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CUMBERLAND FOSSIL PLANT BORROW AREAS AND ACCESS ROAD FINAL ENVIRONMENTAL ASSESSMENT

Stewart County, Tennessee

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Summary

Tennessee Valley Authority (TVA) has prepared the following Environmental Assessment (EA) pursuant to the National Environmental Policy Act (NEPA) to assess the environmental impacts of developing borrow sites for the Cumberland Fossil Plant located in northern Tennessee on the Cumberland River in Stewart County.

The "borrow sites" are sites from which TVA would get soil that would be used in the partial closure of the Dry Fly Ash and Gypsum stacks. The soil from these borrow sites would also be used to support other more routine operation and maintenance activities at the plant, including minor erosion repair and other activities requiring fill such as drainage improvements. If and when such actions are undertaken, they will receive separate NEPA review.

TVA's preferred alternative is Alternative B:

- develop and operate two borrow sites on TVA-owned property at Cumberland Fossil Plant, and
- construct a bridge over Wells Creek and road to provide access to the borrow sites.

TVA evaluated the potential effects of these proposed actions to environmental resources including air quality, land use, prime farmland, geology, groundwater and surface water, floodplains, vegetation, wildlife, aquatic ecology, threatened and endangered species, wetlands, transportation, visual resources, cultural and historic resources, and noise. With the implementation of project best management practices (BMPs) and mitigation measures, no significant impacts to these resources were identified.

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Symbols, Acronyms, and Abbreviations

APE	Area of Potential Effect
ARAP	Aquatic Resource Alteration Permit
BMP	Best Management Practices
CAA	Clean Air Act
CCR	Coal Combustion Residuals
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	Cubic Feet Per Second
со	Carbon Monoxide
CO ₂	Carbon Dioxide
CUF	Cumberland Fossil Plant
CWA	Clean Water Act
dB	Decibels
dBA	A-Scale Weighting Decibels
EA	Environmental Assessment
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
GHG	Greenhouse Gases
HUD	U.S. Department of Housing and Urban Development
Hwv	Highway
IPaC	Information for Planning and Conservation
Ldn	Dav-Night Sound Level
LOS	Level of Service
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOx	Nitrogen Oxides
NPDES	National Pollution Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
Pb	Lead
PM	Particulate Matter
PM _{2.5}	Particulate matter with particle sizes less than or equal to 2.5 micrometers
PM ₁₀	Particulate matter with particle sizes less than or equal to 10 micrometers
RM	River Mile
SHPO	State Historic Preservation Officer
SO ₂	Sulfur Dioxide
SR	State Route
SWPPP	Stormwater Pollution Prevention Plan
TDEC	Tennessee Department of Environment and Conservation
TVA	Tennessee Valley Authority
USACE	U.S. Army Corps of Engineers
USC	United States Code
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	Volatile Organic Compounds
WWC	Wet Weather Conveyances

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CHAPTER 1 – PURPOSE AND NEED FOR ACTION

1.1 Introduction and Background

Tennessee Valley Authority's (TVA) Cumberland Fossil Plant (CUF) is in Stewart County, Tennessee, approximately 22 miles southwest of Clarksville (Figure 1-1). The plant is on a large reservation of approximately 2,388 acres located at the confluence of Wells Creek and the south bank of the Cumberland River near Cumberland City.

Built between 1968 and 1973, the two-unit plant is the largest generating asset in the TVA coal fleet and generates enough energy to supply about 1.1 million homes. The plant consumes an average of 5.6 million tons of coal annually and produces approximately one million tons of Coal Combustion Residuals (CCR) a year.

CUF generates CCR that consists of fly ash, bottom ash, commercial grade gypsum, and solids from the flue gas desulfurization process. Currently, fly ash is transported in dry form to the Fly Ash Stack. Bottom ash is sluiced to the existing Bottom Ash Impoundment where the material settles out. The settled bottom ash is excavated and stacked in the Fly Ash Stack. Gypsum is conveyed to an adjacent wall-board manufacturer for beneficial reuse, or to lined channels where it is dewatered, stockpiled for later use, or disposed in the Gypsum Stack. TVA is planning to partially close the Fly Ash and Gypsum Stacks in accordance with Tennessee Department of Environment and Conservation (TDEC) regulations which state upon achieving final grade or as otherwise required, a final cover that meets the specifications set forth in the Dry Fly Ash and Gypsum stacks closure plans in their permits should be placed. TVA needs suitable cover soil, general fill, and topsoil material to support this action.

1.2 Purpose and Need

TVA proposes to identify and develop borrow sites on TVA-owned property at CUF to secure material to support partial closure of the Dry Fly Ash and Gypsum stacks in accordance with TDEC regulations and TVA's existing TDEC permit. These borrow sites would also be used to support other routine operation and maintenance activities at CUF including minor erosion repair and other activities requiring fill such as drainage improvements as needed. If and when such actions are undertaken, they will receive separate NEPA review.

1.3 Decision to be Made

This Environmental Assessment (EA) has been prepared to inform TVA decision makers and the public about the environmental consequences of the proposed action. The primary decision TVA must make is whether to develop onsite borrow areas to support current and future construction and maintenance activities at CUF.

TVA will use this EA to support the decision-making process and to determine whether an Environmental Impact Statement should be prepared or whether a Finding of No Significant Impact may be issued.



Figure 1-1. Location of TVA's Cumberland Fossil Plant Property in Stewart County, Tennessee

1.4 Related Environmental Reviews

The following environmental reviews have been prepared for actions related to operations at CUF:

Environmental Assessment Development of By-Product Disposal Facilities Cumberland Fossil Plant – Flue Gas Desulfurization Gypsum and Fly Ash (TVA 1992). This EA evaluated disposal options for gypsum and fly ash at CUF. The proposed borrow sites are needed to support partial closure of the gypsum and fly ash stacks.

Environmental Assessment for Cumberland Fossil Plant: Sale of Property for Industrial Development (TVA 1997). This EA evaluated the sale of TVA property for development of a gypsum wallboard plant and gypsum processing plant that would utilize flue gas desulfurization scrubber gypsum from CUF. Gypsum is currently beneficially re-used at the wallboard plant.

Integrated Resource Plan, 2015 Final Report (TVA 2015a). This plan provides direction for how TVA would meet the long-term energy needs of the Tennessee Valley region. This document and the associated Supplemental Environmental Impact Statement evaluate scenarios that could unfold over the next 20 years. It discusses ways that TVA can meet future power demand economically while supporting TVA's equally important mandates for environmental stewardship and economic development across the Tennessee Valley. The report indicated that a diverse portfolio is the best way to deliver low-cost, reliable electricity. TVA released the accompanying Final Supplemental Environmental Impact Statement for TVA's Integrated Resource Plan in July 2015 (TVA 2015b).

1.5 Scope of the Environmental Assessment and Summary of the Proposed Action

This EA evaluates the potential environmental and cultural impacts of development of onsite borrow sites at CUF to support ongoing operations at CUF including partial closure of the Dry Fly Ash and Gypsum stacks in accordance with TDEC regulations and TVA's existing TDEC permit. These borrow sites would also be used to support future operations at CUF as needed. However, future actions would be subject to NEPA reviews when those actions are planned in detail.

The proposed borrow areas would be on CUF property to maximize use of TVA assets and minimize transportation-related impacts and costs associated with obtaining borrow from an offsite source. This project also includes the construction of a road and bridge on CUF property from the plant to Old Scott Road to provide access to the proposed borrow areas. A detailed description of the proposed action and alternatives considered are provided in Chapter 2.

TVA prepared this EA to comply with National Environmental Policy Act (NEPA) and regulations promulgated by the Council on Environmental Quality (CEQ) and TVA's procedures for implementing NEPA. TVA considered the possible environmental effects of the proposed action and determined that potential effects to the environmental resources listed below were relevant to the decision to be made, and assessed the potential impacts on these resources in detail in this EA.

- Air Quality
- Climate Change
- Land Use
- Prime FarmlandGeology and

- Surface Water
- Floodplains
- Vegetation
- Wildlife
- Aquatic Ecology
- Threatened and Endangered Species
- Wetlands
- Transportation
- Visual Resources
 - Cultural and Historic Resources
 - Noise

TVA also considered potential effects related to health and safety; socioeconomics, demographics and environmental justice; natural areas; and solid waste. These resources were found to be absent or not impacted by the proposed project. As such, analysis of these resources is given limited consideration.

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

1.6 Public and Agency Involvement

The draft EA was posted on TVA's Web site for a 14-day public review period. The availability of the draft EA was announced in the newspaper that serves the region, the Stewart County Standard. TVA notified local, state, and federal agencies and federally recognized tribes of its availability through their required consultations. Comments were accepted from July 21, 2017 through August 4, 2017 via mail and e-mail. One comment was received on the draft EA; however, the comment was beyond the scope of the project. No substantive and relevant comments were received on the draft EA.

1.7 **Necessary Permits and Licenses**

TVA would obtain all necessary permits, licenses, and approvals required for the alternative selected. TVA anticipates the following may be required for implementing the proposed alternatives.

- A General Permit for Storm Water Discharges Associated with Construction Activities may be required for the proposed project and a Stormwater Pollution Prevention Plan (SWPPP) would be required to detail sediment and erosion control best management practices (BMPs). The current individual National Pollution Discharge Elimination System (NPDES) permit would be evaluated to ascertain if a modification would be needed as part of this project.
- Actions involving wetlands and/or stream crossings would be subject to federal CWA Section 404 permit requirements.
- A TDEC Aquatic Resources Alteration Permit (ARAP) certification may be required for any alterations to the streams, wetlands and wet weather conveyance channels. TVA would adhere to all appropriate state and county regulatory requirements, including obtaining a burn permit if required, if burning of landscape waste is conducted.
- Other necessary permits would be evaluated based on site-specific conditions. •

CHAPTER 2 – ALTERNATIVES

2.1 Description of Alternatives

TVA considered several options to secure borrow material to support partial closure of the Dry Fly Ash and Gypsum stacks in accordance with TVA's existing TDEC permit as well as other routine operation and maintenance activities at CUF. These options and TVA's preferred alternative are described below.

2.1.1 Development of Borrow Sites and Access Road Alternative

In March 2015, TVA conducted a study that considered options for obtaining borrow material to support operations at CUF. The borrow study identified soil resources available within 1,250 acres on CUF property (onsite) and from commercial borrow sites within a 20-mile radius of the fossil plant (Stantec 2015).

The results of the borrow study indicate that significant volumes of soil materials are available for potential future applications onsite, and the better source of borrow material within the 1,250 acres of TVA-owned property on CUF would be from the pasture areas located in the southeast portion of the property. The evaluation of commercial borrow sources in the region indicated that significant volumes of materials, similar to those available onsite, were available from the commercial sources in the surrounding region.

TVA considered these results and determined that the development of borrow areas on CUF property is preferred. This option would avoid the long-term transport of borrow on public roadways which eliminates the long-term impacts associated with air emissions, increased traffic and associated long-term safety risks, and disruptions to the public that would be associated with such off-site transport. In addition, the use of borrow from TVA-owned property on CUF optimizes the use of TVA resources and minimizes cost.

Once TVA determined that borrow developed on TVA-owned property was the preferred option to support operation and maintenance activities at CUF, TVA considered three alternative routes to provide access from these sites to CUF (Stantec 2017). TVA further optimized the location of the proposed borrow site and access road by considering the following:

- Impacts to Cultural Resources Several cultural resource sites are known to exist on the CUF property including a house that is listed on the National Register of Historic Places (NRHP) along Old Scott Road. The design of the proposed access road and borrow site would avoid existing culturally sensitive areas and the viewshed of the historic property.
- *Impacts to Surface Waters and Wetlands* Wetlands and surface water features were identified and these areas were avoided where possible.
- Sensitive Species The location of existing forested areas were avoided where
 possible to minimize potential impacts to sensitive bat species.
- Impacts to Existing Roadways TVA considered the ability to use existing roadways to provide access to the borrow site. However, TVA determined that the long-term use of existing roadways would have a negative impact on traffic operations and safety and, therefore, proposed to construct an access road on CUF property.

