those described above under Alternative B. The same areas would be disturbed or cleared; therefore, as under Alternative B, overall direct and indirect impacts to wildlife would be minor.

3.7 Threatened and Endangered Species

3.7.1 Affected Environment

The Endangered Species Act provides broad protection for species of animals and plants that are listed by the federal government as threatened or endangered in the United States or elsewhere. The Endangered Species Act outlines procedures for federal agencies to follow when taking actions that may affect federally listed species or their designated critical habitat. In addition to species federally listed under the Endangered Species Act, the Commonwealth of Kentucky also provides protection for species it considers threatened, endangered, or of special concern within the state (Kentucky Department of Fish and Wildlife Resources 2013). The listing of species is managed by the Kentucky Department of Fish and Wildlife Resources. Additionally, the Kentucky State Nature Preserves Commission (KSNPC) and TVA both maintain databases of terrestrial and aquatic species that are considered threatened, endangered, or of special concern in Kentucky. Section 3.12 of the Final EIS discusses threatened and endangered species in McCracken County, Kentucky in depth, including an analysis of potential impacts. This analysis is incorporated by reference in this SEIS. Table 3.12-1 of the Final EIS lists the species with federal or state status that have recorded occurrences in McCracken County. A field survey was conducted in January 2018 to assess the proposed PWB project areas for species of special concern.

3.7.1.1 Plants

No federally threatened or endangered plant species were observed during field survey efforts and there are no federally listed plant species with known recorded occurrences in McCracken County, Kentucky (USFWS 2016a).

The Kentucky Rare Plant Recognition Act of 1994 provides protection for species considered threatened, endangered, or in need of management within the state. Table 3.21-1 of the Final EIS lists the state-listed plant species with recorded occurrences in McCracken County (Nature Serve 2016). A review of the TVA Natural Heritage Database indicated that only two of the state-listed plant species (water hickory and star tickseed) have recorded occurrences within a 5-mile radius of SHF. Potential suitable habitat for state-listed species was observed throughout the PWB project areas. However, no state-listed plant species were observed during field surveys.

Water hickory is state-listed as threatened. It is a large tree species associated with bottomland forests and floodplain swamps that have standing water for a portion of the year (NatureServe 2016). Wet woodland areas in the PWB project areas could provide low-quality habitat for the water hickory, but due to the land's repeated disturbance, it is unlikely that the species would become established in such fragmented patches of wet, woodland areas. No individuals of this species were observed by Jackson Group during the January 2018 vegetation survey of the PWB project areas.

Star tickseed has a state status of special concern. It is a perennial herb associated with open woodlands, dry slopes and cliffs, and back edges of boulder-cobble bars near riverbanks (NatureServe 2016). The star tickseed has also been recorded to become established along the edges of forested wetlands. There is potential habitat for this plant on the PWB project site, including open woodlands and edges of forested wetlands. No individuals of this species were observed by Jackson Group during the January 2018 vegetation survey of the PWB project areas. However, star tickseed is a small herb and would not be likely to have been observable during the January 2018 field survey. Star tickseed has been recorded within 5 miles of SHF, so the potential for occurrence is not discountable. However, the site has been highly disturbed in the past, making the survival of remnant populations of this species in this historically impacted area unlikely. The area of potential habitat for this species within the PWB project site is small, and the likelihood of its occurrence within these habitats is low. These potential habitats are not within the proposed footprint of the PWB basin or the potential laydown areas within the PWB project site.

3.7.1.2 Terrestrial Wildlife

The wildlife included in this section are terrestrial animals (although some occupy aquatic habitats, they breathe air). According to the KSNPC, 26 terrestrial animal species with federal or state status have recorded or expected occurrences in McCracken County (Table 3.12-1 of the Final EIS). The Resources Report for McCracken County from the USFWS IPaC website identified four federally listed animal species (one bird and three bats) that have the potential to occur in the project area. A review of the TVA Regional Natural Heritage Database in November 2016 indicated that of the 26 terrestrial animal species listed by USFWS and the KSNPC, ten species are currently known or have been known to occur within a 5-mile radius of the project area (Table 3.12-1 of the Final EIS). Those terrestrial wildlife species with recorded occurrences within 5 miles of SHF are discussed in the Final EIS and this information is incorporated by reference in this SEIS. Bird species with recorded occurrences within a 5-mile radius of the SHF project area include Bell's vireo, fish crow, hooded merganser, interior least tern, and osprey. Potential mammal species included the cotton mouse and four bats: the southeastern myotis, northern long-eared bat, Indiana bat, gray bat, and evening bat. One reptile species with a state status of threatened and three reptile species with a state status of special concern are known to occur in McCracken County. Of these, only the midland smooth softshell turtle has potential habitat at SHF. Two amphibians with a state status of special concern are known to occur in McCracken County within 5 miles of SHF. These species and their habitats are discussed in Section 3.12 of the Final EIS. That analysis is incorporated by reference in this SEIS.

3.7.1.2.1 Bat Habitat Assessment

Surveys were conducted in January 2018 to evaluate the suitability of habitats within the proposed PWB project areas and the bordering forested areas for federally listed bats. The forested areas were systematically surveyed to assess the quality and quantity of potentially suitable roosting habitat. The survey determined that 0.56 acres of suitable habitat would be directly impacted by the PWB construction as a result of the construction of pipe corridors (Jackson Group 2018c). Figure 3.7-1 shows potential bat habitat and roost trees within the project areas. Complete survey information, including area description, tree species, and habitat type is provided in Appendix B.

The proposed PWB project areas were also surveyed to identify cave and/or portal openings that may provide suitable winter habitat for the Indiana and northern long-eared bat. No winter habitat was observed during the field survey efforts. Additionally, no Indiana bat or northern long-eared bat spring or fall swarming habitat was observed (Jackson Group 2018c).

Overall, deciduous forest and pasture/cropland are the dominant land cover types of the adjacent properties to the proposed PWB project areas. The surrounding area is dominated by agricultural uses with interspersed forested areas. There are stream and travel corridors present, both directly adjacent to the project area and throughout the region, which would likely facilitate bat movement. Surrounding forested areas will facilitate movement throughout the region and will be available to potential roosting Indiana and northern long-eared bats in subsequent maternity seasons.

3.7.1.3 Aquatic Ecology

Aquatic animals are those species that breathe water as adults. As discussed Subsection 3.12.1.1.5 of the Final EIS, according to the KSNPC, 39 aquatic animal species (fish, crayfish, snails, and mussels) with federal or state status have been recorded or are expected to occur in McCracken County (Final EIS Table 3.12-1). The Resources Report for McCracken County from the USFWS IPaC website identified ten federally listed animal species (mussels) that have the potential to occur in the McCracken County (USFWS 2016a). A review of the TVA Regional Natural Heritage Database in November 2016 indicated that of those aquatic species listed by USFWS and the KSNPC, a total of 14 federally- and state-listed species of mussels are currently known or have been known to occur within a 10-mile radius of the project area (Final EIS Table 3.12-1). Thirteen of these 14 species occur in McCracken County and one occurs in Massac County, Illinois (across the Ohio River). Aquatic wildlife species with recorded

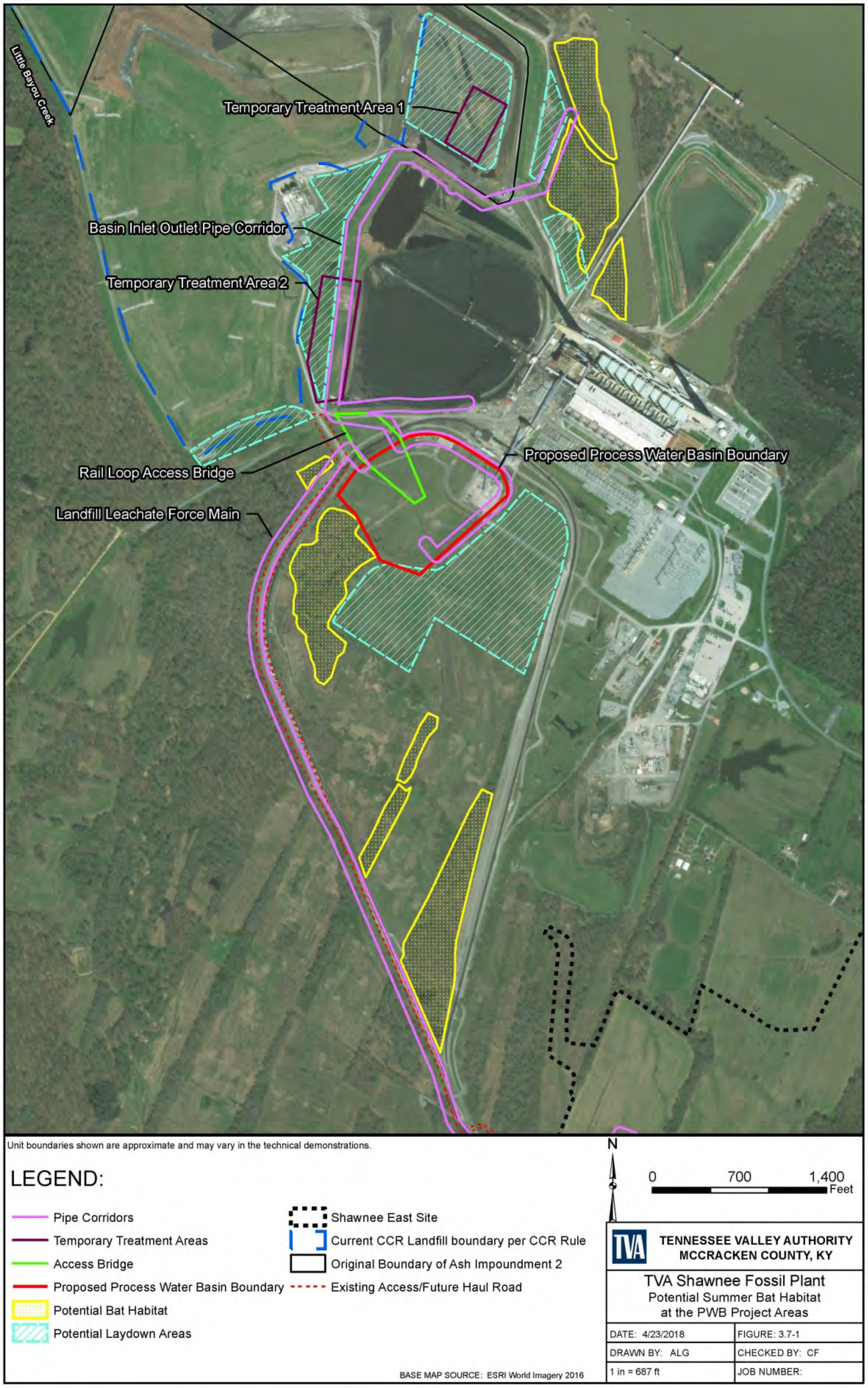

Figure 3.7-1. Potential Summer Bat Habitat at the PWB Project Areas

occurrences within 10 miles of SHF were discussed in the Final EIS and this information is incorporated by reference in this SEIS. Of the species identified as potentially occurring in the Final EIS, no suitable habitat for fish, crayfish, or snails was found to be present within the SHF project area, therefore, only mussels are discussed below.

3.7.1.3.1 Mussels

Fourteen freshwater mussel species federally- or state-listed as endangered or threatened are known to occur in McCracken County, according to the USFWS and KSNPC (Table 3.12-1 of the Final EIS). Five of these mussel species, the pink mucket, sheepnose, orangefoot pimpleback, fat pocketbook, and rabbitsfoot, have been recorded within a 10-mile radius of SHF according to the TVA Regional Natural Heritage Database. All of these aquatic species require flowing freshwater systems (NatureServe 2016). No suitable stream habitat exists within the proposed project area. Therefore, these mussels are not expected to occur in the project area.

The reach of the Ohio River between Olmstead, Illinois and Paducah, Kentucky, which includes the portion of the river adjacent to SHF, is designated as critical habitat for the rabbitsfoot mussel (USFWS 2015b). Critical habitat includes specific areas (occupied or unoccupied by the species) in which physical or biological features essential to the conservation of the species can be found (constituent elements), and which may require special management. The constituent elements for the rabbitsfoot critical habitat include: geomorphically stable river channels and banks; a hydrologic flow regime necessary to maintain benthic habitats where the species is found; water and sediment quality necessary to sustain natural physiological processes; the presence and abundance of fish hosts; and either little or no competitive or predaceous invasive species. Part of the PWB project areas is located adjacent to this critical aquatic habitat within the river. The PWB Rail Loop site is approximately 0.5 miles southwest of the river. No critical habitat for the rabbitsfoot has been identified within the project area.

3.7.2 Environmental Consequences

3.7.2.1 Alternative A – No Action

Under the No Action Alternative, TVA would continue current plant operations and not cease operations at its SWL and Ash Impoundment 2 or close either of those facilities. Additionally, TVA would not construct and operate the proposed PWB and associated ancillary infrastructure. With no changes to plant operations and no construction, no impacts to threatened or endangered species would occur. Once the dewatering system has been constructed and the new CCR landfill is operational, new CCR would no longer be stored in the SWL or Ash Impoundment 2. This alternative would not be consistent with the project's purpose and need and it does not align with current CCR regulations.

3.7.2.2 Alternative B – Closure-in-Place by Reduced Footprint of the Special Waste Landfill and Ash Impoundment 2 and Construction of a New Process Water Basin

The area of the SHF facility that would be affected by closure of Ash Impoundment 2 and the SWL primarily consists of developed or disturbed land that is generally unsuitable for the listed species in Table 3.12-1 of the Final EIS. The closure of Ash Impoundment 2 and the trenches would result in the loss of a limited amount of open water that may currently be used as foraging habitat by federally and state-listed species such as bats and the interior least tern, and state-listed species such as the hooded merganser. However, because there are thousands of acres of high quality, open-water habitat in the immediate area, those species that might utilize Ash Impoundment 2 on an infrequent basis would have ample areas of higher quality habitat in which to forage along the Ohio River, Metropolis Lake, Little Bayou Creek, and other water bodies in the vicinity. The over-excavation of material from Ash Impoundment 2 during closure activities would not result in additional impacts to any species of special concern.

Alternative B would also result in the potential clearing of vegetation from approximately 118.5 acres of land within the proposed PWB project areas. All of these vegetation communities are common in the adjacent 6,425-acre WKWMA and in the region as a whole. Much of the terrestrial habitat on the SHF facility has been severely degraded and is currently maintained as developed land or mowed lawn, which is generally unsuitable habitat for the listed plant and animal species with federal and state status that have been recorded in the vicinity of SHF. The areas to be directly impacted by clearing for the proposed PWB are predominantly former open grassland and shrub/scrub. One plant species of special concern potentially could occur in open forest and forest edge habitats that currently exist within the PWB project areas, but it is unlikely to occur in these areas, and the these types of habitats are not in areas proposed to be directly impacted by clearing for the PWB and laydown areas. No evidence of this species has been found in these areas, and adverse impacts are not anticipated.

No occurrences of federally listed plants have been recorded in McCracken County. Additionally, no federally or state-listed plant species were observed during the January 2018 field survey of the proposed PWB project areas. Therefore, no direct or indirect effects on federally or state- listed threatened or endangered plants are anticipated under Alternative B.

As indicated in the TVA Regional National Heritage Database, most sightings of state-listed terrestrial animal species in the area (i.e., northern crawfish frog, green treefrog, Bell's vireo, and evening bat) have been documented in or near the WKWMA. Aquatic species have been documented either in the Ohio River or Metropolis Lake, neither of which would be impacted by Alternative B. The wooded areas in the PWB project areas have the potential to provide roosting habitat for federally and state-listed bat species, as well as foraging and nesting habitat for bird species with state status, particularly the fish crow and Bell's vireo, which are species of special concern that have been recorded within 5 miles of SHF. Individuals of these two bird species are highly mobile and could avoid direct effects from clearing of habitat unless the disturbance affects eggs or nestlings. Adult birds would be displaced to similar habitats in the surrounding area. Hundreds of acres of woodlands, croplands, and old fields are available in the surrounding area, including in the nearby WKWMA.

The two frogs (green treefrog and Northern crawfish frog) that are state species of special concern and that could occur within the PWB project areas may be directly affected, if present. Individuals of these species could be affected by injury or loss of habitat in the area of disturbance due to the removal of wetlands and ponds during the breeding season (either species) or the clearing of forests (green treefrog) and fields (northern crawfish frog) in any season. However, abundant woodlands, old fields, and wetlands are available nearby, including in the nearby WKWMA, and overall effects on local populations of these frogs are likely to be minor.

Suitable habitat for federally and state-listed aquatic species does not occur within the project area; therefore, direct and indirect impacts are not anticipated to result from the implementation of Alternative B. Additionally, the proposed project would not adversely modify the critical habitat for the rabbitsfoot mussel within the Ohio River.

The habitat assessment for federally listed bats conducted in January 2018 (Appendix B) identified potential habitat for listed bat species within the PWB project areas. Only 0.56 acres of potential bat habitat would potentially be directly impacted by the construction of the proposed PWB (Jackson Group 2018c). The project area occurs within 5 miles of a documented Indiana bat maternity habitat. Accordingly, TVA will track and document removal of potentially suitable summer roost trees and include that information in annual reporting in accordance with Endangered Species Act (ESA) Section 7(a)(2) consultation. Tree removal of potentially suitable summer roosting habitat would occur in winter months (between November 15 and March 30) and would be tracked, documented, and reported to the USFWS. Trees would be mulched onsite and the mulch used for ground cover and erosion control. Given the amount of suitable roost habitat (0.56 acres) proposed for removal, and the abundance of available habitat within the vicinity, implementation of the Alternative B is anticipated to have a negligible impact on available bat habitat within the region. No impacts would be anticipated to gray bats.

A number of activities associated with the proposed action, including tree clearing, were addressed in TVA's programmatic biological assessment on routine actions and federally listed bats in accordance with ESA Section 7(a)(2). For those activities with potential to affect bats, TVA committed to implementing specific conservation measures. Therefore, direct and indirect impacts to federally-listed bat species are expected to be minor. All activities with potential to affect federally-listed bat species are in compliance with the final biological opinion (BO) issued by USFWS (USFWS 2018) in response to TVA's 2017 programmatic biological assessment.

3.7.2.3 Alternative C – Closure-in-Place and Regrading of the Special Waste Landfill and Ash Impoundment 2 and Construction of a New Process Water Basin

Under Alternative C, the same areas would be physically disturbed and the adverse impacts to threatened and endangered species would be the same as those described under Alternative B. Therefore, under Alternative C, direct and indirect impacts to threatened and endangered species due to the closure activities and the construction and operation of the proposed PWB would be minor.

3.8 Wetlands

3.8.1 Affected Environment

Wetlands are protected under Sections 404 and 401 of the Clean Water Act and by EO 11990 (EPA 1972). The USACE regulates the discharge of fill material into waters of the United States, including wetlands, pursuant to Section 404. In order to conduct specific activities in wetlands, authorization under a Section 404 permit from the USACE may be required, depending on the wetland's size and hydrologic connectivity to a navigable waterway. Section 401 gives to states the authority to certify whether activities permitted under Section 404 are in accordance with state water quality standards. In Kentucky, the Department of Environmental Protection, Division of Water is responsible for issuing Section 401 water quality certifications. EO 11990 (Protection of Wetlands) requires federal agencies to avoid, to the extent possible, adverse impacts to wetlands and to preserve and enhance their natural and beneficial values. Section 3.13 of the Final EIS discusses wetland impacts associated with the closure of the SWL and Ash Impoundment 2. This analysis is incorporated by reference in this SEIS.

As described in Section 3.13 of the Final EIS, SHF is located in the Bayou Creek watershed within the Four Rivers Basin (Cobb 2009). This area is within the Atlantic and Gulf Coast region for wetland delineations (USACE 2010) and Region 4 of the National Wetlands Inventory (USFWS 2016c). The proposed PWB project areas are composed of approximately 118.5 acres within the SHF facility. Portions of the PWB project areas are heavily industrialized while other areas are currently undeveloped, there are a few smaller areas of forest.

Major water bodies or wetland areas surrounding the project area include the Ohio River to the north and east and Little Bayou Creek to the west (Figure 3.8-1). Wetland surveys were completed at the proposed PWB project areas during January 2018 (Appendix C, Jackson Group 2018a). Prior to these surveys, the potential for wetlands on these properties was evaluated solely by reviewing the USFWS National Wetland Inventory Map.

The wetlands determination was performed in accordance with the procedures outlined in the USACE Wetlands Delineation Manual (USACE 1987), as well as the regional supplement for the Atlantic and Gulf Coastal Plain Region (USACE 2010). Data were collected to characterize wetland areas in terms of hydrology, soils, dominant plant species, and wetland type on data forms as provided in the Regional Supplement (USACE 2010). In addition, the value of each wetland was scored by using the TVA Rapid Assessment Method (TVA RAM) to assess wetland condition, functional capacity, and quality (Mack 2001). Wetland data forms and TVA RAM forms are provided in the delineation report (Appendix C). Wetland boundaries were determined and recorded in the field, with Geographic Information System (GIS) files generated for each potential wetland area.

Approximately 0.26 acres of herbaceous wetlands would be permanently impacted by the proposed PWB construction, specifically in the pipeline corridor and the PWB footprint (Table 3.8-1 and Figure 3.8-1). No wetlands are located within the temporary treatment areas or potential laydown areas (Jackson Group 2018a).

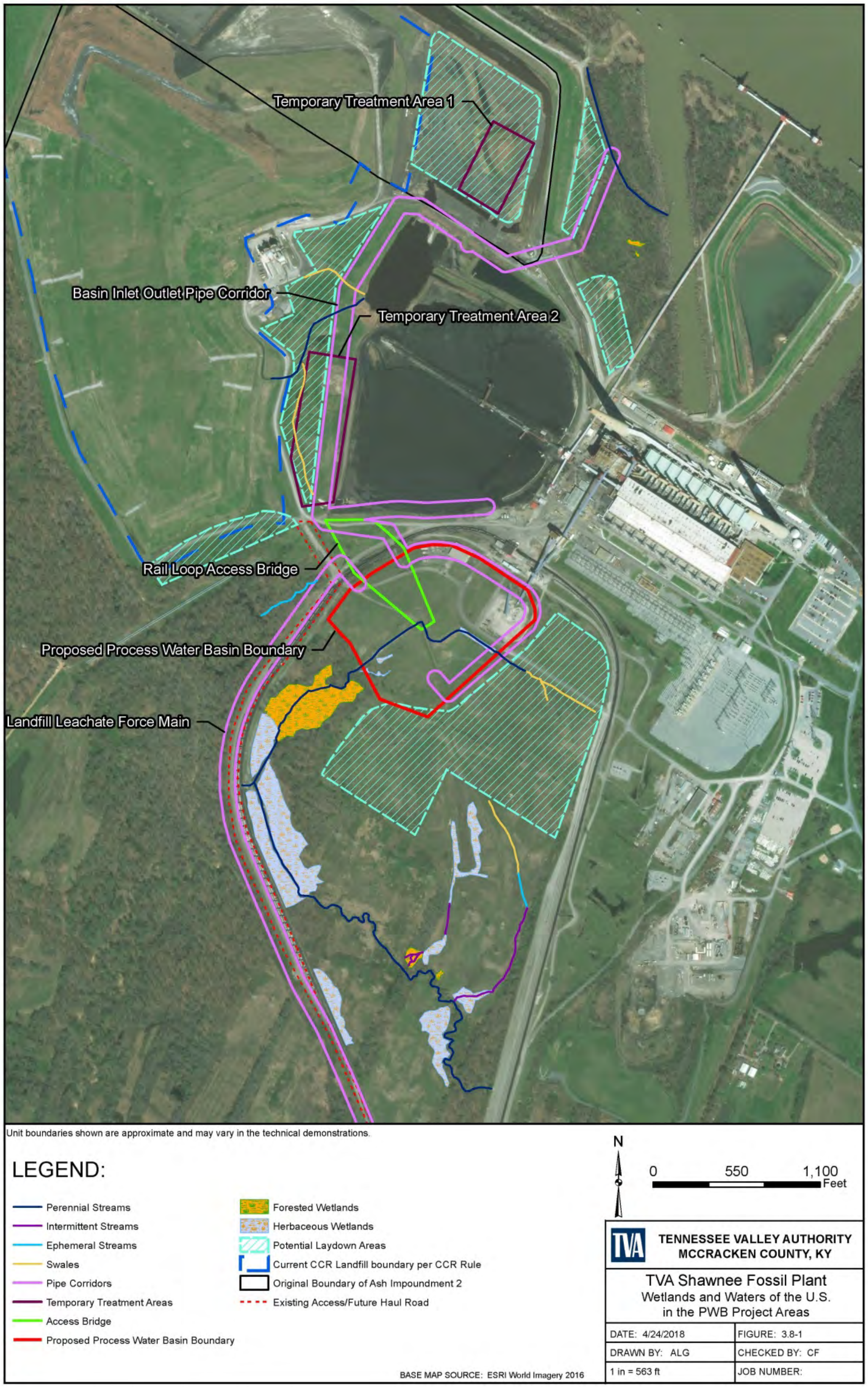

Figure 3.8-1. Wetlands and Waters of the US in the Vicinity of the PWB Project Areas

As described in Section 3.4.1 of this SEIS, 2,061.3 linear feet of non-jurisdictional streams (swales or WWCs) would be impacted by the construction of the proposed PWB in the pipe corridor, potential laydown, and PWB areas. No stream features were identified within the temporary treatment areas. The stream features impacted by construction of the PWB are also shown on Figure 3.8-1.

In implementing Section 404 of the Clean Water Act, the USACE has jurisdiction over waters of the U.S. (EPA 1972). Wetlands and water bodies that meet the criteria to be waters of the U.S. are “jurisdictional.” TVA estimated the jurisdictional status of the wetlands and water bodies on each site based on their characteristics and whether they were likely to be considered waters of the U.S. by the USACE. During consultation, the USACE agreed with TVA’s assessment of the jurisdictional status of the three small wetlands and issued a preliminary jurisdictional determination to that effect on August 17, 2018 (Garrett 2018b).

Table 3.8-1. Wetlands within the Proposed PWB Project Areas

Wetland	Wetland Type	Description	Pipeline Corridor Acreage	Proposed Water Basin Acreage	Total Acreage
WSP* 4	Herbaceous	Positive indicators for all three wetland criteria were present. This area is a fringe wetland along an upland swale and also serves as a water detention area for the site. Area vegetation is dominated by common reed (*Phragmites australis*), an exotic invasive species. Soil was assumed hydric due to the annual inundation levels in this wetland area.	0.02	0.15	0.17
WSP* 5	Herbaceous	Positive indicators were observed for all three wetland criteria. Area is dominated by hydrophytic vegetation such as *Carex*, *Juncus*, and *Festuca* species. Vegetation may need to be re-evaluated during the growing season to determine species level identification and more accurate indicator status.	0.00	0.05	0.05
WSP* 6	Herbaceous	Area is dominated by hydrophytic vegetation such as *Carex*, *Juncus*, and *Festuca* species. Vegetation may need to be re-evaluated during the growing season to determine species- level identification and more accurate indicator status.	0.00	0.04	0.04
Total			**0.02**	**0.24**	**0.26**

* WSP = wetland sampling point

3.8.2 Environmental Consequences

3.8.2.1 Alternative A – No Action

Under the No Action Alternative, TVA would continue current plant operations and not cease operations at its SWL and Ash Impoundment 2 or close either of those facilities. Additionally, TVA would not construct and operate the proposed PWB and associated ancillary infrastructure. With no changes to plant operations and no new construction, no impacts to wetlands would occur under the No Action Alternative. Once the dewatering system has been constructed and the new CCR landfill is operational, new CCR would no longer be stored in the SWL or Ash Impoundment 2. This alternative would not be consistent with the project's purpose and need and it does not align with current CCR regulations.

3.8.2.2 Alternative B – Closure-in-Place by Reduced Footprint of the Special Waste Landfill and Ash Impoundment 2 and Construction of a New Process Water Basin

As described in Subsection 3.13.2.2 of the Final EIS, the open water features within Ash Impoundment 2 are considered SHF treatment systems and are, therefore, excluded from regulation under Section 404 of the Clean Water Act. Temporary laydown areas would be located within the impoundment complex or on already disturbed areas of the SHF property. There are no jurisdictional wetlands within the Ash Impoundment 2 and/or SWL complex; therefore, permanent direct impacts to jurisdictional wetlands associated with closure of these areas are not anticipated. The impacts discussion associated with the closure of the SWL and Ash Impoundment 2 in the Final EIS are incorporated by reference in this SEIS. The over-excavation of the Ash Impoundment 2 would not cause any additional impacts to wetlands or streams.

As identified in Table 3.8-1, 0.26 acres of wetlands were documented within the footprint of the PWB project areas (Figure 3.8-1). TVA is consulting with the USACE regarding the impacts to the three wetlands located within these 0.26 acres. The results of that consultation will be reported in the Final SEIS. TVA would attempt to avoid impacts to these wetlands if possible. However, because the activities involved in the proposed actions (i.e., construction of a PWB and associated piping) must be in close proximity to each other, there is no practicable alternative to certain activities which would result in adverse impacts to wetlands, such as clearing, excavating, and grading land. In such instances where impacts to wetlands cannot be avoided, TVA would mitigate impacts in accordance with the Section 404 permit and/or Water Quality Certification as determined in consultation with the USACE and Kentucky Division of Water. With this mitigation, minor direct impacts to wetlands would be anticipated under Alternative B.

Potential indirect impacts resulting from construction activities at either the closure sites or the PWB project areas could include erosion and sedimentation from storm water runoff during construction into offsite or nearby jurisdictional and non-jurisdictional wetlands. Use of BMPs in accordance with site-specific erosion control plans would be implemented to minimize this potential. Overall, indirect impacts to wetland areas due to construction activities would be minor. Closure of Ash Impoundment 2 and the SWL and development of the new PWB and associated piping would be conducted in accordance with EO 11990.

3.8.2.3 Alternative C – Closure-in-Place and Regrading of the Special Waste Landfill and Ash Impoundment 2 and Construction of a New Process Water Basin

Under Alternative C, impacts to wetlands would be the same as those described above under Alternative B. Given that the same areas would be disturbed under this alternative as were discussed under Alternative B, the same hydrology would be altered during the closure activities, and adverse impacts would also be minimized as much as possible through BMPs and avoidance, direct and indirect impacts to wetlands would be minor.

3.9 Cultural and Historic Resources

Cultural resources include prehistoric and historic archaeological sites, districts, buildings, structures, and objects as well as locations of important historic events. Federal agencies, including TVA, are required by the National Historic Preservation Act (NHPA) (16 United States Code 470) and by the NEPA to consider the possible effects of their undertakings on historic properties. “Undertaking” means any project, activity, or program, and any of its elements, which has the potential to have an effect on a historic property and is under the direct or indirect jurisdiction of a federal agency or is licensed or assisted by a federal agency. An agency may fulfill its statutory obligations under NEPA by following the process outlined in the regulations implementing Section 106 of NHPA. Additional cultural resource laws that protect historic resources include the Archaeological and Historic Preservation Act, Archaeological Resources Protection Act, and the Native American Graves Protection and Repatriation Act. Section 106 of the NHPA requires that federal agencies consider the potential effects of their actions on historic properties and allow the Advisory Council on Historic Preservation an opportunity to comment on the action. Section 106 involves four steps: (1) initiate the process, (2) identify historic properties, (3) assess adverse effects, and (4) resolve adverse effects. This process is carried out in consultation with the State Historic Preservation Officer (SHPO) and other interested consulting parties, including federally recognized Indian tribes.

Cultural resources are considered historic properties if they are listed or eligible for listing in the National Register of Historic Places (NRHP). The NRHP eligibility of a resource is based on the Secretary of the Interior’s criteria for evaluation, which state that significant cultural resources possess integrity of location, design, setting, materials, workmanship, feeling, association, and

a. Are associated with events that have made a significant contribution to the broad patterns of our history; or
b. Are associated with the lives of persons significant in our past; or
c. Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic value; or
d. Have yielded, or may yield, information (data) important in prehistory or history (Andrus 2002).

A project may have effects on a historic property that are not adverse, if those effects do not diminish the qualities of the property that identify it as eligible for listing on the NRHP. However, if the agency determines (in consultation with the SHPO and tribes) that the undertaking's effect on a historic property within the area of potential effect (APE) would diminish any of the qualities that make the property eligible for the NRHP, the effect is said to be adverse. Examples of adverse effects would be ground-disturbing activity in an archaeological site or erecting structures within the viewshed of a historic building in such a way as to diminish the structure's integrity or setting.

Federal agencies must resolve the adverse effects of their undertakings on historic properties. Resolution may consist of avoidance (such as choosing a project alternative that does not result in adverse effects), minimization (such as redesign to lessen the effects), or mitigation. Adverse effects to archaeological sites are typically mitigated by means of excavation to recover the important scientific information contained within the site. Mitigation of adverse effects to historic structures sometimes involves thorough documentation of the structure by compiling historic records, studies, and photographs. Agencies are required to consult with SHPOs, tribes, and others throughout the Section 106 process and to document adverse effects to historic properties resulting from agency undertakings. Section 3.18 of the Final EIS analyzed cultural and historic resources with respect to the closure of the SWL and Ash Impoundment 2, this analysis is incorporated by reference in this SEIS.

3.9.1 Area of Potential Effect

The APE is the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if such properties exist.

Under Alternative A, TVA would continue to manage CCR in Ash Impoundment 2 and the SWL. Therefore, the APE for Alternative A is the footprint of these features and the adjacent associated areas including the laydown yards/staging area. (Though laydown/staging areas would not be required for closure projects under Alternative A, they could be disturbed by ongoing CCR management, therefore, they have been included in the APE for this alternative.) The Alternative A APE consists of previously developed and disturbed lands that were evaluated for cultural resources as part of the *Shawnee Fossil Plant Bottom Ash Process Dewatering Facility Environmental Assessment* (TVA 2016b). The analysis from the Final Environmental Assessment is incorporated in this SEIS by reference.

For Alternative B and C, the APE for direct effects is defined as the project footprint. This includes two areas within which ground disturbance could occur:

- The footprints of Ash Impoundment 2 and the SWL and laydown yards/staging areas as defined for Alternative A. As described for Alternative A, that analysis from the Final EA is incorporated in this SEIS by reference.
- The approximately 38-acre PWB area including the associated piping corridors. The survey area includes the PWB footprint and pipe corridors. The total Phase 1 survey area encompassed approximately 38.2 acres, of which 16 acres have been previously surveyed, leaving 22.2 acres requiring archaeological investigation.

The APE for architectural resources in the vicinity of SHF includes areas within a one-half mile radius of the proposed PWB and pipeline corridor that would have a direct line of sight to these project areas.

3.9.2 Previous Studies

Section 3.18 of the Final EIS describes previous studies conducted at the SWL and Ash Impoundment 2 area. This information is incorporated by reference into this SEIS.

Based on the new location proposed for the PWB, TVA conducted additional records searches at the Office of State Archaeology in Lexington, Kentucky and the Kentucky Heritage Council in Frankfort, Kentucky to identify previously recorded archaeological and architectural properties listed on, or eligible for inclusion in the NRHP within the proposed PWB APE. Background research revealed that some portions of the Phase A survey area have been previously surveyed (Autry 1979; Watson 1981; Fredrick 1994; Bradley and Knopf 2013; Amec Foster Wheeler 2018). No previously recorded archaeological sites were identified within the Phase A survey area.

Additionally, the laydown area northeast of the coal yard was included in a 2016 archaeological survey in relation to a proposed dewatering area, and no archaeological sites were identified within this area.

The architectural resources and NRHP-listed properties at and in the vicinity of the SHF site were evaluated in Section 3.18 of the Final EIS and are incorporated in this SEIS by reference.

3.9.3 Affected Environment

No new studies were undertaken at the Ash Impoundment 2 and SWL project areas because the study undertaken with respect to the dewatering facility was considered sufficient for this area. Additionally, both Ash Impoundment 2 and the SWL are highly disturbed areas and would not likely contain any intact archeological resources.

The entire PWB footprint and pipeline corridors were surveyed during the current investigations. The survey area is primarily characterized by maintained grass fields, forested areas, and developed/industrial areas associated with the plant and existing roads. The entire survey area, including previously surveyed areas, was investigated with pedestrian and subsurface survey. A total of 206 shovel test profiles were excavated within the survey area. The survey did not result in the discovery of any archaeological sites or isolated finds (Amec Foster Wheeler 2018).

The 2018 survey included the laydown area within the Rail Loop. As described in Subsection 3.9.2, the laydown area northeast of the coal yard was included in a 2016 archaeological survey and no archaeological sites were identified in this area. The remaining laydown areas are located on artificial fill that was used for construction of the Original SWL and the SWL Current Stacking Area. These latter areas have no potential to contain intact soils that could contain archaeological sites.

SHF was listed on the NRHP in August 2016 under Criterion A for its historic significance as the first TVA fossil plant to be built in Kentucky. TVA completed a review of historic documents and current satellite imagery and has not identified any additional above ground historic properties within the viewshed of the proposed PWB and pipeline corridor.

3.9.4 Environmental Consequences

3.9.4.1 Alternative A – No Action

Under the No Action Alternative, TVA would continue current plant operations and not cease operations at its SWL and Ash Impoundment 2 or close either of those facilities. Additionally, TVA would not construct and operate the proposed PWB and associated ancillary infrastructure. With no changes to plant operations and no construction, no impacts to cultural resources or historic properties would occur. Once the dewatering system has been constructed and the new CCR landfill is operational, new CCR would no longer be stored in the SWL or Ash Impoundment 2. This alternative would not be consistent with the project's purpose and need and it does not align with current CCR regulations.

3.9.4.2 Alternative B – Closure-in-Place by Reduced Footprint of the Special Waste Landfill and Ash Impoundment 2 and Construction of a New Process Water Basin

As archaeological surveys have identified no archaeological sites within the project APE, closure activities at Ash Impoundment 2 and the SWL and ground-disturbing activities at the PWB project areas are not anticipated to result in any impacts to cultural resources. However, in the event of discovery of unidentified archaeological resources during construction, TVA would cease all construction activities in the immediate area. TVA would contact the SHPO to determine what further action, if any, would be necessary to comply with Section 106 of the NHPA.

As described in Subsection 3.18.3.3 of the Final EIS, TVA finds that the closure projects and construction of a new PWB (in the original location within Ash Impoundment 2) would result in an indirect visual effect to SHF, but that the effect would not be adverse. On August 31, 2017, the SHPO concurred with TVA's recommendation that there would be no adverse effect to historic properties. The consultation letters are included in Appendix F of the Final EIS. While portions of the proposed PWB in the rail loop location may be visible from SHF, the PWB would be consistent in appearance with SHF operations (such as the SWL). This would not constitute a major change to visual resources (or the viewshed) of the NRHP-eligible SHF. Therefore, no adverse effects to the NRHP-nominated SHF are anticipated as a result of the proposed actions.

TVA finds that the undertaking would result in an indirect visual effect to SHF, but that the effect would not be adverse. TVA is consulting with the SHPO regarding the findings of this analysis. The completion of the consultation will be reported in the Final SEIS. Consultation letters are provided in Appendix D of this SEIS.

3.9.4.3 Alternative C – Closure-in-Place and Regrading of the Special Waste Landfill and Ash Impoundment 2 and Construction of a New Process Water Basin

Under Alternative C, impacts to cultural resources would be the same as those described above under Alternative B. The same areas would be disturbed and would result in similar visual effects post-construction. Therefore, as with Alternative B, and concurrence of the SHPO, the closure of the SWL and Ash Impoundment 2 and the construction of the proposed PWB would have an indirect visual effect to SHF, but it would not be adverse. Additionally, no other impacts to cultural resources are anticipated.

3.10 Unavoidable Adverse Environmental Impacts

Unavoidable adverse impacts are the effects of the proposed actions on natural and human resources that would remain after mitigation measures or BMPs have been applied. Mitigation measures and BMPs are typically implemented to reduce a potential impact to a level that would be below the threshold of significance, as defined by the Council on Environmental Quality (CEQ) and the courts. Impacts associated with the management of CCR from SHF have the potential to cause unavoidable adverse effects to several environmental resources.

As described in Section 3.22 of the Final EIS, the impacts from the Ash Impoundment 2 and SWL closure would primarily be related to construction activities. Activities associated with the use of construction equipment may result in varying amounts of dust, air emissions, and noise impacts to the immediate vicinity. Emissions from onsite construction activities and equipment are minimized through implementation of BMPs, including proper maintenance of construction equipment and vehicles and wet suppression to control fugitive dust emissions. During construction, BMPs to minimize surface water runoff will be implemented but there could still be some uncontrolled runoff that could affect nearby outfalls and water bodies. Additionally, an increase in the construction workforce and some construction-related equipment could increase traffic on public roads. This additional construction-related traffic would also increase noise and fugitive dust in areas proximate to these roads. Emissions from transportation of CCR are minimized through implementation of BMPs including proper maintenance of equipment and vehicles and wet suppression to control fugitive dust.

Alternative B includes the construction of the proposed PWB in currently undeveloped, though largely previously disturbed areas. The construction would result in a permanent change in land use for the 22-acre PWB. This constitutes an unavoidable adverse impact. Potential bat habitat, wetlands, and WWCs within the PWB project areas would be impacted by the clearing and grading activities. These would be unavoidable adverse impacts; however, the clearing of potential bat habitat, wetlands, and WWCs would be mitigated or minimized through consultation with USACE and the application of appropriate Avoidance and Minimization measures. Impacts of clearing of other habitats on the site would be minor relative to the abundance of similar cover types within the vicinity. Impacts would be similar under Alternative C.

3.11 Relationship of Short-Term Uses and Long-Term Productivity

NEPA requires a discussion of the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity. Section 3.23 of the Final EIS focused on the analyses of environmental impacts associated with the ongoing disposal of CCR at SHF over the next 20 years, including construction of the proposed PWB. These activities were considered short-term uses for purposes of the analysis in the Final EIS. The 'long-term' was considered to be final closure of the CCR impoundments, which would be initiated when operations at the Ash Impoundment 2 and the SWL have ceased and the proposed CCR Landfill is closed at some future date. Section 3.23 of the Final EIS evaluated the relationship of short-term uses to long-term productivity for the closure of ash impoundments in general (TVA 2017a). That section included an evaluation of the extent that the short-term uses preclude any options for future long-term use of the project sites at SHF under the current proposed actions.

For this SEIS, short-term activities are considered to be the construction of the proposed PWB. This would likely occur within the next 5 years. The long-term is still considered to be the period after closure of Ash Impoundment 2 and the SWL is complete as it was in the Final EIS. This section includes an evaluation of the extent that the short-term uses preclude any options for future long-term use of the project sites at SHF under the current proposed actions. The relationships of short-term uses and long-term productivity would be the same for Alternatives B and C.

Closure of Ash Impoundment 2 and the SWL would have a negative effect on a limited amount of short-term uses of the environment such as air, noise, and transportation resources. Access to Ash Impoundment 2 and the SWL would be restricted during closure activities. In addition, closure activities such as site preparation and noise may displace some wildlife during the construction period. Most environmental impacts during closure activities would be relatively short-term and would be addressed by programmatic BMPs and mitigation measures.

Unavoidable short-term impacts to water quality from runoff at the closure site could impact nearby outfalls and water bodies at the new landfill site during initial construction. BMPs to minimize runoff would be implemented.

The closure of Ash Impoundment 2 and the SWL and construction of the proposed PWB would have a favorable short-term impact to the local economy through the creation of construction and support jobs and revenue.

Long-term effects of the closure activities would include the permanent loss of waterfowl and wading bird habitat and a permanent loss of aquatic habitat at Ash Impoundment 2. However, other higher quality aquatic habitat is located elsewhere in the vicinity of SHF.

Ash impoundments that are closed-in-place have post-closure requirements, and future land uses could be limited. However, Ash Impoundment 2 is located in an area presently dedicated for industrial uses which already limits future use of the site.

Ash impoundment closure at SHF would have a beneficial effect on long-term groundwater quality through the reduction or elimination of potential discharges of CCR constituents to groundwater that could occur as a result of continued use of the ash impoundment.

The acreage disturbed during the initial clearing for the proposed PWB will have a negative effect on a limited amount of short-term uses of the environment such as air, noise, soil and visual resources. Additionally, these construction activities may displace some wildlife, aquatic resources, and alter existing vegetation. Since the proposed actions would occur within an area previously subject to human disturbance, and since the surrounding vicinity includes similar vegetation and habitat types, the short-term disturbance due to construction and operations is not expected to significantly alter long-term productivity of wildlife or other natural resources.

3.12 Irreversible and Irretrievable Commitments of Resources

A resource commitment is considered irreversible when impacts from its use would limit future use options and the change cannot be reversed, reclaimed, or repaired. Irreversible commitments generally occur to nonrenewable resources such as minerals or cultural resources and to those resources that are renewable only over long time spans, such as soil productivity. A resource commitment is considered irretrievable when the use or consumption of the resource is neither renewable nor recoverable for use by future generations until reclamation is successfully applied. Irretrievable commitments generally apply to the loss of production, harvest, or natural resources and are not necessarily irreversible.

As described in Section 3.24 of the Final EIS, with respect to ash impoundment closure, resources required by construction activities, including labor, fossil fuels, and construction materials, would be committed for the life of the project. Nonrenewable fossil fuels would be irretrievably lost through the use of gasoline and diesel-powered equipment during construction. In addition, construction materials (such as liners) would be consumed. However, it is unlikely that their limited use in these projects would adversely affect the future availability of these resources (TVA 2017a).

The loss of wetlands would be irretrievable, though not irreversible because TVA would mitigate this loss in consultation with the USACE. The loss of bat habitat areas would be irretrievable and irreversible; however, TVA would minimize this loss by funding future conservation projects in consultation with the USFWS.

The land used for the ash impoundments that are closed-in-place would be irreversibly committed as the CCR material would remain in place for the foreseeable future representing a permanent commitment of the land, precluding future use of the land. However, if the Ash Impoundment 2 site is revegetated, it would support some natural resources (therefore not irretrievable). If the Ash Impoundment 2 and SWL are capped using closure turf, the land would still remain irreversibly committed for the foreseeable future.