• *Cost* – Selection and development of an onsite borrow site and the proposed Wells Creek crossing were the lowest cost options considered. Minimizing costs contributes to TVA's commitment to provide cost-effective power to users in its service area.

In consideration of the above factors, TVA proposes to develop two borrow sites on CUF property and develop an access road as described under Alternative B.

2.1.2 Alternative A – The No Action Alternative

Under the No Action Alternative, TVA would continue current plant operations and would not develop borrow areas on TVA property. As this material is necessary to support current operations, TVA would obtain borrow, when needed, from one or more previously permitted commercial sites within 30 miles of CUF. This would require the use of over-the-road dump trucks rather than the larger articulated dump trucks used under Alternative B which requires minimal use of public roadways. Based on the estimate of borrow available from the proposed two borrow sites and the volume of an over-the-road dump truck, the number of truckloads needed to obtain the same volume of borrow from offsite sources would increase by 33 percent.

2.1.3 Alternative B – Develop and Operate Two Borrow Sites, Construct an Access Road and Bridge on CUF Property

Under Alternative B, TVA would develop two borrow sites on TVA-owned property at CUF. Both sites are on the west side of Wells Creek (Figure 2-1). One site (approximately 6 acres) would be located about 0.25 mile east of the main plant area. Another larger site (approximately 93 acres) would be located approximately 0.5 mile south of the main plant site. Both areas were identified by TVA to contain soils suitable for use as borrow material and are expected to provide, at a minimum, enough material to support Dry Fly Ash and Gypsum Stack closure activities as well as meet future borrow requirements. Both sites require minimal clearing and as both sites are gently sloping pasture areas, would be accessible to construction equipment. In addition, the sites chosen minimize impacts to natural and cultural resources while maximizing TVA assets. Preliminary estimates indicate that approximately 640,000 yd³ of suitable soil to support current and future operations at CUF could be obtained from these sites.

Construction activities associated with utilization of the borrow sites would start with clearing and grubbing the site. Topsoil would be removed and stockpiled. Any marketable timber would be salvaged where feasible; otherwise, woody debris and other vegetation may be disposed onsite through open burning or sent offsite to an approved solid waste facility for disposal. TVA would adhere to all appropriate state and county regulatory requirements if burning of landscape waste is conducted. Borrow material would be excavated and loaded onto trucks for transport and placement as dictated by plant operations. Although final grading plans have not been developed, TVA estimates that borrow would be excavated to the top of rock, and existing stormwater flow patterns would be routed around the borrow site during excavation and upon completion of borrow activities. Upon cessation of excavation, borrow sites would be restored using stockpiled topsoil and seeding in accordance with the SWPP requirements. The existing tree line along the northern and western edge of the larger (southernmost) borrow site would be maintained as a visual buffer. All elements of the borrow excavation would be performed in accordance with established TVA and other applicable federal, state, and local guidelines for earthwork activities.



Figure 2-1. Proposed Project Areas Located in Stewart County, Tennessee

A two-lane gravel access road would be constructed on CUF property to provide access to the borrow sites. The approximately 0.6-mile-long road would be 40-foot-wide with 5-foot-wide shoulders, and would extend from Old Scott Road in the west to the CUF perimeter road in the east (see Figure 2-1). The access route would require the construction of a new bridge over Wells Creek (see Figure 2-1). The new bridge is required as the existing bridge in its current condition is not capable of supporting the trucks needed to transport borrow material. TVA considered upgrading the existing bridge and determined that rehabilitation of the existing bridge with a wider deck was not feasible due to the estimated construction timeline, unknown structural issues, inability to meet seismic requirement, shorter lifespan compared to a new bridge, and cost (Stantec 2017).

The proposed new bridge would be located approximately 30 feet downstream of the existing bridge. The bridge would have a total span of approximately 220 feet and would consist of two sets of piers that would line up hydraulically with the piers of the existing upstream bridge. TVA would extend the rip rap currently in place on both sides of the upstream and downstream banks of Wells Creek near the bridge piers to minimize stream bank erosion. The road would also require a culverted crossing of Scott Branch, a tributary to Wells Creek, near Old Scott Road (see Figure 2-1).

Access to the southernmost borrow site would incorporate the existing Old Scott Road (see Figure 2-1), a narrow county road with a gravel surface. TVA would grade and provide regular maintenance to reduce potholes or "washboarding" of the gravel surface.

TVA proposes to use an approximate 1-acre laydown area on the east side of Wells Creek for vehicle and equipment parking as well as materials storage (see Figure 2-1). The construction areas for the access road and northernmost borrow site could also be used temporarily.

TVA would temporarily use existing roadways to access the southernmost borrow site during construction of the proposed access road from Old Scott Road to the CUF perimeter road (estimated to range from 6 to 9 months). The approximately 7-mile proposed interim route exits the borrow site on Old Scott Road, then proceeds south to Buckeye Road, then east to State Route (SR) 149, then north to Old Highway (Hwy) 149, and then west to SR 233 (Cumberland City Road) where it enters CUF (see Figure 2-1). These roadways would only be used to transport borrow materials to the plant until the access road and bridge are complete, after which, the bridge and access road would then be the preferred route for transport of borrow material. To minimize potential safety concerns with users of this interim access route, TVA would post flagmen along the temporary route as needed during peak use periods.

During this interim period, TVA would use over-the-road tandem dump trucks to transport 135 truckloads a day (270 truck trips) of borrow material along this route. Once the new road is complete, TVA estimates it would use articulated dump trucks capable of transporting 210 loads a day (420 truck trips) to transport borrow to the plant as needed to support specific operations.

TVA estimates indicate that the proposed borrow sites would provide suitable quantities of fill material to support the partial closure of the Dry Fly Ash and Gypsum stacks as well as provide borrow needed to support other current and future operations. However, it is possible that additional borrow material may be needed to support future operation and

maintenance activities at CUF. If that is the case, TVA would obtain borrow from an offsite commercial source within 30 miles of the plant.

A summary of the primary characteristics of the proposed borrow sites and access road are provided in Table 2-1.

Project Feature	Characteristic	Value
Borrow Area	Northernmost Borrow Project Area	6 acres
	Southernmost Borrow Area Limit of Disturbance	93 acres
Access Road	Length	0.6 mile
Access Road	Project Area	14 acres
Laydown Area	Project Area	1 acre
Wells Creek Crossing	New Bridge	50-foot-wide; 222-foot-long
Scott Branch Crossing	Culvert Type	Box culvert
Method for interim (short- term) use of existing roads to transport borrow to the plant	Tandem dump trucks capable of transporting 135 truckloads per day	270 truck trips
Method for long-term use of new access road to transport borrow to the plant	Articulated dump trucks capable of transporting 210 truckloads per day	420 truck trips

Table 2-1.Primary Characteristics of the Proposed Borrow Sites
and Access Road in Stewart County, Tennessee

2.2 Comparison of Alternatives

The environmental impacts of each of the alternatives under consideration are summarized in Table 2-2. These summaries are derived from the information and analyses provided in the Affected Environment and Environmental Consequences sections of each resource in Chapter 3.

Resource Issue Area	Alternative A – No Action	Develop and Operate Two Borrow Sites, and Construct an Access Road and Bridge on CUF Property
Air Quality	Air emissions related to transport of borrow from offsite commercial sources would be greater than Alternative B due to increased vehicles needed to transport borrow.	Temporary minor impacts from fugitive dust and emissions from equipment and vehicles during development of the borrow sites and transport of borrow material on public roadways. Long-term minor, intermittent impact during periods when borrow is obtained.
Climate Change and Greenhouse Gases	Carbon dioxide (CO ₂) emissions associated with transport of borrow from offsite sources would be incrementally greater than Alternative B. However, no impact to regional climate change.	Transport of borrow contributes to localized CO ₂ emissions. No impact to climate change or changes in regional greenhouse gas levels.
Geology and Soils	No impact.	Minor temporary increase in soil erosion, minimized with BMPs. Topsoil would be removed and stockpiled for restoring the borrow sites following excavation activities
Groundwater	No impact.	Minor, localized impact to seasonal surficial groundwater patterns.
Surface Water	No impact.	Minor impact, minimized with BMPs.
Floodplains	No impact.	Minor impact. Proposed activities are consistent with EO 11988.
Vegetation	No Impact	Minor impact. No special plant communities present and abundant similar cover types in the vicinity.
Wildlife	No impact.	Minor impact due to permanent loss of primarily low quality habitat.
Aquatic Ecology	No impact.	Minor impact due to permanent loss of surface water features which provide limited aquatic habitat.
Threatened and Endangered Species	No impact.	Minor impact due to loss of bat foraging and summer roosting habitat.
Wetlands	No impact.	Minor impact associated with loss of 0.8 acre of wetlands determined to be jurisdictional under Section 404 of the CWA.
Land Use	No impact.	Conversion of approximately 113 acres of undeveloped land to industrial use (borrow sites and access road). Impact is minor because the land is located on CUF property which supports industrial use and because there is an abundance of undeveloped land nearby.

Table 2-2.	Summary and Comparison of Alternatives by Resource Area
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Resource Issue Area	Alternative A – No Action	Develop and Operate Two Borrow Sites, and Construct an Access Road and Bridge on CUF Property
Prime Farmland	No impact.	Minor impact of converting 31.1 acres of land with prime farmland soils to industrial use
Visual Resources	No impact.	Minor alteration of local viewshed. No change in scenic class.
Cultural and Historic Resources	No impact.	No impact.
Transportation	Minor impact related to increased traffic and potential increase in crash rates during the transport of borrow from an offsite source.	Minor temporary impact during interim use of public roadways (6 to 9 months). Minimal long-term impact to public roads as the access road would utilize a portion of Old Scott Road.
Noise	Minor indirect impact along the access route used to transport borrow to CUF. Greater than Alternative B due to increased number of trucks on public roadways.	Minor impact to one noise receptor along the access route due to noise emissions from trucks transporting borrow to CUF. The increase in noise would be intermittent (occurring only during specified construction periods), and would occur only during normal working hours.
Cumulative Effects	No notable cumulative effect.	Minor, localized effects to surface water, aquatic resources, wetlands and prime farmland, minor localized increase in noise and air emissions. No notable cumulative effect.

2.3 TVA's Preferred Alternative

TVA's preferred alternative is Alternative B – Develop and Operate Two Borrow Sites, Construct an Access Road and Bridge on CUF Property. Alternative B meets the purpose and need of the project as it would allow TVA to secure borrow material to support the partial closure of the Dry Fly Ash and Gypsum stacks as well as support future routine operation and maintenance activities at CUF including minor erosion repair and other activities requiring fill such as drainage improvements. Implementation of this alternative would optimize existing TVA assets but would utilize a portion of Old Scott Road. This road is a two-lane gravel road with minimal traffic. As such, the impacts associated with air emissions, increased traffic and associated long-term safety risks, and disruptions to the public that would be associated with the long-term use of public roadways are minimized with this alternative.

2.4 Summary of Mitigation Measures and BMPs

TVA has identified the following BMPs that would be used to minimize impacts and restore areas disturbed during construction:

- TVA would use applicable BMPs as described in the project-specific SWPPP and Tennessee Erosion and Sediment Control Handbook
- Fugitive dust emissions from site preparation and construction would be controlled by wet suppression and BMPs (CAA Title V operating permit incorporates fugitive dust management conditions).
- Consistent with EO 13751, disturbed areas would be seeded or sodded with native or non-native, non-invasive plant species to avoid the introduction or spread of invasive species.
- TVA would adhere to all appropriate state and county regulatory requirements if burning of landscape waste is conducted.