With respect to the construction of the proposed PWB, the land used would be irreversibly committed because the land would be permanently converted from an undeveloped use to a PWB that would remain in place until it is no longer needed and is closed. The materials used for the construction of the proposed PWB would be committed for the life of the facility. All building materials associated with the construction of the PWB would be irrevocably committed.

Nonrenewable fossil fuels would be irretrievably lost through the use of gasoline and diesel-powered equipment during construction of the PWB. In addition, construction materials would be consumed. However, their limited use in this project would not adversely affect the future availability of these resources.

3.13 Cumulative Effects

The CEQ regulations implementing the procedural provisions of the NEPA of 1969, as amended, define 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 nonfederal) or person undertakes such other actions" (40 CFR § 1508.7). A cumulative impact analysis must consider the potential impact on the environment that may result from the incremental impact of the project when added to other past, present, and reasonably foreseeable future actions. Baseline conditions reflect the impacts of past and present actions. The impact analyses summarized in preceding sections are based on baseline conditions, which reflect the cumulative effects of past and present actions in the vicinity.

This section is based on the resources of potential concern and the geographic area in which potential adverse effects from site-specific activities have the potential to alter (degrade) the quality of the regional environmental resource. The appropriate geographic area of analysis for SHF is therefore the immediate project area and vicinity (2-mile radius) surrounding SHF. This analysis addresses those resource areas potentially adversely affected by project activities under Alternatives B and C, the action alternatives, at the site. Resources that are not affected, or that have an overall beneficial impact as a result of the proposed actions, are not considered for cumulative effects. Accordingly, Land Use, Prime Farmland and Soils, Groundwater, Surface Water, Vegetation, Wildlife, Threatened and Endangered Species, Wetlands, and Cultural and Historic Resources are included in this analysis as these resources may be adversely affected.

Past, present, and reasonably foreseeable future actions that are appropriate for consideration in this cumulative analysis are listed in Section 3.25 of the Final EIS. These actions within the geographic area of analysis were identified as having the potential to, in aggregate, result in larger and potentially significant adverse impacts to the resources of concern. No new actions were identified during the development of this SEIS. The past, present, and reasonably foreseeable actions described in the Final EIS are incorporated by reference in this SEIS.

Because the Final EIS evaluated the closure of Ash Impoundment 2 and the SWL and included the construction of a new PWB, the major project activities considered in the Final EIS are equivalent to the actions evaluated in the SEIS. Therefore, the cumulative impacts analysis described in the Final EIS is still relevant, is incorporated by reference into this SEIS, and no changes to the analyses are warranted.

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CHAPTER 6 - ENVIRONMENTAL IMPACT STATEMENT RECIPIENTS

Federal Agencies
U.S. Army Corps of Engineers, Louisville District
U.S. Fish and Wildlife Service
U.S. Environmental Protection Agency, Region 4
U.S. Department of Interior

Federally Recognized Tribes
Absentee Shawnee Tribe of Oklahoma
Cherokee Nation
Eastern Band of Cherokee Indians
Eastern Shawnee Tribe of Oklahoma
Shawnee Tribe
United Keetoowah Band of Cherokee Indians in Oklahoma

State Agencies
Kentucky Department for Environmental Protection
Kentucky Department for Energy Development and Independence
Kentucky Department of Natural Resources
Kentucky Energy and Environment Cabinet
Kentucky Heritage Council
Kentucky Fish and Wildlife
Kentucky State Clearinghouse
Kentucky State Historic Preservation Officer
Land Between the Lakes
Natural Resources Conservation Service

Appendix A – Vegetation Field Survey Report

VEGETATION FIELD SURVEY REPORT

Shawnee Process Water Basin Project
McCracken County, Kentucky

Prepared by:

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Prepared for:

February 2018

Contents

List of Tables

1.0 INTRODUCTION

On behalf of the Tennessee Valley Authority (TVA), AECOM and Jackson Group have prepared the following vegetation field survey document for the proposed Shawnee Process Water Basin Project (Project) in McCracken County, Kentucky.

1.1 Project Description

As part of an effort to manage the disposal of coal combustion residual (CCR) materials on a dry basis, and to meet new CCR regulations, TVA is proposing to cease CCR management operations at the Shawnee Fossil Plant (SHF) Ash Impoundment 2 former Special Waste Landfill (SWL) in accordance with the U.S. Environmental Protection Agency's final Disposal of Coal Combustion Residuals from Electric Utilities rule (CCR Rule). TVA is currently evaluating the potential environmental impacts associated with closure of Ash Impoundment 2 and the former SWL. Closure of Ash Impoundment 2 and the former SWL includes the construction of a new Process Water Basin (PWB) to receive plant flows and allow for operations to cease at Ash Impoundment 2 once the new SHF dewatering facility is constructed.

TVA is currently developing a Supplemental Environmental Impact Statement (SEIS) to the *Shawnee Fossil Plant Coal Combustion Residual Management Final Environmental Impact Statement* (Final EIS) published in January 2018. The SEIS will further evaluate the closure of Ash Impoundment 2 and the former SWL. Additionally, the SEIS will evaluate the potential environmental impacts associated with construction of a new PWB and supporting systems at SHF. The activities associated with construction of the new PWB would include:

- Construction of a new PWB consisting of two equal-area (approximately 6 acres each) operational, lined basin cells and rerouting existing general plant process flows away from the coal yard drainage basin directly to the PWB.
- Improving the coal yard drainage basin through lowering the pool and dredging to reduce solids loading to the PWB.
- Additional treatment improvements such as:
  - Installation of additional treatment systems (coagulant, flocculent, and polymer injection and mixing) to provide additional total suspended solids (TSS) removal of flows routed to the PWB.
  - Installation of pH adjustment and aeration in the PWB.
  - Installation/upgrade of an additional treatment system to provide additional TSS removal in flows routed to the coal yard drainage basin.

The new PWB would be constructed at the Rail Loop Site. Associated systems would connect the PWB to SHF and existing SHF systems and outfalls. The Project area is depicted on mapping provided in Appendix A.

2.0 VEGETATION

2.1 General Vegetation

SHF is located within the Wabash-Ohio Bottomlands Level IV ecoregion Woods et al. 2002). This unglaciated, level floodplain along the Ohio River was historically southern floodplain forest, a mix of oaks, cypress, and hardwood species. This region has been largely drained and converted for commercial and agricultural use. SHF is mostly an intensely developed site that has been heavily disturbed by construction, maintenance, and operation of the facility. As a result of this alteration of the physical landscape, most areas within SHF no longer support a natural plant community. Within the project area, the land use is classified as developed, low intensity, and the vegetation consists of plants typical of disturbed or landscaped areas.

The proposed Project area is bordered to the north by Gipson Road and the Ohio River, to the south by Andersen Road, to the east by Metropolis Lake Road, and to the west by Little Bayou Creek. Land use within a 5-mile radius of the proposed Project area consists of agricultural, residential, rural, and commercial activities (TVA 2016). Vegetation within 5 miles of the project area is primarily cultivated crops, deciduous forest, and pasture land.

A field survey was conducted by Jackson Group in January 2018 to evaluate land cover, threatened and endangered species, and forest composition within the 283.0-acre Project site. Vegetation observed within the site was primarily bottomland hardwoods, herbaceous wetlands, forested wetlands, upland grasslands, scrub/shrub, and mixed oak forest. Photographs of these habitat types are provided in Appendix B.

There are two types of bottomland hardwoods in the project area, one of which is dominated by American sycamore (*Plantanus occidentalis*), black willow (*Salix nigra*) button bush (*Cephalanthus occidentalis*), eastern cottonwood (*Populus deltoids*), and green ash (*Fraxinus pennsylvanica*); whereas the other type is dominated by sweet gum (*Liquidambar styraciflua*). Herbaceous wetland areas are dominated by various *Carex*, *Festuca*, *Juncus*, and *Polygonum* species, as well as common barnyard grass (*Echinoicloa crus-galli*), and common reed grass (*Phragmites australis*). The vegetation in upland grassland areas consist of species mostly associated with managed grassland areas around industrial sites. These species include various *Festuca s*pecies, Bermuda (*Cybnodon dactylon*), and common barnyard grasses. Scrub/shrub areas on site are managed areas to support wildlife conservation. The vegetation in these areas consists of multifora rose (*Rosa multiflora*) and a variety of upland grass species. Mixed oak forest on-site is primarily composed of blackjack oak (*Quercus marilandica*), northern red oak (*Q. rubra*), and white oak (Q. *alba*).

2.2 Project Area Vegetation

2.2.1 Threatened and Endangered Vegetation

No federally threatened or endangered (T&E) plant species were observed during field survey efforts and there are no T&E plant species with known recorded occurrences in McCracken County, Kentucky (USFWS, Environmental Conservation Online System [ECOS]).

2.2.2 State Listed Species

The Kentucky Rare Plant Recognition Act of 1994 provides protection for species considered threatened, endangered, or in need of management within the state. The state listing of species is managed by the Kentucky Department of Fish and Wildlife Resources (KDFWR). The Kentucky State Nature Preserves Commission (KSNPC) and TVA both maintain databases of aquatic and terrestrial species that are considered threatened, endangered, of special concern, or are otherwise tracked in Kentucky because the species is rare and/or vulnerable within the state.

There are 26 state-listed plant species with recorded occurrences in McCracken County (KSNPC and Nature Serve [Table 1]). Potential suitable habitat for state listed species was observed throughout the Project Area. A review of the TVA Natural Heritage Database indicated that only two of the state-listed plant species (water hickory and star tickseed) have recorded occurrences within a 5-mile radius of the project area. No state listed plant species were observed during field surveys.

Table 1. State listed plant species for McCracken County, Kentucky.

Common Name	Scientific Name	State Status
Lamance Iris	*Iris brevicaulis*	T
One-flower False Fiddleleaf	*Hydrolea uniflora*	T
Porcupine Sedge	*Carex hystericina*	S
Five-lobe Cayaponia	*Cayaponia quinqueloba*	E
Water-locust	*Gleditsia aquatica*	S
Creeping St. John's-wort	*Hypericum adpressum*	S
Compass Plant	*Silphium laciniatum*	T
Buckley's Goldenrod	*Solidago buckleyi*	S
Broadwing Sedge	*Carex alata*	T
Aethusa-like Trepocarpus	*Trepocarpus aethusae*	S
Water Hickory	*Carya aquatica*	T
Red Buckeye	*Aesculus pavia*	T
Sweet Coneflower	*Rudbeckia subtomentosa*	E
Buffalo Clover	*Trifolium reflexum*	E
Cream Wild Indigo	*Baptisia bracteata var. leucophaea*	S
Tall Bushclover	*Lespedeza stuevei*	T
Lake-cress	*Armoracia lacustris*	T
Rose Turtlehead	*Chelone obliqua var. speciosa*	S
Inland Muhly	*Muhlenbergia glabrifloris*	S
Snow Melanthera	*Melanthera nivea*	S
Star Tickseed	*Coreopsis pubescens*	S
Ovate False Fiddleleaf	*Hydrolea ovata*	E
Broadleaf Water-milfoil	*Myriophyllum heterophyllum*	S
Spotted Pondweed	*Potamogeton pulcher*	T
Rough Rattlesnake-root	*Prenanthes aspera*	E
Red Turtlehead	*Chelone obliqua*	E

State Status:
E: Endangered. A taxon in danger of extirpation and/or extinction throughout all or a significant part of its range in Kentucky.

T: Threatened. A taxon likely to become endangered within the foreseeable future throughout all or a significant part of its range in Kentucky.

S: Special Concern. A taxon that should be monitored because (1) it exists in a limited geographic area in Kentucky, (2) it may become threatened or endangered due to modification or destruction of habitat, (3) certain characteristics or requirements make it especially vulnerable to specific pressures, (4) experienced researchers have identified other factors that may jeopardize it, or (5) it is thought to be rare or declining in Kentucky but insufficient information exists for assignment to the threatened or endangered status categories.

2.2.3 Invasive Plant Species

The Project area has been either intensely developed or heavily disturbed, and as a result of these alterations, no longer supports a natural plant community. Invasive species is defined as a species that is not native to the local ecosystem and whose introduction does or is likely to cause economic or environmental harm or harm to human health (USDA 2016 [Executive Order 13112]). Invasive plants can include trees, shrubs, vines, grasses, ferns, and forbs.

The most common invasive species observed were common reed grass, multiflora rose and Japanese honeysuckle (*Lonicera japonica*). These species were sparsely distributed throughout the proposed Project area.

Appendix A: Project Mapping

Shawnee Process Water Basin Project

Vegetation Map

Legend

Project Boundary

Herbaceous Wetlands

Forested Wetlands

Forested Areas

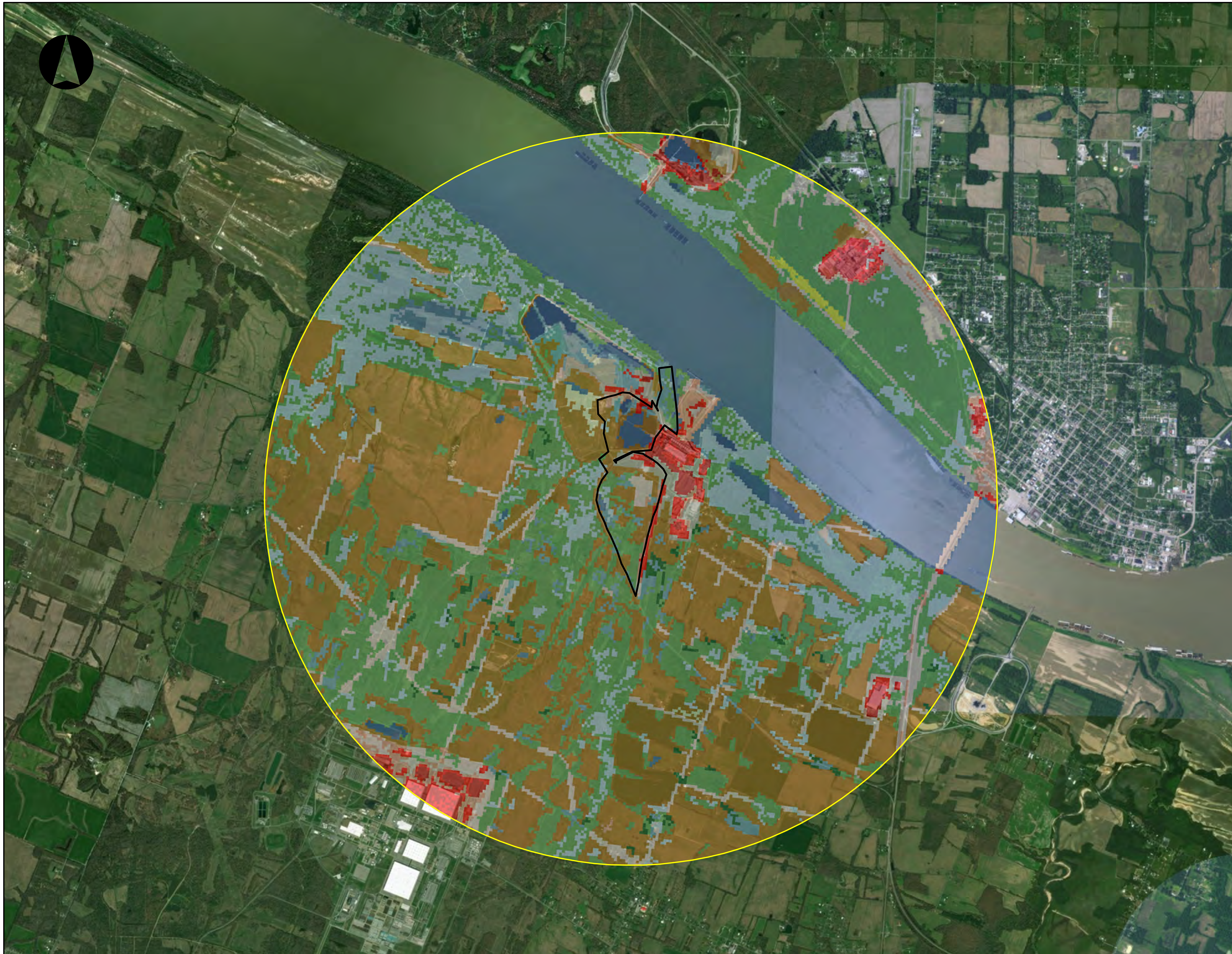
OF - Open Field

SS - Scrub Shrub

2,200 1,100 0 Feet

JACKSON GROUP

AECOM



Shawnee Process Water Basin Project

Land Cover Map

Legend

- Project Boundary
- 5-Mile Buffer

USA Land COver (2011)

- Open Water
- Perennial Snow/Ice
- Developed, Open Space
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, High Intensity
- Barren Land
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Shrub/Scrub
- Herbaceous
- Hay/Pasture
- Cultivated Crops
- Woody Wetlands
- Emergent Herbaceous Wetlands

1.5 0.75 0 Miles

JACKSON GROUP

AECOM

Appendix B: Photographs

Representative photograph of forested area.

Representative photograph of forested area.

Representative photograph of forested area.

Representative photgraph forested area.

Representative photograph of forested area.

Representative photograph of open field area.

Representative photograph of opened field area.

Representative photograph of forested wetland area.

Representative photograph of forested wetland area.

Representative photograph of wetland sampling point 4 (WSP-4).

Representative photograph of herbaceous wetland area.

Representative photograph of forested wetland area.

Representative photograph of herbaceous wetland area.

Representative photograph of herbaceous wetland area.

Appendix B – Bat Habitat Report

BAT HABITAT ASSESSMENT REPORT

Shawnee Process Water Basin Project
McCracken County, Kentucky

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Contents

List of Tables

1.0 INTRODUCTION

On behalf of the Tennessee Valley Authority (TVA), AECOM and Jackson Group have prepared the following document to assess potential habitat for threatened and endangered bat species, the Indiana bat (*Myotis sodalis*) and northern long-eared bat (*Myotis septentrionalis*) for the proposed Shawnee Process Water Basin Project (Project) in McCracken County, Kentucky. The methods used to develop this document were derived from the Range-Wide Indiana Bat Summer Survey Guidelines (2017).

1.1 Project Description

As part of an effort to manage the disposal of coal combustion residual (CCR) materials on a dry basis, and to meet new CCR regulations, TVA is proposing to cease CCR management operations at the Shawnee Fossil Plant (SHF) Ash Impoundment 2 former Special Waste Landfill (SWL) in accordance with the U.S. Environmental Protection Agency's final Disposal of Coal Combustion Residuals from Electric Utilities rule (CCR Rule). TVA is currently evaluating the potential environmental impacts associated with closure of Ash Impoundment 2 and the former SWL. Closure of Ash Impoundment 2 and the former SWL includes the construction of a new Process Water Basin (PWB) to receive plant flows and allow for operations to cease at Ash Impoundment 2 once the new SHF dewatering facility is constructed.

TVA is currently developing a Supplemental Environmental Impact Statement (SEIS) to the *Shawnee Fossil Plant Coal Combustion Residual Management Final Environmental Impact Statement* (Final EIS) published in January 2018. The SEIS will further evaluate the closure of Ash Impoundment 2 and the former SWL. Additionally, the SEIS will evaluate the potential environmental impacts associated with construction of a new PWB and supporting systems at SHF. The activities associated with construction of the new PWB would include:

- Construction of a new PWB consisting of two equal-area (approximately 6 acres each) operational, lined basin cells and rerouting existing general plant process flows away from the coal yard drainage basin directly to the PWB.
- Improving the coal yard drainage basin through lowering the pool and dredging to reduce solids loading to the PWB.
- Additional treatment improvements such as:
  - Installation of additional treatment systems (coagulant, flocculent, and polymer injection and mixing) to provide additional total suspended solids (TSS) removal of flows routed to the PWB.
  - Installation of pH adjustment and aeration in the PWB.
  - Installation/upgrade of an additional treatment system to provide additional TSS removal in flows routed to the coal yard drainage basin.

The new PWB would be constructed at the Rail Loop Site. Associated systems would connect the PWB to SHF and existing SHF systems and outfalls. The Project area is depicted on mapping provided in Appendix A.

2.0 HABITAT ASSESSMENT AND FIELD SURVEYS

Jackson Group utilized the 2011 National Land Cover Database to calculate the amount of forested habitat proposed to be impacted within the proposed project area. Forested and non-forested acreages within the habitat evaluation area were calculated for pre-tree clearing and post tree clearing scenarios (Table 1). A total of approximately 43.84 acres of forested habitat are present within the project area.

Table 1. Forested Impacts within Project Area.

Phase	Project	Total Acres	Non-Forested Acres	Forested Acres
Pre-Tree Clearing	Shawnee Process Water Basin	283.0	239.16	43.84
Post-Tree Clearing	Shawnee Process Water Basin	283.0	283.0	43.28
			Resulting Loss of Forested Habitat	0.56

2.1 Field Surveys

The proposed Project was systematically surveyed by qualified biologists in January 2018 to assess the quality and quantity of potentially suitable roosting habitat in the Project area. For the purposes of the field surveys, trees were considered potentially suitable roost trees (PRT's) if they possessed the following characteristics (USFWS, 2017):

- Indiana bat - diameter at breast height (dbh) $\geq$ 5 inches dbh,
- Northern long-eared bat – dbh $\geq$ 3 inches
- Both species - have exfoliating bark, cracks, crevices, and/or hollows

Data were collected on representative PRT's for each of the habitat assessment areas within the project area. Habitat assessment sites were selected within forested areas for identifying and qualifying potential areas of suitable bat habitat and to provide a representative description of each habitat assessment area as depicted on aerial photographs in Appendix A. When not hibernating Indiana and northern long eared bats will roost in trees that provide suitable shelter (PRT's). Trees that exhibited suitable roosting characteristics, as described above, were geo-referenced and recorded. Characteristics such as tree species and diameter at breast height were recorded as well. Data sheets can be found in Appendix B.

During the course of the habitat assessment, qualified biologists also recorded current forest conditions so that the quality and quantity of Indiana bat and northern long-eared bat travel and foraging habitat could be assessed. At forest crossings where practicable, forest conditions were evaluated as to canopy and understory characteristics, average dbh, tree species, presence of known jurisdictional water resources, and suitability for Indiana and northern long-eared bat habitat. Forest conditions were evaluated by the type of habitat use supported (i.e. roosting, foraging, commuting).

2.1.1 Summer Habitat

The 43.84 acres of forested habitat within the Project area represents potentially suitable summer habitat for the Indiana bat and northern long-eared bat. Of the 43.84 acres of potentially suitable summer habitat, a total of 0.56 acres will be will be affected by proposed project actions (Table 2). Figure 1 depicting potential suitable summer bat habitat impacts can be found in Appendix A.

Table 2. Potentially Suitable Bat Habitat Impacts within Project Area.

Habitat Assessment Area	Temporary Treatment Areas (AC)	Pipe Corridors (AC)	Potential Laydown Areas (AC)	Proposed Process Water Basin (AC)	Total (AC)
1					
2					
3					
4		0.08			0.08
5					

Habitat Assessment Area	Temporary Treatment Areas (AC)	Pipe Corridors (AC)	Potential Laydown Areas (AC)	Proposed Process Water Basin (AC)	Total (AC)
6		0.31	0.17		0.48
7					
8					
9					
Total		0.39	0.17		0.56

2.1.1.1 Potential Roost Trees

A total of 39 representative PRT's were identified within the project habitat assessment areas, of which 4 contain moderate or high quality roosting characteristics, including (Table 3):

- ≥ 9 inches diameter at breast height (dbh)
- 25% or greater solar exposure

These trees would represent potential primary maternity roosting habitat. The remaining 35 PRT's ranged from 10 to 54 inches dbh, received < 25% solar exposure, and could be used as secondary roosts by maternity colonies as well as non-reproductive females and males.

Table 3. Representative Potential Roost Trees identified within habitat assessment areas.

	Primary PRT	Secondary PRT	Total
	4	35	**39**
Total	**4**	**35**	**39**

2.1.1.2 Foraging Habitat

Within the project area, the 43.84 acres of forest represent potentially suitable foraging habitat. On-site conditions were recorded by qualified surveyors. Area streams, wetlands, deciduous forest, and open areas serve as potential foraging habitat. Complete survey information, including tree clearing area description, tree species, and habitat type are provided in Table 4. Photographs can be found in Appendix C.

Table 4. Habitat assessment within project area.

Area	Plot Description	Tree Species	Habitat Type[1]	Acres
1	This forested area is potential suitable summer bat habitat. Numerous potential roost trees displaying the physical characteristics necessary for a bat to roost (i.e. cracks, crevices, sloughing bark, or hollows) were observed. Additionally, trees were present that met the minimum diameter at breast height (DBH) for both the Indiana (*Myotis sodalis*; ≥ 5 inches) and northern Long-eared bat (*M. septentrionalis*; ≥ 3 inches) thus this area could be considered potential foraging habitat along with potential travel corridors to other forested areas.	*Quercus* species, *Acer* species, *Fraxinus* species, *Robinia pseudoacacia*, *Liquidambar styraciflua, Nyssa sylvatica,*	Non-Maternity Roosting, Maternity Roosting, Foraging	12.46

Area	Plot Description	Tree Species	Habitat Type[1]	Acres
2	This forested area is potential suitable summer bat habitat. Potential roost trees displaying the physical characteristics necessary for a bat to roost (i.e. cracks, crevices, sloughing bark, or hollows) were observed. Additionally, trees were present that met the minimum diameter at breast height (DBH) for both the Indiana (*Myotis sodalis*; > 5 inches) and northern Long-eared bat (*M. septentrionalis*; ≥ 3 inches) thus this area could be considered potential foraging habitat along with potential travel corridors to other forested areas	*Quercus* species, *Acer* species, *Fraxinus* species, *Robinia pseudoacacia*, *Liquidambar styraciflua, Nyssa sylvatica,*	Non-Maternity Roosting, Maternity Roosting, Foraging	1.34
3	This forested area is potential suitable summer bat habitat. Numerous potential roost trees displaying the physical characteristics necessary for a bat to roost (i.e. cracks, crevices, sloughing bark, or hollows) were observed. Additionally, trees were present that met the minimum diameter at breast height (DBH) for both the Indiana (*Myotis sodalis*; ≥ 5 inches) and northern Long-eared bat (*M. septentrionalis*; ≥ 3 inches) thus this area could be considered potential foraging habitat along with potential travel corridors to other forested areas	*Quercus* species, *Acer* species, *Fraxinus* species, *Robinia pseudoacacia*, *Liquidambar styraciflua, Nyssa sylvatica, Platanus occidentalis*	Non-Maternity Roosting, Maternity Roosting, Foraging	10.86
4 4	This forested area is potential suitable summer bat habitat. Potential roost trees displaying the physical characteristics necessary for a bat to roost (i.e. cracks, crevices, sloughing bark, or hollows) were observed. Additionally, trees were present that met the minimum diameter at breast height (DBH) for both the Indiana (*Myotis sodalis*; ≥ 5 inches) and northern Long-eared bat (*M. septentrionalis*; ≥ 3 inches) thus this area could be considered potential foraging habitat along with potential travel corridors to other forested areas.	*Ulmus* species, *Quercus* species, *Acer* species, *Fraxinus* species, *Robinia pseudoacacia*, *Populus deltoides, Nyssa sylvatica, Platanus occidentalis, Carpinus caroliniana*	Non-Maternity Roosting, Maternity Roosting, Foraging	.83
5	This forested area is potential suitable summer bat habitat. Potential roost trees displaying the physical characteristics necessary for a bat to roost (i.e. cracks, crevices, sloughing bark, or hollows) were observed. Additionally, trees were present that met the minimum diameter at breast height (DBH) for both the Indiana (*Myotis sodalis*; ≥ 5 inches) and northern Long-eared bat (*M. septentrionalis*; ≥ 3 inches) thus this area could be considered potential foraging habitat along with potential travel corridors to other forested areas	*Populus deltoides, Quercus alba, Liquidambar styraciflua, Fraxinus pennsylvanica, Acer saccharinum*	Non-Maternity Roosting, Maternity Roosting, Foraging	2.27
6	This forested area is potential suitable summer bat habitat. Potential roost trees displaying the physical characteristics necessary for a bat to roost (i.e. cracks, crevices, sloughing bark, or hollows) were observed. Additionally, trees were present that met the minimum diameter at breast height (DBH) for both the Indiana (*Myotis sodalis*; > 5 inches) and northern Long-eared bat (*M. septentrionalis*; ≥ 3 inches) thus this area could be considered potential foraging habitat along with potential travel corridors to other forested areas	*Populus deltoides, Quercus alba, Liquidambar styraciflua, Fraxinus pennsylvanica, Acer saccharinum*	Non-Maternity Roosting, Maternity Roosting, Foraging	8.26
7	This forested area is potential suitable summer bat habitat. Potential roost trees displaying the physical characteristics necessary for a bat to roost	*Populus deltoides, Quercus alba, Liquidambar styraciflua,*	Non-Maternity Roosting, Maternity Roosting, Foraging	5.26

Area	Plot Description	Tree Species	Habitat Type[1]	Acres
	(i.e. cracks, crevices, sloughing bark, or hollows) were observed. Additionally, trees were present that met the minimum diameter at breast height (DBH) for both the Indiana (*Myotis sodalis*; ≥ 5 inches) and northern Long-eared bat (*M. septentrionalis*; ≥ 3 inches) thus this area could be considered potential foraging habitat along with potential travel corridors to other forested are	*Fraxinus pennsylvanica, Acer saccharinum*		
8	This forested area is potential suitable summer bat habitat. Potential roost trees displaying the physical characteristics necessary for a bat to roost (i.e. cracks, crevices, sloughing bark, or hollows) were observed. Additionally, trees were present that met the minimum diameter at breast height (DBH) for both the Indiana (*Myotis sodalis*; ≥ 5 inches) and northern Long-eared bat (*M. septentrionalis*; ≥ 3 inches) thus this area could be considered potential foraging habitat along with potential travel corridors to other forested areas	*Quercus* species, *Acer* species, *Fraxinus* species, *Robinia pseudoacacia*, *Liquidambar styraciflua, Nyssa sylvatica*	Non-Maternity Roosting, Maternity Roosting, Foraging	1.99
9	This forested area is potential suitable summer bat habitat however, no potential roost trees displaying the physical characteristics necessary for a bat to roost (i.e. cracks, crevices, sloughing bark, or hollows) were observed. Additionally, trees were present that met the minimum diameter at breast height (DBH) for both the Indiana (*Myotis sodalis*; ≥ 5 inches) and northern Long-eared bat (*M. septentrionalis*; ≥ 3 inches) thus this young forested area could be considered potential foraging habitat and it is directly adjacent to a potential travel corridor to the west.	Elm species, *Fagus grandifolia, Cornus florida*	Foraging	.57

[1]Habitat types for the Indiana and northern long-eared bat:

Maternity Roosting – plot contains one or more trees >9 inches dbh, exhibiting roosting characteristics, and >25 % solar exposure.

Non-Maternity Roosting – plot contains one or more trees > 5 inches dbh, exhibiting roosting characteristics

Foraging – plot does not contain trees with suitable roosting characteristics, but provides habitat suitable for use by foraging and/or commuting bats.

2.1.2 Winter Habitat

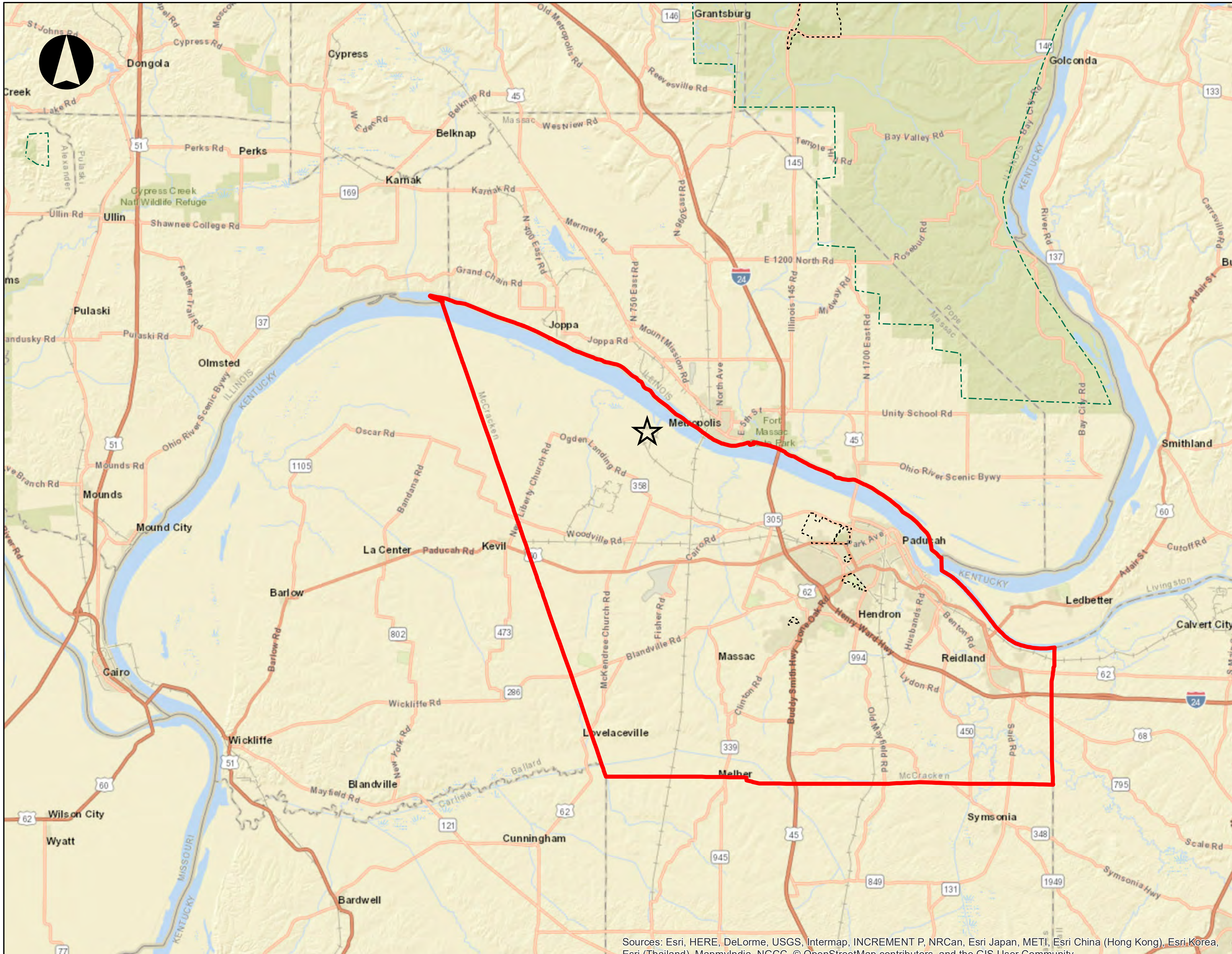
The proposed area was systematically surveyed by qualified biologists to identify cave and/or portal openings that may provide suitable winter habitat for the Indiana and northern long-eared bat. No winter habitat was observed during the field survey efforts. No impacts to Indiana bat or northern long-eared bat spring or fall swarming habitat are expected as a result of the proposed Project.

3.0 Summary

Deciduous forest, and pasture/cropland are the dominant land cover types of the adjacent properties to the Project. The project area is situated within an area dominated by agricultural areas with interspersed forested areas. There are stream and travel corridors that would likely facilitate bat movement through the region and directly adjacent to the Project. Desktop data suggest there are widespread waterbodies adjacent to the project. The project area is primarily situated within an overall hardwood deciduous forest matrix.

Approximately 43.84 acres of forested areas are present within the project area. Suitable summer bat habitat was identified within the project area with approximately 0.56 acres being impacted by proposed project proponents. Surrounding forested areas will facilitate movement throughout the region and will be available to potential roosting Indiana and northern long-eared bats in subsequent maternity seasons.

Appendix A: Project Mapping



Shawnee Process Water Basin Project

Project Vicinity Map

Legend

- Project Location
- McCracken County
- National Forests
- State Parks

10 5 0 Miles

JACKSON GROUP

AECOM

Shawnee Process Water Basin Project

Habitat Assessment Map

Legend

Project Boundary

Potential Bat Habitat

Non-Roosting Habitat

1,800 900 0 Feet

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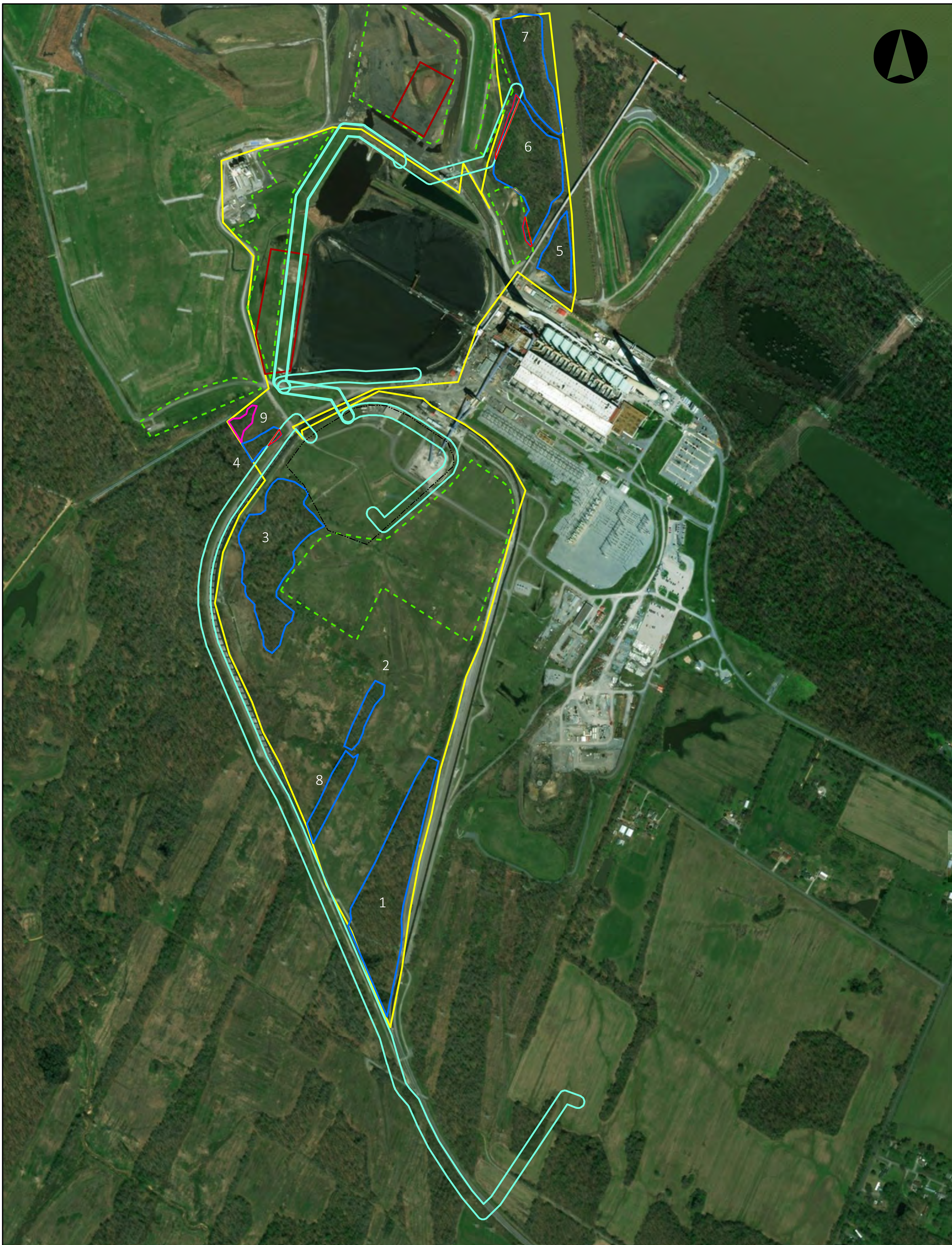
AECOM



Legend

- Project Boundary
- Pipe Corridors
- Proposed Water Basin Boundary
- Temporary Treatment Areas
- Potential Laydown Areas
- Potential Bat Habitat
- Non-Roosting Habitat
- Potential Bat Habitat Impacts

Pipe Corridors - 0.39 acres
Potential Laydown Areas - 0.17 acres

TVA TENNESSEE VALLEY AUTHORITY

Shawnee Process Water Basin Project

Bat Habitat Assessment Map

1,750 875 0 Feet

JACKSON GROUP

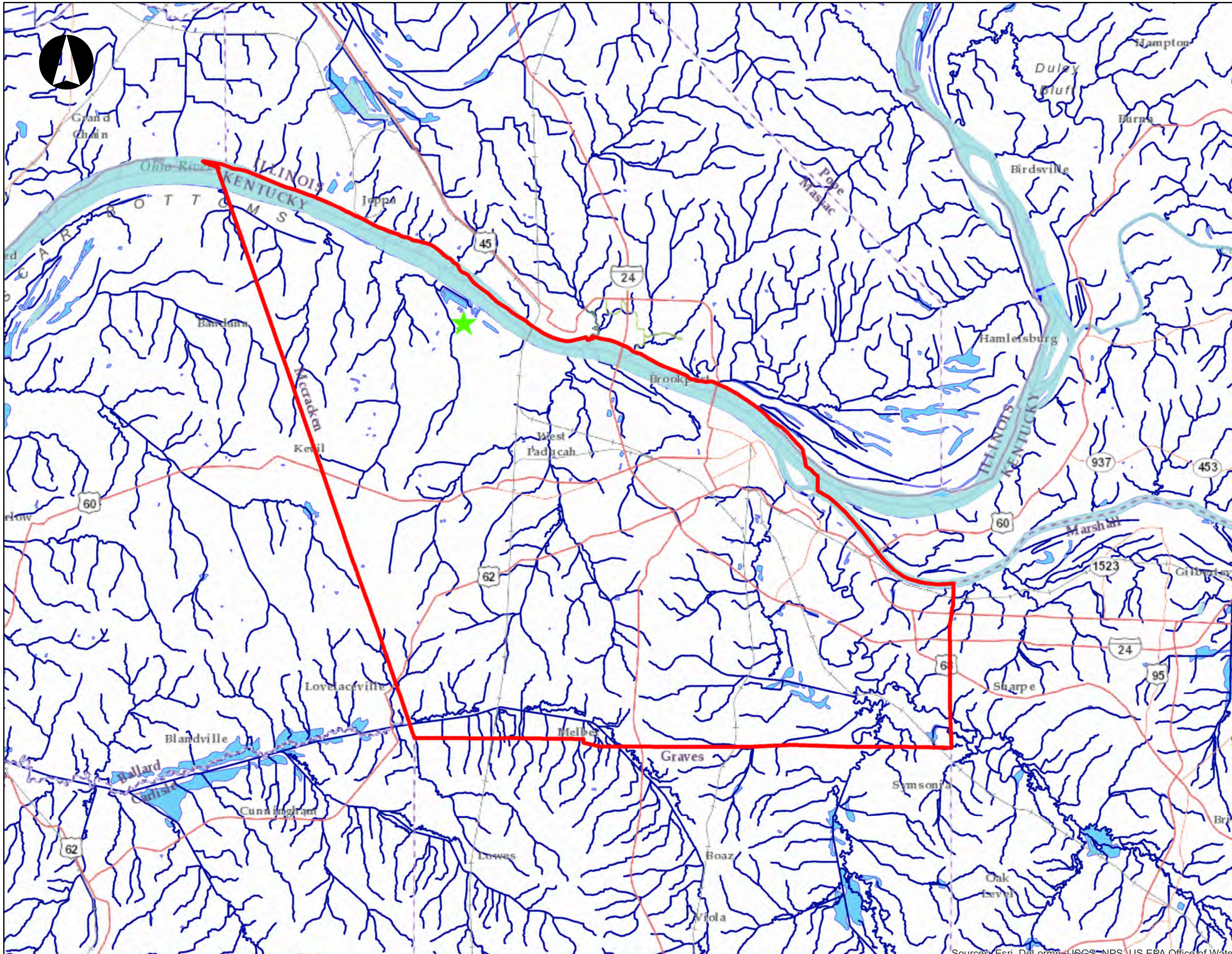
AECOM

DATE: 03/19/2018

FIGURE: 1

DRAWN BY: SR

CHECKED BY: RO



Shawnee Process Water Basin Project

Waterbodies Map

Legend

McCracken County

Project Location

Waterbodies

Lake/Pond

Reservoir

Stream/River

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Shawnee Process Water Basin Project

Habitat Assessment Map

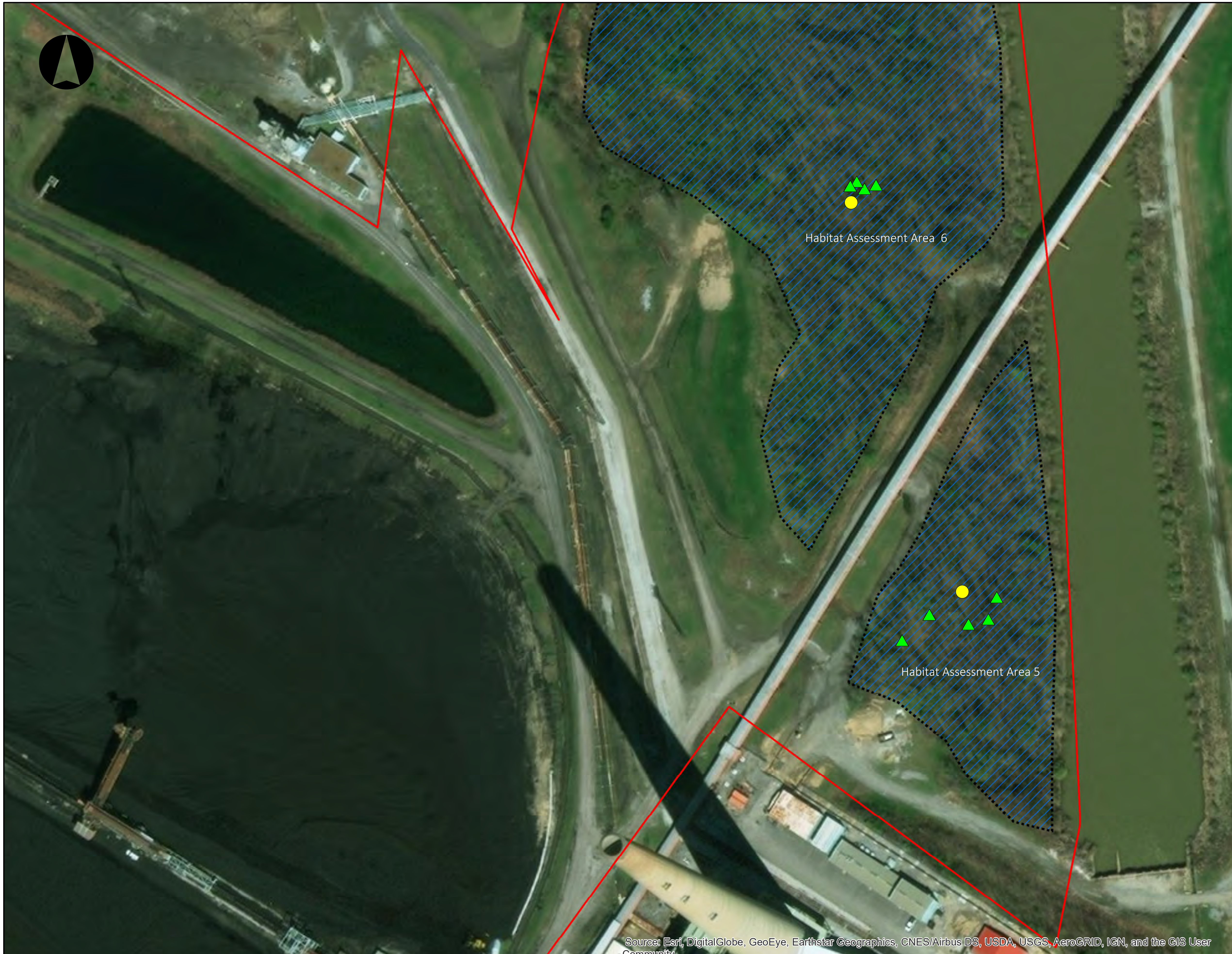
Legend

- Project Boundary
- Habitat Assessment Area
- Bat Habitat Assessment Site
- Potential Bat Habitat
- Non-Roosting Habitat
- Potential Roost Tree

280 140 0 Feet

JACKSON GROUP

AECOM



Shawnee Process Water Basin Project

Habitat Assessment Map

Legend

- Project Boundary
- Habitat Assessment Area
- Bat Habitat Assessment Site
- Potential Bat Habitat
- Non-Roosting Habitat
- Potential Roost Tree

280 140 0 Feet

JACKSON GROUP

AECOM

Shawnee Process Water Basin Project

Habitat Assessment Map

Legend

- Project Boundary
- Habitat Assessment Area
- Bat Habitat Assessment Site
- Potential Bat Habitat
- Non-Roosting Habitat
- Potential Roost Tree

280 140 0 Feet

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Shawnee Process Water Basin Project

Habitat Assessment Map

Legend

- Project Boundary
- Habitat Assessment Area
- Bat Habitat Assessment Site
- Potential Bat Habitat
- Non-Roosting Habitat
- Potential Roost Tree

280 140 0 Feet

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Shawnee Process Water Basin Project

Habitat Assessment Map

Legend

Project Boundary
Habitat Assessment Area
Bat Habitat Assessment Site
Potential Bat Habitat
Non-Roosting Habitat
Potential Roost Tree

280 140 0 Feet

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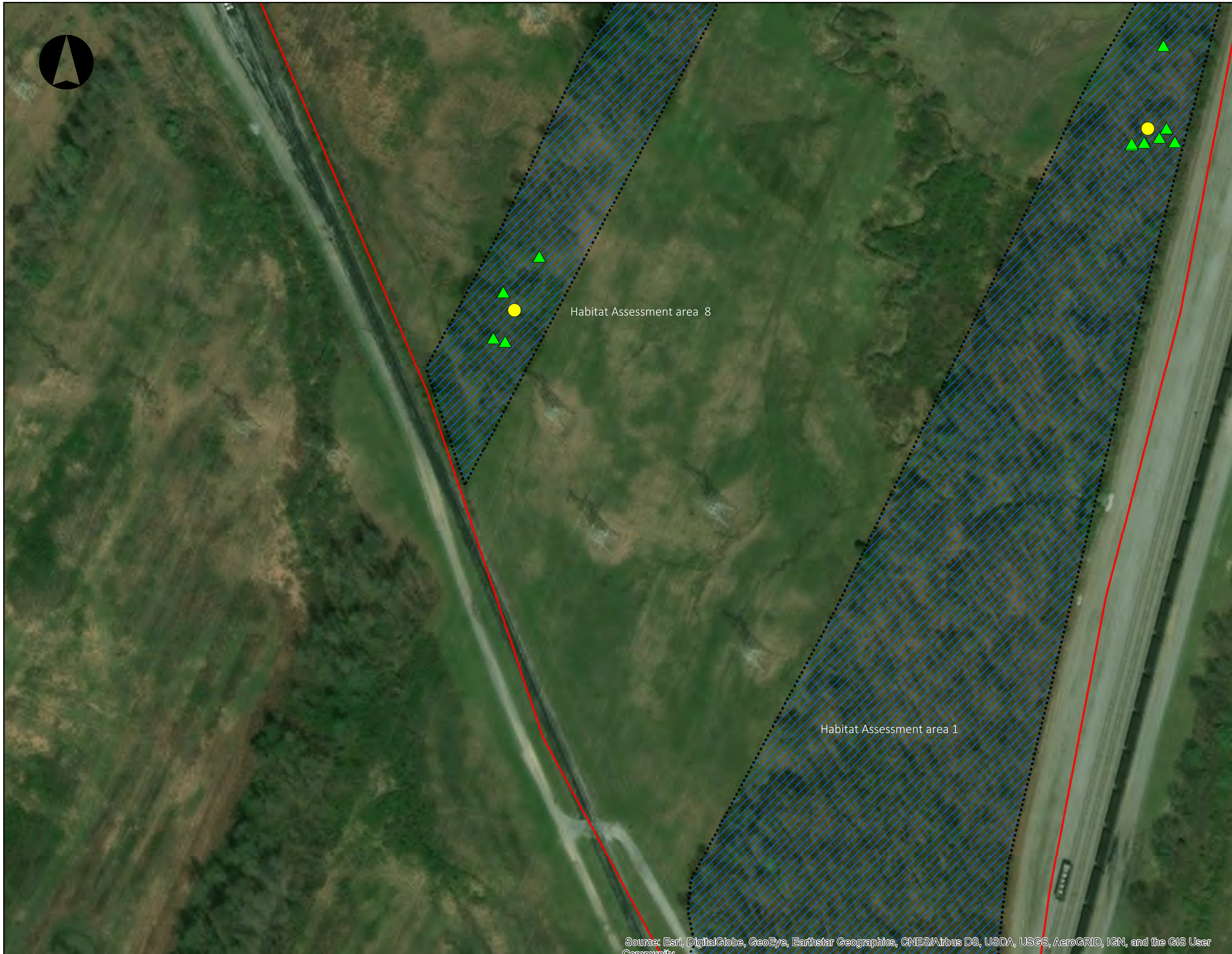
Sheet 5 of 11



Shawnee Process Water Basin Project

Habitat Assessment Map

Legend

- Project Boundary
- Habitat Assessment Area
- Bat Habitat Assessment Site
- Potential Bat Habitat
- Non-Roosting Habitat
- Potential Roost Tree

280 140 0 Feet

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Sheet 6 of 11

Shawnee Process Water Basin Project

Habitat Assessment Map

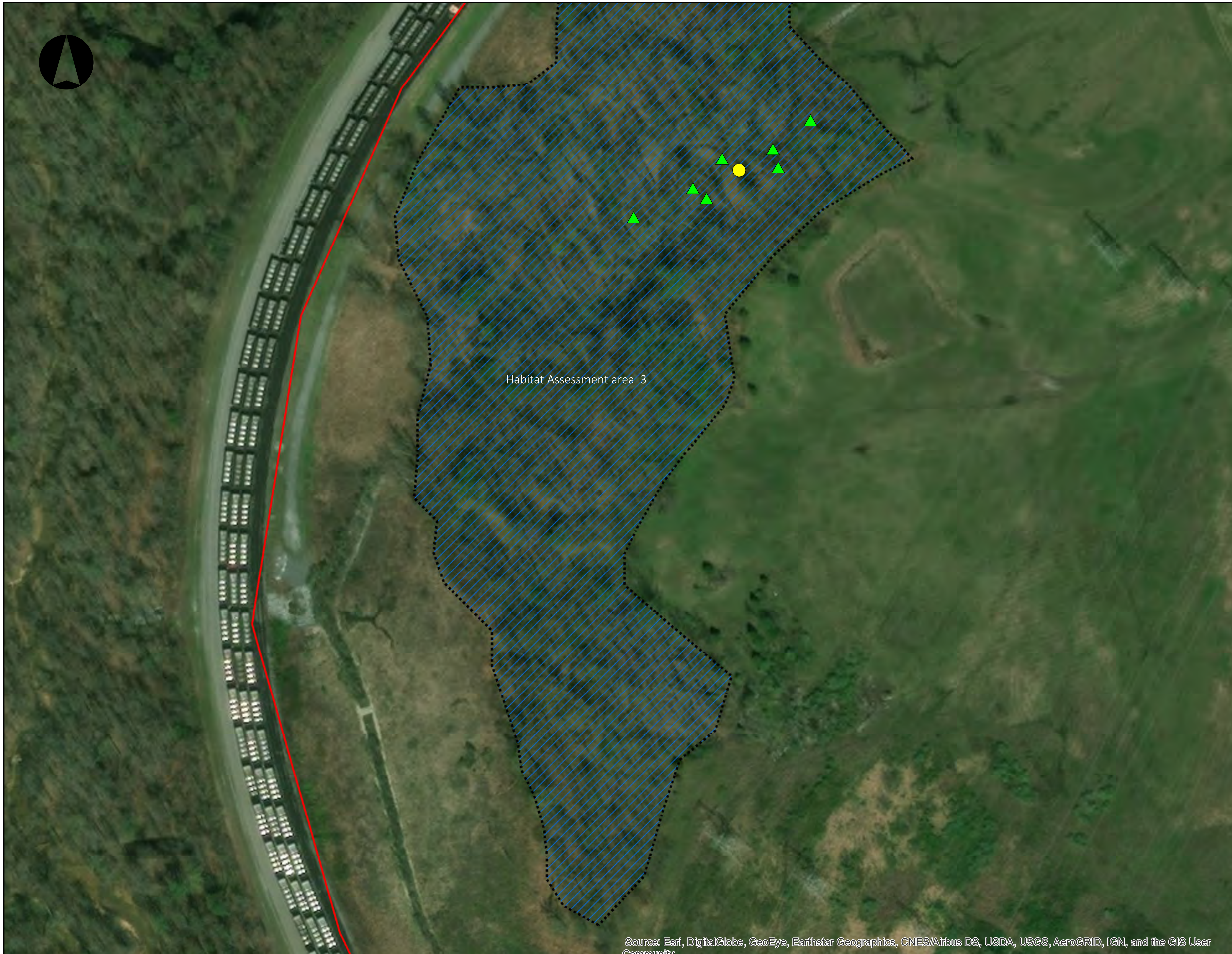
Legend

- Project Boundary
- Habitat Assessment Area
- Bat Habitat Assessment Site
- Potential Bat Habitat
- Non-Roosting Habitat
- Potential Roost Tree

280 140 0 Feet

JACKSON GROUP

AECOM



Shawnee Process Water Basin Project

Habitat Assessment Map

Legend

Project Boundary
Habitat Assessment Area
Bat Habitat Assessment Site
Potential Bat Habitat
Non-Roosting Habitat
Potential Roost Tree

280 140 0 Feet

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Shawnee Process Water Basin Project

Habitat Assessment Map

Legend

- Project Boundary
- Habitat Assessment Area
- Bat Habitat Assessment Site
- Potential Bat Habitat
- Non-Roosting Habitat
- Potential Roost Tree

280 140 0 Feet

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Shawnee Process Water Basin Project

Habitat Assessment Map

Legend

- Project Boundary
- Habitat Assessment Area
- Bat Habitat Assessment Site
- Potential Bat Habitat
- Non-Roosting Habitat
- Potential Roost Tree

280 140 0 Feet

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Shawnee Process Water Basin Project

Habitat Assessment Map

Legend

- Project Boundary
- Habitat Assessment Area
- Bat Habitat Assessment Site
- Potential Bat Habitat
- Non-Roosting Habitat
- Potential Roost Tree

280 140 0 Feet

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AECOM

Appendix B: Data Sheets

PHASE 1 SUMMER HABITAT ASSESSMENT

Indiana Bat Habitat Assessment Data Sheet

Project Name: Shawnee Process Water Basin Project **Date:** 10-11, Jan. 2018

Township: Paducah, KY **Lat/Long:** 37.148483°N, -88.782138°W **Surveyor:** Jeremy L. Jackson, Hunter Jackson

Project Description

As part of an effort to manage the disposal of coal combustion residual (CCR) materials on a dry basis, and to meet new CCR regulations, TVA is proposing to cease CCR management operations at the Shawnee Fossil Plant (SHF) Ash Impoundment 2 former Special Waste Landfill (SWL) in accordance with the U.S. Environmental Protection Agency's final Disposal of Coal Combustion Residuals from Electric Utilities rule (CCR Rule). TVA is currently evaluating the potential environmental impacts associated with closure of Ash Impoundment 2 and the former SWL. Closure of Ash Impoundment 2 and the former SWL includes the construction of a new Process Water Basin (PWB) to receive plant flows and allow for operations to cease at Ash Impoundment 2 once the new SHF dewatering facility is constructed.

Project Area

Project	Total Acres	Forested Acres		Non-forested
	283	43.84		239.16
Proposed Tree Removal (ac)	Completely Cleared	Partially Cleared (will leave trees)	Preserve acres (no clearing)	
	0.56		43.28	

Vegetation Cover Types

Pre-Project	***Post-Project***
The property is comprised of approximately 19% deciduous sessional upland and wetland forest that is potential suitable summer bat habitat and 81% non-forested areas.	Approximately 0.56 acres of forested habitat is scheduled to be cleared

Landscape within 5 mile radius

Flight corridors to other forested areas?

The project area occurs within the Wabash-Ohio Bottomlands of the Interior River Valleys and Hills Level III Ecoregion of Kentucky. This ecoregion is a generally level with poorly drained floodplains and rolling terraces. Presently, small and large scattered woodlands occur, however agriculture such as livestock production and row crops dominate where historically southern floodplain forested use to occur. Land use within the Wabash-Ohio Bottomlands is generally affected by seasonally high water tables and localized flooding. Streams in this ecoregion are low-gradient in nature with silt and/or sand substrates, which are dominated by Ohio River type fish species and aquatic life. Area streams, woodlots, and forested agricultural fence rows serve as multiple sources of potential travel and foraging corridors to the other many forested areas surrounding the project area.

Adjacent Properties

Deciduous forest (upland & wetland), pasture/cropland, commercial properties, and urban residential areas are the dominant land covers types of the adjacent properties to the proposed site.

Proximity to Public Land

What is the distance (mi.) from the project area to forested public lands?

Approximately 9 miles southeast (Stewart Nelson Park) and 12.9 miles northeast (Shawnee National Forest).

PHASE 1 SUMMER HABITAT ASSESSMENT

Sample Site Description
Sample Site No.(s): Shawnee Process Water Basin Project – Habitat Assessment Area 1

Water Resources at Sample Site

Stream Type (# and length)	*Ephemeral*	*Intermittent*	*Perennial*	*Describe existing condition of water sources:* One water resource was observed within this forested area.
	0	0	1 (~298 ft)	
Pools/Ponds (# and length)	0	*Open and accessible to bats?*		
		N/A		
Wetlands (approx. ac.)	*Permanent*	*Seasonal*		
	0	0		

Forest Resources at Sample Site

Closure/Density	*Canopy (> 50')*	*Midstory (20-50')*	*Understory (20')*
	11-20%	81-100%	1-10%
Dominant Species of Mature Trees	Oak species, Maple species, Ash species, *Robinia pseudoacacia*, *Liquidambar styraciflua, Nyssa sylvatica,*		
% Trees w/ Roosting Features	1-10%	1-10%	0
Size Composition of Live Trees (%)	*Small (3-8 in)*	*Med (9-15 in)*	*Large (>15 in)*
	61-80%	11-20%	1-10%
No. of Suitable Snags			

1 = 1-10%, 2 = 11-20%, 3 = 21-40%, 4 = 41-60%, 5 = 61-80%, 6 = 81-100%

IS THE HABITAT SUITABLE FOR INDIANA OR NORTHERN LONG-EARED BATS? ___Yes___

Additional Comments:

This forested area is potential suitable summer bat habitat. Numerous potential roost trees displaying the physical characteristics necessary for a bat to roost (i.e. cracks, crevices, sloughing bark, or hollows) were observed. Additionally, trees were present that met the minimum diameter at breast height (DBH) for both the Indiana (*Myotis sodalis*; ≥ 5 inches) and northern Long-eared bat (*M. septentrionalis*; ≥ 3 inches) thus this area could be considered potential foraging habitat along with potential travel corridors to other forested areas. General location coordinates for this forested area are 37.14277°N, -88.78104°W. The above percentages are visual estimates.

PHASE 1 SUMMER HABITAT ASSESSMENT

Sample Site Description
Sample Site No.(s): Shawnee Process Water Basin Project – Habitat Assessment Area 2

Water Resources at Sample Site

Stream Type (# and length)	*Ephemeral*	*Intermittent*	*Perennial*	*Describe existing condition of water sources:* Two water resources were observed within this forested area.
	0	1 (~300 ft)	0	
Pools/Ponds (# and length)	0	*Open and accessible to bats?*		
		N/A		
Wetlands (approx. ac.)	*Permanent*	*Seasonal*		
	0.22	0		

Forest Resources at Sample Site

Closure/Density	*Canopy (> 50')*	*Midstory (20-50')*	*Understory (20')*
	1-10%	81-100%	1-10%
Dominant Species of Mature Trees	Oak species, Maple species, Ash species, *Robinia pseudoacacia*, *Liquidambar styraciflua*, *Nyssa sylvatica,*		
% Trees w/ Roosting Features	1-10%	1-10%	0
Size Composition of Live Trees (%)	*Small (3-8 in)*	*Med (9-15 in)*	*Large (>15 in)*
	61-80%	11-20%	1-10%
No. of Suitable Snags			

1 = 1-10%, 2 = 11-20%, 3 = 21-40%, 4 = 41-60%, 5 = 61-80%, 6 = 81-100%

IS THE HABITAT SUITABLE FOR INDIANA OR NORTHERN LONG-EARED BATS? ___Yes___

Additional Comments:

This forested area is potential suitable summer bat habitat. Potential roost trees displaying the physical characteristics necessary for a bat to roost (i.e. cracks, crevices, sloughing bark, or hollows) were observed. Additionally, trees were present that met the minimum diameter at breast height (DBH) for both the Indiana (*Myotis sodalis*; $\geq$ 5 inches) and northern Long-eared bat (*M. septentrionalis*; $\geq$ 3 inches) thus this area could be considered potential foraging habitat along with potential travel corridors to other forested areas. General location coordinates for this forested area are 37.143986°N, -88.782828°W. The above percentages are visual estimates.

PHASE 1 SUMMER HABITAT ASSESSMENT

Sample Site Description
Sample Site No.(s): Shawnee Process Water Basin Project – Habitat Assessment Area 3

Water Resources at Sample Site

Stream Type (# and length)	*Ephemeral*	*Intermittent*	*Perennial*	*Describe existing condition of water sources:* Two water resources were observed within this forested area.
	0	0	1 (~845 ft)	
Pools/Ponds (# and length)	0	*Open and accessible to bats?*		
		N/A		
Wetlands (approx. ac.)	*Permanent*	*Seasonal*		
	3.32	0		

Forest Resources at Sample Site

Closure/Density	*Canopy (> 50')*	*Midstory (20-50')*	*Understory (20')*
	11-20%	81-100%	1-10%
Dominant Species of Mature Trees	Oak species, Maple species, Ash species, *Robinia pseudoacacia*, *Liquidambar styraciflua*, *Nyssa sylvatica*, *Platanus occidentalis*		
% Trees w/ Roosting Features	1-10%	1-10%	0
Size Composition of Live Trees (%)	*Small (3-8 in)*	*Med (9-15 in)*	*Large (>15 in)*
	61-80%	11-20%	1-10%
No. of Suitable Snags			

1 = 1-10%, 2 = 11-20%, 3 = 21-40%, 4 = 41-60%, 5 = 61-80%, 6 = 81-100%

IS THE HABITAT SUITABLE FOR INDIANA OR NORTHERN LONG-EARED BATS? ___Yes___

Additional Comments:

This forested area is potential suitable summer bat habitat. Numerous potential roost trees displaying the physical characteristics necessary for a bat to roost (i.e. cracks, crevices, sloughing bark, or hollows) were observed. Additionally, trees were present that met the minimum diameter at breast height (DBH) for both the Indiana (*Myotis sodalis*; $\geq$ 5 inches) and northern Long-eared bat (*M. septentrionalis*; $\geq$ 3 inches) thus this area could be considered potential foraging habitat along with potential travel corridors to other forested areas. General location coordinates for this forested area are 37.148381°N, -88.784845°W. The above percentages are visual estimates.

PHASE 1 SUMMER HABITAT ASSESSMENT

Sample Site Description
Sample Site No.(s): Shawnee Process Water Basin Project – Habitat Assessment Area 4

Water Resources at Sample Site

Stream Type (# and length)	*Ephemeral*	*Intermittent*	*Perennial*	*Describe existing condition of water sources:* One water resource was observed within this forested area.
	0	1 (~277 ft)	0	
Pools/Ponds (# and length)	0	*Open and accessible to bats?*		
		N/A		
Wetlands (approx. ac.)	*Permanent*	*Seasonal*		
	0	0		

Forest Resources at Sample Site

Closure/Density	*Canopy (> 50')*	*Midstory (20-50')*	*Understory (20')*
	1-10%	61-80%	1-10%
Dominant Species of Mature Trees	Elm species, Maple species, Oak species, *Robinia pseudoacacia*, *Populus deltoides*, *Nyssa sylvatica*, *Platanus occidentalis*, *Carpinus caroliniana*		
% Trees w/ Roosting Features	0	1-10%	0
Size Composition of Live Trees (%)	*Small (3-8 in)*	*Med (9-15 in)*	*Large (>15 in)*
	61-80%	11-20%	1-10%
No. of Suitable Snags			

1 = 1-10%, 2 = 11-20%, 3 = 21-40%, 4 = 41-60%, 5 = 61-80%, 6 = 81-100%

IS THE HABITAT SUITABLE FOR INDIANA OR NORTHERN LONG-EARED BATS? ___Yes___

Additional Comments:

This forested area is potential suitable summer bat habitat. Potential roost trees displaying the physical characteristics necessary for a bat to roost (i.e. cracks, crevices, sloughing bark, or hollows) were observed. Additionally, trees were present that met the minimum diameter at breast height (DBH) for both the Indiana (*Myotis sodalis*; $\geq$ 5 inches) and northern Long-eared bat (*M. septentrionalis*; $\geq$ 3 inches) thus this area could be considered potential foraging habitat along with potential travel corridors to other forested areas. General location coordinates for this forested area are 37.150235ºN, -88.785848ºW. The above percentages are visual estimates.

PHASE 1 SUMMER HABITAT ASSESSMENT

Sample Site Description
Sample Site No.(s): Shawnee Process Water Basin Project – Habitat Assessment Area 5

Water Resources at Sample Site

Stream Type (# and length)	*Ephemeral*	*Intermittent*	*Perennial*	*Describe existing condition of water sources:* No water resources were observed within this forested area. However a canal directly adjacent to the east connects to the Ohio River.
	0	0	0	
Pools/Ponds (# and length)	0	*Open and accessible to bats?*		
		N/A		
Wetlands (approx. ac.)	*Permanent*	*Seasonal*		
	0	0		

Forest Resources at Sample Site

Closure/Density	*Canopy (> 50')*	*Midstory (20-50')*	*Understory (20')*
	1-10%	61-80%	1-10%
Dominant Species of Mature Trees	*Populus deltoides, Quercus alba, Liquidambar styraciflua, Fraxinus pennsylvanica, Acer saccharinum*		
% Trees w/ Roosting Features	1-10%	1-10%	0
Size Composition of Live Trees (%)	*Small (3-8 in)*	*Med (9-15 in)*	*Large (>15 in)*
	21-40%	61-80%	1-10%
No. of Suitable Snags			

1 = 1-10%, 2 = 11-20%, 3 = 21-40%, 4 = 41-60%, 5 = 61-80%, 6 = 81-100%

IS THE HABITAT SUITABLE FOR INDIANA OR NORTHERN LONG-EARED BATS? ___Yes___

Additional Comments:

This forested area is potential suitable summer bat habitat. Potential roost trees displaying the physical characteristics necessary for a bat to roost (i.e. cracks, crevices, sloughing bark, or hollows) were observed. Additionally, trees were present that met the minimum diameter at breast height (DBH) for both the Indiana (*Myotis sodalis*; $\geq$ 5 inches) and northern Long-eared bat (*M. septentrionalis*; $\geq$ 3 inches) thus this area could be considered potential foraging habitat along with potential travel corridors to other forested areas. General location coordinates for this forested area are 37.154664ºN, -88.777736ºW. The above percentages are visual estimates.

PHASE 1 SUMMER HABITAT ASSESSMENT

Sample Site Description
Sample Site No.(s): Shawnee Process Water Basin Project – Habitat Assessment Area 6

Water Resources at Sample Site

Stream Type (# and length)	*Ephemeral*	*Intermittent*	*Perennial*	*Describe existing condition of water sources:* One water resource was observed within this forested area. Additionally, a canal directly adjacent to the east connects to the Ohio River and an unnamed tributary exist directly north.
	0	0	0	
Pools/Ponds (# and length)	0	*Open and accessible to bats?*		
		N/A		
Wetlands (approx. ac.)	*Permanent*	*Seasonal*		
	0.08	0		

Forest Resources at Sample Site

Closure/Density	*Canopy (> 50')*	*Midstory (20-50')*	*Understory (20')*
	1-10%	61-80%	1-10%
Dominant Species of Mature Trees	*Populus deltoides, Quercus alba, Liquidambar styraciflua, Fraxinus pennsylvanica, Acer saccharinum*		
% Trees w/ Roosting Features	1-10%	1-10%	0
Size Composition of Live Trees (%)	*Small (3-8 in)*	*Med (9-15 in)*	*Large (>15 in)*
	21-40%	61-80%	1-10%
No. of Suitable Snags			

1 = 1-10%, 2 = 11-20%, 3 = 21-40%, 4 = 41-60%, 5 = 61-80%, 6 = 81-100%

IS THE HABITAT SUITABLE FOR INDIANA OR NORTHERN LONG-EARED BATS? ___Yes___

Additional Comments:

This forested area is potential suitable summer bat habitat. Potential roost trees displaying the physical characteristics necessary for a bat to roost (i.e. cracks, crevices, sloughing bark, or hollows) were observed. Additionally, trees were present that met the minimum diameter at breast height (DBH) for both the Indiana (*Myotis sodalis*; $\geq$ 5 inches) and northern Long-eared bat (*M. septentrionalis*; $\geq$ 3 inches) thus this area could be considered potential foraging habitat along with potential travel corridors to other forested areas. General location coordinates for this forested area are 37.156162ºN, -88.778336ºW. The above percentages are visual estimates.

PHASE 1 SUMMER HABITAT ASSESSMENT

Sample Site Description
Sample Site No.(s): Shawnee Process Water Basin Project – Habitat Assessment Area 7

Water Resources at Sample Site

Stream Type (# and length)	*Ephemeral*	*Intermittent*	*Perennial*	*Describe existing condition of water sources:* No water resources were observed within this forested area. However, a canal directly adjacent to the east connects to the Ohio River and an unnamed tributary exist directly west.
	0	0	0	
Pools/Ponds (# and length)	0	*Open and accessible to bats?*		
		N/A		
Wetlands (approx. ac.)	*Permanent*	*Seasonal*		
	0	0		

Forest Resources at Sample Site

Closure/Density	*Canopy (> 50')*	*Midstory (20-50')*	*Understory (20')*
	1-10%	61-80%	1-10%
Dominant Species of Mature Trees	*Populus deltoides, Quercus alba, Liquidambar styraciflua, Fraxinus pennsylvanica, Acer saccharinum*		
% Trees w/ Roosting Features	1-10%	1-10%	0
Size Composition of Live Trees (%)	*Small (3-8 in)*	*Med (9-15 in)*	*Large (>15 in)*
	21-40%	61-80%	1-10%
No. of Suitable Snags			

1 = 1-10%, 2 = 11-20%, 3 = 21-40%, 4 = 41-60%, 5 = 61-80%, 6 = 81-100%

IS THE HABITAT SUITABLE FOR INDIANA OR NORTHERN LONG-EARED BATS? ___Yes___

Additional Comments:

This forested area is potential suitable summer bat habitat. Potential roost trees displaying the physical characteristics necessary for a bat to roost (i.e. cracks, crevices, sloughing bark, or hollows) were observed. Additionally, trees were present that met the minimum diameter at breast height (DBH) for both the Indiana (*Myotis sodalis*; $\geq$ 5 inches) and northern Long-eared bat (*M. septentrionalis*; $\geq$ 3 inches) thus this area could be considered potential foraging habitat along with potential travel corridors to other forested areas. General location coordinates for this forested area are 37.159563ºN, -88.778736ºW. The above percentages are visual estimates.

PHASE 1 SUMMER HABITAT ASSESSMENT

Sample Site Description
Sample Site No.(s): Shawnee Process Water Basin Project – Habitat Assessment Area 8

Water Resources at Sample Site

Stream Type (# and length)	*Ephemeral*	*Intermittent*	*Perennial*	*Describe existing condition of water sources:* No water resources were observed within this forested area. However, one perennial stream flows along the northern boundary.
	0	0	0	
Pools/Ponds (# and length)	0	*Open and accessible to bats?*		
		N/A		
Wetlands (approx. ac.)	*Permanent*	*Seasonal*		
	0	0		

Forest Resources at Sample Site

Closure/Density	*Canopy (> 50')*	*Midstory (20-50')*	*Understory (20')*
	11-20%	41-60%	1-10%
Dominant Species of Mature Trees	Oak species, Maple species, Ash species, *Robinia pseudoacacia*, *Liquidambar styraciflua*, *Nyssa sylvatica,*		
% Trees w/ Roosting Features	1-10%	1-10%	0
Size Composition of Live Trees (%)	*Small (3-8 in)*	*Med (9-15 in)*	*Large (>15 in)*
	61-80%	11-20%	1-10%
No. of Suitable Snags			

1 = 1-10%, 2 = 11-20%, 3 = 21-40%, 4 = 41-60%, 5 = 61-80%, 6 = 81-100%

IS THE HABITAT SUITABLE FOR INDIANA OR NORTHERN LONG-EARED BATS? ___Yes___

Additional Comments:

This forested area is potential suitable summer bat habitat. Potential roost trees displaying the physical characteristics necessary for a bat to roost (i.e. cracks, crevices, sloughing bark, or hollows) were observed. Additionally, trees were present that met the minimum diameter at breast height (DBH) for both the Indiana (*Myotis sodalis*; $\geq$ 5 inches) and northern Long-eared bat (*M. septentrionalis*; $\geq$ 3 inches) thus this area could be considered potential foraging habitat along with potential travel corridors to other forested areas. General location coordinates for this forested area are 37.142121ºN, -88.783810ºW. The above percentages are visual estimates.

PHASE 1 SUMMER HABITAT ASSESSMENT

Sample Site Description
Sample Site No.(s): Shawnee Process Water Basin Project – Habitat Assessment Area 9

Water Resources at Sample Site

Stream Type (# and length)	*Ephemeral*	*Intermittent*	*Perennial*	*Describe existing condition of water sources:* There are no water resources within this forested area of the project.
	0	0	0	
Pools/Ponds (# and length)	0	*Open and accessible to bats?*		
		N/A		
Wetlands (approx. ac.)	*Permanent*	*Seasonal*		
	0	0		

Forest Resources at Sample Site

Closure/Density	*Canopy (> 50')*	*Midstory (20-50')*	*Understory (20')*
	1-10%	61-80%	11-20%
Dominant Species of Mature Trees	Elm species, *Fagus grandifolia, Cornus florida*		
% Trees w/ Exfoliating Bark	0	0	0
Size Composition of Live Trees (%)	*Small (3-8 in)*	*Med (9-15 in)*	*Large (>15 in)*
	61-80%	11-20%	1-10%
No. of Suitable Snags		None observed	

1 = 1-10%, 2 = 11-20%, 3 = 21-40%, 4 = 41-60%, 5 = 61-80%, 6 = 81-100%

IS THE HABITAT SUITABLE FOR INDIANA OR NORTHERN LONG-EARED BATS? ___YES___

Additional Comments:

This forested area is potential suitable summer bat habitat however, no potential roost trees displaying the physical characteristics necessary for a bat to roost (i.e. cracks, crevices, sloughing bark, or hollows) were observed. Additionally, trees were present that met the minimum diameter at breast height (DBH) for both the Indiana (*Myotis sodalis*; $\geq$ 5 inches) and northern Long-eared bat (*M. septentrionalis*; $\geq$ 3 inches) thus this young forested area could be considered potential foraging habitat and it is directly adjacent to a potential travel corridor to the west. General location coordinates for this area are 37.15099ºN, -88.78605ºW. The above percentages are visual estimates.

Appendix C: Photographs

Representative potential roost tree within habitat assessment area 1.

Representative habitat within habitat assessment area 1.

Representative potential roost tree within habitat assessment area 2.

Representative habitat within habitat assessment area 2.

Representative potential roost tree within habitat assessment area 3.

Representative potential roost tree within habitat assessment area 4.

Representative potential roost tree within habitat assessment area 5.

Representative habitat within habitat assessment area 5.

Representative habitat within habitat assessment area 6.

Representative potential roost tree within habitat assessment area 6.

Representative potential roost tree within habitat assessment area 7.

Representative habitat within habitat assessment area 7.

Representative potential roost tree within habitat assessment area 8.

Appendix C – Wetland Delineation Report

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WATERS OF THE U.S. PRELIMINARY JURISDICTIONAL DETERMINATION REPORT

Shawnee Process Water Basin Project
McCracken County, Kentucky

Prepared by:

Jackson Group
3945 Simpson Lane
Richmond, KY 40475
jacksongroupco.com

Prepared for:

AECOM

23 August 2018

Contents

List of Tables

List of Appendices

1.0 INTRODUCTION

On behalf of the Tennessee Valley Authority (TVA), AECOM and Jackson Group have prepared the following document to assess potential Wates of the U.S. (WOUS) for the proposed Shawnee Process Water Basin Project (Project) in McCracken County, Kentucky. The purpose of this document is to identify and describe aquatic resources within the study area relevant to and in support of a jurisdictional determination.

1.1 Project Description

As part of an effort to manage the disposal of coal combustion residual (CCR) materials on a dry basis, and to meet new CCR regulations, TVA is proposing to cease CCR management operations at the Shawnee Fossil Plant (SHF) Ash Impoundment 2 former Special Waste Landfill (SWL) in accordance with the U.S. Environmental Protection Agency's final Disposal of Coal Combustion Residuals from Electric Utilities rule (CCR Rule). TVA is currently evaluating the potential environmental impacts associated with closure of Ash Impoundment 2 and the former SWL. Closure of Ash Impoundment 2 and the former SWL includes the construction of a new Process Water Basin (PWB) to receive plant flows and allow for operations to cease at Ash Impoundment 2 once the new SHF dewatering facility is constructed.

TVA is currently developing a Supplemental Environmental Impact Statement (SEIS) to the *Shawnee Fossil Plant Coal Combustion Residual Management Final Environmental Impact Statement* (Final EIS) published in January 2018. The SEIS will further evaluate the closure of Ash Impoundment 2 and the former SWL. Additionally, the SEIS will evaluate the potential environmental impacts associated with construction of a new PWB and supporting systems at SHF. The activities associated with construction of the new PWB would include:

- Construction of a new PWB consisting of two equal-area (approximately 6 acres each) operational, lined basin cells and rerouting existing general plant process flows away from the coal yard drainage basin directly to the PWB.

- Improving the coal yard drainage basin through lowering the pool and dredging to reduce solids loading to the PWB.

- Additional treatment improvements such as:

    - Installation of additional treatment systems (coagulant, flocculent, and polymer injection and mixing) to provide additional total suspended solids (TSS) removal of flows routed to the PWB.

    - Installation of pH adjustment and aeration in the PWB.

    - Installation/upgrade of an additional treatment system to provide additional TSS removal in flows routed to the coal yard drainage basin.

The new PWB would be constructed at the Rail Loop Site. Associated systems would connect the PWB to SHF and existing SHF systems and outfalls. The Project area is depicted on mapping provided in Appendix A.

2.0 FIELD SURVEYS

Jackson Group conducted a preliminary survey for the Project area to document the presence and characteristics of potential WOUS, including wetlands. WOUS, including wetlands, were identified using methods described in the USACE *Wetland Delineation Manual* (USACE 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coast (Version 2.0)*. Data was collected using the USACE wetland determination form – Atlantic and Gulf Coastal Plain Region and low gradient stream data forms. The field data collected provides a preliminary assessment of jurisdictional status of all features identified within Project area.

2.1 Field Surveys

The proposed Project area was systematically surveyed by qualified biologists in January 2018 to assess potential WOUS, including wetlands. For the purposes of the field surveys, the following characteristics were considered for potential WOUS:

- Wetlands
  - Hydric Soils
  - Wetland Vegetation
  - Wetland Hydrology

- Streams
  - Ordinary High Water Mark
  - Scour
  - Sediment sorting
  - Deposition
  - Water staining
  - Shelving
  - Changes in the character of soil
  - Destruction of terrestrial vegetation
  - Natural line impressed on the bank
  - Presence of litter and debris
  - Multiple observed flow events
  - Wracking
  - Bed and banks
  - Vegetation matted down, bent, or absent
  - Leaf litter disturbed or washed away
    - Change in Plant Community

- Stream Flow

During the course of the fieldwork, data were collected, photographs were taken, and locations were surveyed using a geographic positioning system (GPS). Data sheets can be found in Appendix B and photographs in Appendix C.

2.1.1 Wetlands

A total of three wetlands totaling 0.25 acres of herbaceous wetlands were identified within the Project area (Tables 1 and 2). Wetlands were dominated by *Carex spp*., *Juncus spp., and Festuca spp.* These species of herbaceous plants are common for wetlands in this area and wetlands present on disturbed lands.

Table 1. Potential Waters of the U.S. Identified within the Project Area.

Feature	Forested (Acres)	Herbaceous (Acres)	Total
Wetland	0.00	0.25	0.25
Total	0.00	0.25	0.25

Table 2. Wetland Assessment Plots within the Project Area.

Plot	Plot Description	Acreage	Habitat Type[1]
WSP 4	Positive indicators for all three wetland criteria were present. This area is a fringe wetland along a perennial stream and also services a water detention area for the site. Area vegetation is dominated by Common Reed (Phragmites australis) an exotic invasive species. Soil was assumed hydric due the annual inundation levels in this wetland area.	.16	Herbaceous Wetland
WSP 5	Positive indicators were observed for all three wetland criteria. Area is dominated by hydrophytic vegetation. Area vegetation is dominated by Carex, Juncus and Festuca species. Vegetation may need to be reevaluated during the growing season to determine species level identification and more accurate indicator status.	.05	Herbaceous Wetland
WSP 6	Area is dominated by hydrophytic vegetation. Area vegetation is dominated by Carex, Juncus and Festuca species. Vegetation may need to be reevaluated during the growing season to determine species level identification and more accurate indicator status.	.04	Herbaceous Wetland
WSP 7			Upland Site

[1] Habitat Types:
Forested Wetland - characterized by woody vegetation that is 6 m tall or taller.
Herbaceous Wetland – dominated by soft-stemmed plants, not woody.
Upland Site – area above the level of where flooding occurs and/or not meeting criteria of a wetland area.

2.1.2 Streams

There were no jurisdictional stream channels observed within the project area (Appendix A)

3.0 Soils

Based on the USDA Web Soil Survey (01/30/2018), the project area contains three soil mapping units, including Dumps, Coal Waste, Falaya-Collins, Miscellaneous water, Urban land-Udorthents, and water (Table 3). There are no hydric soil map units within the project area. The soils observed within the Project area are typical of disturbed site locations. Although the project area does not have mapped hydric soils, portions of the Project area have prolonged soil saturation that supports wetland vegetation as identified. Soils map units are illustrated in Appendix A.

Table 3. USDA Web Soil Survey (01/30/2018) within the Project Area.

Soil Type	Description	Percent of Project Area	Hydric Soil Rating
Du	Dumps, Coal, and Waste disposal areas	87	No
UrA	Urban land-Udorthents complex, 0 to 4 percent slopes	12	No
W	Water	<1	

4.0 Summary

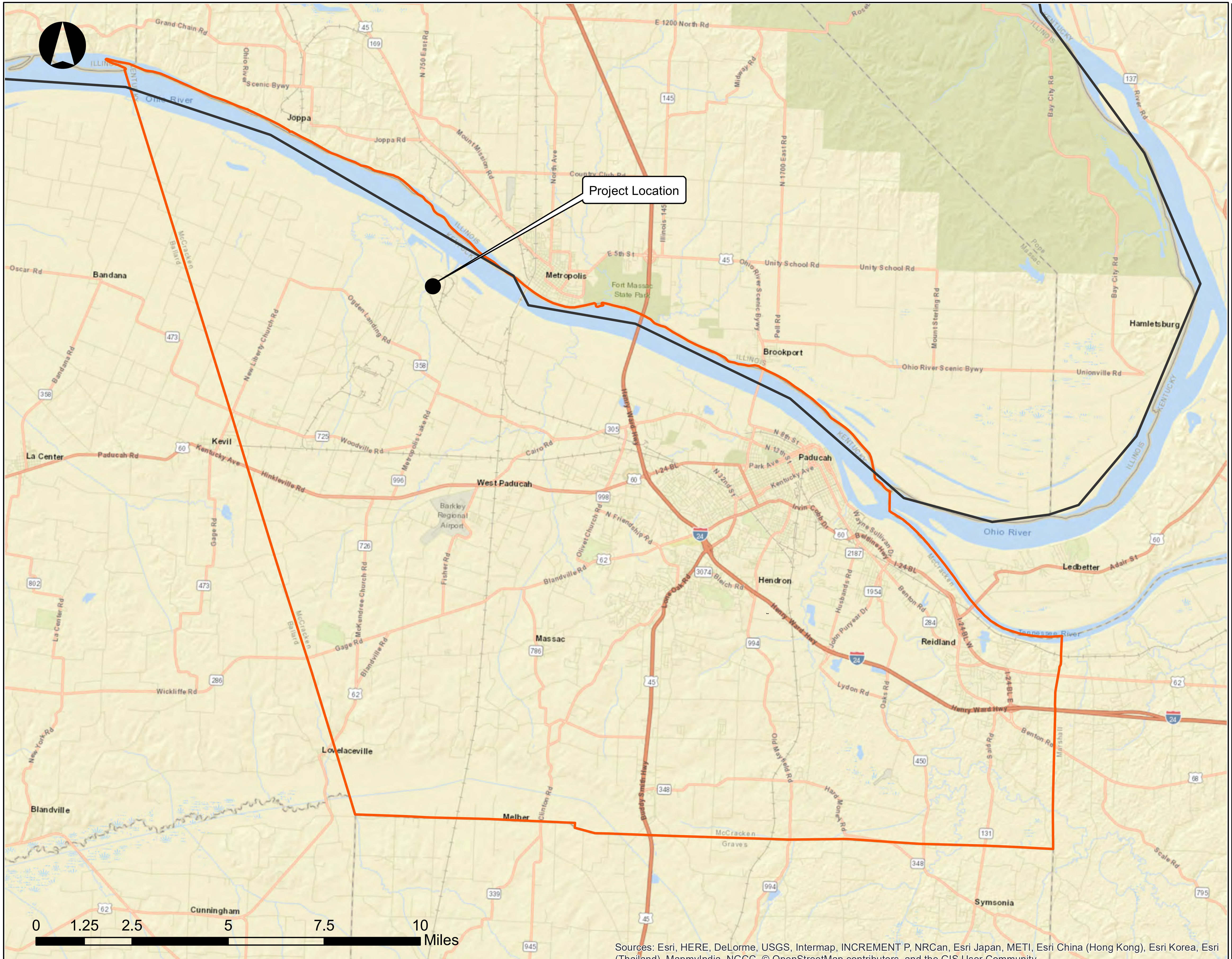
A Preliminary Jurisdictional Determination is sought for identified waters associated within the Project in McCracken County, Kentucky. Jackson Group conducted a WOUS delineation within Project area in January 2018 as the basis to request an Preliminary Jurisdictional Determination on the project's drainages. There are 0.25 acres of wetlands within Project area. The preliminary jurisdictional determination for the Project waters represents the best professional judgement of Jackson Group; however, only the USACE can determine the jurisdictional status of WOUS.