Mitigation measures designed to avoid, minimize, or compensate for adverse impacts associated with the development of the borrow sites, access road and bridge include:

- TVA would comply with the terms and conditions of the TDEC ARAP and U.S. Army Corps of Engineers (USACE) 404 permits, including any compensatory mitigation credits if required, prior to the start of clearing and construction
- Unavoidable impacts to potential suitable summer roosting habitat for the northern long-eared bat and Indiana bat would be mitigated as required in accordance with ESA during Section 7 consultation with the USFWS. Any tree removal would be scheduled so that all tree clearing would be conducted between August 16 and March 31 to avoid nesting season for these species.
- TVA would use existing public roadways to access the southernmost borrow site while the bridge over Wells Creek and access road is constructed (estimated to take 6 to 9 months). TVA would post a flagman along these public roadways as needed during peak use periods to minimize potential safety concerns.

TVA has determined that the undertaking would have no effects to any archaeological sites listed or eligible for listing in the NRHP. The Tennessee State Historic Preservation Officer (SHPO) concurs with this determination. TVA's determination is predicated on the following avoidance and minimization measures are implemented:

- Previously identified potentially eligible archeological sites identified within the vicinity of the southernmost borrow area would be flagged with a 100-foot buffer to ensure avoidance during the use of the borrow area.
- TVA would ensure that the gravel portion of Old Scott Road fronting the Hollister House is well maintained, and speed of the trucks would be kept to a minimum in order to minimize any indirect effects from increased vibrations to the Hollister House.

The existing tree line along the northern, western, and southern edges of the larger (southernmost) borrow site would be maintained as a visual buffer to avoid impacts to the viewshed of the Hollister House.

CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The existing condition of environmental resources that could potentially be affected by adopting and implementing the proposed Action Alternative during the development of the borrow sites, access road, and bridge is described in this chapter. The descriptions below of the potentially affected environment are based on field surveys conducted between November 2016 and February 2017, on published and unpublished reports, and on personal communications with resource experts. This information establishes the baseline conditions against which TVA decision makers and the public can compare the potential effects of implementing the alternatives under consideration.

The potential effects of adopting and implementing the No Action Alternative and the Action Alternative on the various resources were analyzed, and the findings are documented in this chapter. From this review, TVA focused its environmental review on specific resources and eliminated others from further evaluation. Cumulative effects are discussed, as appropriate and necessary, under the respective resource areas.

This EA does not contain detailed discussions on resources not found in the planning area, or that would not be impacted by any of the alternatives. These resources include:

- Natural Areas, Parks and Recreation. Although there are many natural areas and recreation sites within the vicinity of CUF, the proposed construction activities would be confined to TVA-owned property. There would be no direct impacts to natural areas, parks or recreation facilities. There is a publicly accessible boat ramp located on CUF property approximately 0.4-mile northwest of the main plant. The ramp would not be directly impacted by the proposed action, but users of the boat ramp may be indirectly impacted during the interim use of SR 233 (Cumberland City Road) to transport borrow until the access road is complete. This traffic increase would be short term (6 to 9 months) and is unlikely to interfere with use or enjoyment of this facility.
- Socioeconomics and Environmental Justice. Demographic characteristics are not expected to change due to implementation of the proposed action. Given the scope of the proposed Action Alternative, there would be no discernable impact to the surrounding workforce and regional economy. Communities subject to environmental justice considerations are not present in the immediate project area and, therefore, would not be impacted.
- Solid and Hazardous Waste. Proposed construction and borrow areas are currently vacant, and are primarily pasture land. Under Alternative B, some debris and waste materials may be generated and removed from the proposed borrow areas. It is expected that this material would primarily be vegetative waste associated with the construction of the access road and preparation of the area for soil excavation. All materials would be properly managed and disposed of at approved solid waste facilities or recycled in compliance with applicable pertinent federal, state and local requirements. Solid and hazardous wastes generated at TVA facilities are managed in accordance with established procedures and applicable regulations, and wastes generated by equipment maintenance would be managed under existing programs. The status of CUF as a small quantity generator of hazardous waste would not

change under this alternative. Therefore, no impacts to solid waste and hazardous waste generation are anticipated.

• Public Health and Safety. TVA's Safety Standard Programs and Processes would be strictly adhered to during implementation of the proposed action. The safety programs and processes are designed to identify actions required for the control of hazards in all activities, operations, and programs. It also establishes responsibilities for implementing Section 19 of the Occupational Safety and Health Act of 1970. Therefore, impacts to public health and safety are not anticipated. A discussion of resources retained for detailed analysis is provided in the following sections.

3.1 Air Quality

3.1.1 Affected Environment

3.1.1.1 Regulatory Framework for Air Quality

Through passage of the CAA, Congress mandated the protection and enhancement of our nation's air quality resources. National Ambient Air Quality Standards (NAAQS) for the following criteria pollutants have been set to protect the public health and welfare:

- Sulfur dioxide (SO₂)
- Ozone
- Nitrogen dioxide (NO₂)
- Particulate matter with particle sizes less than or equal to 10 micrometers (PM₁₀)
- Particulate matter with particle sizes less than or equal to 2.5 micrometers (PM_{2.5})
- Carbon monoxide (CO)
- Lead (Pb)

The primary NAAQS were promulgated to protect public health, and the secondary NAAQS were promulgated to protect the public welfare from any known or anticipated adverse effects associated with the presence of pollutants in the ambient air (U.S. Environmental Protection Agency [EPA] 2017a).

In accordance with the CAA Amendments of 1990, all counties are designated with respect to compliance, or degree of noncompliance, with the NAAQS. These designations are either attainment, nonattainment, or unclassifiable. An area with air quality better than the NAAQS is designated as "attainment;" whereas an area with air quality worse than the NAAQS is designated as "non-attainment." Non-attainment areas are further classified as extreme, severe, serious, moderate, or marginal. An area may be designated as unclassifiable when there is a lack of data to form a basis of attainment status. New or expanded emissions sources located in areas designated as nonattainment for a pollutant are subject to more stringent air permitting requirements.

Stewart County and the surrounding counties (Benton, Christian, Calloway, Henry, Houston, Montgomery, Trigg) are all in attainment with applicable NAAQS (EPA 2017) and Tennessee ambient air quality standards referenced in the Tennessee Air Pollution Control Regulations Chapter 1200-3-3.

The proposed construction activities would be subject to both federal and state (Tennessee Division of Air Pollution Control) regulations. These regulations impose permitting requirements and specific standards for expected air emissions.

3.1.2 Environmental Consequences

3.1.2.1 Alternative A – No Action Alternative

Under this alternative, the borrow sites, access road, and bridge would not be constructed and no onsite project-related impacts to air quality would occur. However, as borrow needed to support current operations would have to be obtained from offsite sources, air emissions related to transport of borrow would be greater than Alternative B due to the increased number of trucks needed to transport the equivalent volume of borrow from commercial sources.

3.1.2.2 Alternative B – Develop and Operate Two Borrow Sites, Construct an Access Road and Bridge on CUF Property

Development of the proposed actions would require the use of earthmoving and compacting equipment as well as trucks for hauling materials. Construction-related air quality impacts would be related primarily to operation of internal combustion engines and site preparation activities.

Combustion of gasoline and diesel fuels by internal combustion engines (vehicles, generators, construction equipment, etc.) would generate local emissions of particulate matter (PM), nitrogen oxides (NO_x), CO, volatile organic compounds (VOC), and sulfur dioxide (SO₂) during the site preparation and construction period. However, new emission control technologies and fuel mixtures have significantly reduced vehicle and equipment emissions. Additionally, it is expected that all vehicles would be properly maintained which would also reduce emissions. Therefore, emissions from internal combustion engines during construction and operation would result in minor short-term local effects on air quality due to the relatively low number of vehicles, adherence to equipment maintenance requirements, and continued improvement of emission control measures and fuel blends.

Fugitive dust from the transport of borrow material on paved public roads would be minimized during the period when these roadways are used (6 to 9 months). However, after the access road and bridge are built, borrow would be transported to the stack closure sites using the onsite unpaved access road. Equipment movement on unpaved portions of the access road would produce fugitive dust that could affect particulate levels. Emissions from equipment that use diesel or gas as fuel may include particulates, CO, CO₂, NO_x, ozone, SO₂ and VOCs. All TVA power plants have fugitive dust control plans as required under existing Title V permits. In addition, all vehicles would be properly maintained which would also reduce emissions. Therefore, emissions from internal combustion engines would result in minor short-term local effects on air quality due to the relatively low number of vehicles, adherence to equipment maintenance requirements, and continued improvement of emission control measures and fuel blends.

Air quality impacts from onsite construction activities would be temporary, and transportation of borrow material to support CUF construction activities would only occur when borrow material is needed. Air emissions would be dependent upon both man-made factors (e.g., intensity of activity, control measures) and natural factors (e.g., wind speed, wind direction, soil moisture). However, even under unusually adverse conditions, these emissions would have, at most, a minor transient impact on offsite air quality and would be well below the applicable ambient air quality standard.

3.2 Climate Change and Greenhouse Gases

3.2.1 Affected Environment

"Climate change" refers to any substantive change in measures of climate, such as temperature, precipitation, or wind lasting for an extended period (decades or longer) (EPA 2016). The 2014 National Climate Assessment concluded that global climate is projected to continue to change over this century and beyond. The amount of warming projected beyond the next few decades, by these studies, is directly linked to the cumulative global emissions of greenhouse gases (GHGs) (e.g., CO₂, methane). By the end of this century, the 2014 National Climate Assessment concluded a 3°F to 5°F rise can be projected under the lower emissions scenario and a 5°F to 10°F rise for a higher emissions scenario (Melillo et al. 2014).

Climate change is primarily a function of too much CO_2 in the atmosphere. CO_2 is the primary GHG emitted through human activities. Activities associated with the proposed action that produce CO_2 are primarily related to emissions from fossil-fuel-powered equipment (e.g., bulldozers, loaders, haulers, trucks, generators, etc.) during construction and transport of borrow material.

3.2.2 Environmental Consequences

3.2.2.1 Alternative A – No Action Alternative

Under this alternative, the borrow sites, access road, and bridge would not be constructed, and there would be no onsite project-related impacts to GHGs and climate change. However, as borrow to support current operations would be obtained from offsite sources, CO_2 emissions would be greater under this alternative than those evident under Alternative B due to the increase in vehicle miles travelled. Overall, CO_2 emissions associated with this alternative would be minor and are not anticipated to result in increases in regional GHG levels or impact climate change.

3.2.2.2 Alternative B – Develop and Operate Two Borrow Sites, Construct an Access Road and Bridge on CUF Property

As discussed in Section 3.1, CO₂ construction-related emissions would occur using internal combustion engines during construction activities and transport of borrow material. Due to the small number of vehicles and construction equipment involved, only a minor temporary increase in CO₂ emissions would be anticipated as a result of the construction of the access road and bridge and borrow site development. Such emission levels are *de minimis* in comparison to the regional and world-wide volumes of CO₂. Therefore, local and regional GHG levels would not be adversely impacted by emissions from construction activities.

In the long-term, borrow needed to support construction activities at CUF would be transported using dump trucks which would result in emissions of GHG. However, due to minimal transport distance and intermittent nature of borrow transport, the trucks would produce a minor, long-term increase in CO₂ emissions, but are not anticipated to increase regional GHG levels or impact climate change.

3.3 Geology and Soils

3.3.1 Affected Environment

3.3.1.1 Site Geology

As shown in Figure 3-1, CUF is in the Highland Rim Physiographic Province which is underlain by a sequence of sedimentary bedrock that extends from Mississippi and Northern Alabama through Tennessee, northward into Kentucky, Indiana, and Illinois. The formations that underlie this province consist of dolostone, limestone, shale, and sandstone. The bedrock strata have been subjected to an extended period of erosion which has produced a series of moderate to steeply sloping hills and broad valleys. The province is relatively flat or rolling upland into which a complex drainage pattern has been incised. In general, the elevation of this upland surface ranges from 700 feet to 800 feet mean sea level in the south and lowers northward to 600 to 700 feet mean sea level. The Cumberland River enters the Wells Creek area on the east and at an elevation of about 360 feet and leaves its western edge at an elevation of about 340 feet. The Cumberland River has subsequently deposited a blanket of alluvium at lower elevations over the bedrock (State of Tennessee 1968).