5.0 References

U.S. Army Corps of Engineers - Engineer Research and Development Center (2008) Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coast (Version 2.0) ERDC/EL TR-08-28, Final report, September 2008, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199
http://el.erdc.usace.army.mil/elpubs/pdf/trel08-28.pdf

U.S. Army Corps of Engineers - Environmental Laboratory (1987) Wetlands Delineation Manual Wetlands Research Program Technical Report Y-87-1, Final Report, January 1987, Waterways Experiment Station, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199
http://el.erdc.usace.army.mil/elpubs/pdf/wlman87.pdf

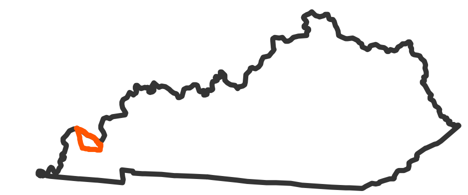
Appendix A: Project Mapping



Shawnee Process Water Basin Natural Resource Survey Area

Jurisdictional Waters Determination

Vicinity map



Legend

- Kentucky
- McCraken County

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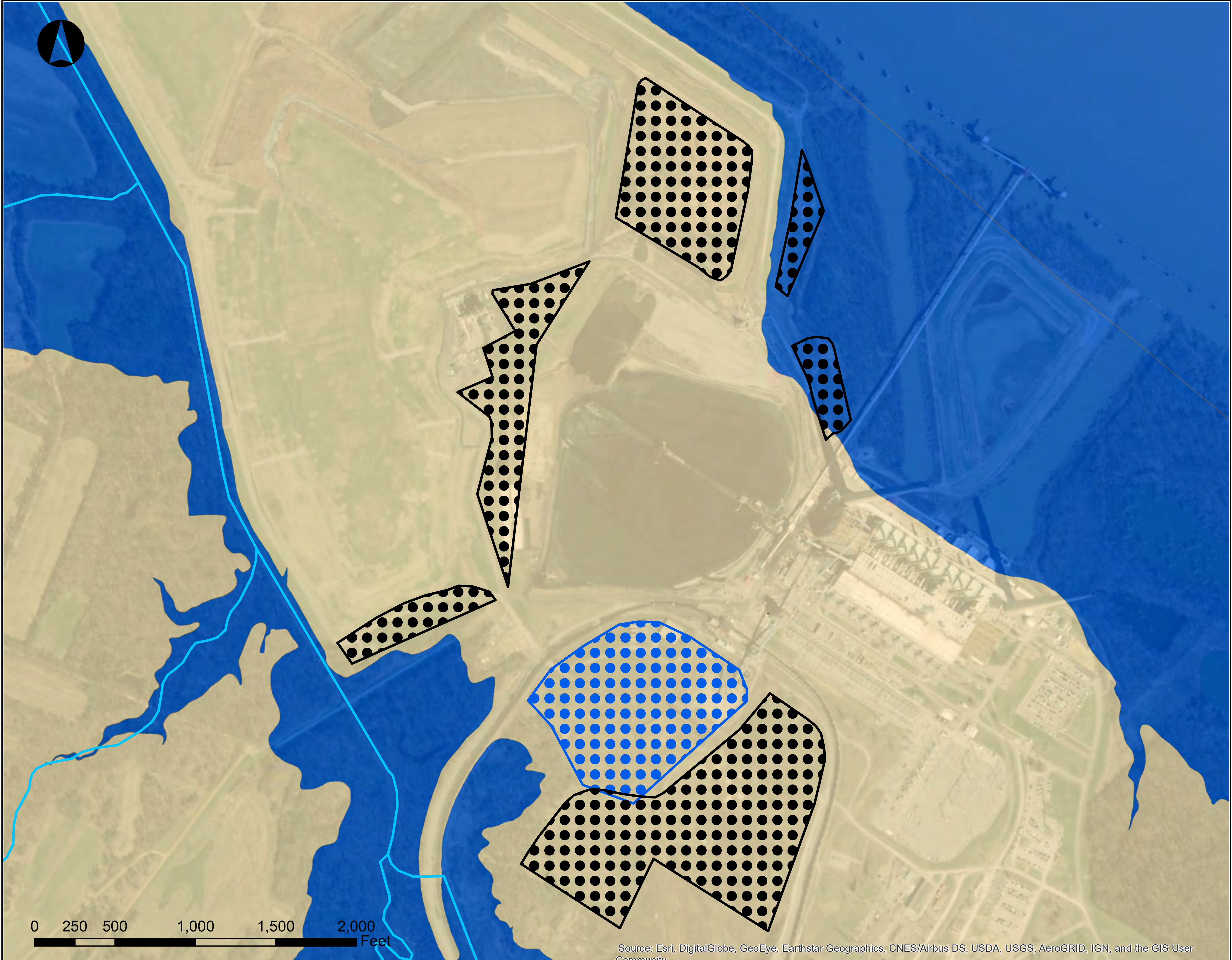
22 August 2018



Shawnee Process Water Basin Natural Resource Survey Area

Jurisdictional Waters Determination

FEMA Flood Plain Map

Legend

Streams

Potential Laydown Areas

Proposed Water Basin

FEMA Flood Zone

A

AE

X

AECOM

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22 August 2018

Shawnee Process Water Basin Natural Resource Survey Area

Jurisdictional Waters Determination

National Wetlands Inventory Map

Legend

Streams

Potential Laydown Areas

Proposed Water Basin

National Wetland Inventory (NWI)

Wetland Type

Freshwater Emergent Wetland

Freshwater Forested/Shrub Wetland

Freshwater Pond

Lake

Riverine

AECOM

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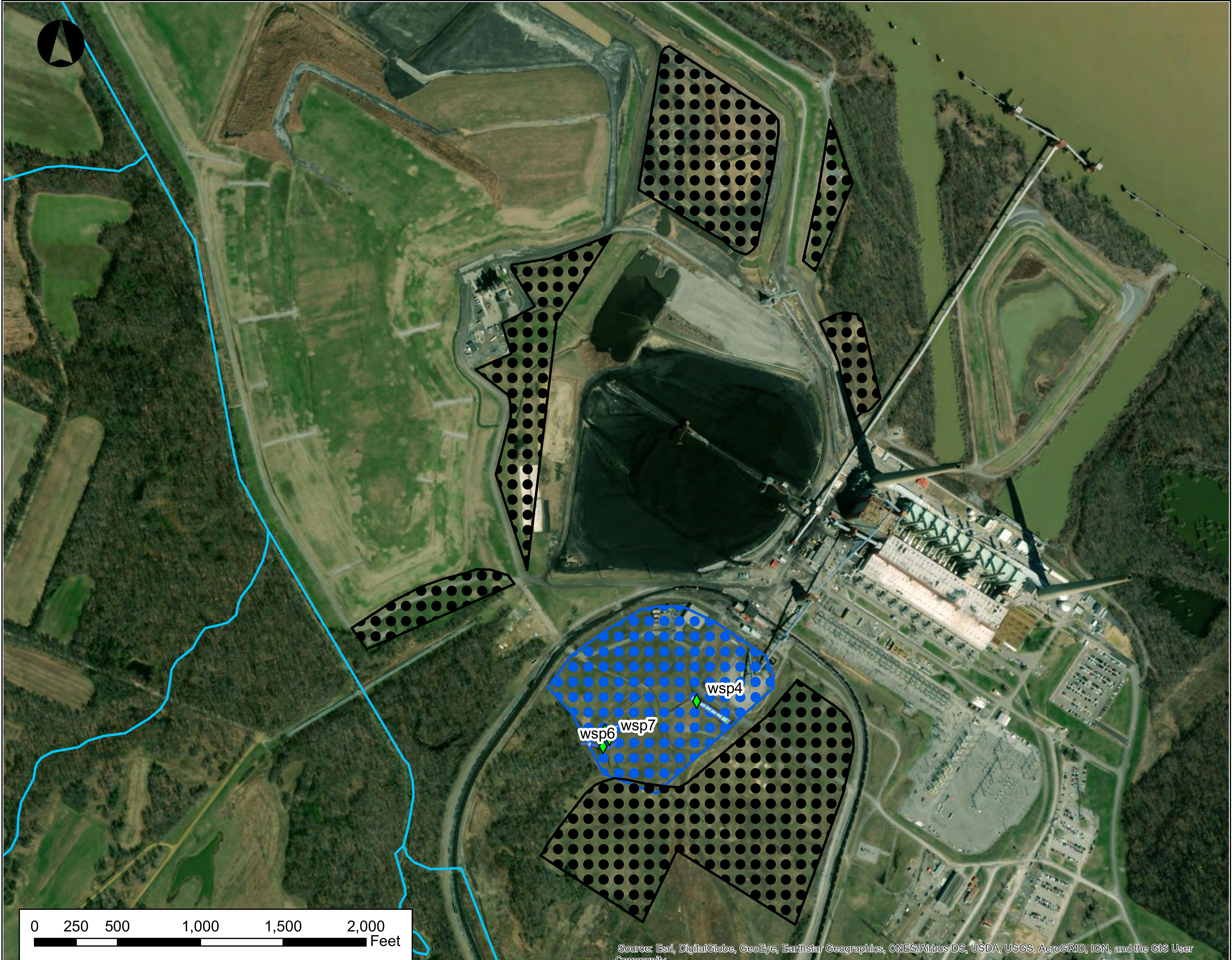

Shawnee Process Water Basin Natural Resource Survey Area

Jurisdictional Waters Determination

Jurisdicitonal Waters Delineation Map

Legend

- Herbaceous Wetlands
- Wetland Sampling Points (WSP)
- Streams
- Potential Laydown Areas
- Proposed Water Basin

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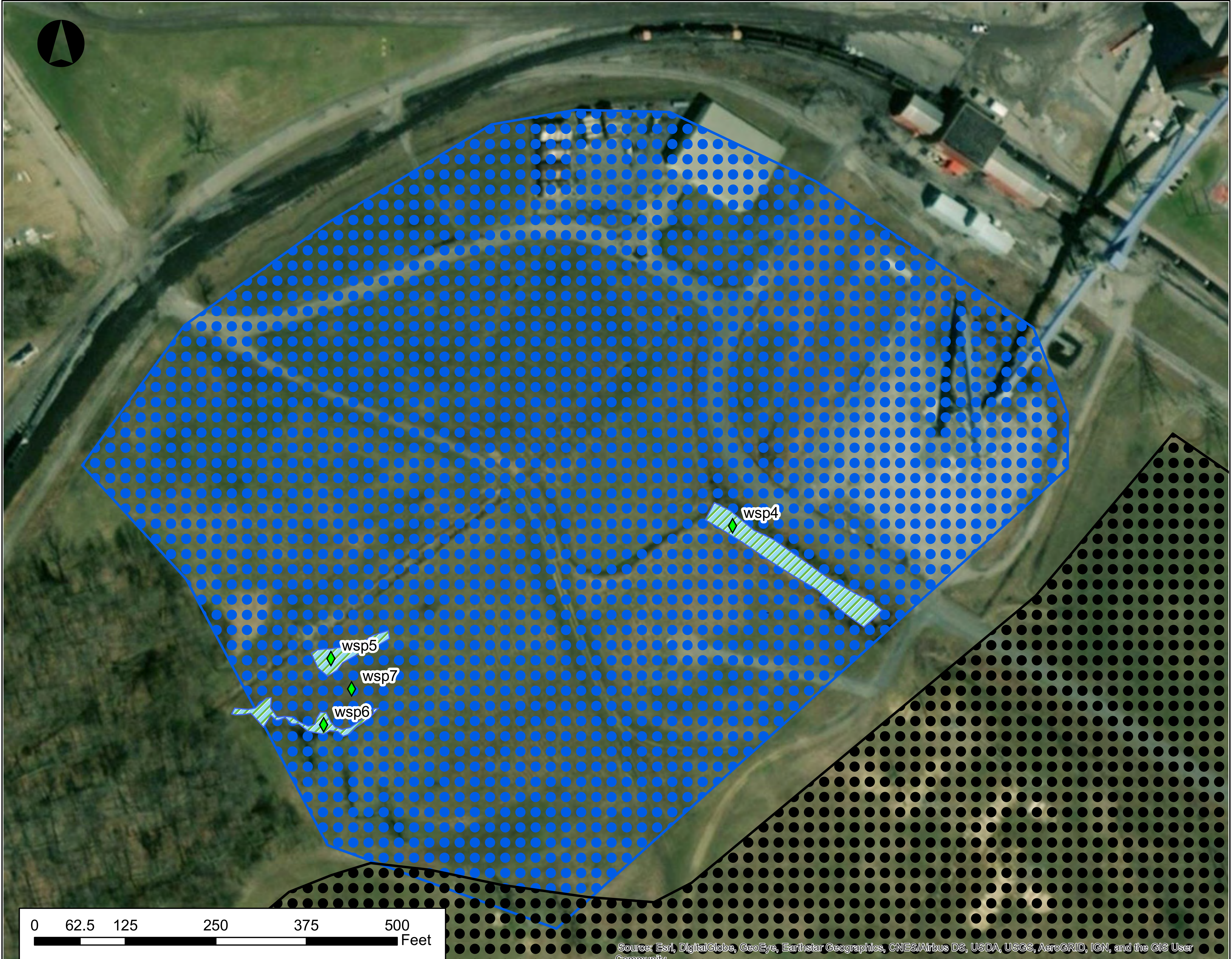
Sheet 1 of 2

22 August 2018



Shawnee Process Water Basin Natural Resource Survey Area

Jurisdictional Waters Determination

Jurisdicitonal Waters Delineation Map

Legend

- Herbaceous Wetlands
- Wetland Sampling Points (WSP)
- Streams
- Potential Laydown Areas
- Proposed Water Basin

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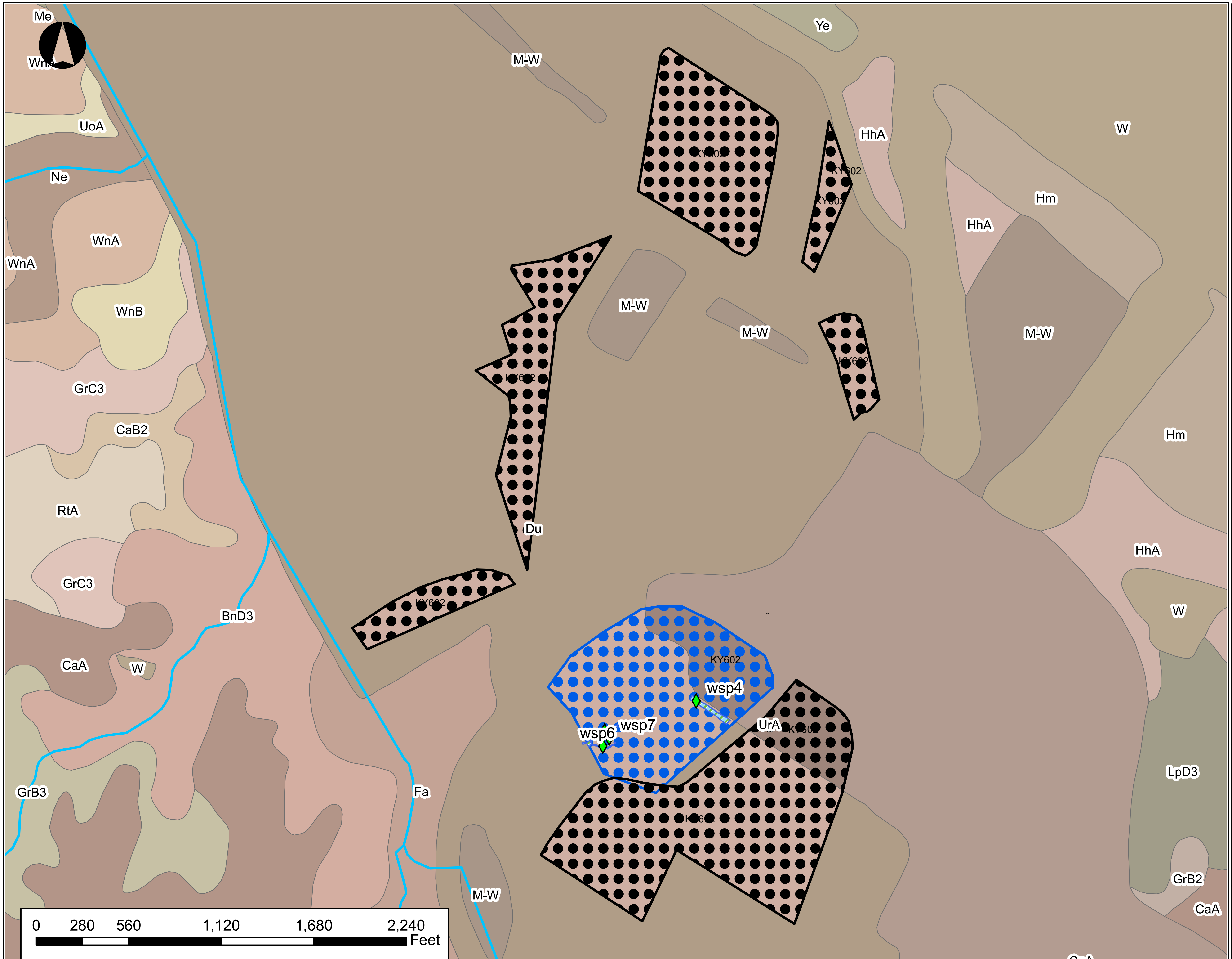
Sheet 2 of 2

22 August 2018



Shawnee Process Water Basin Natural Resource Survey Area

Jurisdictional Waters Determination

Soils Maps

Legend

- Herbaceous Wetlands
- Wetland Sampling Points (WSP)
- Streams
- Potential Laydown Areas
- Proposed Water Basin

MUSYM

- W
- UrA
- Du

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22 August 2018

Appendix B: Data Sheets

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Shawnee process Water Basin Project City/County: McCracken Sampling Date: 10-11 Jan. 2018

Applicant/Owner: ______ State: KY Sampling Point: WSP-4

Investigator(s): Jeremy L. Jackson, Hunter Jackson Section, Township, Range: Paducah

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): concave Slope (%): 0-5%

Subregion (LRR or MLRA): ______ Lat: 37.149641 Long: -88.782042 Datum: NAD83

Soil Map Unit Name: Dumps, coal and waste disposal areas NWI classification: emergent

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

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

Are Vegetation No, Soil Yes, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks:

Positive indicators for all three wetland criteria were present. This area is a fringe wetland along a perennial stream and also services a water detention area for the site. Area vegetation is dominated by Common Reed (Phragmites australis) an exotic invasive species.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

Surface Water Present?	Yes X No ___	Depth (inches): 6	
Water Table Present?	Yes X No ___	Depth (inches): 0-18	
Saturation Present? (includes capillary fringe)	Yes X No ___	Depth (inches): 0-18	**Wetland Hydrology Present? Yes** X **No** ___

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

Remarks:

Area passes hydrology criteria of a wetland.

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

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Sapling/Shrub Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Herb Stratum (Plot size: 30 ft)			
1. Phragmites australis		Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

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

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

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

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

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

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

Area is dominated by hydrophytic vegetation. Area vegetation is dominated by Phragmites australis an exotic invasive species. Vegetation may need to be reevaluated during the growing season.

SOIL

Sampling Point: WSP-4

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

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

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

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

Remarks:

Soil was assumed hydric due the annual inundation levels in this wetland area.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Shawnee process Water Basin Project City/County: McCracken Sampling Date: 10-11 Jan. 2018

Applicant/Owner: ______ State: KY Sampling Point: WSP-5

Investigator(s): Jeremy L. Jackson, Hunter Jackson Section, Township, Range: Paducah

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): concave Slope (%): 0-5%

Subregion (LRR or MLRA): ______ Lat: 37.149159 Long: -88.783845 Datum: NAD83

Soil Map Unit Name: Dumps, coal and waste disposal areas NWI classification: emergent

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

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

Are Vegetation No, Soil Yes, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks:

Positive indicators were observed for all three wetland criteria.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

Surface Water Present?	Yes X No ___	Depth (inches): ___	
Water Table Present?	Yes X No ___	Depth (inches): ___	
Saturation Present? (includes capillary fringe)	Yes X No ___	Depth (inches): ___	**Wetland Hydrology Present? Yes** X **No** ___

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

Remarks:

Area passes hydrology criteria of a wetland.

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

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Sapling/Shrub Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Herb Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Carex species		Yes	FAC
2. Juncus species		Yes	FAC
3. Festuca species		Yes	NI
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Woody Vine Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Definitions of Four Vegetation Strata:

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

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

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

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

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

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

Area is dominated by hydrophytic vegetation. Area vegetation is dominated by Carex, Juncus and Festuca species. Vegetation may need to be reevaluated during the growing season to determine species level identification and more accurate indicator status.

SOIL Sampling Point: WSP-5

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 2/1						Clay	
2-8	10YR 5/2		10YR 3/3				Clay	
8-12	10YR 5/6		10YR 4/1				Clay	
12-18	10YR 5/1		10YR 2/1				Silty/Clay	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

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

Remarks:

Positive indicators were present for hydric soils.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Shawnee process Water Basin Project City/County: McCracken Sampling Date: 10-11 Jan. 2018

Applicant/Owner: ______ State: KY Sampling Point: WSP-6

Investigator(s): Jeremy L. Jackson, Hunter Jackson Section, Township, Range: Paducah

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): concave Slope (%): 0-5%

Subregion (LRR or MLRA): ______ Lat: 37.148841 Long: -88.783873 Datum: NAD83

Soil Map Unit Name: Dumps, coal and waste disposal areas NWI classification: emergent

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

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

Are Vegetation No, Soil Yes, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks:

Positive indicators for all three wetland criteria were observed.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

Surface Water Present?	Yes X No ___	Depth (inches): ___	
Water Table Present?	Yes X No ___	Depth (inches): ___	
Saturation Present? (includes capillary fringe)	Yes X No ___	Depth (inches): ___	**Wetland Hydrology Present? Yes** X **No** ___

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

Remarks:

Area passes hydrology criteria of a wetland.

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

Sampling Point: WSP-6

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Sapling/Shrub Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Herb Stratum (Plot size: 30 ft)			
1. Carex species		Yes	FAC
2. Juncus species		Yes	FAC
3. Festuca species		Yes	NI
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

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

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

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

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

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

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

Area is dominated by hydrophytic vegetation. Area vegetation is dominated by Carex, Juncus and Festuca species. Vegetation may need to be reevaluated during the growing season to determine species level identification and more accurate indicator status.

SOIL

Sampling Point: WSP-6

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 2/1						Clay	
2-8	10YR 5/2		10YR 3/3				Clay	
8-12	10YR 5/6		10YR 4/1				Clay	
12-18	10YR 5/1		10YR 2/1				Silty/Clay	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

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

Remarks:

Positive indicators for wetland hydrology were observed.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Shawnee process Water Basin Project City/County: McCracken Sampling Date: 10-11 Jan. 2018

Applicant/Owner: ______ State: KY Sampling Point: WSP-7

Investigator(s): Jeremy L. Jackson, Hunter Jackson Section, Township, Range: Paducah

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): 0-5%

Subregion (LRR or MLRA): ______ Lat: 37.149047 Long: -88.783756 Datum: NAD83

Soil Map Unit Name: Dumps, coal and waste disposal areas NWI classification: Upland

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

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

Are Vegetation No, Soil Yes, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks:

Positive indicators were only observed for one of the three wetland criteria

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

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

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

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

Remarks:

Area does not passes hydrology criteria of a wetland.

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

Sampling Point: WSP-7

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	
Sapling/Shrub Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	
Herb Stratum (Plot size: 30 ft)			
1. Festuca Species		No	NI
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		
50% of total cover:		20% of total cover:	
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 0 (B)

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

Prevalence Index worksheet:

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

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

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

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

Definitions of Four Vegetation Strata:

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

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

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

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

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

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

Area does not meet hydrophytic vegetation criteria of a wetland.

SOIL

Sampling Point: WPS-7

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 4/1						Silt Loam	
4-18	10YR5/2		10YR 5/6				Clay	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

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

Remarks:

Positive indicators of hydric soils were observed.

Appendix C: Photographs

Representative photograph of wetland sampling point 4 (WSP-4).

Representative photograph of wetland sampling points 5 and 6 (WSP-5 and WSP-6).

Appendix D – Agency Consultation

TVA Bat Strategy Project Assessment *(03/2018)*

This form is to assist in determining alignment of proposed TVA projects and any necessary steps to ensure compliance with TVA's ESA Section 7 programmatic consultation for routine actions and federally-listed bats (i.e., bats addressed in consultation (02/2018), which includes gray bat (listed in 1976), Indiana bat (listed in 1967), northern long-eared bat (listed in 2015), and Virginia big-eared bat (listed in 1979)).

Project Name: Shawnee CCR Management Supplemental EIS, McCracken County, KY **Date**: 04/10/2018
Contact(s): Ashley Pilakowski, Kevin Davenport, Michael Baker **CEC#**: ________ **RLR#**: ________ **Project ID**: 429520

STEP 1) Select Appropriate TVA Action (or check here ☐ if none of the Actions below are applicable):

☐	**1**	Manage Biological Resources for Biodiversity and Public Use on TVA Reservoir Lands	☐	**6**	Maintain Existing Electric Transmission Assets
☐	**2**	Protect Cultural Resources on TVA-Retained Land	☐	**7**	Convey Property associated with Electric Transmission
☐	**3**	Manage Land Use and Disposal of TVA-Retained Land	☐	**8**	Expand or Construct New Electric Transmission Assets
☐	**4**	Manage Permitting under Section 26a of the TVA Act	☐	**9**	Promote Economic Development
☑	**5**	Operate, Maintain, Retire, Expand, Construct Power Plants	☐	**10**	Promote Mid-Scale Solar Generation

STEP 2) Select **all** activities from **Tables 1 and 2** (Column 1 only) included in proposed project. If you have an activity that is not listed below, describe here): ______________________________

Table 1. Activities (CHECK ALL THAT APPLY) with No Effect on Federally Listed Bats. If none, check here: ☐

	#	ACTIVITY		#	ACTIVITY
☐	**1**	Loans and/or grant awards	☐	**12**	Sufferance agreement
☐	**2**	Purchase of property	☐	**13**	Engineering or environmental planning or studies
☐	**3**	Purchase of equipment for industrial facilities	☐	**14**	Harbor limits
☐	**4**	Environmental education	☐	**19**	Site-specific enhancements in streams and reservoirs for aquatic animals
☐	**5**	Transfer of ROW easement or ROW equipment	☐	**20**	Nesting platforms
☐	**6**	Property and/or equipment transfer	☐	**41**	Minor water-based structures
☐	**7**	Easement on TVA property	☐	**42**	Internal renovation or internal expansion of existing facility
☐	**8**	Sale of TVA property	☐	**43**	Replacement or removal of TL poles, or cutting of poles to 4-6 ft above ground
☐	**9**	Lease of TVA property	☐	**44**	Conductor and OHGW installation and replacement
☐	**10**	Deed modification of TVA rights or TVA property	☐	**49**	Non-navigable houseboats
☐	**11**	Abandonment of TVA retained rights			

Table 2. Activities (CHECK ALL THAT APPLY) and Associated Conservation Measures. If none, check here: ☐

	#	ACTIVITY	CONSERVATION MEASURES	TZ SME Review Needed
☐	**15**	Windshield or ground surveys for archaeological resources	☐ a. NV1 ☐ b. HP2	☐ b. HP1
■	**16**	Drilling	■ a. NV1 ■ f. SSPC1, SSPC2, SSPC3 ☐ g. L1, L2	■ a NV3, NV4 / ☐ a1. NV2
■	**17**	Mechanical vegetation removal; does <u>not</u> include removal of trees or tree branches ≥ 3" in diameter.	■ a. NV1 ■ f. SSPC1, SSPC2, SSPC3, SSPC5	■ f. SSPC4, SSPC7
■	**18**	Erosion control – minor	■ a. NV1 ■ f. SPCC1, SSPC2, SSPC3, SSPC5	None
☐	**21**	Herbicide use	☐ d. SSPC1, SSPC2, SSPC3, SSPC5	☐ d. SSPC6, SSPC7
■	**22**	Grubbing	■ a. NV1 ■ f. SSPC1, SSPC2, SSPC3, SSPC5	■ f. SSPC4
☐	**23**	Prescribed burns, burn piles, or	☐ c. SHF1, SHF4, SHF5	☐ c. SHF2, SHF3, SHF6, SHF7,

	#	ACTIVITY	CONSERVATION MEASURES	TZ SME Review Needed
		brush piles		SHF8, SHF9
☐	**24**	Tree planting	☐ a. NV1 ☐ f. SSCP1, SSPC2, SSPC3, SSPC5	None
■	**25**	Maintenance, improvement or construction of pedestrian or vehicular access corridors	■ a. NV1 ■ f. SSPC1, SSPC2, SSPC3, SSPC5	☐ a1. NV2 ■ f. SSPC7
☐	**26**	Maintenance or construction of access control measures	☐ a. NV1 ☐ b. HP2 ☐ f. SSPC1, SSPC2, SSPC3, SSPC5 ☐ g. L1, L2	☐ a NV3, NV4 / ☐ a1. NV2 ☐ b. HP1 ☐ f. SSPC7
■	**27**	Restoration of sites following human use and abuse	■ a. NV1 ■ f. SSPC1, SSPC2, SSPC3	■ f. SSPC7
☐	**28**	Removal of debris (e.g., dump sites, hazardous material, unauthorized structures)	☐ a. NV1 ☐ f. SSPC1, SSPC2, SSPC3	☐ f. SSPC7
■	**29**	Acquisition and use of fill/borrow material	■ a. NV1 ■ f. SSPC1, SSPC2, SSPC3	■ f. SSPC7
☐	**30**	Dredging and excavation; recessed harbor areas	☐ a. NV1 ☐ f. SSPC2, SSPC3, SSPC5	None
■	**31**	Stream/wetland crossings	■ a. NV1 ■ f. SSPC1, SSPC2, SSPC3, SSPC5	■ f. SSPC7
☐	**32**	Clean-up following storm damage	☐ a. NV1 ☐ f. SSPC1, SSPC2, SSPC3	☐ f. SSPC4, SSPC7
☐	**33**	Removal of hazardous trees or tree branches	☐ a. NV1 ☐ d. TR7, TR8 ☐ f. SSPC1, SSPC2, SSPC3, SSPC5	☐ d. TR1, TR2, TR3, TR4, TR5, TR6, TR9, ☐ f. SSPC4, SSPC7
■	**34**	Mechanical vegetation removal, includes trees or tree branches three inches or greater in diameter	■ a. NV1 ■ d. TR7, TR8 ■ f. SSPC1, SSPC2, SSPC3, SSPC5	■ d. TR1, TR2, TR3, TR4, TR5, TR6, TR9, ■ f. SSPC4, SSPC7
■	**35**	Stabilization (major erosion control)	■ a. NV1 ■ f. SSPC1, SSPC2, SSPC3, SSPC5	■ f. SSPC4, SSPC7
■	**36**	Grading	■ a. NV1 ■ f. SSPC1, SSPC2, SSPC3, SSPC5 ☐ g. L1, L2	■ f. SSPC4, SSPC7
■	**37**	Installation of soil improvements	■ a. NV1 ■ f. SSPC1, SSPC2, SSPC3 ☐ g. L1, L2	☐ a1. NV2 ■ f. SSPC7
■	**38**	Drainage installations (including for ponds)	■ a. NV1 ■ f. SSPC1, SSPC2, SSPC3 ☐ g. L1, L2	■ f. SSPC7
■	**39**	Berm development	■ a. NV1 ■ f. SSPC1, SSPC2, SSPC3, ☐ g. L1, L2	None
☐	**40**	Closed loop heat exchangers (heat pumps)	☐ f. SSPC5	None
☐	**45**	Stream monitoring equipment-placement, use	☐ a. NV1	None
☐	**46**	Floating boat slips within approved harbor limits	☐ f. SSPC5	None
☐	**47**	Conduit installation	☐ a. NV1	☐ a. NV2
■	**48**	Laydown areas	■ a. NV1 ■ f. SSPC1, SSPC2, SSPC3, ☐ g. L1, L2	None
■	**50**	Minor land-based structures	■ a. NV1 ■ f. SSPC1, SSPC2, SSPC3, SSPC5 ☐ g. L1, L2	None
☐	**51**	Signage installation	☐ a. NV1 ☐ f. SSPC1, SSPC2, SSPC3, SSPC5	None
☐	**52**	Floating buildings	☐ a. NV1 ☐ f. SSPC2, SSPC3, SSPC5 ☐ g. L1, L2	☐ a. NV2
☐	**53**	Mooring buoys or posts	☐ a. NV1	

	#	ACTIVITY	CONSERVATION MEASURES	TZ SME Review Needed
			□ f. SSPC2, SSPC3, SSPC5	None
■	54	Maintenance of water control structures (dewatering units, spillways, levees)	■ a. NV1 ■ f. SSPC2, SSPC3, SSPC5	■ f. SSPC6, SSPC7
□	55	Solar panels	□ a. NV1 □ f. SSPC2, SSPC3, SSPC5	□ f. SSPC7
□	56	Culverts	□ a. NV1 □ f. SSPC1, SSPC3, SSPC5	None
□	57	Water intake - non-industrial	□ a. NV1 □ f. SSPC3, SSPC5	None
■	58	Wastewater outfalls	■ a. NV1 ■ f. SSPC2, SSPC3, SSPC5	None
□	59	Marine fueling facilities	□ a. NV1 □ f. SSPC2, SSPC3, SSPC5 □ g. L1, L2	None
□	60	Commercial water-use facilities (e.g., marinas)	□ a. NV1 □ f. SSPC2, SSPC5 □ g. L1, L2	None
□	61	Septic fields	□ a. NV1 □ f. SSPC1, SSPC2, SSPC3, SSPC5	None
□	62	Blasting	□ a. NV1 □ f. SSPC1, SSPC2, SSPC3, □ g. L1, L2	□ a NV3, NV4 / □ a1. NV2
□	63	Foundation installation	□ a. NV1 □ f. SSPC1, SSPC2, SSPC3	□ a1. NV2
□	64	Installation of steel structure, overhead bus, equipment, etc.	□ a. NNV1 □ g. SSPC1, SSPC2, SSPC3	□ a1. NV2
□	65	Pole and/or tower installation and/or extension	□ a. NV1 □ f. SSPC1, SSPC2, SSPC3	□ a1. NV2
□	66	Private, residential docks, piers, boathouses	□ a. NV1 □ f. SPCC5 □ g. L1, L2	None
■	67	Siting of temporary office trailers	■ a. NV1 ■ f. SSPC1, SSPC2, SSPC3, SSPC5 □ g. L1, L2	None
□	68	Financing for speculative building construction	□ a. NV1 □ f. SSPC5	None
□	69	Renovation of existing structures	□ a. NV1 □ f. SSPC1, SSPC3, SSPC5 □ g. L1, L2	□ e. AR1, AR2, AR4, AR5
□	70	Lock maintenance and construction	□ a. NV1 □ f. SSPC2, SSPC3, SSPC5	□ a1. NV2
□	71	Concrete dam modification	□ a. NV1 □ f. SSPC2, SSPC3	□ a1. NV2
□	72	Ferry landings/service operations	□ a. NV1 □ f. SSPC5 □ g. L1, L2	None
□	73	Boat launching ramps	□ a. NV1 □ f. SSPC2, SSPC5	□ a1. NV2
□	74	Recreational vehicle campsites	□ a. NV1 □ g. SPCC5	None
□	75	Utility lines/light poles	□ a. NV1 □ f. SPCC5 □ g. L1, L2	None
□	76	Concrete sidewalk	□ a. NV1 □ f. SSPC2, SSPC3, SSPC5	None
□	77	Construction or expansion of land-based buildings	□ a. NV1 □ f. SSPC2, SSPC3, SSPC5 □ g. L1, L2	□ e. AR1, AR2, AR5
□	78	Wastewater treatment plants	□ a. NV1 □ f. SSPC2, SSPC5 □ g. L1, L2	□ a1. NV2
□	79	Swimming pools and associated	□ a. NV1	

	#	ACTIVITY	CONSERVATION MEASURES	TZ SME Review Needed
		equipment	□ f. SSPC5 □ g. L1, L2	None
□	**80**	Barge fleeting areas	□ a. NV1 □ f. SSPC2, SSPC3, SSPC5	□ a1. NV2
□	**81**	Water intakes - Industrial	□ a. NV1 □ f. SSPC2, SSPC3, SSPC5	None
□	**82**	Construction of dam/weirs/ Levees	□ a. NV1 □ f. SPCC2, SPCC3, SPCC5	□ a1. NV2
□	**83**	Submarine pipeline, directional boring operations	□ a. NV1 □ f. SSPC2, SSPC3, SSPC5	□ a1. NV2
□	**84**	On-site/off-site public utility relocation or construction or extension	□ a. NV1 □ f. SSPC1, SSPC3, SSPC5	None
□	**85**	Playground equipment - land-based	□ a. NV1 □ f. SSPC5	None
□	**86**	Landfill construction	□ a. NV1 □ f. SSPC2, SSPC3 □ g. L1, L2	□ a1. NV2
■	**87**	Aboveground storage tanks	■ a. NNV1 ■ f. SSPC2, SSPC3, SSPC5	None
□	**88**	Underground storage tanks (USTs)	□ a. NV1 □ g. SSPC2, SSPC3, SSPC5	None
□	**89**	Structure demolition	□ f. SSPC1, SSPC2, SSPC3	□ e. AR1, AR2, AR4, AR5
■	**90**	Pond closure	■ a. NV1 ■ f. SSPC2, SSPC3	None
□	**91**	Bridge replacement	□ a. NV1 □ f. SSPC3, SSPC5	□ a1. NV2 □ e. AR1, AR2, AR3, AR5,
□	**92**	Return of remains to former burial sites	□ a. NV1 □ b. HP2	□ b. HP1
□	**93**	Standard license	□ a. NV1 □ f. SSPC5	None
□	**94**	Special use license	□ a. NV1	None
□	**95**	Recreation license	□ a. NV1 □ f. SSPC5	None
□	**96**	Land use permit	□ a. NV1 □ f. SSPC5	None

STEP 3) Are all project activities limited to Table 1? If **YES**, no further questions need to be answered; include this form in environmental documentation (e.g., attach to CEC). If **NO**, proceed to Step 4)…………□ **YES** ■ **NO**

STEP 4) Are any of the characteristics below relevant to project/project area? CHECK ALL THAT APPLY. If **NO**, stop here; include this form in environmental documentation (e.g., attach to CEC):……………..■ **YES** □ **NO**

■ **a.** Project may occur outside, involves human presence, or use of equipment that **generates noise or vibration** (e.g., drilling, blasting, loud machinery).

□ **a1.** Project involves continuous noise (i.e., $\geq$ 24 hrs) that is >75 decibels measured on A scale (e.g., loud machinery).

□ **b.** Project may involve **human entry into/survey of a potential bat roost** (cave, bridge, other structure).

□ **c.** Project may involve **fire (e.g., prescribed fire, burn piles) or preparation of fire breaks** within 0.25 mi of trees, caves, or water sources. **If prescribed burn**, estimated acreage: __________

■ **d.** Project may involve **tree removal.** Tree removal may need to occur **outside of winter:**…………………………..□ **YES** ■ **NO**

Estimated number of trees or acres to be removed: 0.56 ■ acres □ trees

If warranted, project has flexibility for bat surveys (May 15-Aug 15):…………………………………□ **MAYBE** □ **YES** ■ **NO**

□ **e.** Project may involve **alteration or removal of bridges or other human structures**.

■ **f.** Project may involve land use activities involving **ground disturbance or use of chemicals or fuels** near water sources, wetlands, sinkholes, caves, or exposed limestone/karst.

□ **g.** Project may involve use of **artificial lighting** at night.

STEP 5) *Please contact Holly LeGrand or other Bat Strategy support staff for assistance if needed*. For those Activities selected in Table 2: select all Conservation Measures with letters (e.g., a-g) that correspond to letters selected in Step 1. If this results in selection of Conservation Measures in the last column of Table 2, a review by a terrestrial zoologist is required.

Based on Step 5, does proposed project require review by a terrestrial zoologist? If **YES**, submit this form as part of environmental review request; if **NO**, include this form in environmental documentation……■ **YES** □ **NO**

Terrestrial Zoologist SME Verification (Steps 6-11 will be completed by a terrestrial zoologist if warranted):

STEP 6) Project includes the following:

- □ Removal/burning of suitable trees within 0.5 mile (0.8 km) of P1-P2 Indiana bat hibernacula or 0.25 mile (0.4 km) of P3-P4 Indiana bat hibernacula or any northern long-eared bat hibernacula.
- □ Removal/burning of suitable trees within 10 miles of documented Indiana bat hibernacula or within 5 miles of northern long-eared bat hibernacula.
- □ Removal/burning of suitable trees greater than 10 miles from documented Indiana bat hibernacula or greater than 5 miles from documented northern long-eared bat hibernacula.
- □ Removal/burning of trees within 150 feet of a documented Indiana bat or northern long-eared bat maternity roost tree.
- ■ Removal/burning of suitable trees within 2.5 miles of Indiana bat roost trees or within 5 miles of Indiana bat capture sites.
- □ Removal/burning of suitable trees greater than 2.5 miles from Indiana bat roost trees or greater than 5 miles from Indiana bat capture sites.
- □ Removal/burning of documented Indiana bat or northern long-eared bat roost tree, if still suitable.

STEP 7) Amount of SUITABLE tree/acreage removal or burned (may be different than total amount of removal): 0.56 ■ acres □ trees

STEP 8) Select anticipated date range of burning/tree removal in table below:

STATE	SWARMING	WINTER	NON-WINTER	PUP
GA, KY, TN	□ Oct 15 - Nov 14	■ Nov 15 - Mar 31	□ Apr 1 - May 31, Aug 1- Oct 14	□ Jun 1 - Jul 31
VA	□ Sep 16 - Nov 15	□ Nov 16 - Apr 14	□ Apr 15 - Sep 15	□ Jun 1 - Jul 31
AL	□ Oct 15 - Nov 14	□ Nov 15 - Mar 15	□ Mar 16 - May 31, Aug 1 - Oct 14	□ Jun 1 - Jul 31
NC	□ Oct 15 - Nov 14	□ Nov 15 - Apr 15	□ Apr 16 - May 31, Aug 1 - Oct 14	□ Jun 1 - Jul 31
MS	□ Oct 1 - Nov 14	□ Nov 15 - Apr 14	□ Apr 15 - Sep 30	□ Jun 1 - Jul 31

STEP 9) Presence/absence surveys (visual, mist net, acoustic) were/will be conducted: □ **YES** ■ **NO** □ **TBD**

STEP 10) Result of presence/absence surveys (if conducted), on ______________ (date): □ **NEGATIVE** □ **POSITIVE** ■ **N/A** *NOTES*: ______________________________

STEP 11) □ Conservation measures have been verified (and modified, if necessary) in Table 2. *NOTES*: ______________________________

Bat Strategy Compliance Verification (Steps 12-15 will be completed by SME/Bat Strategy Support staff):

STEP 12) Project ■ **WILL** □ **WILL NOT** require use of Incidental Take in the amount of 0.56 ■ acres or □ trees, proposed to be used during the □ **VOLANT** ■ **NON-VOLANT** bat season (or □ **N/A**).

STEP 13) Available Incidental Take as of 04/10/2018 for Operate, Maintain, Retire, Expand, Construct Power Plants (Action):

TVA Action	Total 20-year acreage	Winter Burning/Removal	Volant Season Burning/Removal	Non-Volant Season Burning/Removal
#5 (Power Plants)	2,200 (Original)	1561	290	110

STEP 14) Amount contributed to TVA's Bat Conservation Fund upon activity completion: $0 or □ **N/A**

NOTES: Clearing of suitable habitat will occur in winter (November 15 - March 31).

TVA's ESA Section 7 Bat Strategy Conservation Measures Required for:

Project Name: Shawnee CCR Management Supplemental EIS, McCracken County, KY **Project ID** (if applicable): 429520
Project Contact(s): Ashley **Today's Date**: 04/10/2018

Submission of this form is an indication that the Project Lead Michael Baker (name) is (or will be made) aware of the requirements below. Please save this form in environmental documentation, AND send a copy of form to (hlegrand@tva.gov).

- Implementation of conservation measures identified in Table 2 is required to comply with TVA's programmatic Endangered Species Act bat consultation.
- Confirmation of implementation of conservation measures (e.g., report from contractor, time stamped photos pre and post completion) will be provided to TVA's Bat Strategy Compliance Officer (currently hlegrand@tva.gov) following completion of project.
- TVA may conduct post-project monitoring to determine if conservation measures were effective in minimizing or avoiding impacts to federally listed bats.

For projects that require use of Take and/or contribution to TVA's Bat Conservation Fund, please acknowledge the following statement:

■ Project Lead/Contact acknowledges that proposed project will result in use of 0.56 ■ acres/□ trees in Incidental Take and will require $0 contribution to TVA's Conservation Fund upon completion of activity.