Figure 3-1. Physiographic Sections of the TVA Power Service Area Region (Adapted from Fenneman 1938)

The area around CUF is in a distinctive geologic setting that is characterized as an ancient meteor impact crater. This feature is known as the Wells Creek Impact Structure (Figure 3-2) which is approximately 2 miles in diameter and is generally concentric in form as evidenced in published geologic maps (Law Engineering 1992). The floor of the basin ranges from 360 to 450 feet in elevation. Central Hill is located near the center of the basin which rises to about 450 feet. Surrounding Central Hill is the belt of prominent inner ring-shaped valleys, which ranges in elevation from 360 to 380 feet. This feature is surrounded, in turn, by a broken ring of annular ridges, an incomplete belt of outer annular valleys, and an outer belt of annular ridges 500 to 600 feet in elevation (State of Tennessee 1968).



Figure 3-2. Wells Creek Impact Structure Located in Stewart County, Tennessee in Relation to the Cumberland Fossil Plant (Source: Law Engineering 1992)

Generalized geology of the proposed borrow sites was obtained from the U.S. Geological Survey (USGS) web site (USGS 2017a) (Figure 3-3). Geologic formations mapped within the project area are associated with the Wells Creek Basin Structure. In the northernmost borrow site, these formations include the Devonian-aged Pegram, Camden, Harriman, and Flat Gap and Ross Formations. The southernmost borrow site is primarily underlain by bedrock of Ordovician Age comprised of formations of the Richmond Group and Nashville Group. These formations are faulted and typically consist of limestone interbedded with shale of Devonian, Silurian, and Ordovician age. Depth to bedrock ranges from 7 feet to 16 feet.



Figure 3-3. Generalized Geologic Map of the Wells Creek Impact Structure Located in Stewart County, Tennessee

3.3.1.2 Geologic Hazards

There are federal design requirements to allow the structures to withstand a major destructive earthquake originating in the New Madrid seismic zone (the same area that suffered a major earthquake in 1812). CUF is on the edge of this zone (USGS 2009). According to the USGS hazard map, CUF would suffer minimal damage, but federal and Tennessee state regulations require appropriate design measures to be implemented to minimize impacts from design seismic events.

Faults – Four main concentric faults are associated with the Wells Creek Structure (Meteorite Impact Structure). The proposed borrow sites, access road, and new bridge are located just east and northeast of the center of the Wells Creek Structure. Numerous faults are present beneath and nearby CUF. The Wells Creek structure, including the surrounding radial faults, is late Mississippian in age and the USGS database indicates no faults or folds within and around the site occurred during the more recent Quaternary Period which includes the Holocene Epoch (Stantec 2016). The Carlisle Fault is located outside of the structure, but it is not believed to be associated with the Wells Creek Structure (State of Tennessee 1968). The areas between each concentric fault are represented by hill and valley terrain that extend from the center of the structure to its periphery. However, faults near CUF are located deep beneath the surface and have been re-cemented over geologic time posing no significant seismic concern (Law Engineering 1992). Additionally, the faults have not exhibited displacement in Holocene time.

Karst Topography – "Karst" refers to a type of topography that is formed when rocks with a high carbonate content, such as limestone and dolomite, are dissolved by groundwater to form sinkholes, caves, springs and underground drainage systems. Karst topography forms in areas where limestone and dolomite are near the surface.

Karst features are not known to exist within the footprint of the proposed borrow site or access road. This is consistent with published geologic maps of Steward County and of the Wells Creek Basin structure which indicate that sinkhole potential in the Fort Payne Formation (Mfp) (predominant formation underlying the site) is unlikely.

Soils – According to the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) web soil survey (NRCS 2017), most of the native soils on the proposed project areas are silty and clay loams. The extent of soils mapped within the proposed borrow sites and access road project areas are shown on Table 3-1.

Soil Type	Project Area (acres)
Aa – Nolin silt loam, occasionally ponded	18.1
Ba – Sengtown gravelly silt loam, 5 to 12 percent slopes	8.2
Bh – Bodine gravelly silt loam, 12 to 20 percent slopes, eroded	1.8
Ga – Humphreys Gravelly silt loam, 2 to 5 percent slopes	0.3
Gc – Trace silt loam, 2 to 5 percent slopes	3.8
Hb – Maury silty clay loam, 5 to 12 percent slopes, eroded	36.8
Lg – Lindell silt loam, 0 to 2 percent slopes, occasionally flooded	8.9
Ma – Melvin silt loam, frequently flooded	6.5
Pf – Byler silt loam, 5 to 12 percent slopes, eroded	29.5
Ga – Humphreys Gravelly silt loam	0.3
Ha – Maury silty clay loam, 12 to 20 percent slopes, eroded	0.03
Tb – Gumdale silt loam, rarely flooded	0.6
Total	114.8

Source: NRCS 2017

According to soil boring data collected by TVA, most of the proposed borrow areas is overlain by topsoil having an average thickness between roughly 4 to 7 inches followed by a layer of silt with an average thickness of about 2 feet (if present). Clays with varying amounts of sand and gravel were present below the silt layer that extended to the bedrock (Stantec 2015).

3.3.2 Environmental Consequences

3.3.2.1 Alternative A – No Action Alternative

Under Alternative A, no excavations or construction would occur. Therefore, there would be no impacts to geological resources.

3.3.2.2 Alternative B – Develop and Operate Two Borrow Sites, Construct an Access Road and Bridge on CUF Property

3.3.2.2.1 Construction Impacts

Development of the borrow sites and access road would involve ground disturbing activities that would include clearing and grubbing. Topsoil in the borrow areas would be stockpiled, and borrow soils would be excavated to near bedrock (about 16 to 17 feet below ground surface). As described above, the bedrock underlying the proposed borrow site is composed of carbonate rocks associated with the Wells Creek Basin Structure. Neither access road construction nor excavations of borrow sites are expected to impact bedrock formations.

Approximately 114 acres of surface soils would be directly impacted. Soil functions in these areas would be adversely impacted until restoration is completed. Clearing and grubbing have the potential to disturb soil stability and increase erosion. Despite this, impacts to soil resources associated with surface disturbances related to the proposed clearing and grubbing activities are expected to be minor. BMPs outlined in the SWPPP would be implemented to minimize erosion during land clearing, site preparation, and access road construction. Stockpiles of topsoil would be used for borrow site restoration and help promote native soil biota and re-establishment of soil functions.

Some faulting has taken place due to the meteor impact; faults are considered dormant structures that typically do not join existing active faults in the subsurface. Additionally, karst features are not known to exist within the footprint of the proposed borrow sites or access road. The design of the bridge sufficiently addresses soils and materials that may be susceptible to liquefaction, soil strength and slope stability, differential settlement potential, and fill material selection and compaction requirements. Therefore, based on these design considerations, risks associated with geological features and soils are expected to be minor.

3.3.2.2.2 Operational Impacts

TVA would consider earthquake loads (and the secondary effects of strong ground shaking) as part of the design of the new bridge. These design considerations are expected to mitigate the potential seismic risk of impact to the bridge structure. Therefore, no notable seismic impacts are expected to occur on the proposed bridge that would impair operation.

3.4 Groundwater

3.4.1 Affected Environment

3.4.1.1 Regional Aquifers

Aquifers near CUF are described as the bedrock carbonate aquifer and the alluvial aquifer associated with the Wells Creek Embayment and the Cumberland River.

As described in Section 3.3 (Geology), CUF is located just to the north of the center of the Wells Creek Impact Structure, whereas the proposed borrow sites and access road are located just east and northeast of the center of the Wells Creek Impact Structure. The center of the impact structure is mostly overlain by the Wells Creek Embayment. This embayment is low lying and drains into the Cumberland River to the North. Wells Creek drains from the south to the north and borders the southern and western portion of CUF. It is thought that groundwater recharge occurs primarily along the elevated perimeter of the basin where a portion of rainfall percolates into the near-surface rock outcrops and overburden soils. Groundwater flows downgradient by forces of gravity through the pore spaces of soils and along any fractures, faults, or joints in the bedrock (Law Engineering 1992).

Soils near the borrow areas are composed of those formed over the regional bedrock and alluvial parent materials associated with Wells Creek. Dominant soils included within the borrow areas include Maury silty clay loam, Byler silt loam and Nolin silt loam. Surficial groundwater associated with the water table within soils of the residuum is expected to be deep (e.g., Maury soils), whereas the water table may be more shallow in soils formed in alluvial parent materials (Byler and Nolin soils) (NRCS 2017). Groundwater is present within the alluvial material, particularly at lower elevations near Wells Creek (Law Engineering 1992). Boring studies conducted near the proposed borrow sites confirm the absence of established groundwater formations within the proposed borrow area as no groundwater was observed at borings locations or test pits with the borrow sites (Stantec 2015).

Bedrock of carbonate formations of the Highland Rim are generally slightly alkaline and high in dissolved solids and hardness. The quality of regional groundwater from shallow bedrock aquifers is generally soft to moderately hard, but may contain elevated concentrations of iron. Most groundwater from the alluvium along the Cumberland River is generally harder and contains more iron than groundwater derived from the bedrock aquifers.

Domestic water wells within 1 mile of the subject site are either up-gradient or in another hydrologic zone. Therefore, there are no local users of groundwater near the proposed project areas.

3.4.2 Environmental Consequence

3.4.2.1 Alternative A – No Action Alternative

Under Alternative A, no construction would occur on TVA property. Consequently, no impacts to groundwater resources would occur under this alternative.

3.4.2.2 Alternative B – Develop and Operate Two Borrow Sites, Construct an Access Road and Bridge on CUF Property

The proposed borrow sites and access road are on terraces and alluvial areas along Wells Creek. Soil data coupled with field borings demonstrate that groundwater in the vicinity of

proposed borrow sites is not likely to be evident in more upgradient soils formed in residuum as groundwater is expected to occur at deeper elevations. Consequently, within such areas no notable impacts to groundwater would occur.

Shallow surficial groundwater may, however, be expected to occur seasonally in localized areas within the borrow sites and access road. Along the access road area, however, no deep excavations are planned that would impact groundwater. Within the southern borrow site, seasonally shallow groundwater may be expected in alluvial areas that are also characterized as having wet weather conveyance channels. During borrow site excavation, some localized reduction of seasonal groundwater availability may occur due to the excavation of areas that may function as groundwater recharge zones.

Impacts to groundwater are considered localized and limited to potential effects on seasonal surficial groundwater patterns. Because water producing aquifers are deeper and substantially unaffected by proposed construction activities, no impacts to regional groundwater availability or water quality are expected. Therefore, impacts to groundwater are minor.

3.5 Surface Water

3.5.1 Affected Environment

Primary surface water features in the project area include Wells Creek and Scott Branch, a tributary to Wells Creek (Figure 3-4). Jurisdictional streams and wetlands were delineated within the project areas in August 2014 and confirmed in December 2016 (Amec Foster Wheeler 2017). Wetlands are described in Section 3.11. The field survey identified 371 linear feet of streams within the proposed northern borrow site and access road project areas. Three wet-weather conveyances (WWCs)/ephemeral streams that flow northeast through the south borrow site (labelled as WWC-1, WWC-2 and WWC-4) were also identified during this field survey. These WWCs only experience water flows during wet weather conditions. Two farm ponds were identified in the south borrow site. These ponds are primarily used as cattle waterholes and are very shallow.

Wells Creek flows into Barkley Reservoir on the Cumberland River near River Mile (RM) 102.8. Wells Creek is identified by TDEC in the 2014 biennial stream assessment as being "fully supporting" of the intended uses of Wells Creek. However, Wells Creek was previously identified as being impaired by *Escherichia coli* from failing collection systems in the City of Erin area. Wells Creek was de-listed in 2016 (TDEC 2016a) when the 2014 303d list became final. Wells Creek in Houston County was identified as one of three tributaries to Barkley Reservoir to be impaired by pathogens and a Total Daily Maximum Load study was completed (TDEC 2007). Other TDEC reports identified the entire main stream of Wells Creek to the outlet to Barkley Reservoir as being impaired (TDEC 2008). The cause of the previous non-supporting classification for Wells Creek (sewage overflows in City of Erin) has been eliminated. Pathogen sampling of the stream during 2010-2011 indicated that the water quality standard was being met. Accordingly, Wells Creek has been delisted. Erin Creek, a tributary to Wells Creek, remains a non-supporting stream segment within the Wells Creek watershed with elevated pathogen levels (TDEC 2016a).