	Conservation Measure Acronym	Conservation Measure Description
☑	NV1	Noise will be short-term, transient, and not significantly different from urban interface or natural events (i.e., thunderstorms) that bats are frequently exposed to when present on the landscape.
☐	NV2	Drilling, blasting, or any other activity that involves continuous noise (i.e., longer than 24 hours) disturbances greater than 75 decibels measured on the A scale (e.g., loud machinery) within a 0.5 mile radius of documented winter and/or summer roosts (caves, trees, unconventional roosts) will be conducted when bats are absent from roost sites.
☐	NV3	Drilling or blasting within a 0.5 mile radius of documented cave (or unconventional) roosts will be conducted in a manner that will not compromise the structural integrity or alter the karst hydrology of the roost site.
☐	NV4	Drilling or blasting within 0.5 miles of a documented roost site (cave, tree, unconventional roost) that needs to occur when bats are present will first involve development of project-specific avoidance or minimization measures in coordination with the USFWS.
☐	HP1	Site-specific cases in which potential impact of human presence is heightened (e.g., conducting environmental or cultural surveys within a roost site) will be closely coordinated with staff bat biologists to avoid or minimize impacts below any potential adverse effect. Any take from these activities would be covered by TVA's Section 10 permit.
☐	HP2	Entry into roosts known to be occupied by federally listed bats will be communicated to the USFWS when impacts to bats may occur if not otherwise communicated (i.e., via annual monitoring reports per TVA's Section 10 permit). Any take from these activities would be covered by TVA's section 10 permit.
☐	SHF1	Fire breaks will be used to define and limit burn scope.
☐	SHF2	Site-specific conditions (e.g., acres burned, transport wind speed, mixing heights) will be considered to ensure smoke is limited and adequately dispersed away from caves so that smoke does not enter cave or cave-like structures.
☐	SHF3	Acreage will be divided into smaller units to keep amount of smoke at any one

		time or location to a minimum and reduce risk for smoke to enter caves.
☐	SHF4	If burns need to be conducted during April and May, when there is some potential for bats to present on the landscape and more likely to enter torpor due to colder temperatures, burns will only be conducted if the air temperature is 55° or greater, and preferably 60° or greater.
☐	SHF5	Fire breaks will be plowed immediately prior to burning, will be plowed as shallow as possible, and will be kept to minimum to minimize sediment.
☐	SHF6	Tractor-constructed fire lines will be established greater than 200 feet from cave entrances. Existing logging roads and skid trails will be used where feasible to minimize ground disturbance and generation of loose sediment.
☐	SHF7	Burning will only occur if site specific conditions (e.g. acres burned, transport wind speed, mixing heights) can be modified to ensure that smoke is adequately dispersed away from caves or cave-like structures. This applies to prescribed burns and burn piles of woody vegetation.
☐	SHF8	Brush piles will be burned a minimum of 0.25 mile from documented, known, or obvious caves or cave entrances and otherwise in the center of newly established ROW when proximity to caves on private land is unknown.
☐	SHF9	A 0.25 mile buffer of undisturbed forest will be maintained around documented or known gray bat maternity and hibernation colony sites, documented or known Virginia big-eared bat maternity, bachelor, or winter colony sites, Indiana bat hibernation sites, and northern long-eared bat hibernation sites. Prohibited activities within this buffer include cutting of overstory vegetation, construction of roads, trails or wildlife openings, and prescribed burning. Exceptions may be made for maintenance of existing roads and existing ROW, or where it is determined that the activity is compatible with species conservation and recovery (e.g., removal of invasive species).
☑	TR1	Removal of potentially suitable summer roosting habitat during time of potential occupancy has been quantified and minimized programmatically. TVA will track and document alignment of activities that include tree removal (i.e., hazard trees, mechanical vegetation removal) with the programmatic quantitative cumulative estimate of seasonal removal of potential summer roost trees for Indiana bat and northern long-eared bat. Project will therefore communicate completion of tree removal to appropriate TVA staff.
☐	TR2	Removal of suitable summer roosting habitat within 0.5 mile of Priority 1/Priority 2 Indiana bat hibernacula, or 0.25 mile of Priority 3/Priority 4 Indiana bat hibernacula or any northern long-eared bat hibernacula will be prohibited, regardless of season, with very few exceptions (e.g., vegetation maintenance of TL ROW immediately adjacent to a known cave).
☑	TR3	Removal of suitable summer roosting habitat within documented bat habitat (i.e., within 10 miles of documented Indiana bat hibernacula, within five miles of documented northern long-eared bat hibernacula, within 2.5 miles of documented Indiana bat summer roost trees, within five miles of Indiana bat capture sites, within one mile of documented northern long-eared bat summer roost trees, within three miles of northern long-eared bat capture sites) will be tracked, documented, and included in annual reporting. Project will therefore communicate completion of tree removal to appropriate TVA staff.
☐	TR4	Removal of suitable summer roosting habitat within potential habitat for Indiana bat or northern long-eared bat hibernacula will be tracked, documented, and included in annual reporting. Project will therefore communicate completion of tree removal to appropriate TVA staff.
☐	TR5	Removal of any trees within 150 feet of a documented Indiana bat or northern long-eared bat maternity summer roost tree during non-winter season, range-wide pup season or swarming season (if site is within known swarming habitat), will first require a site-specific review and assessment. If pups are present in trees to be removed (determined either by mist netting and assessment of adult females, or by visual assessment of trees following evening emergence counts),

		TVA will coordinate with the USFWS to determine how to minimize impacts to pups to the extent possible. May include establishment of artificial roosts before removal of roost tree(s).
☐	TR6	Removal of a documented Indiana bat or northern long-eared bat roost tree that is still suitable and that needs to occur during non-winter season, range-wide pup season, or swarming season (if site is within known swarming habitat) will first require a site-specific review and assessment. If pups are present in trees to be removed (determined either by mist netting and assessment of adult females, or by visual assessment of trees following evening emergence counts), TVA will coordinate with USFWS to determine how to minimize impacts to pups to the extent possible. This may include establishment of artificial roosts before removal of roost tree(s).
☐	TR7	Tree removal within 100 feet of **existing transmission ROWs** will be limited to hazard trees. On or adjacent to TLs, a hazard tree is a tree that is tall enough to fall within an unsafe distance of TLs under maximum sag and blowout conditions and/or are also dead, diseased, dying, and/or leaning. Hazard tree removal includes removal of trees that 1) currently are tall enough to threaten the integrity of operation and maintenance of a TL or 2) have the ability in the future to threaten the integrity of operation and maintenance of a TL.
☐	TR8	Requests for removal of hazard trees on or adjacent to **TVA reservoir land** will be inspected by staff knowledgeable in identifying hazard trees per International Society of Arboriculture and TVA's checklist for hazard trees. Approval will be limited to trees with a defined target.
☐	TR9	If removal of suitable summer roosting habitat occurs when bats are present on the landscape, a funding contribution (based on amount of habitat removed) towards future conservation and recovery efforts for federally listed bats would be carried out. Project can consider seasonal bat presence/absence surveys (mist netting or emergence counts) that allow for positive detections without resulting in increased constraints in cost and project schedule. This will enable TVA to contribute to increased knowledge of bat presence on the landscape while continuing to carry out TVA's broad mission and responsibilities.
☐	AR1	Projects that involve structural modification or demolition of buildings, bridges, and potentially suitable box culverts, will require assessment to determine if structure has characteristics that make it a potentially suitable unconventional bat roost. If so a survey to determine if bats may be present will be conducted. Structural assessment will include: o Visual check that includes an exhaustive internal/external inspection of building to look for evidence of bats (e.g., bat droppings, roost entrance/exit holes); this can be done at any time of year, preferably when bats are active. o Where accessible and health and safety considerations allow, a survey of roof space for evidence of bats (e.g., droppings, scratch marks, staining, sightings), noting relevant characteristics of internal features that provide potential access points and roosting opportunities. Suitable characteristic may include: gaps between tiles and roof lining, access points via eaves, gaps between timbers or around mortise joints, gaps around top and gable end walls, gaps within roof walling or around tops of chimney breasts, and clean ridge beams. o Features with high-medium likelihood of harboring bats but cannot be checked visually include soffits, cavity walls, space between roof covering and roof lining. o Applies to box culverts that are at least 5 feet (1.5 meters) tall and with one or more of the following characteristics. Suitable culverts for bat day roosts have the following characteristics: ▪ Location in relatively warm areas

		▪ Between 5-10 feet (1.5-3 meters) tall and 300 ft (100 m) or more long ▪ Openings protected from high winds ▪ Not susceptible to flooding ▪ Inner areas relatively dark with roughened walls or ceilings ▪ Crevices, imperfections, or swallow nests o Bridge survey protocols will be adapted from the Programmatic Biological Opinion for the Federal Highway Administration (Appendix D of USFWS 2016c, which includes a Bridge Structure Assessment Guidance and a Bridge Structure Assessment Form). o Bat surveys usually are NOT needed in the following circumstances: ▪ Domestic garages /sheds with no enclosed roof space (with no ceiling) ▪ Modern flat-roofed buildings ▪ Metal framed and roofed buildings ▪ Buildings where roof space is regularly used (e.g., attic space converted to living space, living space open to rafters) or where all roof space is lit from skylights or windows. Large/tall roof spaces may be dark enough at apex to provide roost space.
☐	AR2	Additional bat P/A surveys (e.g., emergence counts) conducted if warranted (i.e., when AR1 indicates that bats may be present).
☐	AR3	Bridge survey protocols will be implemented, either by permittee (e.g., state DOT biologists) or qualified personnel. If a bridge is determined to be in use as an unconventional roost, subsequent protocols will be implemented.
☐	AR4	Removal of buildings with suitable roost characteristics within six miles of known or presumed occupied roosts for Virginia big-eared bat would occur between Nov 16 and Mar 31. Buildings may be removed other times of the year once a bat biologist evaluates a buildings' potential to serve as roosting habitat and determines that this species is not present and/or is not using structure(s).
☐	AR5	If evidence of bat use warrants seasonal modification or removal, TVA will carry out or recommend (i.e., to applicants) seasonal modification or removal. Risk to human safety, however, should take priority. For project-specific cases in which project is unable to accommodate seasonal modification or removal, and federally listed bat species are present, TVA will carry out or recommend consultation with the USFWS to determine the best approach in the context of the project-specific circumstance. This may include establishment of artificial roosts before demolition of structures with bats present.
☐	SSPC1	**Transmission actions and activities** will continue to Implement A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities. This focuses on control of sediment and pollutants, including herbicides. Following are key measures: o BMPs to minimize erosion and prevent/control water pollution in accordance with state-specific construction storm water permits. BMPS are designed to keep soil in place and aid in reducing risk of other pollutants reaching surface waters, wetlands and ground water. BMPs will undertake the following principles: ▪ Plan clearing, grading, and construction to minimize area and duration of soil exposure. ▪ Maintain existing vegetation wherever and whenever possible. ▪ Minimize disturbance of natural contours and drains. ▪ As much as practicable, operate on dry soils when they are least susceptible to structural damage and erosion. ▪ Limit vehicular and equipment traffic in disturbed areas. ▪ Keep equipment paths dispersed or designate single traffic flow

✔		paths with appropriate road BMPs to manage runoff. ▪ Divert runoff away from disturbed areas. ▪ Provide for dispersal of surface flow that carries sediment into undisturbed surface zones with high infiltration capacity and ground cover conditions. ▪ Prepare drainage ways and outlets to handle concentrated/increased runoff. ▪ Minimize length and steepness of slopes. Interrupt long slopes frequently. ▪ Keep runoff velocities low and/or check flows. ▪ Trap sediment on-site. ▪ Inspect/maintain control measures regularly and after significant rain. ▪ Re-vegetate and mulch disturbed areas as soon as practical. o Application of herbicide is in compliance with USEPA, state water quality standards, and state permits. Areas in which covered species are known to occur on existing transmission line ROW are depicted on referenced, applicable spreadsheets and include guidelines to follow for impact minimization or avoidance. During pre-job briefings, the ROW Forester will review location of resources with contractors and provide guidelines and expectations from TVA's BMP Manual (Appendix O). Herbicides labeled for aquatic use are utilized in and around wetlands, streams, and SMZs. Unless specifically labeled for aquatic use, measures are taken to keep herbicides from reaching streams whether by direct application or through runoff or flooding by surface water. Hand application of certain herbicides labeled for use within SMZs is used only selectively. o Specific guidelines regarding sensitive resources and buffer zones: ▪ Extra precaution (wider buffers) within SMZs is taken to protect stream banks and water quality for streams, springs, sinkholes, and surrounding habitat. ▪ BMPs are implemented to protect and enhance wetlands. Select use of equipment and seasonal clearing is conducted when needed for rare plants; construction activities are restricted in areas with identified rare plants. ▪ Standard requirements exist to avoid adverse impacts to caves, protected animals, and unique and important habitat (e.g., protective buffers around caves, restricted herbicide use, seasonal clearing of suitable habitat).
✔	SSPC2	Operations involving chemical/fuel storage or resupply and vehicle servicing will be handled outside of riparian zones (streamside management zones) in a manner to prevent these items from reaching a watercourse. Earthen berms or other effective means are installed to protect stream channel from direct surface runoff. Servicing will be done with care to avoid leakage, spillage, and subsequent stream, wetland, or ground water contamination. Oil waste, filters, other litter will be collected and disposed of properly. Equipment servicing and chemical/fuel storage will be limited to locations greater than 300-ft from sinkholes, fissures, or areas draining into known sinkholes, fissures, or other karst features.
✔	SSPC3	**Power Plant actions and activities** will continue to implement standard environmental practices. These include: o Best Management Practices (BMPs) in accordance with regulations:

<table>
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▪ Ensure proper disposal of waste, ex: used rags, used oil, empty containers, general trash, dependent on plant policy
▪ Maintain every site with well-equipped spill response kits, included in some heavy equipment
▪ Conduct Quarterly Internal Environmental Field Assessments at each sight
▪ Every project must have an approved work package that contains an environmental checklist that is approved by sight Environmental Health & Safety consultant.
▪ When refueling, vehicle is positioned as close to pump as possible to prevent drips, and overfilling of tank. Hose and nozzle are held in a vertical position to prevent spillage

o Construction Site Protection Methods

▪ Sediment basin for runoff - used to trap sediments and temporarily detain runoff on larger construction sites
▪ Storm drain protection device
▪ Check dam to help slow down silt flow
▪ Silt fencing to reduce sediment movement

o Storm Water Pollution Prevention (SWPP) Pollution Control Strategies

▪ Minimize storm water contact with disturbed soils at the construction site
▪ Protect disturbed soil areas from erosion
▪ Minimize sediment in storm water before discharge
▪ Prevent storm water contact with other pollutants
▪ Construction sites also may be required to have a storm water permit, depending on size of land disturbance (>1 acre)

o Every site has a Spill Prevention and Control Countermeasures (SPCC) Plan and requires training. Several hundred pieces of equipment often managed at the same time on power generation properties. Goal is to minimize fuel and chemical use
</td></tr>
<tr><td>☐</td><td>SSPC4</td><td>Woody vegetation burn piles associated with transmission construction will be placed in the center of newly established ROWs to minimize wash into any nearby undocumented caves that might be on adjacent private property and thus outside the scope of field survey for confirmation. Brush piles will be burned a minimum of 0.25 miles from documented caves and otherwise in the center of newly established ROW when proximity to caves on private land is unknown.</td></tr>
<tr><td>☐</td><td>SSPC5</td><td>Section 26a permits and contracts associated with solar projects, economic development projects or land use projects include standards and conditions that include standard BMPs for sediment and contaminants as well as measures to avoid or minimize impacts to sensitive species or other resources consistent with applicable laws and Executive Orders.</td></tr>
<tr><td>☐</td><td>SSPC6</td><td>Herbicide use will be avoided within 200 ft of portals associated with caves, cave collapse areas, mines and sinkholes that are capable of supporting cave-associated species. Herbicides are not applied to surface water or wetlands unless specifically labeled for aquatic use. Filter and buffer strips will conform at least to federal and state regulations and any label requirements.</td></tr>
<tr><td>☐</td><td>SSPC7</td><td>Clearing of vegetation within a 200-ft radius of documented caves will be limited to that conducted by hand or small machinery clearing only (e.g., chainsaws, bush-hog, mowers). This will protect potential recharge areas of cave streams and other karst features that are connected hydrologically to caves.</td></tr>
<tr><td>☐</td><td>L1</td><td>Direct temporary lighting away from suitable habitat during the active season.</td></tr>
<tr><td>☐</td><td>L2</td><td>Evaluate the use of outdoor lighting during the active season and seek to minimize light pollution when installing new or replacing existing permanent lights by angling lights downward or via other light minimization measures (e.g., dimming, directed lighting, motion-sensitive lighting).</td></tr>
</table>

LeGrand, Holly G

From:	LeGrand, Holly G
Sent:	Tuesday, June 26, 2018 4:18 PM
To:	'lee_andrews@fws.gov'; Carrie Allison
Subject:	Project-specific notification in accordance with TVA Programmatic Consultation for Routine Actions and Federally listed bats
Attachments:	429520_SHF-CCR-EIS_PowerPlants_TVA-Bat-Strategy_2018-04-10.pdf

Good afternoon,

TVA's programmatic ESA consultation on routine actions and bats was completed in April , 2018.

For projects with NLAA or LAA determinations, TVA will be providing project-specific notification to relevant Ecological Service Field Offices. This notification also will be stored in the project administrative record. For projects that utilize Take issued through the Biological Opinion, that Take will be tracked and reported in TVA's annual report to the USFWS in March of the following year.

The attached form is serving at TVA's mechanism to determine if project-specific activities are within the scope of TVA's bat programmatic consultation and if there is project-specific potential for impact to covered bat species, necessitating conservation measures, which are identified for the project on pages 6-11. The form also is serving as the primary means of notification to the USFWS and others as needed.

Project: Shawnee Fossil Plant Coal Combustion Residuals Supplemental EIS, McCracken County, KY

Thank you,

Holly LeGrand
NEPA Specialist (Rotation)
Environmental Compliance and Operations

400 West Summit Hill Drive, WTK11-C
Knoxville, TN 37902
865-632-4010
hlegrand@tva.gov

LeGrand, Holly G

From:	LeGrand, Holly G
Sent:	Tuesday, June 26, 2018 4:23 PM
To:	'Layna.E.Thrush@usace.army.mil'
Subject:	TVA Shawnee Fossil Plant CCR Landfill - Project-specific notification in accordance with TVA Programmatic Consultation for Routine Actions and Federally listed bats
Attachments:	Notification_Sup-EIS-429520_SHF-CCR_PowerPlants_TVA-Bat-Strategy_2018-06-26.pdf; 429520_SHF-CCR-EIS_PowerPlants_TVA-Bat-Strategy_2018-04-10.pdf

Layna,

Good afternoon, TVA's programmatic ESA consultation on routine actions and bats was completed in April, 2018. The Louisville District (along with other USACE Districts over which the TVA Region overlaps) was provided a copy of the BA and BO associated with the consultation on May 2, 2018.

This email is to provide you with documentation that aligns TVA's Shawnee Fossil Plant Coal Combustion Residuals Landfill project with TVA's ESA Section Programmatic Consultation for routine actions and federally listed bats. The attached form is serving at TVA's mechanism to determine if project-specific activities are within the scope of TVA's bat programmatic consultation and if there is project-specific potential for impact to covered bat species, necessitating conservation measures, which are identified for the project on pages 6-11. The form also is serving as the primary means of notification to the USFWS and others (e.g., USACE) as needed.

For your records, I also have attached the notification provided to the Kentucky Ecological Services Field Office.

Project: Shawnee Fossil Plant Coal Combustion Residuals Landfill – Supplemental EIS

Thank you,

Holly LeGrand
NEPA Specialist (Rotation)
Environmental Compliance and Operations

400 West Summit Hill Drive, WTK11-C
Knoxville, TN 37902
865-632-4010
hlegrand@tva.gov

Tennessee Valley Authority, 400 West Summit Hill Drive, Knoxville, TN 37902

April 12, 2018

Mr. Craig Potts
State Historic Preservation Officer
and Executive Director
Kentucky Heritage Council
300 Washington Street
Frankfort, Kentucky 40601

Dear Mr. Potts:

TENNESSEE VALLEY AUTHORITY (TVA), SHAWNEE FOSSIL PLANT, PROCESS WATER BASIN, MCCRACKEN COUNTY, KENTUCKY

TVA proposes to construct a process water basin (PWB) at Shawnee Fossil Plant (SHF). The PWB would be part of a system for treating wastewater runoff from the coal yard drainage basin and other process water plant flows. Construction of the PWB would support TVA's goals to eliminate all wet storage of coal combustion residuals (CCR) at SHF and meet new CCR regulations. TVA's preferred alternative for the PWB includes construction of two adjacent 6-acre basins inside the Rail Loop and connecting them to the coal yard drainage basin and SHF outfall with piping. TVA has determined that this project is an undertaking (as defined at 36 CFR § 800.16(y)) that has the potential to cause effects on historic properties. We are initiating consultation under Section 106 of the National Historic Preservation Act for this undertaking.

The proposed project would include construction of two components: the PWB and a pipeline connecting the PWB to both the coal yard drainage basin and outfall. For access to the PWB, TVA would use an access bridge that would be constructed over the railroad as part of a separate undertaking at SHF, the "Demolition of Structures and Installation of Prefabricated Bridge" project, for which we are consulting concurrently with your office. TVA has determined that the area of potential effects (APE) for archaeological resources includes the potential footprints of the PWB and the pipeline. Because TVA is proposing construction of a bridge within the same corridor as the pipeline, even though the bridge is part of a separate undertaking, we included a ca. 100-foot buffer on the proposed bridge location and a 100 to 200-foot pipeline corridor in this undertaking's APE. In addition, we include the entire area within the Rail Loop as part of the archaeological APE. In the unlikely event that TVA modifies the project so as to affect other areas within the Rail Loop, this will allow TVA to consider the project's potential effects on historic properties in those areas without additional cultural resources surveys.

TVA determined the APE for visual effects to be the viewshed within a half-mile radius of the proposed PWB and pipeline. The eastern and northern portions of this APE were included in two previous architectural surveys that TVA performed in connection with prior undertakings: a proposed dewatering facility in 2016 and a proposed CCR management project in 2017. Neither of the previous architectural surveys identified any NRHP-eligible above ground resources other than SHF itself, which was listed on the NRHP in 2016. Your office agreed with our findings and determinations for those two prior undertakings (letters dated September 21, 2016 and August 31, 2017, respectively).

TVA carried out a desktop review of the architectural APE, using historic topographic maps, TVA's 1951 Land Acquisition Maps for Shawnee Steam Plant, and current satellite imagery available from www.bing.com. This review identified no extant historic structures other than SHF. Existing facilities/infrastructure within the visual APE include several non-contributing SHF structures such as the ash disposal facility, fly ash transfer silos, warehouses, storage sheds, the boiler building, and the limestone conditioner building. These facilities are pictured and discussed in a 2017 survey report prepared by Tennessee Valley Archaeological Research (*Phase I Architectural Survey for the Proposed TVA Shawnee Dry Ash Landfill Project, McCracken County, Kentucky*. KHC Project Registration #FY-2608). Also within the viewshed are a set of pipelines, a capped CCR landfill, a railroad, various roads, the coal yard, transmission structures, and a retention pond. Some of these are pictured in the 2016 survey letter report prepared by Amec Foster Wheeler (*RE: Determination of Effects Assessment of Historic Resources for the Shawnee Fossil Plant Dewatering Facility Project Near Paducah, McCracken County, Kentucky*). TVA finds that the proposed undertaking would result in a visual effect on SHF, but that the effect would not be adverse because the new facilities would be similar in appearance to the existing industrial facilities and infrastructure within the viewshed.

TVA is seeking ways to move forward with this project even as survey and consultation continues on those portions of the project area that are not part of the current design, but that have been included in the APE. One such way is for TVA to use a phased evaluation and identification process as provided in § 800.4(b)(2) and § 800.5(a)(3) of the regulations of the Advisory Council on Historic Preservation ("Council"). In using the phased approach, TVA would consider the project in two phases (Figure 1): Phase A, the area within which the PWB and pipeline would be constructed under the current design, and Phase B, the area within the Rail Loop that would not be affected unless the location or design of the PWB is modified. Accordingly, we conducted the cultural resources survey in two corresponding phases, beginning with Phase A.

Phase A of the archaeological survey includes the proposed pipe and bridge corridors and the preferred location for the PWB and encompasses approximately 38.2 acres. Phase B includes all remaining areas of the APE (consisting of those areas within the Rail Loop that would only be affected if TVA were to change the current design), and encompasses approximately 115 acres.

TVA contracted with AMEC Foster Wheeler Environment and Infrastructure, Inc. (AMEC Foster Wheeler) to perform a Phase I Archaeological survey in Phase A of the APE. Enclosed are two copies of the draft archaeological survey report titled, *Phase I Archaeological Survey, TVA Shawnee Process Water Basin, Phase A, McCracken County, Kentucky*, along with two CDs containing digital copies.

AMEC Foster Wheeler's background study, conducted prior to the field study, indicated that no previously recorded archaeological sites or properties listed in the NRHP are located within the Phase A survey area. The survey crew verified that the APE contains no above-ground structures. The archeological study included pedestrian survey and systematic shovel testing. The survey did not result in the identification of any archaeological sites or features. The report authors recommend no further archaeological investigations in connection with TVA's proposed actions in the Phase A survey area.

TVA has read the report and agrees with the findings and recommendations of the authors. TVA finds that the undertaking would result in no adverse effects on historic properties within the Phase A area, in accordance with § 800.5(b).

Pursuant to 36 CFR Part 800.5(d)(2), we are seeking your concurrence with our findings that the project as currently proposed will result in no adverse effects on historic properties. Consistent with the phased approach allowed by the Council's regulation, we will continue to consult further with your office concerning the undertaking's potential to affect historic properties in the remainder of the APE.

Pursuant to 36 CFR Part 800.3(f)(2), TVA is consulting with federally recognized Indian tribes regarding historic properties within the APE that may be of religious and cultural significance and are eligible for the NRHP.

If you have any questions or comments, please contact Steve Cole by telephone, (865) 632-2551 or by email, sccole0@tva.gov.

Sincerely,

Clinton E. Jones
Manager
Cultural Compliance

SCC:ABM
Enclosures

INTERNAL COPIES ONLY, NOT TO BE INCLUDED WITH OUTGOING LETTER:

A. Michelle Cagley, KFP 1T-KST
Stephen C. Cole, WT 11D-K
Marty M. Gamble, WT 11C-K
Hallie A. Hearnes, WT 11-K
Susan R. Jacks, WT 11C-K
Ashley A. Pilakowski, WT 11D-K
M. Susan Smelley, BR 4A-C
Edward W. Wells, WT 11D-K
ECM, WT CA-K

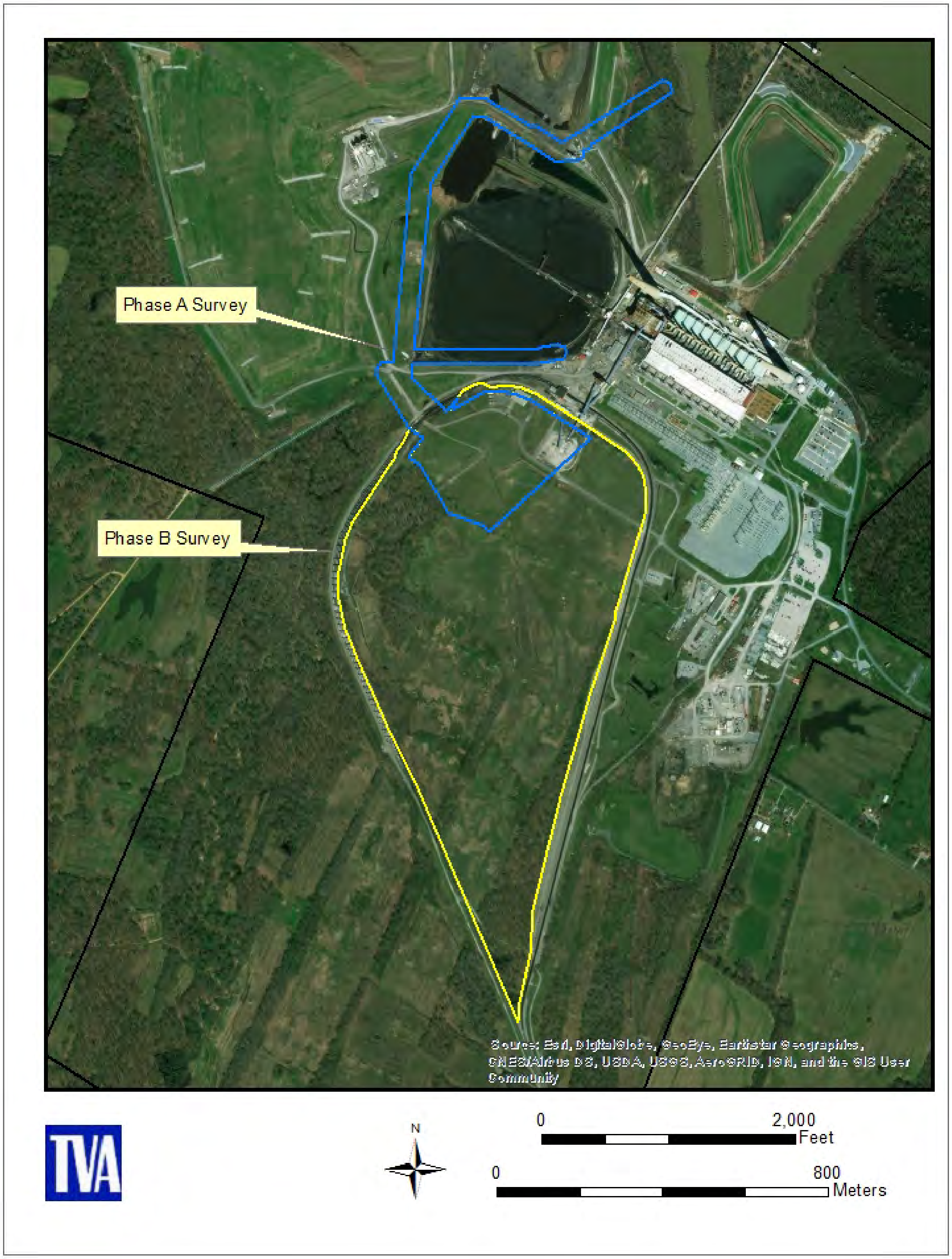

Figure 1. APE, divided into the two phases of survey: Phase A (PWB, bridge, pipeline corridor), and Phase B (remainder of Rail Loop area).

PHASE I ARCHAEOLOGICAL SURVEY

TVA Shawnee Process Water Basin, Phase A, McCracken County, Kentucky.
Abbreviated – Negative Finding Report

March 2018

MATTHEW G. BEVIN
GOVERNOR

TOURISM, ARTS AND HERITAGE CABINET
KENTUCKY HERITAGE COUNCIL
THE STATE HISTORIC PRESERVATION OFFICE
410 HIGH STREET
FRANKFORT, KENTUCKY 40601
PHONE (502) 564-7005
FAX (502) 564-5820
www.heritage.ky.gov

REGINA STIVERS
INTERIM SECRETARY

CRAIG A. POTTS
EXECUTIVE DIRECTOR
& STATE HISTORIC
PRESERVATION OFFICER

July 26, 2018

Mr. Clinton E. Jones
Manager, Cultural Resources
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, TN 37902

RE: Phase I Archaeological Survey, TVA Shawnee Process Water Basin, McCracken County, Kentucky prepared by John Hunter of AMEC Foster Wheeler. Report dated May2018.

Dear Mr. Jones:

Thank you for your letter and enclosed archaeological survey report concerning the above mentioned project, received June 29, 2018. The report describes the archaeological survey of the area of direct effect for a proposed Process Water Basin (PWB) for the Shawnee Fossil Plant Coal Combustion Residuals (CCR) project, McCracken County, Kentucky. The report describes the assessment of the location of the water basin cells and a pipeline corridor.

The archaeological survey consisted of intensive pedestrian reconnaissance, supplemented by screened shovel tests. No archaeological artifacts or cultural features were identified. The investigator recommended no additional work. After review of the report, we agree with the report's findings and recommendations. ***We accept this report as final and acknowledge receipt of two archival copies.***

Additionally, we understand that TVA has performed a desktop review of the project area for possible effects to architectural resources. The Shawnee Fossil Plant (MCN 372) is listed on the National Register of Historic Places, and the proposed PWB will be constructed within the National Register property boundaries. Therefore, the PWB construction will result in a direct effect to a National Register listed historic property. However, we do not feel that the PWB will diminish the qualities for which the Shawnee Plant was listed.

After consideration of the current project modification, and in consideration of our previous consultation on various components of the CCR project, we continue to recommend that the overall project will result in **No Adverse Effect to Historic Properties**.

Should you have any questions, feel free to contact Chris Gunn of my staff at (502) 564-7005, extension 4450 or chris.gunn@ky.gov.

Sincerely,

Craig A. Potts,
Executive Director and
State Historic Preservation Officer

CP: cmg, jr KHC # 51850
cc: George Crothers (OSA); John Hunter (Wood)

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
REGULATORY DIVISION, SOUTH BRANCH
6855 STATE ROAD 66
NEWBURGH, INDIANA 47630

CELRL-RDS

August 7, 2018

MEMORANDUM FOR RECORD

SUBJECT: LRL-2018-652-JMG

On Thursday, August 2, 2018, I met with Mr. Shane Harris of the TVA at the Shawnee Fossil Plant in West Paducah, KY to conduct a site visit in order to review a submitted wetland delineation and provide a jurisdictional determination of delineated waters onsite.

Upon conducting the site visit it was determined that the perennial streams identified on the submitted wetland delineation were identified incorrectly. There was no defined bed and bank, nor was there any discernable ordinary high water mark that is typically present in jurisdictional streams. Therefore, the waterway identified on the wetland delineation as perennial stream UT-B is improperly identified as such, and will be considered a non-jurisdictional upland swale.

After further review of the site and the originally submitted drawings, it was discovered that several of the outfall structures included in the project review area were already covered under a NPDES permit under Section 402 of the Clean Water Act. Since the Corps believes that state and federal regulatory programs should complement rather than duplicate one another per 33CFR320.1(a)(5), the Corps will not be reviewing these outfall structures in order to avoid duplicate regulation. For this reason, we have asked TVA to redraw the project boundary to reflect only the waters that are not currently regulated by Section 402, and covered under TVA's current NPDES permit.

In conclusion, the Corps has suggested that the current project boundary for construction of a new Process Water Basin be redrawn to only encompass be the new Process Water Basin that includes the delineated wetlands identified as WSP4, WSP5, and WSP6. This is a direct result of the improper identification of the streams onsite, so as to avoid misidentification of other waters for future TVA projects on this site as USACE jurisdictional determinations are in place for a five year period.

8/7/2018

Justin Garrett
Project Manager
Regulatory Division

Garrett_RDS/Memo for Record

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
REGULATORY DIVISION, SOUTH BRANCH
6855 STATE ROAD 66
NEWBURGH, INDIANA 47630

August 17, 2018

Regulatory Division
South Branch
ID No. LRL-2018-652-JMG

Mr. Randle DeHart
TVA-Shawnee Plant
7900 Metropolis Lake Road
West Paducah, KY 42086

Dear Mr. DeHart:

This letter is in regard to a preliminary jurisdictional determination request, received in this office on July 19, 2018, regarding a proposed Process Water Basin project located at the TVA Shawnee Fossil Plant near West Paducah, McCracken County, Kentucky; in the vicinity of 37.149518° N latitude, -88.783022° W longitude.

The site was reviewed pursuant to Section 404 of the Clean Water Act (CWA). Section 404 of the CWA requires that a Department of the Army (DA) permit be obtained for the placement or discharge of dredged and/or fill material into "waters of the United States (U.S.)," including wetlands, prior to conducting the work (33 U.S.C. 1344).

Based on the information provided to this office, and review of the proposed site location; the site contains a total of 0.26 acres of palustrine emergent wetlands that may be considered jurisdictional "waters of the U.S.," in accordance with the Regulatory Guidance Letter for Jurisdictional Determinations issued by the U.S. Army Corps of Engineers on October 31, 2016 (RGL No. 16-01).

As indicated in the guidance, this Preliminary Jurisdictional Determination is non-binding and cannot be appealed and only provides a written indication that "waters of the U.S.," including wetlands, may be present on-site. For purposes of computation of impacts, compensatory mitigation requirements, and other resource protection measures, a permit decision made on the basis of a Preliminary Jurisdictional Determination will treat all waters and wetlands on the site as if they are jurisdictional "waters of the U.S."

Attached to this letter are a preliminary jurisdictional determination (JD), a Notification of Appeal Process (NAP) fact sheet, and Request for Appeal (RFA) form. However, a preliminary JD is not appealable and impacting "waters of the U.S." identified in the preliminary JD will result in you waiving the right to request an approved JD at a later date. An approved JD may be requested (which may be appealed), by contacting me for further instruction.

Should your project proposal include the placement or discharge of dredged and/or fill material into any "waters of the U.S.," a DA Permit application must be submitted. Along with the DA permit application, we will need additional details regarding the project's design, scope, photos, construction methods, purpose, maps, and all impacts to "waters" (linear feet, width and acreage), as well as any coordination or documentation with the United States Fish and Wildlife Service and the State Historic Preservation Officer (if possible). You are reminded that all drawings musts be submitted on 8 ½ x 11-inch paper and be of reproducible quality.

Further information on the Regulatory Program, including the DA Permit application, can be obtained from our website located at: http://www.lrl.usace.army.ml/Missions/Regulatory.aspx . Please allow sufficient time in your preconstruction schedule for the processing of a DA permit application.

If you have any questions, please contact this office by writing to the Newburgh Regulatory Office at the above address; ATTN: Justin Garrett, calling 812-853-7632, or by email at Justin.M.Garrett@usace.army.mil. All correspondence pertaining to this matter should refer to our ID No. LRL-2018-652-JMG.

Sincerely,

Justin M. Garrett
Project Manager
Regulatory Division

Enclosures:

Preliminary Jurisdictional Determination
Notification of Appeal Process
Request for Appeal

CC:

Mr. Chad Reed
Tennessee Valley Authority
1101 Market Street
Chattanooga, TN 37402

PRELIMINARY JURISDICTIONAL DETERMINATION FORM

U.S. Army Corps of Engineers

BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR PRELIMINARY JURISDICTIONAL DETERMINATION (JD): 8/3/18

B. NAME AND ADDRESS OF PERSON REQUESTING PRELIMINARY JD:

APPLICANT: Randle DeHart
TVA-Shawnee Fossil Plant
7900 Metropolis Lake Road
West Paducah, KY 42086

C. DISTRICT OFFICE, FILE NAME, AND NUMBER: Louisville, LRL-2018-652

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:

(USE THE ATTACHED TABLE TO DOCUMENT MULTIPLE WATERBODIES AT DIFFERENT SITES)

State: Kentucky County: McCracken City: West Paducah

Center coordinates of site: Latitude and Longitude (NAD 83):

Latitude: 37.0137077 North, Longitude: 88.772147 West

Authority: ☑ Section 404 ☐ Section 10

Name of nearest waterbody: Little Bayou Creek

Identify (estimate) amount of waters in the review area:

Non-wetland waters: N/A linear feet: width (ft) and/or ft wide, acres.

Cowardin Class: Choose Class

Stream Flow: Choose Flow

Wetlands: 0.26 acres.

Cowardin Class: Scrub-shrub

Name of any water bodies on the site that have been identified as Section 10 waters:

Tidal: N/A

Non-Tidal: NA

E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

☐ Office (Desk) Determination. Date:

☑ Field Determination. Date(s): August 2, 2018

1. The Corps of Engineers believes that there may be jurisdictional waters of the United States on the subject site, and the permit applicant or other affected party who requested this preliminary JD is hereby advised of his or her option to request and obtain an approved jurisdictional determination (JD) for that site. Nevertheless, the permit applicant or other person who requested this preliminary JD has declined to exercise the option to obtain an approved JD in this instance and at this time.

2. In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre-construction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an approved JD for the activity, the permit applicant is hereby made aware of the following: (1) the permit applicant has elected to seek a permit authorization based on a preliminary JD, which does not make an official determination of jurisdictional waters; (2) that the applicant has the option to request an approved JD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an approved JD could possibly result in less compensatory mitigation being required or different special conditions; (3) that the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) that the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) that undertaking any activity in reliance upon the subject permit authorization without requesting an approved JD constitutes the applicant's acceptance of the use of the preliminary JD, but that either form of JD will be processed as soon as is practicable; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a preliminary JD constitutes agreement that all wetlands and other water bodies on the site affected in any way by that activity are jurisdictional waters of the United States, and precludes any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an approved JD or a preliminary JD, that JD will be processed as soon as is practicable. Further, an approved JD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331, and that in any administrative appeal, jurisdictional issues can be raised (see 33 C.F.R. §331.5(a)(2)). If, during that administrative appeal, it becomes necessary to make an official determination whether CWA jurisdiction exists over a site, or to provide an official delineation of jurisdictional waters on the site, the Corps will provide an approved JD to accomplish that result, as soon as is practicable. This preliminary JD finds that there "*may be*" waters of the United States on the subject project site, and identifies all aquatic features on the site that could be affected by the proposed activity, based on the following information:

SUPPORTING DATA. Data reviewed for preliminary JD (check all that apply) - checked items should be included in case file and, where checked and requested, appropriately reference sources below):

- ☑ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:
- ☑ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
  - ☐ Office concurs with data sheets/delineation report.
  - ☐ Office does not concur with data sheets/delineation report.
- ☐ Data sheets prepared by the Corps: Click here to enter text
- ☐ Corps navigable waters' study: Click here to enter text
- ☐ U.S. Geological Survey Hydrologic Atlas: Click here to enter text
  - ☐ USGS NHD data.
  - ☐ USGS 8 and 12 digit HUC maps.
- ☐ U.S. Geological Survey map(s). Cite scale & quad name:
- ☐ USDA Natural Resources Conservation Service Soil Survey. Citation: Click here to enter text
- ☐ National wetlands inventory map(s). Cite name: Click here to enter text.
- ☐ State/Local wetland inventory map(s): Click here to enter text
- ☐ FEMA/FIRM maps: Click here to enter text.
- ☐ 100-year Floodplain Elevation is: Click here to enter text (National Geodectic Vertical Datum of 1929)
- ☐ Photographs: ☐ Aerial (Name & Date): Click here to enter text.
- ☐ or ☐ Other (Name & Date): Click here to enter text
- ☐ Previous determination(s). File no. and date of response letter: Click here to enter text
- ☐ Applicable/supporting case law: Click here to enter text.
- ☐ Applicable/supporting scientific literature: Click here to enter text
- ☐ Other information (please specify): Click here to enter text

IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.

8/13/18

Signature and date of Regulatory Project Manager (REQUIRED)

Signature and date of person requesting preliminary JD (REQUIRED, unless obtaining the signature is impracticable)

Site Number	Latitude/ Northing	Longitude/ Easting	Cowardin Class/ Stream Flow	Estimated Amount of Aquatic Resource in Review Area	Class of Aquatic Resource
WSP4	37.0149839	88.780951	Palustrine	0.17 acres	Section 404
WSP5	37.149151	88.782350	Palustrine	0.05 acres	Section 404
WSP6	37.149151	88.782350	Palustrine	0.04 acres	Section 404

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Randle DeHart - TVA		File Number: LRL-2018-652	Date: 8/17/2018
Attached is:			See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)		A
	PROFFERED PERMIT (Standard Permit or Letter of permission)		B
	PERMIT DENIAL		C
	APPROVED JURISDICTIONAL DETERMINATION		D
X	PRELIMINARY JURISDICTIONAL DETERMINATION		E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/CECW/Pages/reg_materials.aspx or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact:	If you only have questions regarding the appeal process you may also contact:
Mr. Justin Garrett U.S. Army Corps of Engineers Newburgh Regulatory Office 6855 State Road 66 Newburgh, IN 47630 (812) 853-7632	U.S. Army Corps of Engineers ATTN: Appeal Review Officer CELRD-PD-REG 550 Main Street, Room 10524 Cincinnati, OH 45202-3222 TEL (513) 684-6212; FAX (513) 684-2460

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

________________________ Signature of appellant or agent.	Date:	Telephone number:

Appendix E – Public Comments and Responses

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Appendix E – Public Comments and Responses

TVA released the Draft SEIS on May 4, 2018 and the notice of availability was published in the Federal Register on the same day initiating a 45-day public comment period which concluded on June 18, 2018. In addition to the notice in the Federal Register, TVA sent notification of the availability of the Draft SEIS to local and state government entities and federal agencies, published notices regarding this effort in local newspapers; issued a press release to media; and posted the notice of availability on the TVA Website.

TVA accepted comments submitted through mail and email. TVA received a total of 19 comments from six commenters. Of the six submissions, five were from federal entities and one was from an environmental organization. Comments were received in relation to the Draft SEIS alternatives analysis, groundwater and surface water resources, PWB location, air quality, waste management, cultural and historic resources, and general Draft SEIS comments.

In addition, TVA received a copy of one comment submission which had been previously submitted in relation to the *Shawnee Fossil Plant Coal Combustion Residual Management Draft Environmental Impact Statement*. Those comments have been previously addressed in Appendix I of the Final EIS and are not addressed further in this Final SEIS*.* The *Shawnee Fossil Plant Coal Combustion Residual Management Final Environmental Impact Statement* (TVA 2017a) is available on the TVA website at: https://www.tva.gov/Environment/Environmental-Stewardship/Environmental-Reviews.

TVA carefully reviewed all of the substantive comments that were received. Summarized comments and TVA's responses are included below. The original comment submissions are included following the responses to comments.

1.1 Alternatives Analysis

Comment 1: The Draft SEIS proposed to select the new Alternative C, despite previously rejecting a similar option (in the Draft EIS), and concurrently to reject Alternative B, despite previously adopting a similar option (in the Draft EIS). (*Commenter: Sierra Club*)

> **Response 1:** Subsection 2.1.1 of the Final EIS has been revised to better explain TVA's reasoning for reevaluating the previously eliminated Alternative 4b and including it as the new Alternative C in the SEIS. Subsection 2.1.1 and Section 2.5 explain TVA's rationale for selecting Alternative C as the preferred alternative.

Comment 2: The purported bases on which TVA relies for now preferring Alternative C are that Alternative C "calls for less movement of CCR material and less dewatering than Alternative B, resulting in greater stability under Alternative C"; that Alternative C "would also reduce air quality impacts associated with the mobilization of dust and emissions from equipment associated with the movement of CCR material as compared to Alternative B"; and that "[c]onsequently, Alternative C could be completed sooner and for a lower cost than Alternative B."

Assuming the choice is between Draft SEIS Alternatives B and C, Sierra Club submits that the Draft SEIS is defective because it fails to provide a reasoned, supported explanation backing up those conclusions as well as its change-of-mind based on materially the same record.

In particular, the Draft SEIS fails to provide any new analysis concerning the relative advantage of Alternative C vis-à-vis stability, air quality, or speed and cost of construction; fails to show any relative advantage of Alternative C vis-à-vis any other resource it does newly analyze (if anything, the new analysis shows the opposite); and fails to explain why, given that record, TVA now prefers an option that it earlier rejected over an option it earlier favored.

With respect to the nine resources that TVA does freshly analyze in the Draft SEIS, TVA either offers identical assessments of the respective impacts of Alternatives B and C (impacts are the same for Land Use, Surface Water, Vegetation, Wildlife, Threatened and Endangered Species, Wetlands, and Cultural and Historic Resources), or notes that Alternative B is more advantageous (such as for Prime Farmlands and Soils and Groundwater).

The Draft SEIS includes no new data or substantive discussion regarding the factors it now invokes for its change of mind; rather, it simply incorporates the analysis in the Final EIS, which had preferred the original Alternative B over the original Alternative C. Additionally, the comparative analysis of the resources reevaluated in the Draft SEIS is either neutral between the two alternatives, or mildly favors Alternative B. This change in preference without substantiating new data in favor of Alternative C is an example of arbitrary and capricious decision-making. This is unlawful under NEPA and the bedrock principles of administrative law.