Figure 3-4. Environmental Features of the Proposed Project Sites Located in Stewart County, Tennessee
The Lower Cumberland River from the Kentucky-Tennessee line (RM 74.6) to Cummings Creek (RM 118.3) is classified for use for domestic and industrial water supply, fish and aquatic life, recreation, livestock watering and wildlife, and irrigation. Wells Creek from RM 0.0 at its convergence with the Cumberland River to its origin is classified for use for fish and aquatic life, recreation, livestock watering and wildlife, and irrigation (TDEC 2016a). Scott Branch, a tributary to Wells Creek located adjacent to CUF has not been assessed and is classified for use for fish and aquatic life, recreation, livestock watering and wildlife, and irrigation in accordance with TDEC rules, Chapter 0400-40-04. No Nationwide Rivers Inventory streams or Wild and Scenic Rivers are near the proposed project sites.

The Cumberland River (Barkley Reservoir) downstream of CUF is subject to the influence of the thermal discharges from the plant. Under normal conditions, the Cumberland River flow near CUF is primarily dependent upon releases from the USACE Cheatham Dam located approximately 46 miles upstream, and to a lesser extent by downstream releases from Barkley Dam and tributary inflows upstream of the plant. However, in 2007 leakage was discovered in the USACE's Wolf Creek Dam located upstream of CUF at Cumberland River Mile 460.9 which impounds the 65,530-acre Lake Cumberland in Russell County, Kentucky. To accommodate repairs, the reservoir pool was lowered substantially which resulted in reduced flows in the Cumberland River system downstream for approximately 5 years. During this time of reduced river flows; and even though the plant reduced power production (derated) to comply with thermal discharge limits, a large proportion of the flow in the river was withdrawn by the plant for condenser cooling which magnified the potential for adverse effects to the aquatic community downstream.

Wolf Creek Dam repairs were completed in 2013 and full pool elevations were restored in 2014. At this time, river flows past the plant have returned to historical norms and TVA's biological monitoring indicates that biological recovery is occurring and a balanced, indigenous population of aquatic life is returning to the river downstream of the plant (TVA 2017a). Barkley Reservoir (TN Waterbody ID TN05130205 015 – 1000) is still currently listed on the state 303(d) report as impaired, only partially supporting its designated uses in Stewart and Montgomery counties because of industrial thermal discharges (TDEC 2016a).

Flow in Wells Creek is less affected by Cumberland River conditions at greater distances upstream from its mouth and more influenced by discharge from the Wells Creek watershed itself. Low flows are typically associated with water quality concerns. There is no long-term USGS streamflow monitoring station on Wells Creek or within the Wells Creek watershed. There were, however, a series of six low-flow measurements made on Wells Creek upstream in Houston County at a location with a drainage area of 34.5 square miles during the drought period from 1962 through 1964 (USGS Station 05130205 Wells Creek near Erin, Tennessee). Three of the six measured flows during that time were in the range of 7.7 to 9.0 cubic feet per second (cfs).

The low flow statistics for Wells Branch and Scott Branch at the proposed access road and bridge crossing locations are provided in Table 3-2. At the Wells Creek crossing, backwater conditions exist but the flows in Table 3-2 provide an indication of the flow rate and velocity through the project area during low flow periods.

	Low Flow (cfs)	
Flow Parameter	Wells Creek	Scott Branch
7-Day, 10-Year Mean Flow	10.1	0.09
30-Day, 5-Year Mean Flow	13.2	0.12
Mean Flow Annual	93.8	0.99
Mean Flow Summer (June through August)	44.4	0.40
99.5% Exceedance	9.71	0.087

Table 3-2.Low Flow Statistics for Access Road Crossing Locations on Wells
Creek and Scott Branch in Stewart County, Tennessee

Sources: USGS 2017b, Law et al. 2009

3.5.2 Environmental Consequences

3.5.2.1 Alternative A – No Action

Under this alternative, no construction would occur on TVA property, and no direct or indirect effects to local surface water resources are anticipated.

3.5.2.2 Alternative B – Develop and Operate Two Borrow Sites, Construct an Access Road and Bridge on CUF Property

Development of borrow areas and construction of the access road and bridge would involve ground disturbance and construction activities resulting in the potential for increased sediment release and erosion. On-going operations would potentially generate dust and sediment loading as a result of stormwater runoff and equipment washing. Land disturbing activities associated with access road construction would be short term (6 to 9 months), whereas land disturbance of borrow sites would be long term occurring throughout the duration of borrow site operation. Excavation of the southern borrow site would have a direct impact to the 2,851 linear feet of stream and two small farm ponds. Existing stormwater flow patterns would be maintained throughout excavation of the proposed borrow sites and upon completion of borrow activities.

Excavation of the borrow sites is expected to result in final graded areas that are relatively flat and low-lying compared to the existing conditions. Upon completion of borrow activities, the finished borrow site is expected to be covered with stockpiled topsoil and then stabilized with an approved seed mix. Because these areas are depressed relative to the surrounding landscape, no runoff to adjacent receiving streams would occur. Soil erosion and turbidity, as well as other potential water quality concerns, may be reduced due to lower runoff rates. The affected areas are relatively small compared to the Wells Creek watershed area.

Construction of the access road, a bridge over Wells Creek and a culvert within Scott Branch would directly impact approximately 110 feet of Wells Creek and approximately 90 linear feet of Scott Branch. As part of construction of the bridge, TVA would extend rip rap currently in place on the upstream and downstream banks of Wells Creek near the bridge piers to minimize stream bank erosion. Rip rap would be placed above the ordinary high water mark and would not be expected to have an impact on Wells Creek. During construction of the proposed bridge and access road, the disturbance of soils and sediment creates the potential for increased turbidity and suspended solids in Wells Creek. Although construction period BMPs such as turbidity curtains would be implemented, increased turbidity and suspended solids would be unavoidable impacts resulting from work in the creek or runoff from the work area in the event of a rainfall occurrence. None of the anticipated activities would result in impacts that could exacerbate identified water quality concerns identified above.

For all proposed construction and operation activities, TVA would comply with all appropriate state and federal permit requirements. A General Permit for Stormwater Discharges Associated with Construction Activities (TDEC 2016b) would be required for this project, and this permit would require development of a project-specific SWPPP. BMPs would be based on the Tennessee Erosion and Sediment Control Handbook. Additionally, work in conjunction with the bridge and access road development would require a TDEC ARAP and USACE 404 Nationwide permit.

Appropriate BMPs as described in the project specific SWPPP and Tennessee Erosion and Sediment Control Handbook (TDEC 2012) would be followed to minimize impacts associated with soil disturbance and all proposed project activities (including equipment washing and dust control discharges). Additionally, all construction and operation activities would be conducted in a manner to ensure that waste materials are contained and managed appropriately (e.g., refueling, maintenance activities, and storage of equipment) to ensure that the introduction of pollutants to the receiving waters would be minimized.

Proposed project activities result in minimal direct impacts to surface water resources and include the use of BMPs that would further reduce indirect impacts to surface water. Therefore, both direct and indirect impacts to surface water resources are anticipated to be minor.

3.6 Floodplains

3.6.1 Affected Environment

A floodplain is the relatively level land area along a stream or river that is subjected to periodic flooding. The area subject to a 1 percent chance of flooding in any given year is normally called the 100-year floodplain. The area subject to a 0.2 percent chance of flooding in any given year is normally called the 500-year floodplain.

CUF is located along the left descending bank of the Cumberland River between approximately RM 102.5 and RM 104.0. This reach of the Cumberland River is also within Barkley Reservoir, which at normal summer pool elevation of 359 feet extends from Barkley Dam at RM 31 to Cheatham Dam near RM 148. Wells Creek is a tributary to Cumberland River that discharges at approximately RM 102.8 after passing through CUF. Scott Branch is a tributary of Wells Creek joining Wells Creek at about Wells Creek mile 1.5. The 2010 Stewart County, Tennessee, Flood Insurance Rate Map for the project area is presented in Figure 3-4.

From the Final Programmatic Ash Impoundment Closure Environmental Impact Statement (TVA 2016b), the 100- and 500-year flood elevations at Cumberland RM 102.8 on Barkley Reservoir would be 379.6 and 385.3 feet, respectively.

The floodplains of Scott Branch and Wells Creek are depicted as Zone A on the Flood Insurance Rate Map, which means that flood elevations on these streams have not been determined. Scott Branch is a small tributary to Wells Creek with a drainage area of approximately 0.7 square mile at the project location (USGS 2017b). The drainage area of

Wells Creek is about 57 square miles (USGS 2017b). Wells Creek at the project location has a bottom elevation of roughly 350 feet, and at normal summer water levels on Lake Barkley, the water depth in the creek is approximately 10 feet.

Flooding within the project area may occur from a Cumberland River flood, a flood on Wells Creek, a flood on Scott Branch, or a combination of these streams. Because the drainage area of the Cumberland River at Wells Creek is far greater than the drainage area of Wells Creek (including Scott Branch), the 100-year flood elevations on the Cumberland River would govern water surface elevations in a 100-year flood. Therefore, the 100- and 500-year flood elevations on Wells Creek and Scott Branch in the project area would be 379.6 and 385.3 feet, respectively.

3.6.2 Environmental Consequences

TVA adheres to the requirements of EO 11988, Floodplain Management. The objective of EO 11988 is "...to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative" (EO 11988, Floodplain Management). The EO is not intended to prohibit floodplain development in all cases, but rather to create a consistent government policy against such development under most circumstances. The EO requires that agencies avoid the 100-year floodplain unless there is no practicable alternative.

3.6.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would continue current CUF operations, would not develop borrow areas or the access road and bridge on TVA property, and would not conduct work that would result in a change in existing floodplain conditions. Therefore, there would be no direct or indirect impacts to floodplains, because there would be no physical changes to existing conditions.

3.6.2.2 Alternative B – Develop and Operate Two Borrow Sites, Construct an Access Road and Bridge on CUF Property

About 13 acres of the 93-acre southern potential borrow site would be located within 100-year floodplains (see Figure 3-4). About 1 acre of the 6-acre northern borrow site would be located within 100-year floodplains. For the proposed borrow sites, any excavation of soil within the floodplain would increase the floodplain storage capacity slightly. Therefore, impacts to floodplains associated with borrow site construction, operation, or post-operation phases would be positive and minor.

A portion of the proposed access road would cross the floodplains of Wells Creek and Scott Branch. At Wells Creek, the natural ground rises rapidly from the left descending bank of Wells Creek to above the floodplain elevation. Similarly, the right descending bank rises abruptly to an elevation above the 500-year flood elevation along the perimeter road and impoundment system. Construction of the access road would require placement of about 1,300 cubic yards (0.8 acre-foot) of fill within the floodplain to size and slope the road. Consistent with EO 11988, minor fill for roads is considered to be a repetitive action in the floodplain that should result in minor impacts.

TVA proposes to construct a new bridge across Wells Creek. The proposed bridge would be located approximately 1.3 miles upstream from the existing Cumberland City Road/Tennessee Hwy 233 bridge near the Wells Creek outlet to the Cumberland River and

approximately 30 feet downstream of an existing bridge over Wells Creek. The proposed bridge is designed to minimize the impacts to flood conveyance.