If the record actually militates towards selection of Alternative B as the objectively better option, then TVA's new preference is not supported by the record. On the other hand, if the record—including the analysis incorporated by reference from the Final EIS—does in fact somehow support Alternative C, TVA has utterly failed to explain its change of mind, including by citing zero new evidence or intervening realizations that support its new preference.

Accordingly, in order for TVA to select Alternative C, TVA must at a minimum provide the new data, substantive discussion, and/or other meaningful analysis that justifies its new preference and explains—in detail, and based on the record in this matter—its abandonment of its previous position in the Final EIS. (*Commenter: Sierra Club*)

> **Response 2:** See response to Comment 1. The analysis in the Final EIS that indicated Alternative B was more preferable than Alternative C was all in regard to the proposed new CCR landfill. The proposed closure methods for Ash Impoundment 2 and the SWL were the same under both Alternative B and C in the Final EIS. The new SEIS Alternative C considered in the SEIS is completely different than the Alternative C evaluated in the EIS. Alternative B in the Final EIS was Closure-in-Place by Reduced Footprint in which a portion of Ash Impoundment 2 would be consolidated into the remainder of the facility. The revised Alternative B remains Closure-in-Place by Reduced Footprint and also includes over-excavation of at least 1 foot of underlying native materials. The bulk of the Alternative B analysis in the Final SEIS then is bounded by the

analysis for Alternative B in the Final EIS, the difference being the over-excavation activities. The new Alternative C in the SEIS is Closure-in-Place and Regrading in which materials are redistributed across the SWL and Ash Impoundment 2 to provide appropriate drainage prior to capping. The new SEIS Alternative C involves significantly less movement of CCR as there would be no consolidation and no over-excavation. Therefore, the SEIS Alternative C analysis is completely bounded by the original Final EIS Alternative B analysis. Therefore, no new analysis is necessary. If the impacts within the larger limits of the Final EIS Alternative B were not significant, then the impacts of the SEIS Alternative C with smaller limits contained within those larger limits must also be not significant.

Additionally, NEPA does not require that federal agencies select the most environmentally preferable alternative. Rather, NEPA requires that agencies consider the effects of their actions on the environment and human health. The environmental impact differences between Alternatives B and C are minor and are explained in SEIS Chapter 3. As described in Subsections 3.3.2.2 and 3.3.2.3, because Alternative B involves consolidation and over-excavation of CCR, Alternative B could have slightly greater beneficial impacts to groundwater than Alternative C. However, the reduced impacts under air quality and the enhanced benefits of better constructability, design considerations, schedule, and economics make Alternative C more preferable than Alternative B as described below.

As described in Subsection 2.5 of the Draft and Final SEIS, identified Alternative C – Closure-in-Place and Regrading of the SWL and Ash Impoundment 2 and Construction of a New PWB as the preferred alternative. Alternative C would achieve the purpose and need of the project and calls for less movement of CCR material and less dewatering than Alternative B resulting in greater stability for Alternative C as well. Alternative C would also have reduced air quality impacts associated with the mobilization of dust and emissions from equipment associated with the movement of CCR material as compared to Alternative B. Consequently, Alternative C could also be completed sooner and for a lower cost than Alternative B. The following paragraphs describe how Alternative C is bounded by the analysis of Final EIS Alternative B with regard to resource areas not reevaluated in the SEIS.

Consolidation of material from the northwest corner of Ash Impoundment 2 into the remainder of Ash Impoundment 2 would result in a higher final elevation of the facility. While, as described in 3.5.2.2 of the Final EIS, there would be no seismic stability concerns related to the consolidated facility at the higher final elevation, under Alternative C, consolidation would not occur, resulting in a lower final elevation of the facility. Thus, Alternative C would have even greater stability than Alternative B because of the reduced elevation and greater footprint of the facility. Because the impact to stability of Alternative C was less than the impact to stability of Alternative B, it was bracketed by the seismology analysis in the Final SEIS. Therefore, TVA could conclude that the impacts would be less than those found insignificant for Alternative B without reevaluating the seismology analysis in the Draft SEIS.

Alternative B includes the movement of CCR within Ash Impoundment 2 as well as the excavation of an additional approximately 1 foot of underlying native material and potential additional remediation to confirm CCR removal. This results in more ground disturbing activities and thus, in potentially more mobilization of fugitive dust than would occur under Alternative C which does not include either of those actions. Therefore, Alternative C would have reduced air quality impacts as compared to Alternative B. Because the Alternative C impacts would be less than, and thus bracketed by, the air quality analysis in the Final EIS, TVA did not need to reevaluate the air quality analysis in the Draft SEIS, but could simply conclude that the impacts from Alternative C would be less than those of Alternative B.

Because Alternative C involves less excavation of materials (both CCR materials and underlying soil) than Alternative B, Alternative C could be completed at a lower cost and within a shorter time than Alternative B. As described in Subsections 3.3.2.2 and 3.3.2.3, the beneficial impacts to groundwater, which environmentally advantage Alternative B over Alternative C, are not substantive enough to outweigh the benefits associated with air quality, constructability, design considerations, schedule, and economics.

While the Final EIS listed Alternative B – Construction of Onsite Landfill, Closure-in-Place by reduced footprint of Ash Impoundment 2, and Closure-in-Place of former SWL as the preferred alternative, the Record of Decision signed January 16, 2018 clarified that TVA's decision pertained only to the construction of a new onsite CCR landfill, and that TVA was electing to further consider the alternatives for closure of Ash Impoundment 2 and the former SWL *before* making a decision. Therefore, TVA's current analysis does not contradict the Final EIS.

Comment 3: Sierra Club does not concede that Alternative B and C in the Draft SEIS are necessarily the only two viable alternatives; nor does Sierra Club agree with the implicit fundamental premise that CCR production should be continued and entrenched at Shawnee. (*Commenter: Sierra Club*)

Response 3: Comment noted.

1.2 Groundwater Resources

Comment 4: The Draft SEIS is rated EC-2 (Environmental Concerns with additional information requested). The EPA is concerned because it appears that the TCE plume is located in the proposed PWB location. While the Draft SEIS indicates that there will be groundwater monitoring activities underway, the EPA also recommends that the Final SEIS fully discuss efforts made to avoid or minimize impacts to groundwater associated with the TCE plume. For example, the Draft SEIS should include more refined information regarding the proximity of the PWB to the plume and any identified remediation measures that may be necessary. (*Commenter: U.S. Environmental Protection Agency*)

Response 4: Section 3.3 Groundwater has been updated in response to this comment. The elevation of the ground surface at the Rail Loop site is approximately 337 to 360 feet above mean sea level. Excavation activities in association with construction of the proposed PWB would not exceed beyond elevation 322 feet. There is one well monitored by the Department of Energy located within the footprint of the proposed PWB footprint, within the RGA (Well MW-152). Well MW-152 shows non-detect for plume contaminants. Well MW-152 shows the uppermost elevation of the RGA to be between 311 to 312 feet. With the excavation of the PWB planned to extend to an elevation of 322 feet there should be no contact with the RGA, and impacts associated with the TCE contaminated groundwater would not be anticipated. The proposed PWB design would incorporate a geomembrane liner system that would utilize a synthetic liner in combination with a compacted clay liner. The liner system would provide a barrier against interaction with the TCE plume and thus minimize potential impacts to local groundwater in association with operation of the PWB. Therefore, with the use of BMPs, impacts to groundwater associated with construction of the proposed PWB and associated piping would be minor, temporary, and localized.

Comment 5: The Department of Energy Paducah Gaseous Diffusion Plant is to the south of the property and they have numerous hazardous waste issues. Contaminated groundwater may flow under the Shawnee site. (*Commenter: Kentucky Department for Environmental Protection Division of Waste Management*)

Response 5: Comment noted. See response to Comment 4. TVA is aware of the potential for contaminated groundwater under SHF from the DOE PGDP.

Comment 6: The proposed work is endorsed[1] by the Groundwater Section of the Watershed Management Branch. However, it is our recommendation that site be made aware of the requirements of 401 KAR 5:037 and the need to develop a Groundwater Protection Plan (GPP) for the protection of groundwater resources within that area. (*Commenter: Kentucky Department for Environmental Protection Division of Water*)

Response 6: The Shawnee Fossil Plant has an existing Groundwater Protection Plan in accordance with 401 KAR 5:037. That plan will be updated as needed for this project.

1.3 Surface Water Resources

Comment 7: To address aquatic resource impacts, TVA proposes to reroute a stream that crosses the PWB footprint in order to continue to provide drainage for the surrounding area. TVA is also in the process of consulting with the USACE regarding jurisdictional determinations for the wetlands and stream impacts within the proposed PWB project area and for potential mitigation. The EPA recommends that the results of any coordination with the USACE should be documented in the Final SEIS. (*Commenter: U.S. Environmental Protection Agency*)

[1] An endorsement does not satisfy, or imply, the acceptance or issuance of any permits, certifications or approvals that may be required under Kentucky Revised Statutes or Kentucky Administrative Regulations. Such endorsement means no major concerns were found from the review of the proposed project as presented other than those stated as conditions or comments.

Response 7: TVA completed consultation with the USACE on August 17, 2018. Sections 3.4 Surface Water and 3.8 Wetlands of the Final SEIS have been updated to present the results of the jurisdictional determination. TVA would obtain a Clean Water Act Section 404 permit and a Kentucky Division of Water 401 Water Quality Certification prior to impacting the wetlands. TVA would mitigate impacts in accordance with these permits.

Comment 8: Pursuant to KRS 151.250, an "Application for a Stream Construction Permit for Construction In or Along a Stream" will need to be submitted to the Kentucky Department for Environmental Protection Division of Water for further review of this project. No formal approval is required for Water Withdrawal Permitting or Water Management Planning. (*Commenter: Kentucky Department for Environmental Protection Division of Water*)

Response 8: As described in the September 17, 2014 letter from Terry Cheek (TVA Water Permits, Compliance, and Monitoring) to Peter Goodman (Kentucky Department for Environmental Protection Division of Water) TVA has determined it is exempt from the Kentucky Stream Construction Permit under KRS 151.250 and 401 KAR 4:060. However, a 401 Water Quality Certification from the Division of Water will be obtained if required.

1.4 Process Water Basin Location

Comment 9: TVA's further investigation and proposed relocation of the PWB from the preliminary "Equalization Basin" location identified in the Draft EIS, appear to have been prompted at least in part by Sierra Club's earlier comment that said location was unsound and that additional, crucial details regarding the PWB were missing from TVA's initial analysis. TVA explained in the Final EIS that "the Process Water Basin will be further evaluated under a separate NEPA analysis" if needed. Sierra Club appreciates the additional details that TVA provided in response, both in the Final EIS and in the Draft SEIS. (*Commenter: Sierra Club*)

Response 9: TVA has decided to avoid construction of new facilities or structures on top of CCR materials at SHF. Therefore, TVA reconsidered the proposed location for the PWB in this supplementary NEPA analysis.

Comment 10: The Supplemental Draft SEIS's treatment of the PWB is problematic. It is not clear that the recommended location within the Rail Loop is outside the floodplain (see Draft SEIS at 2-11). TVA must make certain and make clear to the public that the PWB is not located within the floodplain. (*Commenter: Sierra Club*)

Response 10: Draft SEIS Table 2.1-3 describes the proposed PWB location and configuration alternatives. On page 2-12 of the Draft SEIS, Table 2.1-3 provides a description of Alternative 5 – Rail Loop which explains that "Several locations and configurations of the PWB within the rail loop were considered but were eliminated from further consideration due to conflicts". One of the conflicts listed is the 100-year floodplain. As shown in the figure below, a portion of the Rail Loop is located within the floodplain. As described in Table 2.1-3, TVA eliminated any PWB location alternatives


Ohio River
Alternative 3A/3C
Alternative 3B/3D
Little Bayou Creek
Alternative 2
Alternative 1
Alternative 6
Alternative 4
Alternative 5
Steam Plant Rd
Gipson Rd
Unit boundaries shown are approximate and may vary in the technical demonstrations.
LEGEND:
Rail Loop Area
Alternative 1
Alternative 2
Alternative 3A/3C
Alternative 3B/3D
Alternative 4
Alternative 5
Alternative 6
Proposed Process Water Basin Boundary
Current CCR Landfill boundary per CCR Rule
Original SWL (old Ash Impoundment 1)
Bottom Ash Dewatering Site
SWL Current Stacking Area
Dredge Cell
Original Boundary of Ash Impoundment 2
FEMA 500-yr. Floodplain
FEMA 100-yr. Floodplain
BASE MAP SOURCE: USDA NAIP Aerial Imagery 2014
N
0
850
1,700
Feet
TVA
TENNESSEE VALLEY AUTHORITY
MCCRACKEN COUNTY, KY
TVA Shawnee Fossil Plant
SHF PWB Location Alternatives and Floodplains
DATE: 6/19/2018
DRAWN BY: ALG
CHECKED BY: CF
1 in = 833 ft
JOB NUMBER:

that would have encroached on the 100-year floodplain. The PWB would not contain CCR material, and its function would not be vital to the overall operation of SHF; therefore, the PWB would not be considered a critical action and, thus, is only subject to analysis with respect to the 100-year floodplain. The proposed PWB would be located completely outside the 100-year floodplain of Little Bayou Creek. The PWB would therefore be consistent with EO 11988. As shown on the figure below, although a portion of the proposed PWB location alternative would be located within the 500-year floodplain, because the PWB is not considered a critical action, it is not subject to analysis with respect to the 500-year floodplain.

Comment 11: The Draft SEIS states that “subsurface conditions of the area within the rail loop are unknown,” and “the area has been used as a construction laydown and disposal area in the past.” Accordingly, TVA should undertake further investigation of said subsurface conditions to ensure the site’s suitability, and publish the results of its findings for public comment, prior to finalizing the proposed plans for the PWB. (*Commenter: Sierra Club*)

Response 11: TVA has conducted geotechnical investigations of the proposed PWB site within the rail loop. The results of these investigations will be incorporated into the final design plan and will ensure that the PWB would be constructed with a normal engineering standard of care that will ensure the site’s suitability for the PWB.

1.5 Air Quality

Comment 12: Kentucky Division for Air Quality Regulation 401 KAR 63:010 Fugitive Emissions states that no person shall cause, suffer, or allow any material to be handled, processed, transported or stored without taking reasonable precaution to prevent particulate matter from becoming airborne. Additional requirements include the covering of open bodied trucks, operating outside the work area transporting materials likely to become airborne, and that no one shall allow earth or other material being transported by truck or earth moving equipment to be deposited onto a paved street or roadway. Please note the Fugitive Emissions Fact Sheet. (*Commenter: Kentucky Department for Environmental Protection Division of Air Quality*)

Response 12: As described in the Final EIS, TVA will utilize a variety of best management practices, including covering of open bodied trucks outside the work area, to minimize potential fugitive emissions and air quality impacts to the extent practicable.

Comment 13: Kentucky Division for Air Quality Regulation 401 KAR 63:005 states that open burning is prohibited. Open Burning is defined as the burning of any matter in such a manner that the products of combustion resulting from the burning are emitted directly into the outdoor atmosphere without passing through a stack or chimney. However, open burning may be utilized for the expressed purposes listed on the Open Burning Brochure. (*Commenter: Kentucky Department for Environmental Protection Division of Air Quality*)

Response 13: TVA does not plan to conduct open burning.

Comment 14: The Division would like to offer the following suggestions on how this project can help us stay in compliance with the NAAQS. More importantly, these strategies are beneficial to the health of citizens of Kentucky.

- Utilize alternatively fueled equipment.
- Utilize other emission controls that are applicable to your equipment.
- Reduce idling time on equipment.

(*Commenter: Kentucky Department for Environmental Protection Division of Air Quality*)

Response 14: As described in the Final EIS, TVA will utilize these and other best management practices to minimize potential air quality impacts to the extent practicable.

1.6 Waste Management

Comment 15: The subject site was a hazardous waste generator in 2017. The latest inspection resulted in no violations observed. (*Commenter: Kentucky Department for Environmental Protection Division of Waste Management*)

Response 15: Comment noted.

Comment 16: The Underground Storage Tank (UST) Branch has identified one area of concern:

AI # 3073 TVA-Shawnee Fossil Plant
7900 Metropolis Lake Rd.
West Paducah, KY 42086
13 exempt UST varying in size that were removed in 1990
3-regulated UST (diesel and gasoline) removed in 1995
2- Exempt Active UST store Fuel Oil 12,500 gallons each

Active remediation is ongoing at this site for UST clean-up pertaining to the historic tanks and removals. (*Commenter: Kentucky Department for Environmental Protection Division of Waste Management*)

Response 16: TVA is aware of the ongoing cleanup activity, however, we are not aware of the two 12,500 gallon active USTs mentioned in the area of concern. All USTs from SHF have been removed and there are no active USTs on site. TVA will contact the UST Branch regarding this concern and will address all issues in accordance with all applicable local, state, and federal regulations.

Comment 17: All solid waste generated by this project must be disposed at a permitted facility. If underground storage tanks are encountered, they must be properly addressed. If asbestos, lead paint, and/or other contaminants are encountered during this project, they must be properly addressed. (*Commenter: Kentucky Department for Environmental Protection Division of Waste Management*)

Response 17: All solid waste generated by this project would be disposed at a permitted facility. TVA does not anticipate any underground storage tanks are present within the project area. However, should any underground storage tanks or asbestos, lead paint, or other contaminants be encountered during this project, those tanks/contaminants would be addressed in accordance with all applicable local, state, and federal regulations.

1.7 Cultural and Historic Resources

Comment 18: After review of document section 3.9, we find that it reflects most of our consultation with TVA for this project. We are currently in consultation on effects to historic properties for both the Rail Loop and Process Water Basin portions of the project. For this reason, we should state that the SEIS does not contain a complete record of consultation on cultural resources. We anticipate completion of this consultation soon, and look forward to the completion of the final SEIS. (*Commenter: Kentucky Heritage Council*)

Response 18: Consultation with the Tennessee State Historic Preservation Officer and Kentucky Heritage Council concluded on July 26, 2018. Section 3.9 of the Final EIS has been updated to include the outcome of the consultation.

1.8 General Comments on the Draft SEIS

Comment 19: No comments regarding the Draft Supplemental Environmental Impact Statement for the Management of Coal Combustion Residuals from the Shawnee Fossil Plant. (*United States Department of the Interior and United States Fish and Wildlife Service*)

Response 19: Comment noted.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

JUN 14 2018

Ms. Ashley Pilakowski
NEPA Compliance Specialist
Tennessee Valley Authority
400 West Summit Hill Dr., WT 11 D
Knoxville, Tennessee 37902-1499

Re: Draft Supplemental Environmental Impact Statement (DSEIS) for Shawnee Fossil Plant Coal Combustion Residual Management, McCracken County, Kentucky; CEQ No.: 20180076

Dear Ms. Pilakowski:

The U.S. Environmental Protection Agency reviewed the above referenced document in accordance with Section 309 of the Clean Air Act and Section 102(2)(C) of the National Environmental Policy Act (NEPA). The Tennessee Valley Authority's (TVA) DSEIS considers alternatives for additional storage capacity for Coal Combustion Residuals (CCR) at the Shawnee Fossil Plant (SHF). SHF generates approximately 183,000 cubic yards of CCR annually. SHF is expected to produce approximately 490,000 cubic yards of CCR per year beginning in October of 2017 when the scrubber systems on SHF Units 1 and 4 became operational.

At the SHF, coal ash is currently disposed of in an existing Special Waste Landfill (SWL) and Ash Impoundment 2. Due to projected operations, it is expected that the existing SWL will reach capacity by 2027. To support the TVA's goal to eliminate all wet disposal at its coal plants and provide additional dry CCR material disposal consistent with CCR regulations, TVA is proposing to design, build and operate a new CCR landfill that would accommodate up to 20 additional years of disposal capacity.

The EPA provided technical comments and recommendations to the TVA on the Draft Environmental Impact Statement and Final Environmental Impact Statement on July 31, 2017, and January 8, 2018, respectively. According to the DSEIS, TVA has identified Alternative C as their preferred alternative for disposal of CCR generated at SHF and for wastewater treatment. This alternative includes both closure-in-place and regrading of the SWL and Ash Impoundment 2, and construction of a new Process Water Basin (PWB). This alternative also requires new storm water outfalls along the perimeter of the facilities to outlet at elevations at or above the 100-year flood elevation. Transport of CCR material, dewatering, and air emissions will be reduced under Alternative C compared to the previously identified preferred alternative, Alternative B. However, Alternative C will impact 2,061 linear feet of stream and the proposed PWB will be located in an area that potentially includes trichloroethylene (TCE) contamination from an off-site source.

7 To address aquatic resource impacts, TVA proposes to reroute a stream that crosses the PWB footprint in order to continue to provide drainage for the surrounding area. TVA is also in the process of consulting with the U.S. Army Corps of Engineers (USACE) regarding jurisdictional determinations for the wetlands and stream impacts within the proposed PWB project area and for potential mitigation. The

7 EPA recommends that the results of any coordination with the USACE should be documented in the Final Supplemental Environmental Impact Statement (FSEIS).

5 The DSEIS is rated EC-2 (Environmental Concerns with additional information requested). The EPA is concerned because it appears that the TCE plume is located in the proposed PWB location. While the DSEIS indicates that there will be groundwater monitoring activities underway, the EPA also recommends that the FSEIS fully discuss efforts made to avoid or minimize impacts to groundwater associated with the TCE plume. For example, the DSEIS should include more refined information regarding the proximity of the PWB to the plume and any identified remediation measures that may be necessary.

The EPA recommends that should there be a substantial change to the preferred alternative, then TVA should continue to keep agencies and affected communities informed. The EPA appreciates the opportunity to review the SHF DSEIS. If you wish to discuss this matter further, please contact Ms. Ntale Kajumba, of the NEPA Program Office at (404) 562-9020 or Kajumba.ntale@epa.gov.

Sincerely,

for

Carol J. Monell
Acting Director
Resource Conservation and Restoration Division

MATTHEW G. BEVIN
GOVERNOR

CHARLES G. SNAVELY
SECRETARY

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION

ANTHONY R. HATTON
COMMISSIONER

300 SOWER BOULEVARD
FRANKFORT, KENTUCKY 40601

June 14, 2018

Ashley Pilakowski
NEPA Specialist
NEPA Program & Valley Projects
Tennessee Valley Authority
400 W. Summit Hill Drive
Knoxville, TN 37902

Re: Review of the Draft Supplemental Environmental Impact Statement for Shawnee Fossil Plant Coal Combustion Residual Management

Ms. Pilakowski,

The Energy and Environment Cabinet serves as the state clearinghouse for review of environmental documents generated pursuant to the National Environmental Policy Act (NEPA). Within the Cabinet, the Commissioner's Office in the Department for Environmental Protection coordinates the review for Kentucky state agencies.

We received your correspondence dated April 27, 2018. Your email requested a review of the "Draft Supplemental Environmental Impact Statement for Shawnee Fossil Plant Coal Combustion Residual Management." The following comments are submitted in reference to this project.

Comments from the Division of Water:

8 Pursuant to KRS 151.250, an "Application for a Stream Construction Permit for Construction In or Along a Stream" will need to be submitted to the DOW for further review of this project. No formal approval is required for Water Withdrawal Permitting or Water Management Planning. Questions should be directed to Julia Harrod, Watershed Management Branch, (502) 782-6967, Julia.Harrod@ky.gov.

6 The proposed work is endorsed by the Groundwater Section of the Watershed Management Branch. However, it is our recommendation that site be made aware of the requirements of 401 KAR 5:037 and the need to develop a Groundwater Protection Plan (GPP) for the protection of groundwater resources within that area. Questions should be directed to Wei Ji (502-782-6934) or the Section Supervisor David Jackson (502-782-6986). Questions should be directed to Wei Ji, Watershed Management Branch, (502) 782-6934, Wei.Ji@ky.gov or Section Supervisor, David Jackson, (502) 782-6986, DavidA.Jackson@ky.gov.

Comments from the Division of Waste Management:

15 The subject site was a hazardous waste generator in 2017. The latest inspection resulted in no violations observed. The Department of Energy Paducah Gaseous Diffusion Plant is to the south
4 of the property and they have numerous hazardous waste issues. Contaminated groundwater may flow under the Shawnee site.

The Underground Storage Tank Branch has identified one area of concern:

AI # 3073 TVA-Shawnee Fossil Plant
7900 Metropolis Lake Rd.
West Paducah, KY 42086
16 13 exempt UST varying in size that were removed in 1990
3-regulated UST (diesel and gasoline) removed in 1995
2- Exempt Active UST store Fuel Oil 12,500 gallons each
Active remediation is ongoing at this site for UST clean-up pertaining to the historic tanks and removals.

All solid waste generated by this project must be disposed at a permitted facility. If underground
17 storage tanks are encountered, they must be properly addressed. If asbestos, lead paint, and/or other contaminants are encountered during this project, they must be properly addressed.

Comments from the Division of Air Quality:

Kentucky Division for Air Quality Regulation **401 KAR 63:010** Fugitive Emissions states that no person shall cause, suffer, or allow any material to be handled, processed, transported or stored without taking reasonable precaution to prevent particulate matter from becoming airborne.
12 Additional requirements include the covering of open bodied trucks, operating outside the work area transporting materials likely to become airborne, and that no one shall allow earth or other material being transported by truck or earth moving equipment to be deposited onto a paved street or roadway. Please note the Fugitive Emissions Fact Sheet.

Kentucky Division for Air Quality Regulation **401 KAR 63:005** states that open burning is prohibited. Open Burning is defined as the burning of any matter in such a manner that the
13 products of combustion resulting from the burning are emitted directly into the outdoor atmosphere without passing through a stack or chimney. However, open burning may be utilized for the expressed purposes listed on the Open Burning Brochure.

The Division would like to offer the following suggestions on how this project can help us stay in compliance with the NAAQS. More importantly, these strategies are beneficial to the health of citizens of Kentucky.

14 § Utilize alternatively fueled equipment.

§ Utilize other emission controls that are applicable to your equipment.

§ Reduce idling time on equipment.

This review is based upon the information that was provided by the applicant. An endorsement of this project does not satisfy, or imply, the acceptance or issuance of any permits, certifications or approvals that may be required from this agency under Kentucky Revised Statutes or Kentucky Administrative Regulations. Such endorsement means this agency has found no major concerns from the review of the proposed project as presented other than those stated as conditions or comments.

If you should have any questions, please contact me at (502) 782-6739.

Sincerely,

Ronald T Price

Ronald T. Price

From: Gunn, Chris (Heritage Council) <Chris.Gunn@ky.gov>
Sent: Wednesday, June 13, 2018 12:25 PM
To: Pilakowski, Ashley Anne <aapilakowski@tva.gov>
Cc: Cole, Steve C <sccole0@tva.gov>
Subject: RE: SERO 2018-9 - Shawnee Fossil CCR Project

TVA External Message. Please use caution when opening.

Hello Ashely,

I am writing today to provide comment on the draft supplemental EIS for the Shawnee Fossil CCR project.

18

After review of document section 3.9, we find that it reflects most of our consultation with TVA for this project. We are currently in consultation on effects to historic properties for both the Rail Loop and Process Water Basin portions of the project. For this reason, we should state that the SEIS does not contain a complete record of consultation on cultural resources.

We anticipate completion of this consultation soon, and look forward to the completion of the final SEIS.

Please let me know if I can answer any questions.

Thank you,
Chris Gunn

Christopher M. Gunn, Ph.D.

Archaeology Review Coordinator
Kentucky Heritage Council
410 High Street
Frankfort, KY 40601

Phone: (502) 564-7005, ext. 4450
Fax: (502) 564-5820

From: Laracuente, Nicolas (Heritage Council)
Sent: Thursday, May 03, 2018 4:52 PM
To: Gunn, Chris (Heritage Council) <Chris.Gunn@ky.gov>
Subject: FW: SERO 2018-9

From: Sherrick, Yvonne (Heritage Council)
Sent: Friday, April 27, 2018 11:19 AM
To: Laracuente, Nicolas (Heritage Council) <Nicolas.Laracuente@ky.gov>
Subject: FW: SERO 2018-9

From: Price, Ronald (EEC)
Sent: Friday, April 27, 2018 9:36 AM
To: Dawson, Doug (FW) <Doug.Dawson@ky.gov>; Murphy, Joel (EEC) <Joel.Murphy@ky.gov>; Sherrick, Yvonne (Heritage Council) <Yvonne.Sherrick@ky.gov>; Poore, John (EEC) <John.Poore@ky.gov>
Cc: Price, Ronald (EEC) <Ronald.Price@ky.gov>
Subject: SERO 2018-9

Below is a request for comments for the (SERO 2018-9) Draft Supplemental Environmental Impact Statement for Shawnee Fossil Plant Coal Combustion Residual Management in McCracken County, KY.

The following link will take you directly to the TVA site.

https://www.tva.gov/Environment/Environmental-Stewardship/Environmental-Reviews/Management-of-Coal-Combustion-Residuals-from-the-Shawnee-Fossil-Plant

Comments are needed by June 15, 2018.

Ronald T. Price
Office of the Commissioner
Kentucky Department for Environmental Protection
300 Sower Blvd.
Frankfort, KY 40601
502-782-6739
502-564-4245 (fax)

From: Pilakowski, Ashley Anne <aapilakowski@tva.gov>
Sent: Friday, April 27, 2018 9:08 AM
To: Pilakowski, Ashley Anne <aapilakowski@tva.gov>
Subject: Notice: Release of the Draft Supplemental Environmental Impact Statement for Shawnee Fossil Plant Coal Combustion Residual Management

Good morning,

The Tennessee Valley Authority (TVA) is seeking comment on a draft Supplemental Environmental Impact Statement (SEIS) to address the potential environmental effects associated with ceasing operations at the special waste landfill and Ash Impoundment 2, and building and operating a new process water basin at the Shawnee Fossil Plant (SHF) located near Paducah, Kentucky in McCracken

County. To ensure consideration, comments on the draft SEIS must be postmarked or e-mailed no later than June 18, 2018.

This draft SEIS supplements the SHF CCR Final EIS that was released December 8, 2017 and addresses the environmental impacts associated with the modification and addition of closure alternatives for Ash Impoundment 2 and the special waste landfill. This draft SEIS also identifies the environmental impacts associated with the construction and operation of a process water basin.

The draft SEIS is posted on TVA's website at www.tva.gov/nepa. Written comments should be sent to the mailing address or email address below. Please let me know if you have any questions.

Ashley Pilakowski
NEPA Specialist
NEPA Program & Valley Projects

Tennessee Valley Authority
400 W. Summit Hill Drive
Knoxville, TN 37902

865-632-2256 (w)
aapilakowski@tva.gov

TVA

From: Miller, Jessica
To: Pilakowski, Ashley Anne
Subject: Draft Supplemental EIS for Shawnee Fossil Plan Coal Combustion Residual Management
Date: Friday, May 18, 2018 2:56:34 PM

TVA External Message. Please use caution when opening.

Ms. Pilakowski,

19 The USFWS has no comments regarding the Draft Supplemental EIS for this project. Thank you for the opportunity to review the document.

Jessi

--
Jessica Blackwood Miller
Fish & Wildlife Biologist
Kentucky Field Office
U.S. Fish & Wildlife Service
330 W. Broadway, Rm 265
Frankfort, KY 40601
Ph: (502) 695-0468 ext. 104
Fax: (502) 695-1024

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Richard B. Russell Federal Building
75 Ted Turner Drive, S.W., Suite 1144
Atlanta, Georgia 30303

ER 18/0373
9043.1

June 14, 2018

Ashley Pilakowski
400 West Summit Hill Drive, WT 11D
Knoxville, TN 37902

Re: Comments on the Draft Supplemental Environmental Impact Statement by the Tennessee Valley Authority for the Management of Coal Combustion Residuals from the Shawnee Fossil Plant

Dear Ms. Pilakowski:

19 The U.S. Department of the Interior (Department) has reviewed the Draft Supplemental Environmental Impact Statement for the Management of Coal Combustion Residuals from the Shawnee Fossil Plant. We have no comments at this time.

Thank you for the opportunity to provide comments. I can be reached via email at joyce_stanley@ios.doi.gov or at (404) 331-4524.

Sincerely,

J Stanley

Joyce Stanley, MPA
Regional Environmental Officer

cc: Christine Willis - FWS
Michael Norris - USGS
Anita Barnett – NPS
Michelle Fishburne - OSMRE
OEPC - WASH

June 18, 2018

Ms. Ashley Pilakowski
NEPA Compliance
Tennessee Valley Authority
400 W. Summit Hill Drive, WT 11DK
Knoxville, Tennessee 37902
aapilakowski@tva.gov

Via electronic mail

Re: **Comments on Tennessee Valley Authority's April 2018 Draft Supplemental Environmental Impact Statement for the Shawnee Fossil Plant's Coal Combustion Residual Management**

Dear Ms. Pilakowski:

Sierra Club hereby submits its comments on the Tennessee Valley Authority's ("TVA") April 2017 Draft Supplemental Environmental Impact Statement (hereinafter the "Supplemental DEIS") for the Shawnee Fossil Plant's ("Shawnee") Coal Combustion Residual ("CCR") Management. *See* 83 Fed. Reg. 19,758 (May 4, 2018) (notice of availability).

On July 31, 2017, Sierra Club—together with the Kentucky Environmental Foundation, the Kentucky Conservation Committee, the Southern Alliance for Clean Energy, and the Environmental Integrity Project—submitted comments (including Technical Comments prepared by consultant Mark Quarles) on TVA's June 2017 Draft EIS ("DEIS"), attached hereto for reference as Appendix A ("Sierra Club DEIS Comments"). TVA purported to respond to those and other public comments in its Final EIS (published in December 2017), which the Supplemental DEIS supplements. *See* 83 Fed. Reg. 4,115 (Jan. 29, 2018) (issuance of record of decision). The Supplemental DEIS does not purport to re-raise for comment the entire scope of issues implicated by the Final EIS (or, by the same token, on all CCR management activities and plans at Shawnee). Nonetheless, and at least insofar as the Supplemental DEIS expressly revisits some of the same issues, Sierra Club hereby incorporates and reasserts all its earlier comments, which TVA's earlier purported responses, together with the analysis and plans set out in the Final EIS, did not fully or adequately address. Sierra Club maintains that both the Final EIS, and the Final EIS as proposed to be modified by the Supplemental DEIS, pose potential real-world hazards to human health and the environment, and feature procedural and substantive legal defects under the National Environmental Policy Act ("NEPA"),[1] the Admnistrative Procedure Act ("APA"),[2] and the so-called CCR Rule,[3] at a minimum.[4]

The Supplemental DEIS focuses chiefly on two analytical developments since TVA's publication of its Final EIS: (1) a new proposed plan for closure of Ash Impoundment 2 and the Special Waste Landfill ("SWL"), and (2) a new proposed plan for construction of the Process Water Basin ("PWB"). Sierra Club comments on each in turn.

I. <u>TVA Fails to Explain or to Provide Support in the Record for Its Changed Preference Regarding Closure of Ash Impoundment 2 and the Special Waste Landfill</u>

The Supplemental DEIS revisits TVA's selection of former Alternative B, as described in the Final EIS, for construction of an onsite CCR landfill, closure-in-place of Ash Impoundment 2 with a reduced footprint, and closure-in-place of the SWL. *See, e.g.*, Supplemental DEIS at ES-1. TVA now identifies three alternatives, in light of certain additional analysis since the Final EIS:

A. No Action;
B. Closure-in-place by reduced footprint of the SWL and Ash Impoundment 2 similar to the former Alternative B described in Subsection 2.2.2 and selected in the Final EIS—except now, it would also include over-excavation of an additional approximately 1 foot of underlying native material, intended to confirm CCR removal; or
C. Closure in-Place of the SWL and Ash Impoundment 2 similar to the previously eliminated Alternative 4b identified in Table 2.13 of the Final EIS—except now, the ash in the northwest corner of Ash Impoundment 2 would not be removed and consolidated, and instead both the SWL and Ash Impoundment 2 would be closed-in-place and regraded with materials redistributed within the existing facilities or using borrow material from the Shawnee East Site to establish appropriate drainage and stability, and new storm water outfalls would be installed along the perimeter of the facilities.

See id. at ES-3; *see also id.* at 2-15–2-19. The Supplemental DEIS proposes to select this new
1 Alternative C, despite previously rejecting a similar option, and concurrently to reject Alternative
B, despite previously adopting a similar option. It also rejects Alternative A, reasoning that it
would not serve the Purpose and Need identified for the project.

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[1] 42 U.S.C. § 4321 *et seq.*; *see* 40 C.F.R. pts. 1500-1508.

[2] 5 U.S.C. § 551 *et seq.*

[3] *Disposal of Coal Combustion Residuals from Electric Utilities*, 80 Fed. Reg. 21,301 (Apr. 17, 2015) (final rule); *see* 40 C.F.R. pts. 257 & 261.

[4] *See, e.g.*, Sierra Club DEIS Comments at 2-3. Also potentially implicated, non-exhaustively, are the Resource Conservation and Recovery Act ("RCRA"), 42 U.S.C. § 6901 *et seq.*, and the Clean Water Act, 33 U.S.C. § 1251 *et seq.*

The purported bases on which TVA relies for now preferring Alternative C are that Alternative C "calls for less movement of CCR material and less dewatering than Alternative B, resulting in greater stability under Alternative C"; that Alternative C "would also reduce air quality impacts associated with the mobilization of dust and emissions from equipment associated with the movement of CCR material as compared to Alternative B"; and that, "[c]onsequently, Alternative C could be completed sooner and for a lower cost than Alternative B." *Id.* at ES-4; *see also id.* at 2-22.

Assuming the choice is between Supplemental DEIS Alternatives B and C, Sierra Club submits that the Supplemental DEIS is **defective because it fails to provide a reasoned, supported explanation backing up those conclusions as well as its change-of-mind based on materially the same record.** [5] **In particular, the Supplemental DEIS fails to provide any new analysis concerning the relative advantage of Alternative C vis-à-vis stability, air quality, or speed and cost of construction; fails to show any relative advantage of Alternative C vis-à-vis any other resource it does newly analyze (if anything, the new analysis shows the opposite); and fails to explain why, given that record, TVA now prefers an option that it earlier rejected over an option it earlier favored**.

More specifically, whereas the Supplemental DEIS purports to rely exclusively on Alternative
2 C's advantages with respect to ground stability and air quality, the Supplemental DEIS provides no new analysis on those fronts and instead simply "incorporate[s] by reference" the Final EIS's analyses of Air Quality, Geology and Seismology, and several other resources. *Id.* at 1-5; *see also id* (stating that "the analysis presented in the 2017 Final EIS adequately addressed potential impacts to" those resources, and therefore the Supplemental DEIS does not revisiting them); *id.* at 3-1 ("TVA has determined that the analysis presented in the 2017 Final EIS adequately addressed potential impacts to air quality; . . . geology and seismology; . . . .). Further, to the extent that speed and cost could be construed as independent decisional factor—despite TVA's suggestion that Alternative C's advantageousness in those regards is simply a "consequen[ce]" of the air and stability issues—the Supplemental DEIS likewise fails to present any new data or substantive discussion regarding those considerations.

Meanwhile, with respect to the nine resources that TVA does freshly analyze in the Supplemental DEIS, TVA either offers identical assessments of the respective impacts of Alternatives B and C, or notes that *Alternative B* is more advantageous. *See id.* at 2-20–2-21; *see also id.* at 3-5 ("same" impact on Land Use); *id.* at 3-7 ("same" impact on Prime Farmland and Soils except that "more borrow material may be needed under" under Alternative C); *id.* at 3-12 ("similar" impact on Groundwater except that, "[b]ecause Alternative B involves consolidation and over-excavation of CCR, Alternative B could have slightly greater beneficial impacts"); *id.* at 3-15 ("same" impact on Surface Water); *id.* at 3-20 ("same" impact on Vegetation); *id.* at 3-22 ("same" impact on Wildlife); *id.* at 3-29 ("same" impact on Threatened and Endangered

[5] Sierra Club does not concede that Alternatives B and C in the Supplemental DEIS are necessarily the
3 only two viable alternatives; nor does Sierra Club agree with the implicit fundamental premise that CCR production should be continued and entrenched at Shawnee. *Cf.* Sierra Club DEIS Comments, Technical Comments at 3.

Species); *id.* at 3-32 ("same" impact on Wetlands); *id.* at 3-37 ("same" impact on Cultural and Historic Resources).

In sum, the Supplemental DEIS includes zero new data or substantive discussion regarding the factors it now invokes for its change of mind; rather, to those ends, it simply incorporates the analysis in the Final EIS, which had preferred the analogue of present Alternative B (which TVA now rejects) and had rejected the analogue of Alternative C (which TVA now prefers). At the same time, the comparative analysis of Alternatives B and C vis-à-vis the resources that the Supplemental DEIS does substantively revisit and freshly reexamine is either neutral between the two, or mildly favors Alternative B.

2 TVA's flip-flop from preferring Alternative B to Alternative C, when providing no new data or discussion vis-à-vis the factors it invokes as justifying its preference for Alternative C, and only making the case stronger for Alternative B in its new analysis about other factors, is a quintessential instance of arbitrary and capricious decision-making—unlawful under NEPA and bedrock principles of administrative law. Thus, on the one hand, if the record actually militates towards selection of Alternative B as the objectively better option, then TVA's new preference is not supported by the record. On the other hand, if the record—including the analysis regarding air quality, geology and seismology, and other matters incorporated by reference from the Final EIS—does in fact somehow support Alternative C, TVA has utterly failed to explain its change of mind, including by citing zero new evidence or intervening realizations that support its new preference. Either way, TVA's decision, as it stands, is unreasonable and unlawful.[6]

Accordingly, in order for TVA to select Alternative C, TVA must at a minimum provide the new data, substantive discussion, and/or other meaningful analysis that both justifies its new preference and explains—in detail, and based on the record in this matter—its abandonment of its previous position in the Final EIS.[7]

II. <u>TVA Fails to Provide Important, Record-Supported Assurances Regarding the Proposed Relocation of the Process Water Basin</u>

9 TVA's further investigation and proposed relocation of the PWB, from the preliminary location (initially the "Equalization Basin") identified in the DEIS, appear to have been prompted at least

[6] *See, e.g.*, 40 C.F.R. § 1502.14(a) (NEPA requires rigorous exploration of alternatives, and reasoned, supported, explained choice among them); *Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983) (agency change of position is unlawful absent reasoned explanation based on the record); *Organized Vill. of Kake v. U.S. Dep't of Agriculture*, 795 F.3d 956, 966-68 (9th Cir. 2015).

[7] Again, Sierra Club incorporates by reference, and reasserts, the critiques in its comments on the DEIS that the Final EIS did not resolve and that the Supplemental DEIS likewise fails to cure—including (but not limited to) Sierra Club's earlier observation that TVA's plan to eliminate all wet storage of CCR at Shawnee through closure of the SWL and Ash Impoundment 2 would not eliminate the ash's contact with groundwater, nor eliminate continued leaching of hazardous contaminants from those disposal areas, and that the closure plans would not satisfy closure performance or location restriction requirements. *See, e.g.*, Sierra Club DEIS Comments, Technical Comments at 4-21.

in part by Sierra Club's earlier comment that said location was unsound and that additional, crucial details regarding the PWB were missing from TVA's initial analysis. *See* Supplemental DEIS at ES-1; *see also* Final EIS, Appendix I, at I-34–I-35 (quoting, and noting amendments in response to, Sierra Club comment regarding lack of critical detail about the basin; further indicating that "[i]f needed, the Process Water Basin[s] at [Shawnee] will be further evaluated under a separate NEPA analysis"). Sierra Club appreciates the additional details that TVA provided in response, both in the Final EIS and in the Supplemental DEIS. 9

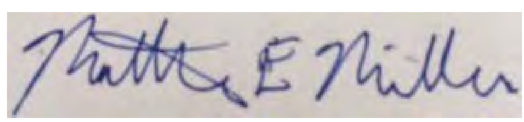
10 The Supplemental DEIS's treatment of the PWB is problematic, however. For one, it is not altogether clear that the recommended location, within the Rail Loop, is in fact outside the floodplain, *see* Supplemental DEIS at 2-11—a concern Sierra Club raised before as well, *see* Sierra Club DEIS Comments, Technical Comments at 19, 33. TVA must make certain and make clear to the public, in finalizing and publishing its plans, that the PWB is not located within the floodplain.

11 Further, the Supplemental DEIS states that "subsurface conditions of the area within the rail loop are unknown," further acknowledging that "the area has been used as a construction laydown and disposal area in the past." Accordingly, TVA should undertake further investigation of said subsurface conditions to ensure the site's suitability, and publish the results of its findings for public comment, prior to finalizing the proposed plans for the PWB.

*   *   *   *   *

Sierra Club sincerely appreciates this opportunity to comment and thanks you in advance for your consideration. As always, we would be pleased to discuss the future of Shawnee, with the aims of ensuring legal compliance, protecting health and the environment, promoting cost savings for consumers through cheaper clean energy, and otherwise promoting the public interest. Please do not hesitate to contact me about CCR management and/or other issues.

Sincerely,



/s/ Matthew E. Miller

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<u>APPENDIX A</u>

Comments (July 2017) of Sierra Club *et al.* on TVA's June 2017 Draft EIS

July 31, 2017

Ms. Ashley Pilakowski
NEPA Compliance
Tennessee Valley Authority
400 W. Summit Hill Drive, WT 11DK
Knoxville, Tennessee 37902
aapilakowski@tva.gov

Via electronic mail as well as upload on www.tva.gov/nepa

Re: Comments on Tennessee Valley Authority's June 2017 Draft Environmental Impact Statement for the Shawnee Fossil Plant's Coal Combustion Residual Management

Dear Ms. Pilakowski:

The **Sierra Club**, the **Kentucky Environmental Foundation** ("KEF"), the **Kentucky Conservation Committee** ("KCC"), the **Southern Alliance for Clean Energy** ("SACE"), the **Environmental Integrity Project** ("EIP"), and **Mark Quarles**, a consultant with Global Environmental, LLC, have reviewed the Tennessee Valley Authority's ("TVA") June 2017 Draft Environmental Impact Statement for the Shawnee Fossil Plant's Coal Combustion Residual Management (the "DEIS"),[1] and hereby submit their comments, consisting of this letter together with the attached Technical Comments prepared by Mr. Quarles.