The bridge has a total span of approximately 220 feet and consists of two sets of piers that would line up hydraulically with the piers of the existing upstream bridge (Stantec 2017). The bridge deck width is anticipated to be 52 feet. The proposed bridge deck across Wells Creek would be designed so that the low beam of the bridge deck would exceed the elevation of the 100-year flood. The open area for flood conveyance for Wells Creek flood flows is estimated to be approximately 3,300 square feet (50-foot bottom width, 2:1 side slopes, and 30-foot depth from streambed to low beam). With a 100-year Wells Creek discharge of 13,600 cfs, the average velocity through the bridge opening would be approximately 4.1 feet per second. This value is well within the range of acceptable velocities in most instances, and is not expected to create significant ponding of flood water upstream of the bridge or excessive scour.

The portion of the access road crossing Scott Branch would be located within the Federal Emergency Management Agency (FEMA) 100 year floodplain. Culverts associated with roads are considered repetitive actions in the floodplain (46 Federal Register 22845 [April 21, 1981]). The proposed access road culvert at Scott Branch would be designed in accordance with standards appropriate for the site and the planned use of the road, which would minimize adverse impacts. Indirect impacts would be minor and insignificant because they would be limited to floodplains within the CUF footprint and would not support additional development within the floodplain.

Based upon implementation of standard BMPs, the proposed borrow sites, bridge, and access road with culvert would be consistent with EO 11988, and therefore would have no significant impact on floodplains.

3.7 Vegetation

3.7.1 Affected Environment

CUF and surrounding areas are located within the Western Highland Rim, a subregion of the Interior Plateau ecoregion. This region is characterized by rolling hills with a geologic base of limestone, chert, and shale. The original oak-hickory forests were mostly removed in the 1800s in association with iron-ore mining, however, the region is once again heavily forested (Griffith et al. 1998).

The vegetation within a 5-mile radius surrounding CUF and within the project areas for the proposed activities was evaluated with land use/land cover information obtained from the National Land Cover Database (Homer et al. 2015). Land cover is summarized in Table 3-3 and illustrated in Figures 3-5 and 3-6.

The proposed project area for the access road is primarily deciduous forest (7 acres) and herbaceous areas (6.0 acres). The northern borrow site is primarily herbaceous vegetation (6.0 acres). The southern borrow site is primarily herbaceous (79.0 acres) with some deciduous forest (14.0 acres) associated with hedgerows and drainageways.

Land cover in the vicinity is primarily deciduous forest (61,203 acres), hay/pasture (6,612 acres), herbaceous/grassland (5,484 acres) and cultivated crops (3,535 acres) (Table 3-3).

Land Cover Type	Access Road (ac)	Northern Borrow Site (ac)	Southern Borrow Site (ac)	Laydown Area (ac)	5-mile Radius (ac)	
Barren Land					35	
Cultivated Crops					3,535	
Deciduous Forest	7	0.3	14		61,203	
Developed, High Intensity					109	
Developed, Low Intensity	0.1				336	
Developed, Medium Intensity					284	
Developed, Open Space	0.2			0.8	2,803	
Emergent Herbaceous Wetlands	0.2		-		174	
Evergreen Forest					776	
Hay/Pasture					6,612	
Herbaceous	6	6	79	0.2	5,484	
Mixed Forest					3	
Open Water	0.3		0.3		2,398	
Shrub/Scrub					551	
Woody Wetlands	0.6				2,033	
Totals	14.2	6.3	93.3	1.0	86,336	

Table 3-3.Land Cover of the Proposed Project Areas and Landcover within the
Vicinity of Cumberland Fossil Plant in Stewart County, Tennessee

Source: Homer et al. 2015



Figure 3-5. Land Cover within the Proposed Project Areas of Disturbance Located in Stewart County, Tennessee



Figure 3-6. Land Use/Land Cover within the Vicinity of the Cumberland Fossil Plant Located in Stewart County, Tennessee

Plants observed during the project site visit conducted in November 2016 and February 2017 are shown on Table 3-4.

		Areas Sur	veyed
Common Name	Scientific Name	Borrow Areas	Access Road
Trees and Shrubs			
American beech	Fagus grandifolia	Х	Х
American elm	Ulmus americana	Х	Х
American hornbeam	Carpinus caroliniana	Х	Х
American sycamore	Platanus occidentalis	Х	Х
Black cherry	Prunus serotina	Х	Х
Black locust	Robinia pseudoacacia		Х
Black willow	Salix nigra	Х	
Boxelder	Acer negundo	Х	Х
Chinese privet	Ligustrum sinense	Х	Х
Chinquapin oak	Quercus muehlenbergii	Х	Х
Coralberry	Symphoricarpos orbiculatus	Х	Х
Eastern cottonwood	Populus deltoides	Х	Х
Eastern red cedar	Juniperus virginiana	Х	Х
Eastern redbud	Cercis canadensis	Х	Х
Flowering dogwood	Cornus florida	Х	Х
Green ash	Franxinus pennsylvanica	Х	Х
Hackberry	Celtis occidentalis	Х	Х
Honey locust	Gleditsia triacanthos	Х	Х
Japanese honeysuckle	Lonicera japonica	Х	Х
Loblolly pine	Pinus taeda	Х	
Northern red oak	Quercus rubra	Х	Х
Osage orange	Maclura pomifera	Х	Х
Pignut hickory	Carya glabra		Х
Red maple	Acer rubrum	Х	Х
Staghorn sumac	Rhus typhina	Х	Х
Sweet gum	Liquidambar styraciflua	Х	Х
White oak	Quercus alba	Х	Х
Winged elm	Ulmus alata	Х	Х
Yellow poplar	Liriodendron tulipifera	Х	Х
Herbaceous Plants			
Bermuda grass	Cynodon dactylon	Х	Х
Blackberry	<i>Rubus</i> sp.	Х	Х
Broomsedge	Andropogon virginicus	Х	Х
Cattail	Typha latifolia	Х	
Christmas fern	Polystichum acrostichoides	Х	

Table 3-4.	Vegetation Observed Within the Proposed Borrow Sites and
	Access Road Areas in Stewart County, Tennessee

		Areas Sur	veyed
Common Name	Scientific Name	Borrow Areas	Access Road
Cocklebur	<i>Xanthium</i> sp.	Х	
Common ragweed	Ambrosia artemisiifolia	Х	Х
Common rush	Juncus effusus	Х	Х
Fescue	<i>Festuca</i> sp.	Х	Х
Ironweed	<i>Vernonia</i> sp.	Х	Х
Johnson grass	Sorghum halepense	Х	Х
Milkweed	<i>Asclepias</i> sp.	Х	
Perilla mint	Perilla frutescens	Х	Х
Sedge	Carex lurida	Х	Х
Slender rush	Juncus tenuis	Х	
Thistle	Cirsium sp.	Х	Х
Wild teasel	Dipsacus sylvestris	Х	Х

Most of the southern borrow site contains herbaceous areas of vegetation and is currently used as pasture land. There are some small wooded hedgerows, WWC drainages and farm ponds. The most common herbaceous species in the borrow areas are fescue, Bermuda grass, and broom sedge. Within the wooded hedgerows and WWC drainage areas, box elder, red maple, hackberry, eastern red cedar, sycamore, and coralberry are the most common trees and shrubs.

The access road and northern borrow site are primarily comprised of herbaceous pasture land with some deciduous forested land. The common plants in this area include red maple, hackberry, American beech, eastern red cedar, sycamore, American elm, black locust, broomsedge, Bermuda grass, fescue, and blackberry.

EO 13751 (Invasive Species) defines an invasive species as any species that is not native to that ecosystem and whose introduction does or is likely to cause economic or environmental harm or harm to human health. Invasive plants are common in and near the project area. They include autumn olive, Japanese honeysuckle, Chinese lespedeza, and Johnson grass. All these species have the potential to affect the native plant communities adversely because of their ability to spread rapidly and displace native vegetation.

According to the TDEC, there are two rare plant communities listed as occurring in Montgomery and Stewart counties. While neither of these communities is ranked by NatureServe as globally rare, they are considered of conservation concern in Tennessee. These communities are Highland Rim Sinkhole and Depression Pond (rare, not state-listed, S2S3) and Pennyroyal Karst Plain Prairie and Barrens (rare, not state-listed, S2). These communities do not occur onsite; field surveys revealed there are no known sinkholes or high quality herbaceous communities within the project areas of the borrow areas, access road and bridge. In addition, the herbaceous areas within the proposed southern borrow area have been heavily grazed by cattle.

3.7.2 Environmental Consequences

3.7.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would continue current CUF operations, and no work would be conducted that would result in ground disturbance or removal of vegetation. Therefore, no project-related environmental impacts with respect to vegetation would occur under this alternative.

3.7.2.2 Alternative B – Develop and Operate Two Borrow Sites, Construct an Access Road and Bridge on CUF Property

Construction and operation of the proposed borrow sites, access road and bridge would result in the disturbance of plant communities from heavy equipment use, and the potential introduction and/or spread of invasive plant species from borrow material.

Under Alternative B, the proposed soil excavation activities would remove approximately 99 acres of vegetation and the access road would disturb 14 acres of vegetation. The vegetation in the project area is common and representative of the region. Therefore, no direct or indirect impacts to unique or important terrestrial plant communities are anticipated.

In both the northern and southern borrow areas, topsoil would be conserved for site restoration at the conclusion of operations. All elements of the borrow excavation would be performed in accordance with established TVA and other applicable federal, state, and local guidelines for earthwork activities. After borrow materials are exhausted within a particular site, topsoil would be replaced and the area would be reseeded with herbaceous noninvasive species. As such, in the long term, just as plant communities within each borrow site are dominated by herbaceous plant communities, herbaceous plant communities would dominate at the conclusion of the proposed project.

Potential indirect impacts to vegetation relate to the transportation of borrow material to CUF for use. Trucks hauling borrow material along existing and constructed access routes would potentially result in minor increases of fugitive dust and exhaust emissions that could indirectly impact vegetation resources along the route due to deposition. However, BMPs such as covered loads and responsible equipment maintenance would be implemented as appropriate to minimize impacts. Therefore, indirect impacts to vegetation from the transport of borrow material to CUF would be negligible.

The project areas are previously disturbed, and invasive plants are present. BMPs consisting of erosion control measures and use of approved seed mixes designed to establish desirable vegetation would mitigate the potential spread of invasive species. In addition, the borrow sites would be revegetated with native or non-native, non-invasive species such as perennial ryegrass, redtop and timothy. As such, the potential for the project to contribute to the spread of invasive plant species would be minimized, as directed by EO 13751.

There are no known special plant communities on the project sites. Additionally, plant communities impacted by the project are dominated by herbaceous pasture land, and in the long term, would be replaced by replanted herbaceous communities. Therefore, potential impacts to vegetation are minor relative to the abundance of similar cover types within the vicinity.

3.8 Wildlife

As described in Section 3.7 (Vegetation), plant communities in the proposed borrow sites and along the proposed access road consist primarily of heavily grazed pastures with scattered wooded hedgerows and drainages. The access road passes through some forest edge areas. Because habitats within the project areas are predominantly disturbed, the wildlife communities associated with these habitats consist of more common species that readily adapt to disturbed or altered habitats. These areas are not expected to support unique or rare wildlife species.

The proposed borrow areas are comprised of approximately 99 acres of pasture containing small wooded areas located along hedgerows and drainages (see Section 3.7 Vegetation). Several common bird and mammal species utilize the pasture and small wooded areas as habitat.

Wooded corridors may provide a limited amount of nesting habitat for migratory bird species as well as habitat for common amphibians, mammals, and reptiles. Habitat for these species may be provided within the hedgerows and wooded drainages scattered within the pasture dominated project sites.

Non-forested habitat, such as the open pastures consisting primarily of herbaceous vegetation within the proposed borrow sites and access road that also provides habitat for wildlife. These early successional habitats provide some limited nesting and foraging habitat for a variety of common grassland bird species and small mammals and reptiles. Wildlife species present in these more open habitats include those often associated with human presence.