The DEIS suffers from numerous material flaws, procedural as well as substantive, which both render the DEIS legally defective and pose potential hazards to human health and the environment. Our conclusions are based on an intensive review of numerous technical documents in conjunction with applicable laws and regulations. To that end, we scrutinized not only the DEIS itself but also TVA documents produced during past discoveries, documents produced by TVA on its CCR website, and many other publically available technical reports, among other materials.

As a general matter, we believe that TVA has not performed proper and adequate analyses necessary to defensibly select a preferred alternative for closure of current disposal units or for selecting a disposal site for long-term disposal of wastes. We believe that the DEIS and its

[1] *See, e.g.*, 82 Fed. Reg. 27,704 (June 16, 2017) (notice of availability of Shawnee Fossil Plants Coal Combustion Residual Management—noting public comment period as ending on July 31, 2017).

proposed courses of action would, if finalized as they currently stand, violate the National Environmental Policy Act ("NEPA")[2] and the CCR Rule,[3] at least—potentially other laws as well (*e.g.*, the Resource Conservation and Recovery Act ("RCRA")[4] and/or the Clean Water Act,[5] *inter alia*).

Our general conclusions concerning the DEIS, explained and supported in the attached technical comments, are as follows:

1. TVA's plan to eliminate all wet storage of coal combustion residuals ("CCR") at Shawnee through closure of the Special Waste Landfill and Ash Impoundment 2 would not eliminate the ash's contact with groundwater, nor would it eliminate continued leaching of hazardous contaminants from those disposal areas.

2. TVA's own monitoring of groundwater and surface water demonstrates widespread contamination, and that contamination discharges into the receiving streams; yetTVA's plan for closure and construction of new disposal units would not prevent that discharge of contamination from occurring in the future, nor would existing permit conditions be able to quantify or mitigate the potential long-term adverse effects.

3. TVA's plan for Closure-in-Place of the Special Waste Landfill and Ash Impoundment 2 would not satisfy the closure performance standards for surface impoundments legally required by the CCR Rule.

4. Nowhere has TVA shown that its plan to laterally expand the Special Waste Landfill over Ash Impoundment 2 would satisfy the location restriction requirements legally required by the CCR Rule.

5. TVA's preliminary alternatives analysis to evaluate future "dry" landfill disposal sites to accommodate Shawnee's waste generation plan was unreasonably brief; moreover, it resulted in the selection of land that was already purchased by TVA, that does not meet TVA's minimum designated acreage requirement, and that likely would not meet the CCR rule site location standards.

6. TVA's elimination of Closure-by-Removal as a facility-wide alternative in the DEIS was not based upon reasonable facts and considerations that TVA should have considered in its analysis.

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[2] 42 U.S.C. § 4321 *et seq.*; *see* 40 C.F.R. pts. 1500-1508.

[3] *Disposal of Coal Combustion Residuals from Electric Utilities*, 80 Fed. Reg. 21,301 (Apr. 17, 2015) (final rule); *see* 40 C.F.R. pts. 257 & 261.

[4] 42 U.S.C. § 6901 *et seq.*

[5] 33 U.S.C. § 1251 *et seq.*

7. The DEIS improperly omits relevant information regarding all past, current, and proposed future waste disposal areas. As such, the DEIS does not properly evaluate the waste management process in compliance with the CCR Rule and NEPA.

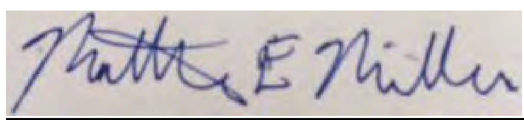
8. TVA failed to include, as it should have, analysis of beneficial reuse, in evaluating waste alternatives. Currently disposed and future wastes are capable of being beneficially reused in commercial products. Factoring in that analysis could materially change the relative economics of, and therefore TVA's informed choice between, the different alternatives.

9. The DEIS improperly relies upon the Programmatic EIS and its EPRI Framework Model to support Closure-in-Place of the Special Waste Landfill and Ash Impoundment 2; the EPRI Framework Model, which the PEIS in turn relied upon, is flawed and should not have been invoked for the Shawnee site.

Please see the attached technical comments, which expand upon the aforementioned problems with the DEIS. As noted in the technical comments, the References cited therein have been collected and made available for download at the following publically-accessible Box site (it would be impracticable to attach them, given the file sizes): https://app.box.com/s/rz005s7adftddh5ghugvzlmznlemdsti. Please let me know if you have any questions or problems accessing the documents on that site.

We sincerely appreciate this opportunity to comment and thank you in advance for your consideration. We look forward to hearing from TVA and would be very pleased to discuss alternative paths forward, including how TVA might remedy the flaws in the DEIS. Please do not hesitate to contact me with any questions, concerns, or requests.

Sincerely,



_*/s/ Matthew E. Miller*_______________

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Enclosure: Technical Comments

Technical Comments Regarding the Draft Environmental Impact Statement (v. June 2017)

Tennessee Valley Authority's Shawnee Fossil Plant Coal Combustion Residual Management

Prepared for:

Sierra Club
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Washington, DC 20001

Prepared by:

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July 2017

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1. **Introduction**

1-1. Purpose

The Tennessee Valley Authority ("TVA") stated that the purposes of its June 2017 Draft Environmental Impact Statement (the "DEIS") for Shawnee Fossil Plant's ("Shawnee") Coal Combustion Residuals ("CCR") Management were:

- "to support TVA's goal to eliminate all wet storage at [Shawnee]";
- "provide additional dry CCR material storage"; and
- "assist TVA in meeting the new CCR regulations."

DEIS at 5.[1]

1-2. Overview of Comments; Prematurity of DEIS

The DEIS fails to achieve its stated purposes and suffers from additional defects, procedural as well as substantive, detailed below, which violate various standards and requirements in the National Environmental Policy Act ("NEPA")[2] and the CCR Rule,[3] at least—and potentially other laws/regulations as well (*e.g.*, the Resource Conservation and Recovery Act ("RCRA")[4] and/or the Clean Water Act,[5] *inter alia*). Not only are TVA's analytical shortcomings legally problematic; they also pose potential hazards to human health and the environment, if finalized as currently proposed. TVA should therefore refrain from implementing the DEIS, and should reconsider alternatives after it has properly addressed the flaws discussed herein.

It should be noted that TVA completed the DEIS even though the current Special Waste Landfill (alternatively referred to as the "SWL" or the "Consolidated Waste Dry Stack") has enough capacity to last for another 10 years (until 2027), and the proposed new landfill would not be needed until that time. DEIS at 1. As such, in addition to its other flaws noted below, the DEIS is premature at this point. This lack of urgency further counsels towards TVA not moving ahead with finalizing the problematic proposals in the DEIS.

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[1] TVA DEIS, Shawnee Fossil Plant Coal Combustion Residual Management, *available at* https://www.tva.gov/file_source/TVA/Site%20Content/Environment/Environmental%20Stewardship/Environmental%20Reviews/Shawnee%20Coal%20Combustion%20Residual/SHF_CCR_EIS_DRAFT_060717.pdf (last accessed July 26, 2017).

[2] 42 U.S.C. § 4321 *et seq.*; *see* 40 C.F.R. pts. 1500-1508.

[3] *Disposal of Coal Combustion Residuals from Electric Utilities*, 80 Fed. Reg. 21,301 (Apr. 17, 2015) (final rule); *see* 40 C.F.R. pts. 257 & 261.

[4] 42 U.S.C. § 6901 *et seq.*

[5] 33 U.S.C. § 1251 *et seq.*

2. **Failure to Eliminate Ash Contact with Groundwater, and Leaching of Contaminants**

First among the several significant defects in the DEIS, TVA's plan to "eliminate all wet storage" of CCRs through closure of Ash Impoundment 2 and the SWL would not eliminate the ash's contact with groundwater, nor would it eliminate continued leaching of hazardous contaminants from those disposal areas. This renders TVA's proposal unlawful under both applicable substantive legal requirements pertaining to CCR, and NEPA's mandate for reasoned decision-making based on a record of fulsome, accurate analysis.

TVA identified only two current or former disposal areas as subject to the U.S. Environmental Protection Agency's ("EPA") CCR Rule and as a focus of consideration in the DEIS: namely (1) Ash Impoundment 2, and the (2) Special Waste Landfill (alternatively referred to as the "SWL" or the "Consolidated Waste Dry Stack"). Crucially, however, *there are in fact other former disposal areas that were not explicitly discussed in the DEIS and that TVA's proposed plan fails to consider*, as the CCR Rule and NEPA, at least, require.

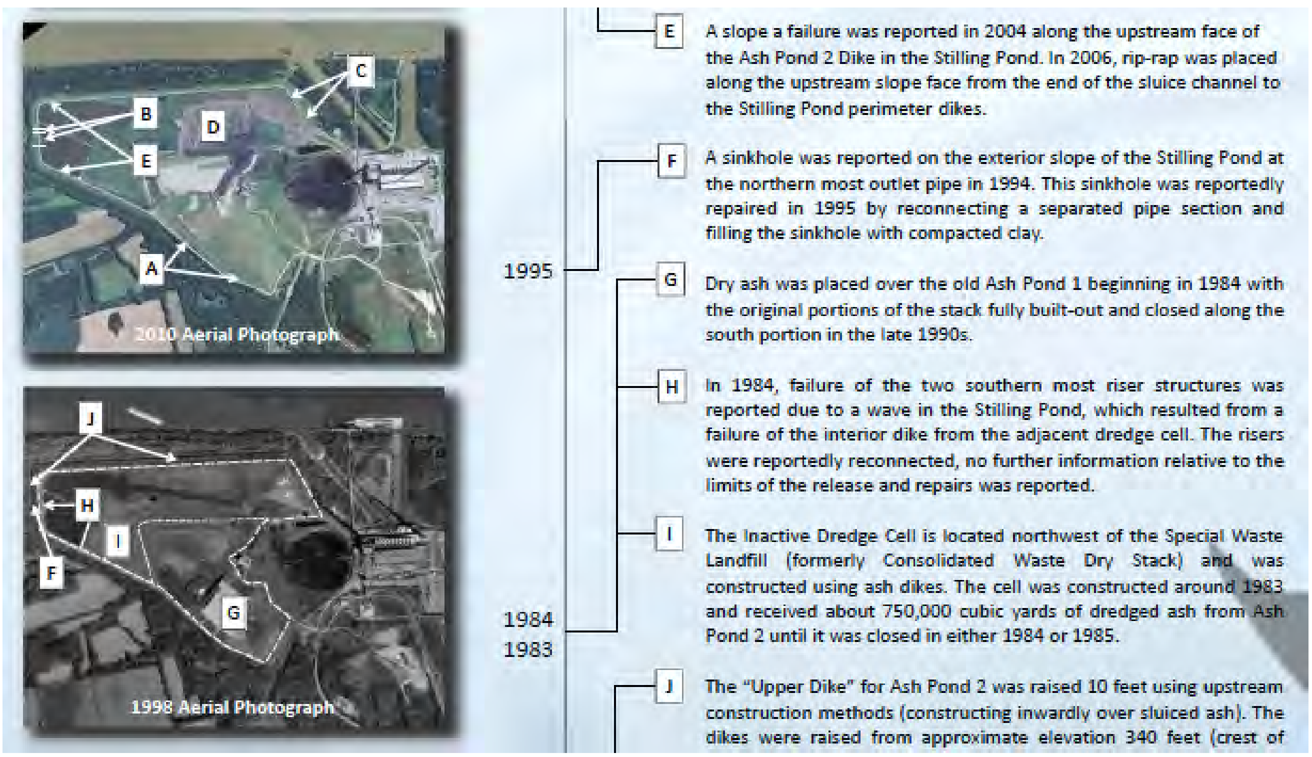
Ash Impoundment 2, the SWL, and these other disposal areas are illustrated below in Graphic 1:

a. Graphic 1: Photographic depiction of the Shawnee site

TVA explains that it "deemed it appropriate to tier closure of the SWL from" TVA's 2016 Ash Impoundment Closure Final Environmental Impact Statement Part I Programmatic Review, or "PEIS," due to the SWL's "location with respect to Ash Impoundment 2 and the former footprint of Ash Impoundment 1." DEIS at 26. TVA is correct in its determination of similarities to Ash Impoundment 2 because the SWL is in fact an "inactive surface impoundment" according to the CCR Rule, as discussed below.

The SWL was built over the original surface impoundment, namely Ash Impoundment 1, at the Shawnee site. TVA sluiced ash to that impoundment from 1956 to 1970. *See* Stantec 2016a, at Appendix B.[6] Although the disposal area has a solid waste permit with the Kentucky Division of Waste Management ("KDWM"), the bottom portion of the landfill and the dikes that formed the base of the landfill are the original dikes of the surface impoundment. Ash Impoundment 1 and a portion its construction history are illustrated in Graphic 2 (*see* Stantec 2016a, at Appendix B):

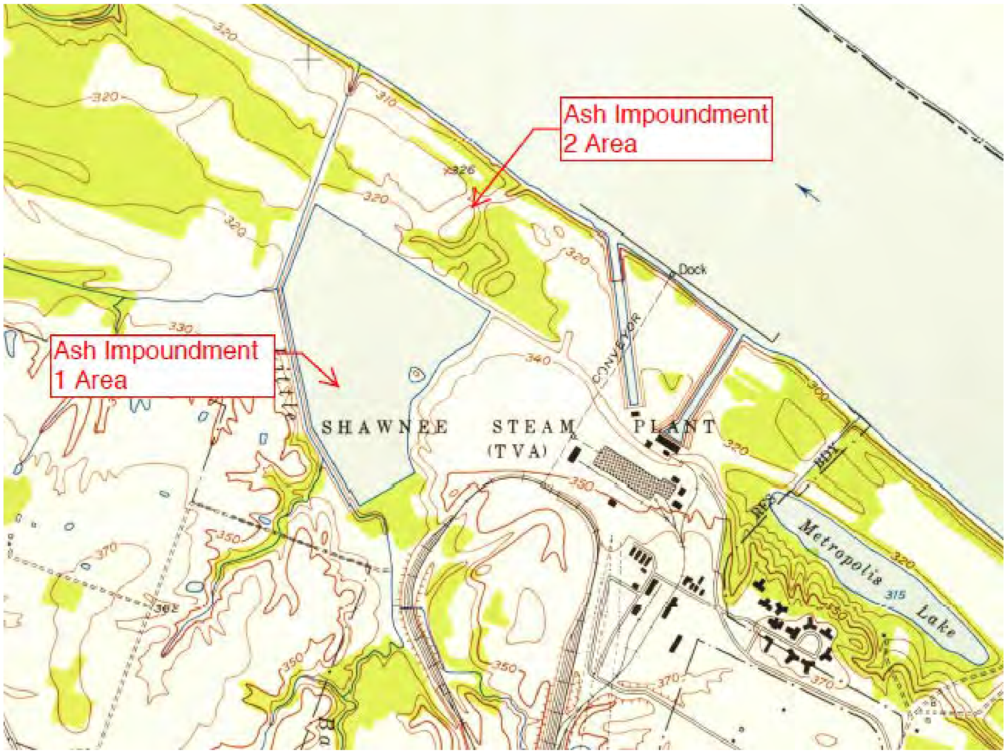
b. Graphic 2: Ash Impoundment 1 and selected construction history



A review of the oldest available topographic map prepared by the U.S. Geological Survey ("USGS") demonstrates that TVA relocated the original channel of Little Bayou Creek to construct Ash Impoundment 1 and place fill into the old stream channel. *See* USGS 1954. The map further illustrates that the original ground topography beneath Ash Impoundment 2 ranged from 310 to 320 feet above mean sea level ("MSL"), as shown below in Graphic 3 (*see* USGS 1954):

[6] The fuller citations for technical sources noted herein are provided in the References pages, *infra* Section 11. As noted below, each source has been collected and made available for download at the following publically-accessible Box site (it would be impracticable to attach them all hereto, given the file sizes): https://app.box.com/s/rz005s7adftddh5ghugvzlmznlemdsti.

c. Graphic 3: Locations and topography of SWL (Ash Impoundment 1) and Ash Impoundment 2



TVA began sluicing both fly ash and bottom ash to Ash Impoundment 2 in 1971. *See* Stantec 2016b at Appendix B. And as Stantec, an environmental consulting firm, has confirmed on behalf of TVA, that Ash Impoundment 2 was constructed *without a liner* that complies with the CCR Rule. *See* Stantec 2016c, at 1. Nevertheless, TVA continues to sluice ash into the impoundment, and has also constructed an expansion of the SWL over that (unlined) impoundment.

To the same end, given that TVA constructed Ash Impoundment 1 before constructing Impoundment 2, one can assume that Ash Impoundment 1 was also constructed without a liner.

The 2007 horizontal expansion of SWL—which, again, was constructed over what was originally Ash Impoundment 1—over Ash Impoundment 2 continues to current day. The horizontal expansion over the surface impoundment likely does not meet the current CCR Rule technical requirements for a new lateral expansion of a surface impound or landfill.[7]

Groundwater and leachate continue to seep from Ash Impoundment 2 onto the ground surface adjacent to the dikes. TVA stated that seepage along the southeast dike of that impoundment occurred for "nearly 20 years" and that the "repair" consisted of covering the wet discharges with a "graded filter." *See* Stantec 2016a, at Appendix B. However, that "filter" does not eliminate or prevent continued seepage of leachate onto the ground surface. The seepage area is not an area that contains standing water in the impoundment. Therefore, the seepage is originating from saturated CCRs *below the ground surface*.

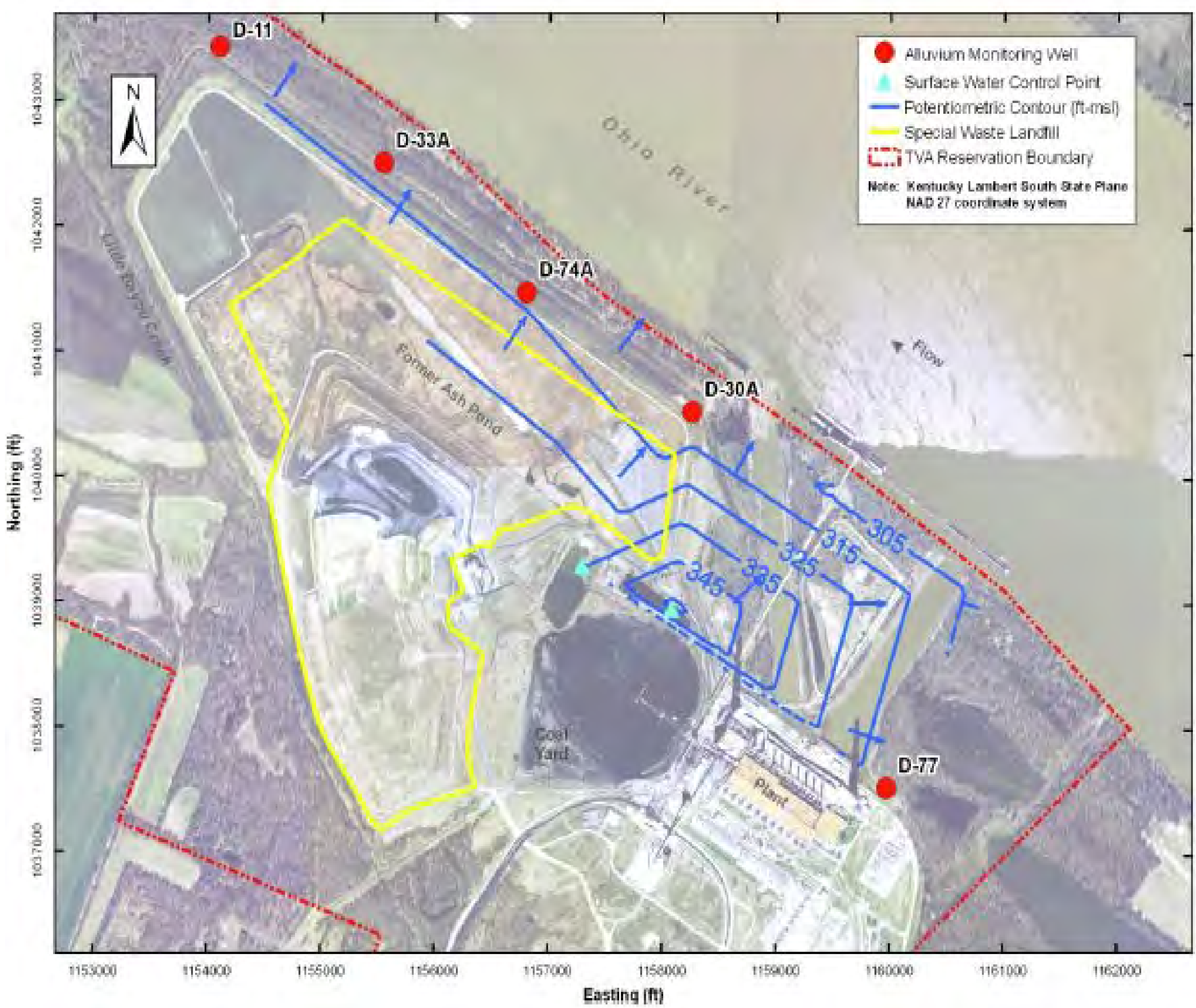
[7] *See also infra* Section 5.

TVA has known since at least 1982 that ash in the impoundments is likely in contact with groundwater. *See* TVA 1982, at 61. TVA concluded that "water-table elevations are probably within the ash disposal ponds much of the year" and that "the elevation of the water table is related directly to the amount of groundwater in storage which varies with the stage of the river." *Id.*

TVA's investigation in 1989 demonstrated that groundwater beneath Ash Impoundment 1 (now called the "Special Waste Landfill" by TVA) was "mounded" and that "groundwater is in contact with the fly ash in the inactive pond"—even though waste disposal ended 19 years earlier in 1970. *See* TVA 1989, at 14 and 26.

Groundwater monitoring in 2010 illustrates the *continued* "mounding" effect (up to 345 ft. MSL) on the shallow alluvial aquifer, despite the fact that the disposal operations over Ash Impoundment 2 and in the SWL are "dry," as illustrated in Graphic 4 (*see* TVA 2010):

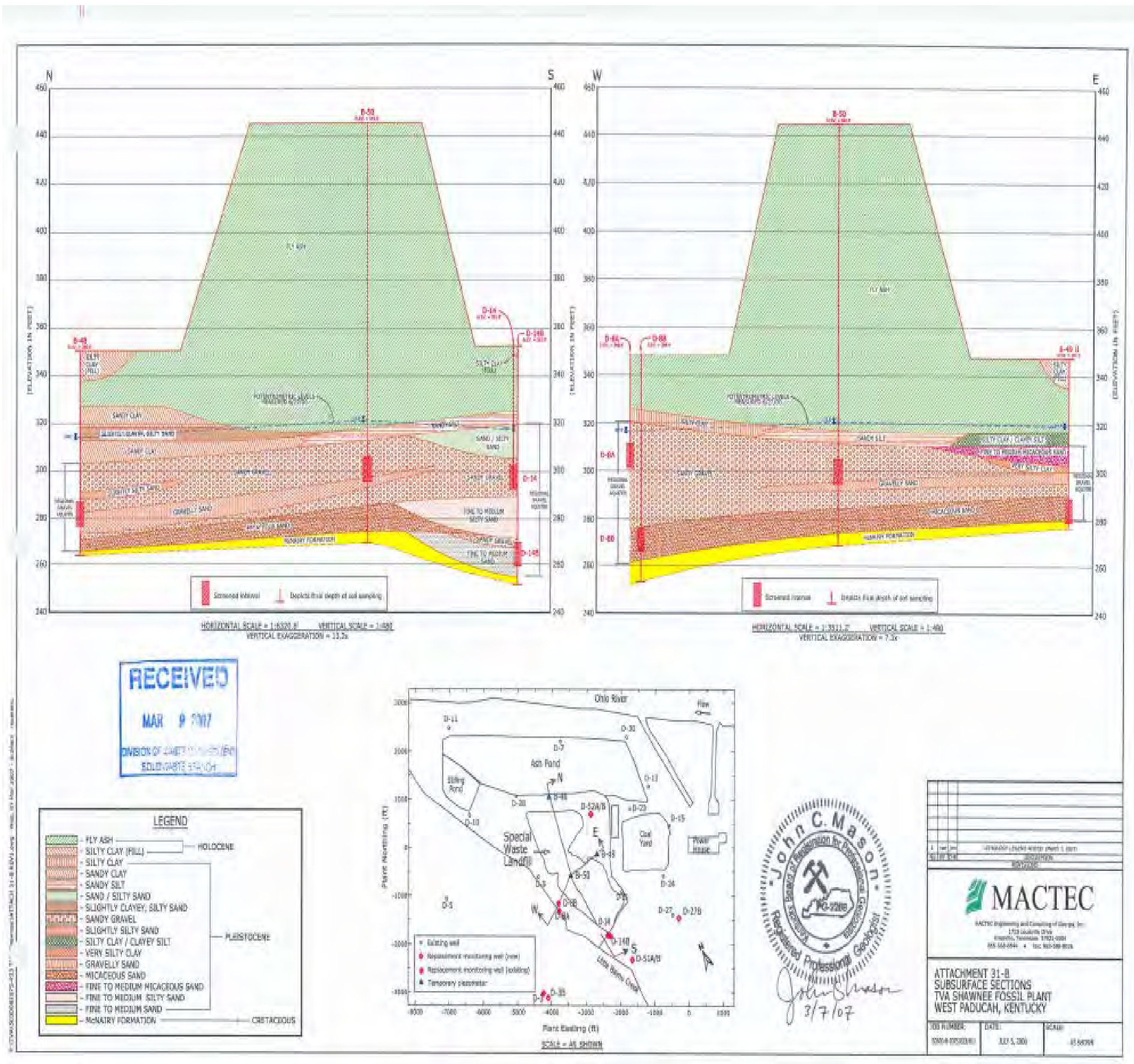
d. Graphic 4: Mounding effect on alluvial aquifer



TVA's 1989 investigation for Ash Impoundment 2 concluded that "data in the wells near the ash pond suggest that saturation (down to the regional aquifer) is likely." TVA 1989, at 27.

To obtain approximate original ground topographic elevations beneath Ash Impoundment 1, I reviewed boring logs and cross-sections reported by Mactec. *See* Mactec 2007, at 138 and 147 (by PDF pagination). That data, based on use of a boring (B-50) drilled into the center of the SWL and others through the perimeter dikes, demonstrated that TVA sluiced wastes onto the original ground elevation (estimated to be 316 ft. MSL in the illustration below), and that groundwater (based upon 2000 measurements) saturates the wastes, as illustrated below in Graphic 5. As such, groundwater remained in contact with the wastes 30 years after TVA terminated wet sluice operations in that impoundment.

e. Graphic 5: Cross-sections showing groundwater saturation of sluiced wastes



More recent 2016 piezometer results from the SWL and Ash Impoundment 2 areas drilled through the perimeter dikes demonstrated that:

- Ash within the SWL likely remains saturated because the water elevations ranged from 319 feet to 335.3 feet MSL—compared, as an example, to the approximate 316 feet MSL original ground surface discussed above.
- Ash within Ash Impoundment 2 also likely remains saturated—even in areas with no standing water at the ground surface—because groundwater elevations ranged from 315.5 feet to 344.2 feet MSL - compared to the estimated original ground surface elevations ranging from 310 feet to 320 feet MSL.

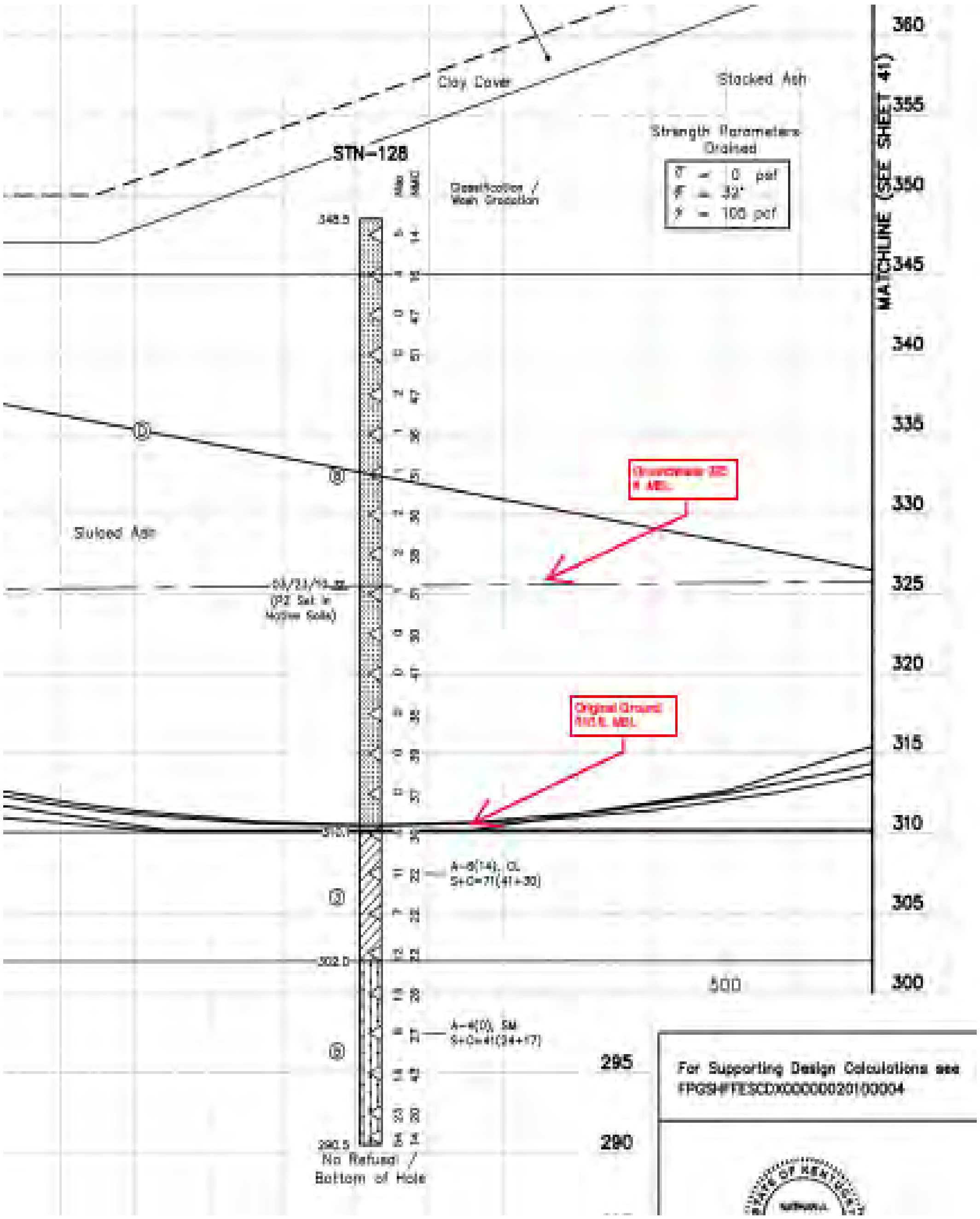
See Triad 2016, Figure 10W313-01 and Table SHF Instrumentation Data, at 18 and 19 (PDF pagination).

The groundwater elevations reported by Triad in 2016 are consistent with Stantec's findings 6 years earlier, in 2010, when the latter firm conducted a geotechnical drilling study of perimeter dikes and into the ash (only one boring into the ash). *See* Stantec 2016a, at 40 (PDF pagination) (incorporating 2010 findings). Notably, TVA relied upon Stantec's work in documenting the construction of Ash Impoundment 2, linking to the study to provide the "History of Construction" for Ash Pond 2 (*i.e.*, Ash Impoundment 2) on its Shawnee CCR website.[8] Stantec demonstrated that:

- Groundwater is in substantial contact (at least 15 feet) with the CCRs in Ash Impoundment 2; and
- Ash was placed onto the original ground in that area to at least 310 feet MSL, as illustrated below in Graphic 6. *See* Stantec 2016a, at 40 (PDF pagination).

[8] The 2016 Stantec study *History of Construction* is linked to from TVA's Shawnee Coal Combustion Residuals website, from the link Surface Impoundment - Ash Pond 2 > Design Criteria > History of Construction. *See* https://www.tva.gov/Environment/Environmental-Stewardship/Coal-Combustion-Residuals/Shawnee (main page, linking to study); *see also* https://ccr.tva.gov/Plants/SHF/Surface%20Impoundment%20-%20Ash%20Pond%202%20(Main%20Ash%20Pond%20and%20Stilling%20Pond)/Design%20Criteria/History%20of%20Construction/257-73(c)_History%20of%20Construction_SHF_Ash%20Pond%202%20 (Main%20Ash%20Pond%20and%20Stilling%20Pond).pdf (the study link).

f. Graphic 6: Groundwater contact with CCRs in Ash Impoundment 2



Given my analysis of the information above—information prepared at the behest of TVA, which TVA used to support Closure-in-Place—the data indicate the **strong likelihood that CCRs in both the SWL and Ash Impoundment 2 remain saturated and in contact with the uppermost aquifer**.

The foregoing analysis further shows that the bottom portion of the SWL (*i.e.*, Ash Impoundment 1) is an "inactive CCR surface impoundment" within the meaning of the CCR Rule because the impoundment *still contains both solid CCRs and liquids*. 40 C.F.R § 257.53 ("Inactive CCR surface impoundment means a CCR surface impoundment that no longer receives CCR on or after October 19, 2015 and still contains both CCR and liquids on or after October 19, 2015."). As such, the bottom portion of the SWL (Ash Impoundment 1) is subject to the significant applicable requirements as a "surface impoundment" under the CCR Rule, *see, e.g. id.* §§ 257.50(b)-(c); *id.* § 257.100(a) ("Inactive CCR surface impoundments are subject to all of the requirements of this subpart applicable to existing CCR surface impoundments."); *id.* § 257.100(e). **The DEIS fails to take that status and its important attendant obligations into account, however.**

3. **<u>Failure to Address Discharge of Contamination into Groundwater and Surface Waters</u>**

TVA's own monitoring of groundwater and surface water demonstrates widespread contamination, and that contamination discharges into the receiving streams. However, TVA's plan for closure and construction of new disposal units would not prevent that discharge of contamination from occurring in the future, nor would existing permit conditions be able to quantify or mitigate the potential long-term adverse effects.

Groundwater sampling beginning in 1985 of the first three monitoring wells demonstrated that the disposal operations had already contaminated groundwater in 2 wells (wells 8 and 9) located along Little Bayou Creek. *See* TVA 1987, at 7. That contamination included arsenic, iron, lead, manganese, pH, selenium, sulfate, and total dissolved solids. Concentrations for arsenic, selenium, and lead had exceeded the Maximum Contaminant Level ("MCL"). For example, the mean concentrations of arsenic in those three wells from 1985 to 1987, met or substantially exceeded EPA's Maximum Contaminant Level of 10 parts per billion ("ppb"): Wells 7, 8 and 9 were at 75, 100, and 10 ppb. *See id.*; *see also National Primary Drinking Water Regulations; Arsenic and Clarifications to Compliance and New Source Contaminants Monitoring*, 66 Fed. Reg. 6,975, 6,981 (Jan. 22, 2001).

According to a TVA, as early as 1987, groundwater mounding beneath the ash impoundment area causes groundwater to flow towards and into Little Bayou Creek *and* the Ohio River. *See* TVA 1987, at 3. TVA determined that the soil within the wells with contaminated groundwater was very porous, concluding that "no soil layer that would restrict or slow migration of leachate into the groundwater" exists because the ground surface beneath the wastes was underlain in some places with sand, pebbles, and gravel. *Id.* at 8.

TVA continued to conclude two years later in 1989 that the contaminated groundwater discharges into Little Bayou Creek – concluding "data collected so far indicate that the ash pond disposal areas are affecting the creek." *See* TVA 1989, at 238, 261 (PDF pagination).

Little Bayou Creek is afforded protection as a stream in the Commonwealth of Kentucky. In fact, it is currently listed as an impaired waterway according to the Kentucky Division of Water and has an established Total Maximum Daily Load ("TMDL") for polychlorinated biphenyls ("PCBs") due to upstream activities at the Paducah Gaseous Diffusion Plant. *See* KDW 2001.

Groundwater monitoring as recent as November 2016 (reported in January 2017) for the SWL and Ash Impoundment 2 indicated continued groundwater contamination due to leachate migration from unlined disposal units. *See* TVA 2017, at 11 and 12 (PDF pagination). TVA concluded that "statistical findings indicate the likelihood of coal-combustion by-product effects on groundwater beneath and downgradient of the Special Waste Landfill." *Id.* TVA concluded that three water-bearing units from shallow to deep were affected:

1. the alluvial soil aquifer;
2. the Upper Continental Deposits aquifer; and
3. the Regional Gravel Aquifer.

Id.

Nevertheless, TVA apparently did not evaluate the results of any wells associated with Ash Impoundment 2. That failure to evaluate was unreasonable.

The reported statistical exceedences for the SWL area were as follows:

1. Alluvial Aquifer – boron, molybdenum, and pH.
2. Upper Continental Deposits Aquifer – boron, calcium, total organic carbon, iron, magnesium, manganese, potassium, specific conductance, strontium, sulfate, and total dissolved solids.
3. Regional Gravel Aquifer – alkalinity, boron, calcium, cobalt, chemical oxygen demand, fluoride, magnesium, manganese, nickel, pH, potassium, specific conductance, strontium, sulfate, and total dissolved solids.

See TVA 2017, at 11 and 12 (PDF pagination).

My review of the tabulated groundwater results from the November 2016 sampling yielded the following general observations:

- Concentrations of some constituents in wells along the Ohio River increased with depth. For example, boron concentrations in wells for Ash Impoundment 2 increased from 2.33 ppm in well D-74A (alluvium well) to 3.99 ppm in a deeper, adjacent cluster well D-74B (Regional Gravel Aquifer).
- Concentrations of some constituents in some wells along Little Bayou Creek decreased with depth. For example, boron from cluster wells D-75A (Upper Continental Deposit) and D-75B (Regional Gravel Aquifer) decreased from 8.16 ppm to 5.46 ppm. Sulfate concentrations also decreased from 780 ppm to 386 ppm.
- Sulfate concentrations routinely exceeded the EPA Secondary Maximum Contaminant Level ("SMCL") for sulfate (250 ppm), manganese (0.05 ppm), and iron (0.3 ppm), as examples. As examples, sulfate concentrations in these wells: D75A (780 ppm) and D75B (386 ppm).
- Boron routinely exceeded state-based health advisory concentrations (ranging from 0.6 to 1 ppm). *See* EPA 2008 at 37. As examples, boron concentrations in these wells: D11B (1.65 ppm), D33A (2.21 ppm), D74A (2.33 ppm), D74B (3.99 ppm), D65A (8.16 ppm), and D75B (5.46 ppm).[9]

Consistent with TVA's conclusion 30 years earlier, in 1987, TVA determined in 2017 that surface water collected from Little Bayou Creek downstream from the SWL, the Dredge Cell, and the Stilling Pond continues to be affected by leakage from the adjacent disposal units and groundwater discharge into the creek. TVA concluded that "upstream-downstream data comparisons for the LBC (Little Bayou Creek) result in higher concentrations of boron, calcium, and sulfate at SW-D (downstream) than at upstream station SW-C." TVA 2017 at 40 (PDF pagination). TVA also reported higher downstream results in the Ohio River for sulfate as compared to an upstream location—thereby

[9] Notably, several of these constituents at issue, including boron, pH, sulfate, and total dissolved solids ("TDS"), are defined by EPA as indicators of CCR contamination. *See Hazardous and Solid Waste Management System*, *Disposal of Coal Combustion Residuals from Electric Utilities*, Final Rule, 80 Fed. Reg. 21,302, 21,397 (Apr. 17, 2015) ("The parameters EPA proposed to be used as indicators of groundwater contamination were the following... ."); *id.* at 21,403 (finalizing the proposed list of indicators after removing conductivity and sulfide from the list); *see also* 40 C.F.R. pt. 257 App'x III (final list of indicators used for detection monitoring).

indicating groundwater discharges also affect the Ohio River along Ash Impoundment 2, notwithstanding the river's significant flow. *See id.*

TVA stated in the DEIS that its proposed new landfill (Option 1, reference to as the "Shawnee East Site") will be designed with a leachate collection system and that leachate will be "sent to the onsite processing impoundment where it would be conveyed to the Ohio River through a Kentucky Pollutant Discharge Elimination System ("KPDES") permitted outfall." DEIS at 21. However, TVA:

- failed to explain which impoundment will receive that leachate;
- failed to explain whether that unit is or will be lined to protect groundwater quality; and
- failed to explain how that impoundment will "process" that leachate to be protective of receiving streams and groundwater.

The DEIS states that all future discharges to local surface waters will be protective because the discharges will be in accordance with the existing KPDES permit and in compliance with Water Quality Standards. *See* DEIS at 81-83. Yet that claim is misleading, because the Shawnee permit *does not include any numeric limitations for any metal, nor does it include all constituents* (e.g., boron, sulfate) that are known to be in the groundwater due to leakage from the unlined surface impoundments. Absent such numeric limits along with an understanding of the assimilative capacity, the fish and aquatic life, and the benthic invertebrate conditions in the receiving streams, **TVA cannot confidently claim that current and future discharges will be protective of human health and the environment.**[10]

TVA stated in the DEIS that closure of the SWL and Ash Impoundment 2 and the construction of the proposed Shawnee East Site landfill will change the water quality that is discharged into streams—yet TVA has offered no definitive plans on how it plans to treat the wastewater. TVA referred to a pair of studies that TVA performed to "inform the process," *see id.* at 83, but it failed to include the results of those studies in order to propose a plan for leachate and stormwater treatment prior to discharging into receiving streams. Therefore, TVA cannot claim that its future discharges will be protective of human health and the fish / aquatic life of the receiving streams.

Further, TVA concluded that "no direct impacts to aquatic ecosystems of the Ohio River or Little Bayou Creek would occur in conjunction with construction of the proposed Shawnee East Site landfill or closure of the SWL and Ash Impoundment 2. *Id.* at 103. That claim is baseless, because TVA has not collected any aquatic information from Little Bayou Creek, the Ohio River in the area of the Shawnee Plant, the unnamed tributary into which runoff from Shawnee East Site landfill will be discharged, or ponds and wetlands located on Shawnee East Site. *See id.* at 100-101. TVA should have performed an aquatic survey of all of those water-bodies and presented the results in the DEIS.

TVA stated in the DEIS that water generated from a proposed new bottom ash dewatering facility could either be discharged into a receiving stream or be "recirculated back into the system." *Id.* at

[10] Worth of note here, non-exhaustively, the Clean Water Act authorizes citizen suits based on violations of effluent standards or limitations, *see* 33 U.S.C. § 1365(a)(1), and RCRA authorizes citizen suits based on violations of solid waste standards, or on endangerment to health or the environment, 42 U.S.C. § 6972(a)(1).

175. TVA should have included that analysis in the DEIS and that analysis should have included recirculation of all wastewaters to result in *zero discharges* to receiving streams.

In summary, TVA has not yet quantified in the DEIS how either the proposed Closure-in-Place alternative for the SWL or Ash Impoundment 2 or the construction of the proposed Shawnee East Site landfill will affect baseline surface water and groundwater conditions, or how those closures will improve groundwater and surface water quality. Moreover, TVA acknowledged that Closure-in-Place is less protective of groundwater when compared to Closure-by-Removal, and that it is uncertain that Closure-in-Place with a cap over the wastes will even improve groundwater quality when ash is in contact with groundwater. *See* TVA 2016, Appendix A at 29. Given the proximity of the SWL and Impoundment 2 to rivers and streams and the ineffectiveness of a cap upon closure to prevent saturated wastes from continuing to contaminate groundwater that flows into streams, **one can expect contaminated groundwater to flow into receiving surface waters for the foreseeable future**.

4. **Failure to Satisfy Applicable Closure Performance Standards**

TVA's plan for Closure-in-Place of the Special Waste Landfill and Ash Impoundment 2 would not satisfy the closure performance standards for surface impoundments required by the CCR Rule.

TVA's Preferred Alternative for closure of the SWL and Ash Impoundment 2 is a combination of the following:

- Constructing a horizontal expansion of the SWL (in addition to the one that already occurred in 2007) over the unlined portion of Ash Impoundment 2.
- Removing "visible ash" from an unspecified "northwest corner of Ash Impoundment 2."
  - Notably, TVA failed to define what "visible" means, how deep the ash will be excavated, or how many cubic yards will be excavated.
- Placing the excavated ash from that northwest corner into the SWL horizontal expansion over the unlined Ash Impoundment 2.
- Capping that horizontal expansion area of the SWL in the future.
- Constructing a new perimeter dike in an undisclosed area "along the northern boundary of the SWL."
- Removing the remaining Ash Impoundment 2 dikes and "support structures" along the northern boundary.
- Constructing a new Equalization Basin to receive "wet ash."

DEIS at 38.

TVA has still not provided essential groundwater information that is needed to justify its selection of the Closure-in-Place alternative. Indeed, TVA selected the Closure-in-Place alternative without providing the following basic, important information necessary to support such a method:

1. Depth to groundwater within the CCRs;
2. Depth of CCRs relative to the three hydraulically connected uppermost aquifers already identified by TVA;
3. The amount of groundwater mounding that is currently present and how much the proposed cap will actually reduce that mounding effect;
4. The quantity of leachate that is currently seeping downward and into groundwater and how much the proposed cap will reduce or eliminate that leakage to groundwater;
5. How much groundwater flows laterally from up-gradient areas and into the CCRs in order to prevent all contact of groundwater with wastes;
6. How leachate and groundwater flows into and interacts with the receiving stream;
7. Soil permeability and hydraulic conductivity conditions beneath the wastes to estimate how fast leachate seeps vertically and horizontally; and
8. The horizontal groundwater flow velocities in the Alluvial Aquifer, the Upper Continental Deposits Aquifer, and the Regional Gravel Aquifers, as defined by TVA as being present.

TVA's Preferred Alternative for Closure-in-Place of the SWL and Ash Impoundment 2 allows for continued discharge of contaminated groundwater, leachate, and surface water runoff into Little Bayou Creek and the Ohio River because CCRs will remain in contact with groundwater. As a result of the continued "wet" CCR waste conditions, **one can expect vertical and horizontal seepage of contaminated groundwater and leachate to continue to flow into deeper portions of the underlying aquifer(s), into Little Bayou Creek, and into the Ohio River**.