Common wildlife species observed during the November 2016 and February 2017 site visits conducted for this project are summarized in Table 3-5.

			urveyed
		Borrow	Access
Common Name	Scientific Name	Areas	Route
Birds			
American crow	Corvus brachyrhynchos	х	х
American robin	Turdus migratorius	Х	Х
Black vulture	Coragyps atratus	Х	
Blue jay	Cyanocitta cristata	Х	Х
Carolina chickadee	Poecile carolinensis	Х	Х
Downy woodpecker	Picoides pubescens		Х
Eastern bluebird	Sialia sialis	Х	Х
Eastern phoebe	Sayornis phoebe		Х
European starling	Sturnus vulgaris	Х	
Great blue heron	Ardea herodias	Х	

Table 3-5.Wildlife Observed Within the Proposed Project Areas on
TVA Property at the Cumberland Fossil Plant in Stewart County,
Tennessee

		Areas S	urveyed	
Common Name	Scientific Name	Borrow Areas	Access Route	
Killdeer	Charadrius vociferus	Х		
Mourning dove	Zenaida macroura	Х	Х	
Northern cardinal	Cardinalis	Х	Х	
Northern flicker	Colaptes auratus		Х	
Northern mockingbird	Mimus polyglottos	х	Х	
Red-bellied woodpecker	Melanerpes carolinus		Х	
Red-shouldered hawk	Buteo lineatus		Х	
Red-tailed hawk	Buteo jamaicensis	Х		
Red-winged blackbird	Agelaius phoeniceus	Х		
Sandhill crane ¹	Grus canadensis			
Song sparrow	Melospiza melodia	х	Х	
Tufted titmouse	Baeolophus bicolor	Х	Х	
Turkey vulture ¹	Cathartes aura	х		
White-throated sparrow	Zonotrichia albicollis		Х	
Mammals				
Coyote	Canis latrans	х		
Eastern chipmunk	Tamias striatus		Х	
Eastern gray squirrel	Sciurus carolinensis	Х	Х	
Fox squirrel	Sciurus niger	х		
Raccoon	Procyon lotor	Х		
White-tailed deer	Odocoileus virginianus	Х	Х	
Amphibians				
Upland chorus frog ²	Pseudacris feriarum		Х	

¹ Observed as a flyover.

² Heard near access road.

Several migratory bird species of concern are listed in the region surrounding CUF. These include Bachman's sparrow, bald eagle, blue-winged warbler, cerulean warbler, chuck-will's-widow, dickcissel, fox sparrow, Kentucky warbler, least bittern, loggerhead shrike, prairie warbler, prothonotary warbler, red-headed woodpecker, rusty blackbird, sedge wren, short-eared owl, willow flycatcher, wood thrush, and worm eating warbler (U.S. Fish and Wildlife Service [USFWS] 2017). The pastures with scattered woodland corridors within the proposed borrow areas are not likely to provide suitable habitats for most of these species, however may be marginally suitable for dickcissel, loggerhead shrike, sedge wren and foraging short-eared owl. Forested areas along the access routes may provide limited habitat for some of these species, including chuck-will's-widow, Kentucky warbler, fox sparrow, prairie warbler, wood thrush, and worm-eating warbler. Federal and/or state-listed migratory bird species known to occur near CUF are addressed in greater detail in Section 3.10 (Threatened and Endangered Species).

No caves have been documented at CUF. One cave occurs within 2.6 miles of CUF in Houston County. No caves were observed on the project sites during the site visits.

3.8.1 Environmental Consequences

3.8.1.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would continue current plant operations and would not develop borrow sites and the associated access road on TVA property. Because no work would be conducted that would result in loss or disturbance of wildlife habitat, no project-related environmental impacts with respect to wildlife would occur under this alternative.

3.8.1.2 Alternative B – Develop and Operate Two Borrow Sites, Construct an Access Road and Bridge on CUF Property

Impacts to wildlife would generally result from loss of habitat via vegetation removal required for construction of the access road and removal of borrow material.

The two borrow areas consist of primarily herbaceous pasture vegetation with a few scattered trees and wooded corridors along hedgerows and drainages. These habitats offer relatively low quality wildlife habitat. Under this alternative, the resident, common and habituated wildlife found in the project area would continue to opportunistically use other available habitats within the CUF property. During construction and operation, most wildlife present within the project sites would likely avoid the construction site and disperse to adjacent and/or similar habitats. Direct impacts to less mobile fauna would be expected. However, given the disturbed nature of the project areas, any impacts during construction and operation would be minor.

Following removal of materials from the two borrow areas, stockpiled topsoil would be placed back over the areas, and the areas would be seeded. Therefore, it is anticipated that these areas would revert to herbaceous habitats in the long term and provide similar wildlife habitats as the existing conditions. Although wooded corridors along the perimeter of the proposed borrow site would be avoided, wooded corridors and hedgerows impacted would not be replanted with trees, but over time, successional and wooded areas may develop if the areas are not maintained. The herbaceous habitats may be expected to provide limited foraging and nesting habitat for grassland species.

No caves were observed on the project sites during the site visits. However, should caves be identified during the project construction, they would be examined for use by wildlife, including threatened and endangered species

While the proposed project would result in alteration of habitats and displacement of resident wildlife species, impacts to wildlife are not expected to result in notable large-scale habitat alteration or destabilization of any wildlife species. Therefore, impacts to wildlife resulting from the borrow areas and access routes would be minor.

3.9 Aquatic Ecology

3.9.1 Affected Environment

The primary aquatic environments within the CUF property include Barkley Reservoir (Cumberland River, a tributary to the Ohio River), Wells Creek (a tributary to the Cumberland River), and Scott Branch (a tributary to Wells Creek) (see Figures 1-1 and 3-5). The Cumberland River is impounded prior to its confluence with the Ohio River to create Barkley Reservoir. However, near CUF, which is located approximately 72 miles upstream of the Barkley Reservoir Dam, Barkley Reservoir exhibits riverine conditions. CUF

is located along the left descending bank near RM 103. Barkley Reservoir-Cumberland River adjacent to CUF is characterized as having poor to fair shoreline aquatic habitat with no aquatic macrophytes.

Water resources were identified and delineated within the project areas in August 2014 and confirmed in December 2016 (Amec Foster Wheeler 2017). Wells Creek is a small tributary of the Cumberland River that flows south-north through the central portion of the CUF property and through the eastern edge of the access road project area. Scott Branch is a tributary of Wells Creek that flows west-east through the property. There is also an unnamed intermittent stream that is a tributary to Scott Branch within the access road project area. The lower reach of this stream, near its confluence to Scott Branch and within the access road project area, has flowing water. The upper reach of this stream, outside/upstream of the access road project area, is dry during parts of the year and only experiences water flow during wet weather.

The fish community of Wells Creek consists primarily of warmwater species with a mix of species typical of both rivers and reservoirs due to its proximity to the main stem of Barkley Reservoir (TVA 2016a).

In the Tennessee River system, TVA has used a Reservoir Ecological Health monitoring program since 1990 to evaluate ecological conditions in major reservoirs. A component of this monitoring program is a multi-metric approach to data evaluation for fish communities known as the Reservoir Fish Assemblage Index. Fish communities are used to evaluate ecological conditions because of their importance in the aquatic food web and because fish life cycles are long enough to integrate conditions over time. Benthic (bottom dwelling) macroinvertebrate populations are assessed using the Reservoir Benthic Index methodology. Because benthic macroinvertebrates are relatively immobile, negative impacts to aquatic ecosystems can be detected earlier in benthic macroinvertebrate communities than in fish communities. A component of this monitoring program includes sampling the benthic macroinvertebrate community (TVA 2016a).

TVA sampled fish (electrofishing and gill netting) upstream and downstream of CUF between RMs 102 and 107 in the spring, summer, and autumn of 2015. Upstream of CUF, 1,576 fish (34 species) were collected in Spring 2015, 753 fish (32 species) were collected in Summer 2015, and 597 fish (37 species) were collected in Autumn 2015. Typical species upstream of CUF included gizzard shad, spotfin shiner, emerald shiner, yellow bass, bluegill, longear sunfish, and largemouth bass. Downstream of CUF, 1,643 fish (32 species) were collected in Spring 2015, 604 fish (27 species) were collected in Summer 2015, and 705 fish (31 species) were collected in Autumn 2015. Typical species downstream of CUF included threadfin shad, longear sunfish, emerald shiner, largemouth bass, bluegill, gizzard shad, and yellow bass. Ecological health ratings were similar for both the upstream and downstream sites for all three seasons, ranging from fair to good (TVA 2016a).

As part of the same TVA 2015 study, benthic (or bottom-dwelling) invertebrates were also collected. Oligochaetes, chironomids, and Asiatic clams were the dominant taxa both upstream and downstream of CUF (TVA 2016a). Ecological health ratings were similar between the upstream and downstream sites for all three seasons, ranging from fair to good

A 2011 mussel survey on the Cumberland River (spot dives) and Wells Creek (along sampling transects) near CUF found low abundances of a small number of relatively

common mussel species. The three most numerous freshwater mussel species included mapleleaf, wartyback, and pink heelsplitter. On the Cumberland River, 24 mussels were collected from 23 locations (catch per unit effort = 9 mussels per hour). On Wells Creek, 11 mussels were collected along four transect locations (density = 0.05 mussels per square meter) (Third Rock Consultants 2011).

There are three WWC/ephemeral streams within the south borrow project site. Total linear feet of the three WWC/ephemeral streams within the south borrow site is 2,851 feet. The WWC/ephemeral streams flow northeast through the south borrow site and only experience water flows during wet weather conditions. Thus, aquatic habitat within the WWC/ephemeral streams is expected to be very limited or absent as they are dry during much of the year.

Two small ponds were documented within the south borrow project site as part of a wetland and stream field delineation (Amec Foster Wheeler 2017) (see Figure 3-4). The surface area of the two ponds within the south borrow project site is only 0.35 acre. These farm ponds, primarily used as cattle waterholes, are very shallow in nature, and likely provide limited aquatic habitat. Given the small size and agricultural (cattle) use, habitat quality and species diversity of aquatic biota is expected to be low.

3.9.2 Environmental Consequences

3.9.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would continue current plant operations, would not develop borrow areas, and access road or bridge on TVA property. As a result, no work would be conducted that would result in loss or disturbance of aquatic resources. Therefore, no project-related environmental impacts with respect to aquatic ecosystems would occur under this alternative.

3.9.2.2 Alternative B – Develop and Operate Two Borrow Sites, Construct an Access Road and Bridge on CUF Property

Development of the borrow sites involves ground disturbing activities that would include grading and excavation. The temporary laydown area is previously disturbed and lacks aquatic resources. Development of the access road involves grading and vegetation clearing, culverting of Scott Branch, and construction of a bridge over Wells Creek. Existing roadways would be used to access the borrow sites during bridge construction.

There is no aquatic habitat within the north borrow site; thus, there would be no direct impacts to aquatic habitat. Development of the south borrow site would have a direct and permanent impact to habitat of the 2,851 linear feet of WWCs/ephemeral streams and the two small farm ponds. Direct impacts are expected to be minor given that these features provide limited aquatic habitat.

Direct and permanent impacts to aquatic biota and their habitats for the development of the access road would be limited to culverting of Scott Branch and construction of a bridge over Wells Creek. The culvert would have a direct impact on approximately 90 linear feet of Scott Branch. The culvert would be designed to allow for the movement of mobile aquatic organisms. Work performed in Wells Creek would consist of construction related to piers for bridge support, bridge abutments on the creek banks, and bank stabilization (placement of rip-rap) within the area of bank disturbance. These activities would adhere to TDEC ARAP and USACE 404 permit limit requirements and would utilize appropriate BMPs that would minimize potential indirect impacts associated with downstream transport and accumulation

of sediments. Watershed level impacts would be insignificant given the local abundance of similar aquatic resources, the limited aquatic habitat within the borrow sites (ponds and WWCs/ephemeral streams), and the relatively localized area of disturbance for the Scott Branch culvert and Wells Creek bridge.