TVA's plan for Closure-in-Place of the SWL and Impoundment 2 does not include *complete removal of all water* in the impoundments—including both standing water in the surface impoundments *and* the saturated pore water deeper in the wastes. Instead, TVA only plans to "decant" or remove the water *standing in open areas* of surface impoundments. *See, e.g.*, DEIS at 3, 37.

TVA's plan of only removing standing water on top of the CCR and not removing *all* liquids from within the saturated ash will not remove the mounding of subsurface liquid in the CCR. That mounding creates a higher-than-normal hydraulic gradient (*i.e.*, the slope of the groundwater) that will continue to form leachate that can more rapidly infiltrate into the groundwater—even after construction of cap during Closure-in-Place.

By contrast, as EPA has explained, the law requires otherwise:

> In order to close a unit with waste in place, the facility must meet *all of the performance standards* in § 257.102(d). If the facility is unable to meet the performance standards for closure with waste in place for a particular unit, *it must clean close the unit*.

EPA 2017 (emphases added); *see* 40 C.F.R. § 257.102.

"Clean close" means Closure-by-Removal, which involves excavating the wastes and re-disposing that waste into a lined landfill. If the wastes are submerged in groundwater or otherwise remain "wet" by a proposed Closure-in-Place method, that closure alternative will *not* meet the CCR Rule requirement for complete dewatering. EPA 2017. EPA has provided the following clarification of that requirement:

> Whether any particular unit or facility can meet the performance standards for closure with waste in place is a site-specific determination that will depend on a number of factual and engineering considerations, such as the hydrogeology of the site, the engineering of the unit, and the kinds of engineering measures available. For example, if a small corner of a unit is submerged in the underlying aquifer, a facility might be able to meet the performance standard for closure with waste in place for the majority of the unit, by "clean closing" the submerged portion of the unit, and installing the necessary engineering measures to ensure that the rest of the unit meets the performance standards in § 257.102(d).

Id.

Construction of a cap during Closure-in-Place will not prevent lateral inflow of groundwater into the CCRs from hydraulically up-gradient areas where such wastes are placed within and below the top of the groundwater. The lateral inflow groundwater that flows through the CCRs will continue to form more leachate and contaminate groundwater that flows into Little Bayou Creek and the Ohio River.

In order for a closure plan to be compliant with EPA's closure performance standard for leaving CCRs in-place, the plan must meet the following performance standards related to leachate control and groundwater protection, among other listed obligations:

> (d) Closure performance standard when leaving CCR in place—
>
> (1) The owner or operator of a CCR unit must ensure that, at a minimum, the CCR unit is closed in a manner that will:
>
> (i) *Control, minimize, or eliminate to the maximum extent feasible*, post-closure infiltration of liquids into the waste and releases of CCR, leachate, or contaminated run-off to the ground or surface waters or to the atmosphere;
>
> (ii) *Preclude the probability* of future impoundment of water, sediment, or slurry;
>
> […]

40 C.F.R. § 257.102(d) (emphases added)

In light of the facts that TVA's own data indicate that CCRs are submerged in groundwater, and that water remains impounded in both the SWL and Ash Impoundment 2, **TVA cannot meet the CCR Rule performance standards for Closure-in-Place. Accordingly, the DEIS's Preferred Alternative for Closure-in-Place would be unlawful—and potentially dangerous.**

5. **Failure to Demonstrate Satisfaction Location Restriction Requirements**

Nowhere has TVA shown that its plan to laterally expand the SWL over Ash Impoundment 2 would satisfy the location restriction requirements legally required by the CCR Rule.

TVA's plan to horizontally expand the existing SWL over Ash Impoundment 2 requires that TVA meet Location Restrictions specified in the CCR Rule because that would constitute a lateral expansion of an existing CCR unit. The DEIS fails to address, as it should, how TVA plans to meet these restrictions. These significant CCR Rule restrictions include, *inter alia*, the following:

1. Placement Above the Uppermost Aquifer, 40 C.F.R. § 257.60 – Requires 5-foot separation between the base of the landfill and the uppermost aquifer.
2. Wetlands, *id.* § 257.61 – Requires that no new landfill or a lateral expansion of an existing unit be located in wetlands unless specific arguments are made.
3. Fault Areas, *id.* § 257.62 – Requires that new landfills or a lateral expansion of an existing unit not be located within 60 meters of the outermost damage zone of a fault that has had displacement in Holocene time, unless the owner demonstrates an alternative setback distance will prevent damage to the structural integrity of the landfill.
4. Seismic Impact Zone, *id.* § 257.63 – Requires that new landfills and lateral expansions must not be located in seismic impact zones unless the owner demonstrates that the structural components will be designed to resist the maximum acceleration in lithified earth material.
5. Unstable Areas, *id.* § 257.64 – Requires that new landfills and lateral expansions must not be located in an unstable area unless recognized and accepted good engineering practices are incorporated into the design. Unstable areas can include wet, saturated or shallow groundwater soil conditions (as an example) that might result in differential settling due to disposal.

First, TVA claims that the Preferred Alternative of closing the SWL and Ash Impoundment 2 in-place and constructing a new CCR landfill will have "no impact on floodplains as all actions would occur outside of floodplains." DEIS at 89. That statement is misleadingly inaccurate, because TVA constructed the current Ash Impoundment 2 (and the proposed SWL expansion) within the 100-year floodplain—*i.e.*, the blue-colored area in Graphic 7, below, as provided by TVA. TVA intends to modify the northwest portion of that impoundment (also likely within the original floodplain) by removing existing dikes; building a new Equalization Basin (also within the likely original floodplain), and building another horizontal expansion over Ash Impoundment 2 (also within the likely original floodplain). As such, under the DEIS's proposal, **that work would be constructed within what likely used to be the 100-year floodplain**, as defined by TVA. *See id.* at 87.

a. Graphic 7: 100-year floodplain encompassing Ash Impoundment 2 and the SWL

Next, the DEIS reveals no on-site investigation performed by TVA to identify local faults beneath any disposal area. TVA concluded that "while there are quaternary faults located in the Metropolis, Illinois area across the Ohio River, none are currently known within the SHF boundaries or immediate vicinity (USGS 2014). Therefore, impacts associated with ground fault rupture would not be anticipated." DEIS at 67. TVA is required to *know* if the units are located in fault areas. *See* 40 C.F.R. § 257.63. Nonetheless, TVA failed to perform such analyses and include them in the DEIS; rather, TVA appears merely to have made untested—and potentially grave—assumptions to that end. TVA acknowledges in the DEIS the importance of locating faults and in the near vicinity because it concluded that "the best mitigation for potential fault ground rupture to structures is to accurately locate the fault and set back structures a safe distance from the fault," DEIS at 67—yet, again, it still failed to undertake and discuss those analyses. DEIS at 67.

My preliminary analysis of the Shawnee site using existing, publically available geologic information indicates, for one, that **the expansion area may not be suitable for the lateral expansion because of the likely presence of faults in that area and the presence of an active seismic zone**.

The Kentucky Geological Survey ("KGS") concluded in a study for the nearby Paducah Gaseous Diffusion Plant, located approximately 2 miles to the southwest of the Shawnee site, that these fault conditions exist (*see* KGS 1997, at 5-6):

a) Faults of young (Quaternary and Tertiary) rocks were confirmed across the Ohio River, in Illinois.

b) Those faults and associated lineaments are northeast trending towards the TVA Shawnee Plant, as shown below in Graphic 8 (*see* KGS 1997, at 5-6).

c) The faults extend from the surface to the Precambrian basement and possibly deeper.

d) The faults mapped at the Gaseous Diffusion Plant "are probably the surface manifestations of buried Fluorspar Area Complex faults." *Id.*

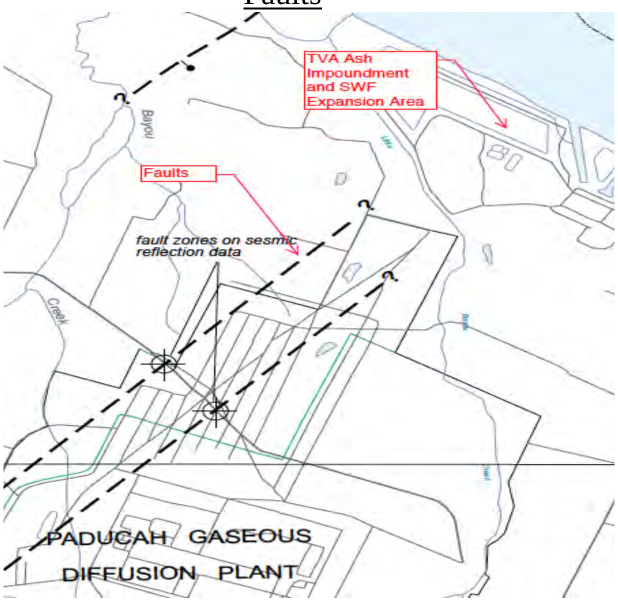
e) In all likelihood, the area around the Gaseous Diffusion Plant is "intensely faulted." *Id.*

f) The number of identified earthquake centers in the plant area indicates "active faults at depth near the plant." *Id.*

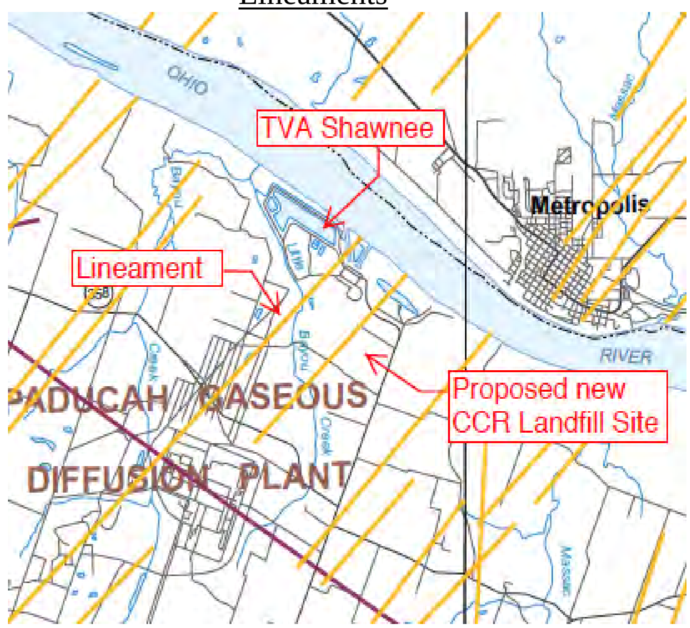
g) The northeast-trending faults are significant because they likely control the direction of groundwater flow and groundwater migration pathways.

b. Graphic 8: Fault lines and associated lineaments appearing below Shawnee

<u>Faults</u>



<u>Lineaments</u>



Given the likely presence of faults beneath the TVA Shawnee property, TVA should have performed its own site-specific investigation prior to developing the DEIS. Had TVA performed the simple analysis above based upon the foregoing publically available information, at the least, it would (and should) have determined that a more in-depth analysis was required for the DEIS. And needless to say, that information should have been included in the DEIS.

The analysis that I performed indicates that **faults and active seismic conditions likely exist at the property**. *See* 40 C.F.R. §§ 257.62, 257.63. As such, TVA's plan for Closure-in-Place and construction of the proposed Shawnee East Site landfill **may not meet the CCR Rule's location restriction performance standards—and may pose serious hazards.**

6. **Flaws in Alternatives Analysis with Evaluation Future "Dry" Landfill Sites**

TVA's preliminary alternatives analysis to evaluate future "dry" landfill disposal sites to accommodate Shawnee's waste generation plan was unreasonably brief; moreover, it resulted in the selection of land that was already purchased by TVA, that does not meet TVA's minimum designated acreage requirement, and that likely would not meet the CCR Rule site location standards.

TVA states that the current CCR waste generation rate is 183,000 cubic yards per year; the current SWL has enough capacity to last another 10 years (to 2027); and the proposed new landfill would provide capacity for another 20 to 25 years past that (to 2047 or 2052). *See* DEIS at 161. TVA estimated that the future waste generation rate will increase to 490,000 to 910,000 cubic yards to the year 2040. *See id.* at 22. That generation rate results in increases of 200 to 400% compared to the current generation rate. TVA's statement in the DEIS regarding the life of the newly proposed landfill is contradictory. TVA claimed that the life is both 20 and 25 years; it is unclear which is correct. *Compare id.* at 1 *with id.* at 20.

TVA apparently completed a detailed analysis in 2015 of potential land disposal options. The details of that analysis were reportedly described in a 2015 New Landfill Siting Study mentioned by TVA—yet that was not included in the DEIS. *See id.* at 9. Given the significance of that evaluation and the results needed to support TVA's Preferred Alternative, TVA should have included that detailed, complete 2015 analysis in the DEIS. That unreasonable omission, like others noted herein, unlawfully renders the public unable to meaningfully review TVA's decision-making and informedly judge the legal adequacy as well as the practical safety and wisdom of the DEIS's plan.

TVA performed a "Preliminary Alternatives" analysis as part of the DEIS. *See id.* That analysis included three sites that were primarily used for agriculture (*i.e.*, farming). The acreage of those sites ranged from 298 to 935 acres. Of those three sites, two sites (Options 2 and 3) were not even available for sale and were apparently selected based on proximity to the Shawnee Plant and acreage. TVA actually already owns the other option (Option 1). Although TVA also considered three existing, privately owned permitted landfills in the vicinity, TVA ultimately selected the TVA-owned Shawnee East site as the "most feasible location for a new CCR landfill." *Id.* at 18.

The total acreage of preferred Shawnee East Site landfill was 330 acres, of which TVA stated that an 88-acre footprint (*i.e.*, actual disposal area) would occupy the center of the site. *See id.* TVA has already begun to construct a "direct transportation route" haul road to the Shawnee East Site. *Id.* at 137, 139. That site is depicted below in Graphic 9 (*see id.* at 19):

a. Graphic 9: Shawnee East Site landfill

Only a portion of the 330 total acres of the Shawnee East landfill site can actually receive wastes because according to TVA, the remaining acreage would be used for perimeter buffer areas, roads, stormwater ponds, a leachate pond, a construction area, office buildings, and a soil borrow area, as illustrated above. DEIS at 20. TVA stated that the Shawnee East Site landfill would provide 8 million cubic yards of disposal capacity, which it equated to an expected 25-year life. *Id.*

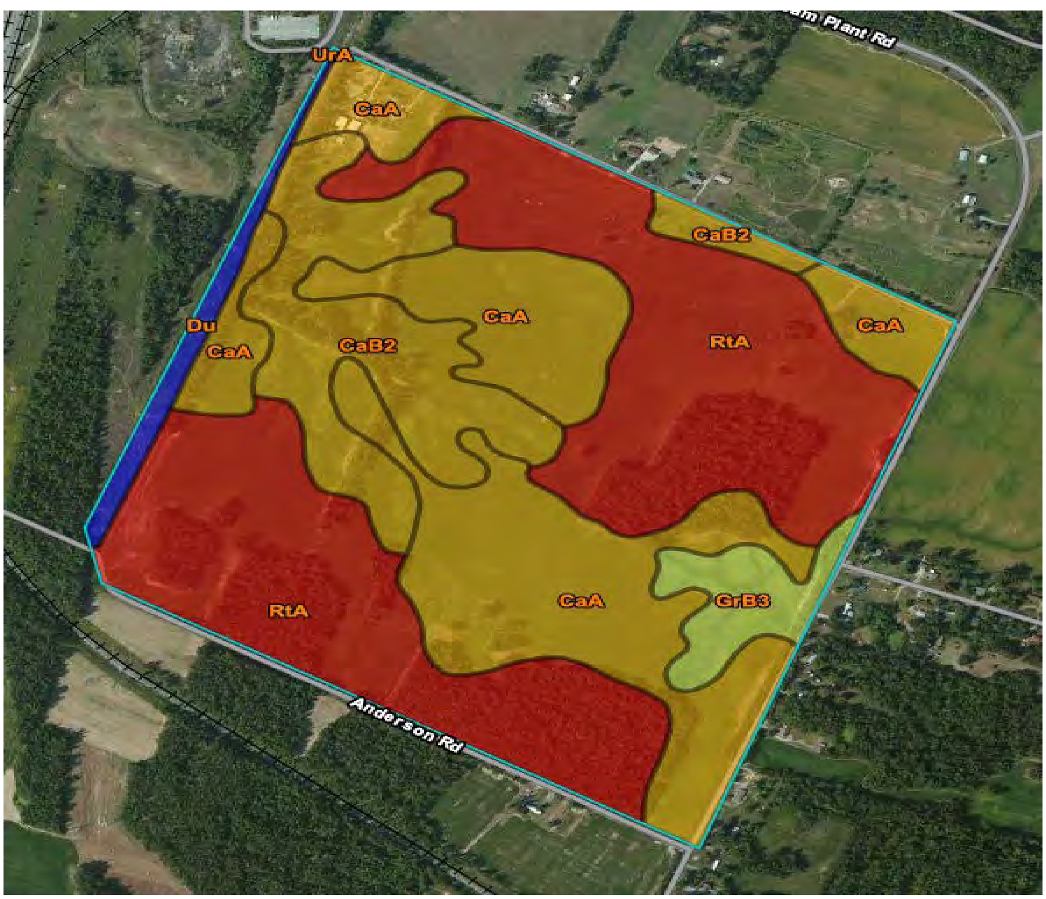
The Shawnee East Site does *not* however, meet TVA's stated minimum 140-acre footprint that TVA stated it needed for 8 million cubic yards capacity. *See id.* at 9. As such, TVA should have determined that the site was unsuitable because it did not meet its minimum requirement.

TVA's alternatives analysis for evaluating all disposal site overstated the costs of disposal—assuming that TVA would have instead considered in the DEIS waste reductions through beneficial reuse. Because the CCR could otherwise be substituted as a raw material in future commercial products for sale, the CCR wastes could have instead been considered a revenue source rather than an expense in the DEIS. Waste reductions would result in less required acreage for disposal, less transportation costs, etc. that would have reduced the overall costs of the alternatives.

TVA states that the Shawnee East Site would be designed to meet the CCR Rule siting and composite liner requirements. DEIS at 20-21. The CCR Rule requires that new landfills have a composite liner system that provides minimum 5 feet of separation between the base of the landfill and the uppermost aquifer. 40 C.F.R. § 257.60. TVA's plan to use the Shawnee East Site landfill as a "borrow area" to obtain soils to construct the cap over the SWL and Ash Impoundment 2 will remove the already existing thin layer of soil above the uppermost aquifer at that site. *See* DEIS at 37, 39. In other words, TVA plans to excavate soil that might otherwise provide the 5-foot buffer legally required by the CCR Rule. TVA relied upon the Soil Data Mapper created by the Natural Resources Conservation Service ("NRCS") to determine soil conditions at the proposed Shawnee East Site landfill site. DEIS at 59. I performed a similar analysis using the same Soil Data Mapper to evaluate if shallow groundwater conditions exist in the soil at that site. My analysis indicates that **the proposed site likely does not have adequate soil thickness to meet the required 5-foot separation between the base of the landfill and uppermost aquifer, as required in the CCR Rule, *even before excavating soils for use as borrow material, as proposed*.**

The NRCS reports very shallow groundwater in the soil at the proposed landfill site—in fact, the *deepest* groundwater at the site is reportedly *no more than 20 inches below ground surface*. NRCS 2017 at 3. Even worse, the area in red below illustrates soil conditions with a groundwater table—*i.e.*, the "uppermost aquifer"—approximately 6 inches below the ground surface. The groundwater table depth within the brown areas was only approximately 12 inches deep. As such, the Shawnee East Site likely cannot meet the CCR Rule requirement for separation from the uppermost aquifer. *See* 40 C.F.R. § 257.60.

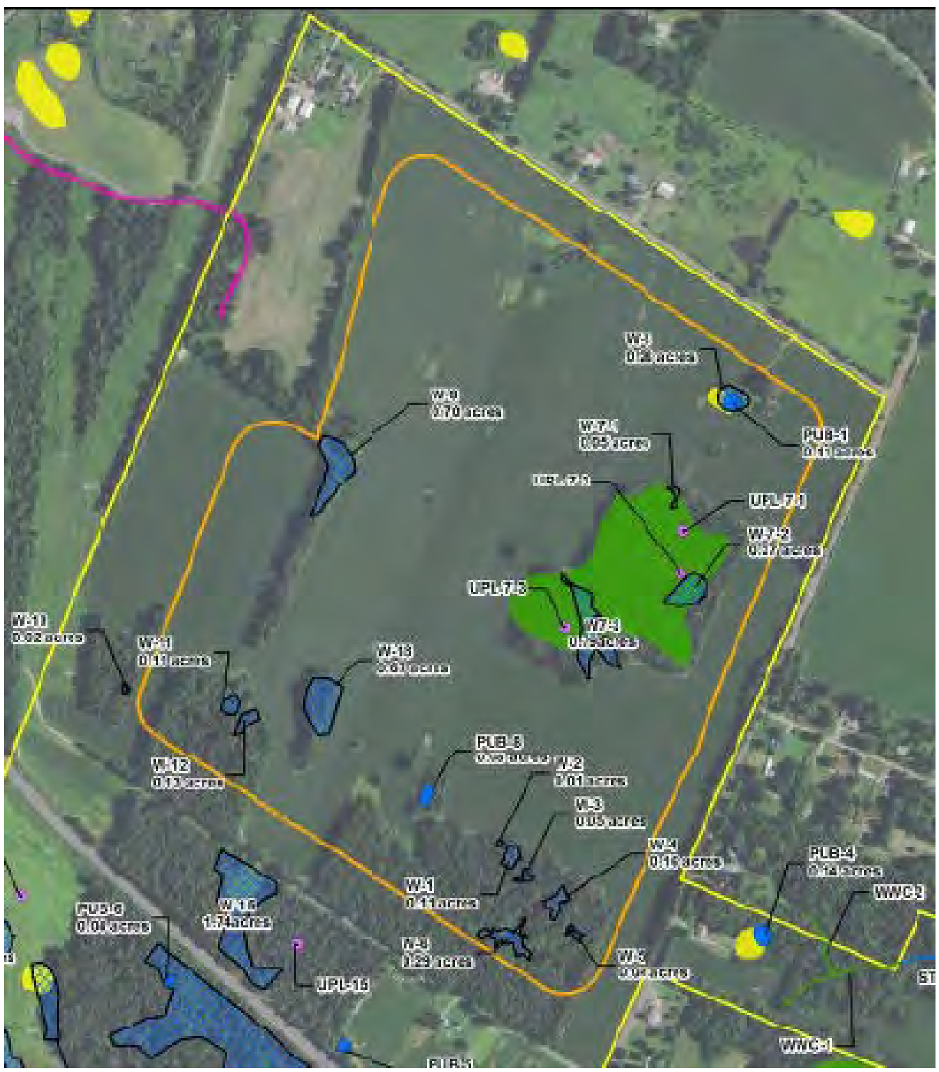
b. Graphic 10: Water table depth at the Shawnee East Site



TVA should have performed the simple aforementioned analysis prior to including the Shawnee East Site in its list of potential disposal site alternatives in the DEIS. TVA chose to use the same Soil Data Mapper to identify soil types that I used to generate the shallow groundwater conditions above, and yet TVA failed to use that same source to determine shallow groundwater conditions.

Such shallow groundwater conditions are expected given the widespread occurrence of wetlands and ponds that indicate very shallow groundwater on the property—features that TVA identified in the DEIS. In fact, TVA identified 19 wetlands totaling 22.4 acres on the proposed property, with 4.13 acres being present within the proposed CCR landfill footprint; TVA also identified numerous farm ponds. *See* TVA DEIS, Appendix D at 4 and 9, illustrated below in Graphic 11.

c. Graphic 11: Wetlands and ponds at the Shawnee East Site



With these wetlands on the Shawnee East Site in mind, TVA has failed to make a showing in the DEIS that might overcome the CCR Rule's rebuttable prohibition against CCR landfills and impoundments on wetlands. *See* 40 C.F.R. § 257.61

Further, the locations of wetlands and farm ponds are where one would expect them to be on the property: in the areas with the shallowest groundwater table according to the NRCS. Given the widespread shallow groundwater conditions at the Shawnee East Site, the site likely does meet the new CCR landfill location restriction for separation with the uppermost aquifer according to the CCR Rule and may not even be suitable as a soil borrow area. As soil is excavated to obtain borrow material to construct the cap for the SWL and Ash Impoundment 2 Closure-in-Place, one would expect more shallow ponds to form at the Shawnee East Site.

The DEIS's discussion of groundwater conditions at the Shawnee East site acknowledged only the deeper Regional Gravel Aquifer; it failed to confront the shallower Alluvial Aquifer and the Upper Continental Deposits Aquifer that are both likely present at the site. TVA's groundwater discussion of the Shawnee East site concluded that the potentiometric surface (of an unspecified aquifer) varied substantially from winter to summer months, with a maximum elevation of 357 feet MSL. When that elevation is compared to the current ground surface elevations illustrated below in Graphic 12 (*see* USGS 1982), that groundwater elevation is within 3 feet of the lowest ground surface elevation for that property (360 ft. MSL). As a result, the site does not provide the required 5-foot separation according to the CCR Rule.

d. Graphic 12: Land Surface Topographic Map

In summary, my review of the DEIS in conjunction with publically available data reveals that the Shawnee East Site landfill likewise appears to violate the CCR Rule's Location Restrictions. *See* 40 C.F.R. §§ 257.60–257.64. TVA should have included in-depth analyses of how the proposed site might meet the applicable restrictions and obligations.

7. **Unreasonable Elimination of Closure-By-Removal**

TVA's elimination of Closure-by-Removal as a facility-wide alternative in the DEIS was not based upon reasonable facts and considerations that TVA should have considered in its analysis.

TVA concluded in the DEIS, that both Closure-in-Place and Closure-by-Removal of surface impoundments can be "equally protective of human health and the environment, provided they are implemented properly." DEIS at 24. Given that TVA's plan for Closure-in-Place does not meet the CCR Rule performance standards, as discussed herein, TVA's plan for closure-in-place is not as protective as Closure-by-Removal.

TVA's concluded in the PEIS that Closure-by-Removal would have a "greater beneficial impact on surface water and groundwater quality than Closure-in-Place if the water table intersects the CCR." TVA 2016, at 32. TVA also confirmed a similar reduction of groundwater contamination in the DEIS for Shawnee when Closure-by-Removal is used. *See* DEIS at 24. Given that groundwater saturates the wastes in the SWL and Ash Impoundment 2, Closure-by-Removal would be a more protective closure alternative.

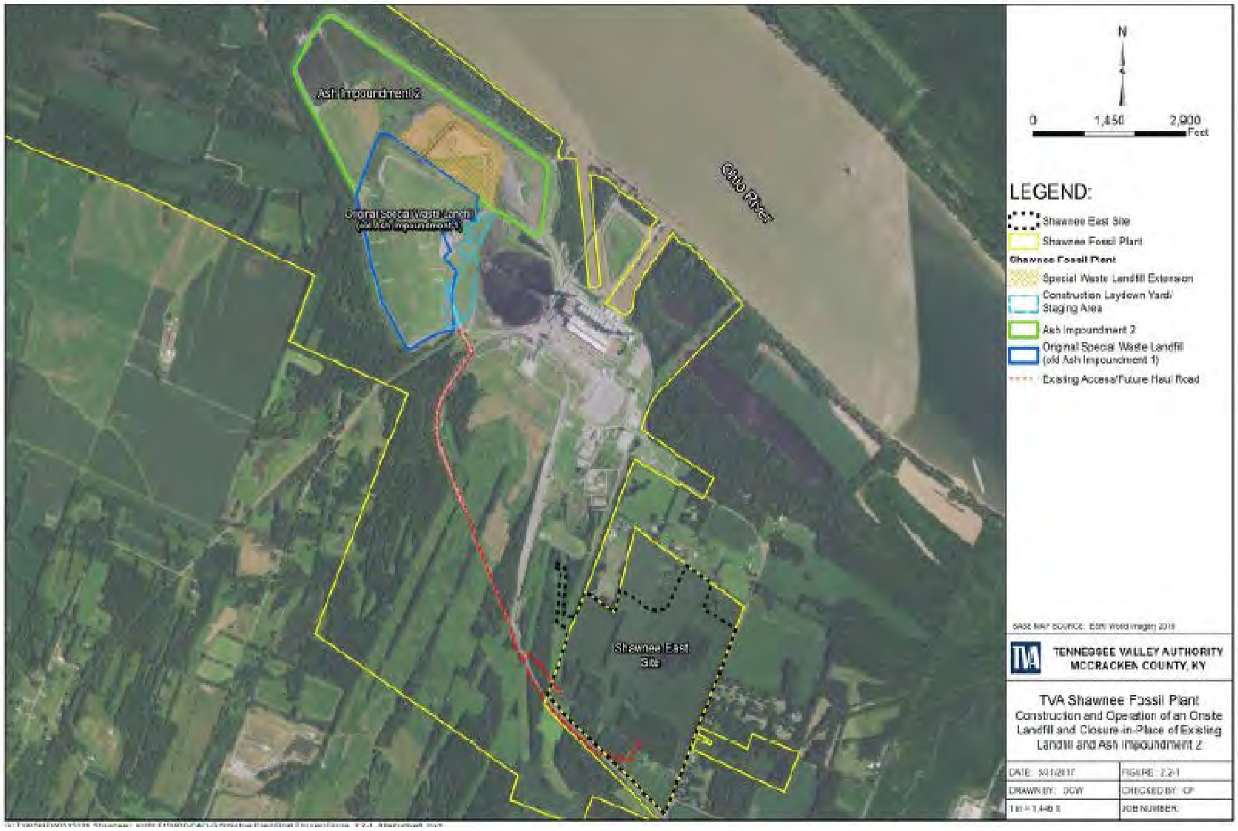
TVA concluded that the CCR Rule requires a "5-year closure window" for Closure-by-Removal as a reason why such closure was not reasonable. DEIS at 35. That conclusion fails to recognize that the EPA allows an owner to apply for an extension for closure. *See* 40 C.F.R. § 257.102(f). Such an extension allows for reduced transportation trips, as an example, which would invalidate some of TVA's assumptions that eliminated Closure-by-Removal as being feasible.

TVA and Stantec assumed that wastes that would be excavated and hauled off-site in a Closure-by-Removal closure would be hauled to an *off-site* landfill, rather than evaluating hauling and disposing of that wastes into an *on-site* landfill on property already owned by TVA. If TVA would have instead considered an on-site landfill in their analysis, the costs for transportation would have been minimal: No tipping fee would have been paid for disposal; larger trucks could be used to reduce truck trips per day; and no off-site impacts would be realized due to off-site transportation (e.g. noise, truck traffic).

Moreover, TVA also did not include in its Closure-by-Removal analysis the economic benefit and cost savings associated with excavating CCRs and beneficially reusing that material in products that are sold. *See infra* Section 9.

Further, TVA and Stantec assumed that an on-site landfill of sufficient footprint and volume capacity cannot be constructed on land already owned by TVA—yet TVA already owns substantial land acreage capable of meeting TVA's 140-acre minimum footprint requirement (and considerably more), as illustrated below within the yellow lines in Graphic 13 (*see* DEIS at 40):

a. Graphic 13: Land ownership surrounding Shawnee



8. **Improper Omission of Pertinent Information Regarding All Waste Disposal Areas**

The DEIS improperly omits relevant information regarding all past, current, and proposed future waste disposal areas. As such, the DEIS does not properly evaluate the waste management process in compliance with the CCR Rule and NEPA.

TVA's plan for closure of the SWL and Ash Impoundment 2, as laid out in the DEIS, differs in comparison to what TVA illustrated on its publicly available CCR Rule website.[11] On its CCR Rule website, TVA considered the Dredge Cell as part of the SWL, rather than being a part of Ash Impoundment 2 as illustrated in the DEIS (*see* green area in Graphic 14, on the following page).

[11] *See* https://www.tva.gov/Environment/Environmental-Stewardship/Coal-Combustion-Residuals/Shawnee (last accessed 7/27/2017).

a. Graphic 14: Comparison of DEIS depiction to TVA CCR website depiction

<u>DEIS</u>

<u>TVA CCR webpage</u>

The Dredge Cell that TVA constructed in 1983 with dikes made of ash is prone to failure and unstable conditions. The Dredge Cell contains a significant amount of wastes (750,000 cubic yards). *See* Stantec 2016a at Appendix B. As one example of that instability, the dike built of ash failed in 1984 and created a "wave" of water that destroyed the water risers in the adjacent Stilling Pond. *See* Stantec 2016a at Appendix B. TVA did not specifically identify the unstable conditions in the DEIS or how it intends to remedy these conditions during closure.

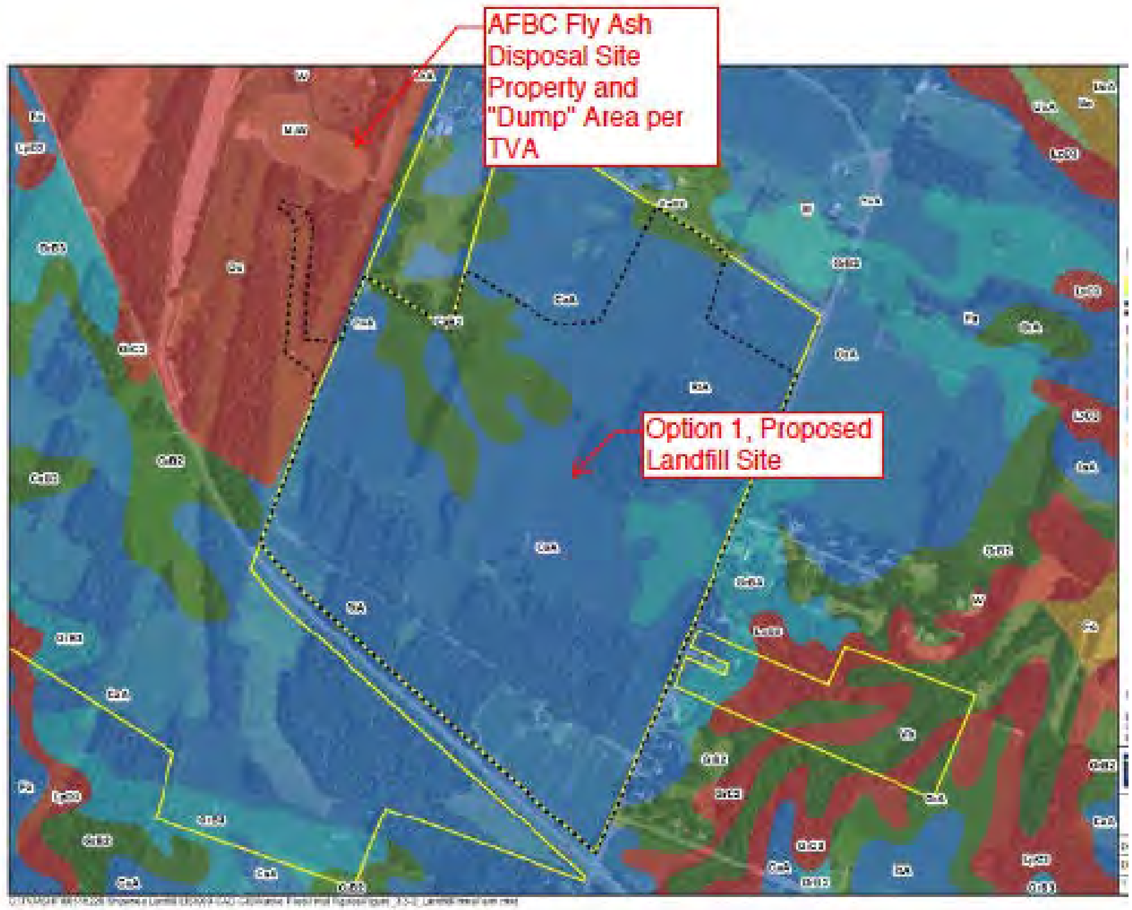
TVA stated that, during completion of a 2015 New Landfill Siting Study, "new information regarding the seismic conditions of the area and the stability requirements since the original permitting prompted TVA to impose a capacity limit to be disposed of in the SWL." DEIS At 9. TVA did not elaborate on what that "new information" was, yet should have included that information in the DEIS. Clearly, this new revelation suggests that the SWL (*i.e.*, Ash Impoundment 1) disposal site is characteristically unstable for unspecified reasons.

TVA fails to discuss one former disposal areas located on-site: the AFBC Fly Ash Disposal Area located southeast of rail loop, depicted by TVA below and highlighted in red in Graphic 15. The DEIS does not show or explain if that disposal area has ever been properly closed consistent with the closure performance standards in the CCR Rule or any KDWM standard. Stantec identified that disposal area in its "History of Construction" document that it prepared for Ash Pond 2. *See* Stantec 2017a, Appendix B.

b. Graphic 15: Depiction of AFBC Fly Ash Disposal Area

The soil data investigation presented by TVA in the DEIS appears to confirm the presence of widespread wastes in the AFBC Fly Ash Disposal Area. TVA's use of the NRCS Soil Data Mapper in the DEIS identified soil types at and near the proposed Shawnee East Site landfill. During its review, TVA identified a soil type called "dump" in the area northwest of the site, as illustrated in red in Graphic 16, below, and from within Table 3.4-1 in the DEIS:

c. Graphic 16: Dump identified next to Shawnee East Site

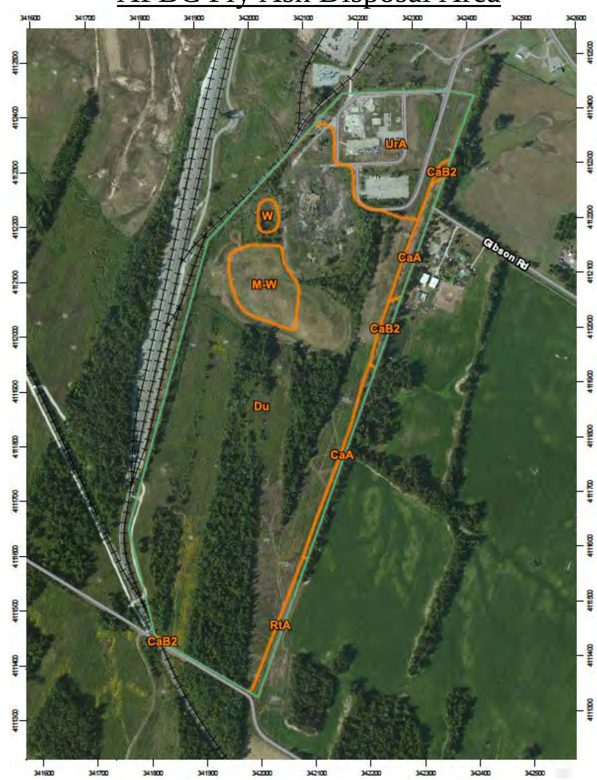


I performed a similar NRCS analysis on the above area identified by TVA as being a "dump," in addition to another TVA-owned area northwest of that area called the "rail loop" area. That analysis, as illustrated in the figures below in Graphic 17, suggests that TVA also disposed of unspecified CCR wastes into that rail loop area, which indicates that a second undisclosed disposal area exists.

d. Graphic 17: Rail loop and AFBC Fly Ash Disposal Area past disposal sites

Rail loop area

AFBC Fly Ash Disposal Area



TVA failed in the DEIS to identify, and thus to confront the relevance of, either the AFBC Fly Ash or the rail loop area as being past disposal sites. TVA should have included a discussion of both the AFBC Fly Ash Disposal Area and the rail loop areas (and any other disposal areas that may not yet have been disclosed), including how TVA plans to properly close all of those former disposal area.

Meanwhile, TVA's plan for closure of Ash Impoundment 2 includes construction of a new Equalization Basin that would receive wastewaters from the Shawnee Plant. *See* DEIS at 28, 31, and 38. However, TVA did not include any pertinent details—such as design parameters, operation, treatment capabilities, location, orientation relative to impoundments, etc.—about this wastewater treatment area. Given its significance as an integral part of TVA's closure and continued landfill operations plan, TVA should have included details in the DEIS such as:

1. Reuse of on-site wastewaters for a zero discharge rather than constructing a new basin.
2. Discharging wastewater to the local publicly owned wastewater treatment facility.
3. Where the basin will be constructed.
4. How the basin will be constructed to protect groundwater.
5. What treatment mechanism will be used to treat the water to remove constituents of concern.

9. **Failure to Include Analysis of Beneficial Reuse of CCR**

TVA failed to include, as it should have, analysis of beneficial reuse, in evaluating waste alternatives. Currently disposed and future wastes are capable of being beneficially reused in commercial products. Factoring in that analysis could materially change the relative economics of, and therefore TVA's informed choice between, the different alternatives.

TVA stated (near the end of the DEIS) that CCRs can be beneficially reused "in the manufacture of wallboard, roofing, cement, concrete, and other products," and that "CCR not sold for reuse are currently managed at the SWL." DEIS at 161. TVA did not discuss any plans or include any beneficial reuse options in its alternatives analysis in the DEIS. Further, TVA never stated how much (if any) CCRs are sold, have been sold in the past, or otherwise beneficially used in any commercial product. TVA's statement in the DEIS that operation of the proposed Shawnee East Site landfill "would not change the quantity of CCR wastes generated at SHF annually" suggests that TVA does not intend to beneficially reuse CCRs in any commercial product. *Id.* at 163.

TVA has partnerships with third party companies at other TVA coal-fired power plants to beneficially reuse CCR as raw material substitutions for commercial products. For example, at the TVA Cumberland Fossil Plant, flue-gas desulfurization ("FGD") wastes are used to manufacture wallboard at an adjacent manufacturing plant. TVA should have included such an analysis and consideration for identifying third-party uses in its alternatives analysis in the DEIS.[12]

TVA estimated that its proposed plan to build the Shawnee East Site landfill will be needed to meet a 10 to 20 million cubic yard total capacity as part of its desired 20-year comprehensive disposal plan, and that 8 million cubic yards will be generated between 2020 and 2044. *See* DEIS at ES-1 and 9. Such large capacity and associated costs would be unnecessary if TVA instead developed and initiated a comprehensive plan to beneficially reuse future wastes to reduce the costs and land area that it says is needed for disposal (*i.e.*, 140 acres—not including buffer, roads, leachate pond, etc.).

If TVA were to beneficially reuse current and future wastes, its alternative analyses and its 20-year (or 25-year) plan would change, because less disposal acreage and lower transportation costs (as non-exhaustive examples) would be required. At the very least, the omission of any meaningful discussion of the potential for beneficial reuse of CCR from Shawnee specifically was unreasonable; TVA's decision-making cannot lawfully stand without it.

[12] *See also supra* pp. 21, 25.

10. **Improper Reliance on Programmatic EIS and EPRI Framework Model**

The DEIS improperly relies upon the Programmatic EIS (“PEIS”) and its Electric Power Research Institute (“EPRI”) Framework Model to support Closure-in-Place of the Special Waste Landfill and Ash Impoundment 2. The EPRI Framework Model, which the PEIS in turn relied upon, is flawed and should not have been invoked for the Shawnee site.

TVA incorporates its PEIS (*see* TVA 2016) as a basis for closing surface impoundments in the more recent DEIS for Shawnee, stating that “a portion of this EIS is intended to tier from the 2016 PEIS to evaluate closure alternatives for the Ash Impoundment 2 and analyze the impacts of closure of the SWL.” DEIS at 3. TVA accordingly relied upon the technical components of the PEIS in the current DEIS.

The PEIS, in turn, relied upon EPRI and its use of the Relative Impact Framework environmental impact model. That EPRI model did not use actual site-specific Shawnee site conditions but rather *assumed* generic site conditions to a *hypothetical* surface impoundment to select the Closure-in-Place alternative as TVA’s preferred system-wide closure approach.

For example, EPRI’s flawed assumption in the Framework Model that arsenic is a “low mobility” CCR constituent that is more slowly transported in water (*see* TVA 2016, at 34) does not consider that arsenic and other metals can have a high solubility and transport rate under a variety of pH conditions. As such, EPRI’s assumption is not universally correct, and their model under-predicts the possible impacts at/near Shawnee associated with some CCR constituents.

In conclusion, the EPRI Framework Model—and hence the PEIS that relied on it—does not support TVA’s selection of the Closure-in-Place alternative because it fails to use site-specific information to properly quantify alleged groundwater improvements by concentration or duration in groundwater or surface water, as one example.

11. **REFERENCES**

The below materials (many of which are too large to attach) have been collected and made available for download at the following publicly-accessible Box site: https://app.box.com/s/rz005s7adftddh5ghugvzlmznlemdsti

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2) EPA 2017. U.S. Environmental Protection Agency, *Relationship Between the Resource Conservation and Recovery Act's Coal Combustion Residuals Rule and the Clean Water Act's National Pollutant Discharge Elimination System Permit Requirements*, last accessed 7/27/2017 at: https://www.epa.gov/coalash/relationship-between-resource-conservation-and-recovery-acts-coal-combustion-residuals-rule#Closure.

3) KDW 2001. Total Maximum Daily Load (TMDL), Little Bayou Creek, November 2001.

4) KGS 1997. Geologic Features Relevant to Ground-Water Flow in the Vicinity of the Paducah Gaseous Diffusion Plant, Kentucky Geological Survey, Open File Report OF-97-02, April 30, 1997.

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7) Stantec 2016a. *History of Construction*, Ash Pond 2, Shawnee Fossil Plant, October 12, 2016.

8) Stantec 2016b. *Closure and Post-Closure Plan*, Ash Pond 2 and Consolidated Waste Dry Stack, Shawnee Fossil Plant, October 12, 2016.

9) Stantec 2016c. *Liner Design Demonstration*, Ash Pond 2, Shawnee Fossil Plant, October 6, 2016.

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16) TVA 2017. *November 2016 Groundwater and Surface Water Monitoring Reports for Second Half of 2016*, to Deborah Long, KDWM, from Abigail Bowen, January 30, 2017.

17) USGS 1954. Joppa Quadrangle Topographic Map, 7.5-Minute Series, 1954.

18) USGS 1982. Joppa Quadrangle Map, 7.5-Minute Series, 1982.