Less mobile and sessile aquatic organisms (aquatic macroinvertebrates) of Scott Branch and Wells Creek and mobile aquatic resources (fish) of the ponds, Scott Branch, and Wells Creek would be directly impacted by excavation, culverting, and bridge work during construction. The direct impacts would be minor for mobile aquatic resources, such as fish of Scott Branch and Wells Creek, which would likely avoid sections of the stream during construction activities and may repopulate following construction completion. Additionally, many macroinvertebrate species would repopulate quickly through their mobile adult phase of life. Permanent impact would occur for aquatic organisms of the south borrow site ponds due to the excavation of the borrow site.

Indirect impacts to aquatic resources of more distant receiving streams from the development of the borrow sites, access road and bridge (i.e., WWCs/ephemeral streams, Wells Creek, Scott Branch) may be associated with stormwater runoff due to temporary construction activities associated with culverting, bridge construction and filling of WWCs/ephemeral streams. Any construction activities would adhere to permit limit requirements and would utilize BMPs as described in the Tennessee Erosion and Sediment Control Handbook (TDEC 2012) to minimize indirect effects on aquatic resources during the construction phase.

Following the construction phase, site-wide management of stormwater using appropriate BMPs would minimize indirect impacts to the aquatic community of the surrounding waters (Scott Branch, Wells Creek, and the WWCs/ephemeral streams). Thus, impacts to aquatic resources due to the development of the borrow sites, access road and bridge are expected to be minor.

3.10 Threatened and Endangered Species

3.10.1 Affected Environment

The ESA 16 United States Code [USC] §§ 1531-1543 was passed to conserve the ecosystems upon which endangered and threatened species depend, and to conserve and recover those species. An endangered species is defined by the ESA as any species in danger of extinction throughout all or a significant portion of its range. Likewise, a threatened species is likely to become endangered within the foreseeable future throughout all or a significant part of its range. Critical habitats, essential to the conservation of listed species, also can be designated under the ESA. The ESA establishes programs to conserve and recover endangered and threatened species and makes their conservation a priority for federal agencies. Section 7 of the ESA requires federal agencies to consult with the USFWS when their proposed actions may affect endangered or threatened species and their critical habitats.

The State of Tennessee provides protection for species considered threatened, endangered or deemed in need of management within the state other than those already federally listed under the ESA. Plant species are protected in Tennessee through the Rare Plant Protection and Conservation Act of 1985. The listing of species is managed by the TDEC. Additionally, TVA also maintains databases of aquatic and terrestrial animal species that are considered threatened, endangered, special concern, or are otherwise tracked in Tennessee because the species is rare and/or vulnerable within the state.

3.10.1.1 Wildlife

According to TDEC, 43 wildlife species of conservation concern occur in Stewart, Montgomery, and Houston counties (TDEC 2016c). While the proposed project sites are located within Stewart County, the projects are within 3 miles of Montgomery and Houston counties; therefore, these counties were included in the analysis. The USFWS Information for Planning and Conservation (IPaC) tool contains a listing of the federally listed species that have potential to occur near the project area. A review of the TVA Regional Natural Heritage database in February 2017 indicated that of those species listed by USFWS and TDEC, two species are currently known, or have been known, to occur within a 5-mile radius of CUF– the bald eagle and the northern long-eared bat. Species contained on the TVA, TDEC and USFWS IPaC lists are included in Table 3-6.

		S	Suitable	
Common Name	Scientific Name	Federal ¹	State ² (Rank ³)	Habitat Present⁴
Amphibians				
Barking treefrog	Hyla gratiosa		D (S3)	Ν
Hellbender	Cryptobranchus alleganiensis		D (S3)	P (Limited)
Fish				
Blue sucker*	Cycleptus elongatus		T (S2)	Ν
Lake sturgeon*	Acipenser fulvescens		E (S1)	N
Slenderhead darter	Percina phoxocephala		D (S3)	N
Southern cavefish	Typhlichthys subterraneus		D (S3)	Ν
Mollusks				
Clubshell**	Pleurobema clava	LE	E (SH)	Ν
Muddy rocksnail	Lithasia salebrosa		*(S2)	Ν
Orangefoot pimpleback	Plethobasus cooperianus	LE, XN	E (S1)	Ν
Pink mucket	Lampsilis abrupta	LE	E (S2)	Ν
Rabbitsfoot**	Pleurobema clava	LE	E (SH)	Ν
Ring pink	Obovaria retusa	LE, XN	E (S1)	Ν
Rough pigtoe	Pleurobema plenum	LE, XN	E (S1)	Ν
Slabside pearly mussel	Pleuronaia dolabelloides	LE	*(S2)	Ν
Tan riffleshell	Epioblasma florentina walkeri	LE	E (S1)	Ν
Crustaceans				
An amphipod	Stygobromus vitreus		*(S2)	Ν
Mammoth cave	Orconectes pellucidus		*(S3)	Ν
crayfish				
Birds	-		*(0.1)	
American bittern	Botaurus lentiginosus		*(S1)	P (Limited)
Bachman's sparrow	Aimophila aestivalis		E (S1B)	N

Table 3-6.Species of Conservation Concern Within Houston, Montgomery, and
Stewart Counties, Tennessee, and Within the Vicinity of Cumberland
Fossil Plant

		Status		Suitable
Common Name	- Scientific Name	Federal ¹	State ² (Rank ³)	Habitat Present⁴
Bald eagle**	Haliaeetus leucocephalus		D (S3)	N
Bewick's wren	Thryomanes bewickii		E (S1)	Р
Cerulean warbler	Dendroica cerulea		D (S3B)	Ν
Golden eagle	Aquila chrysaetos		T (S1)	Ν
Henslow's sparrow	Ammodramus henslowii		D (S1É)	Ν
Lark sparrow	Chondestes grammacus		T (S1B)	Р
Little blue heron	Egretta caerulea		D (S2B, S3N)	P(Limited)
Savannah sparrow	Passerculus sandwichensis		*(S1B, S4N)	`Р ́
Swainson's warbler	Limnothlvpis swainsonii		D (S3)	Ν
Vesper sparrow	Pooecetes gramineus		D (S1B, S4N)	Р
Mammals	J.		(-) -)	
American pygmy shrew	Sorex hoyi		(S2)	Ν
Cinereus Shrew	Sorex cinereus		D (S4)	Ν
Eastern small-footed	Myotis leibii		D (\$2\$3)	Р
Grav bat	Mvotis arisescens	LE	E (S2)	Р
Indiana bat	Myotis sodalis	LE	E (S1)	P
Meadow jumping	Zapus hudsonius		D (S4)	P (Limited)
mouse			ζ, γ	
Northern long-eared bat**	Myotis septentrionalis	LT	*(S1S2)	Р
Southeastern shrew	Sorex longirostris		D (S4)	P (Limited)
Southern bog	Synaptomys cooperi		D (S4)	N
lemming Reptiles				
Alligator snapping	Macrochelys temminckii		D (S2S3)	P (Limited)
turtle				
Copperbelly	Nerodia erythrogaster		*(S2S3)	P (Limited)
watersnake	neglecta			
Eastern slender glass	Ophisaurus attenuatus		D (S3)	N
lizard	longicaudus			
Northern pinesnake	Pituophis melanoleucus		T (S3)	N
Western pygmy	Sistrurus miliarius		T (S2S3)	Р
rattlesnake	streckeri			
Insects	Onkingennet		*/22)	
Acuminate snaketail	Ophogomphus acuminatus		*(S2)	N
Coleman cave beetle	Pseudanophthalmus colemanensis	C	*(S1)	N
Plants	colonianensis	U		
American dinsend	Panax quinquefolius		S-C (S3S4)	N
Reak grass	Diarrhena obovata		S (S1)	N
Bearded rattlesnake-	Prenanthes barbata		S (S2)	N
root Rivo mud plantain	Heteranthera limesa		T (\$1\$2)	N
	neteranthera IIInosa Salvia azurea var		I (3132) C (C2)	IN NI
Dive saye	arandiflora		3 (33)	IN
Bristly sedge	Carex comosa		T (S2)	N
Buffalo clover	Trifolium reflexum		F (S1)	N
Buffalo currant	Ribes odoratum		T (S1)	N
Butternut	Juglans cinerea		T (S3)	N
	J		()	-

		Status		Suitable
Common Name	- Scientific Name	Federal ¹	State ² (Rank ³)	Habitat Present⁴
Compass plant	Silphium laciniatum		T (S2)	N
Cow-parsnip	Heracleum maximum		S (S2)	Р
Cream wild-indigo	<i>Baptisia bracteata</i> var.		S (S1S2)	Ν
ç	leucophaea			
Creamflower tick-	Desmodium ochroleucum		E (S1)	Ν
trefoil				
Earleaved false-	Agalinis auriculata		E (S2)	Ν
foxglove	-			
Featherfoil	Hottonia inflata		S (S2)	P (Limited)
Fen orchid	Liparis loeselii		T (S1)	Ν
Fraser's loosestrife	Lysimachia fraseri		E (S2)	Ν
Hair grass	Muhlenbergia glabrifloris		S (S1)	Ν
Hairy hawkweed	Hieracium longipilum		S (S1)	Ν
Lake cress	Neobeckia aquatica		S (S2)	P (Limited)
Lamance iris	Iris brevicaulis		E (S1)	N
Lance-like spike-rush	Eleocharis lanceolata		S (S1)	Ν
Limestone blue star	Amsonia		S (S3)	Ν
	<i>tabernaemontana</i> var.			
	gattingeri			
Maryland milkwort	Polygala mariana		S (S1)	Ν
Matted spike-rush	Eleocharis intermedia		E (S1)	Ν
Missouri gooseberry	Ribes missouriense		S (S2)	Р
Muskingum sedge	Carex muskingumensis		E (S1)	Ν
Naked-stem	-		S (S2)	Ν
sunflower	Helianthus occidentalis			
Nuttall's waterweed	Elodea nuttallii		S (S2)	Ν
Ovate-leaved	Sagittaria platyphylla		S (S2S3)	Ν
arrowhead				
Ozark downy phlox	Phlox pilosa ssp.		S (S1S2)	Ν
	ozarkana			
Pale false-foxglove	Agalinis skinneriana		T (S1S2)	Ν
Pale-purple	Echinacea pallida		E (S1)	Ν
coneflower				
Prairie ragwort	Packera plattensis		S (S1)	Ν
Price's potato-bean	Apios priceana	LT	E (S3)	Ν
Purple milkweed	Asclepias purpurascens		S (S1)	Ν
Rock goldenrod	Solidago rupestris		E (S1)	Ν
Sand grape	Vitis rupestris		E (S1)	Ν
Sessile-fruited	Sagittaria rigida		E (S1)	Ν
arrowhead				
Short-beaked	Sagittaria brevirostra		T (S1)	Ν
arrowhead	-			
Short's bladderpod	Physaria globosa	LE	E (S2)	Ν
Short's rock-cress	Boechera shortii		S (S1S2)	Ν
Silky dogwood	Cornus obliqua		S (S2)	P (Limited)
Southern prairie-dock	Silphium pinnatifidum		T (S2)	N
Spreading false-	Aureolaria patula		S (S3)	Ν
foxglove	-		· · ·	
Sticky hedge-hyssop	Gratiola brevifolia		S (S1)	Ν
Swamp lousewort*	Pedicularis lanceolata		S (S1S2)	Ν
Sweet coneflower	Rudbeckia subtomentosa		Ť (S2)	Ν
Sweet-scented	Hasteola suaveolens		S (S2)	P (Limited)
Indian-plantain				

		Status		
Common Name	Scientific Name	Federal ¹	State ² (Rank ³)	Habitat Present⁴
White water-	Ranunculus aquatilis var.		E (S1)	P (Limited)
buttercup	diffusus			
Yellow water-	Ranunculus flabellaris		T (S2)	N
crowfoot				
Sources: TDEC 2016c, T ¹ Federal Status Codes: LE = Listed Endanger	/A 2017b, and USFWS IPaC 2017 ed: LT = Listed Threatened: C = Canc	lidate species: XN	= Non – essential expe	rimental
population in portion of	range; = Not Listed by USFWS;			
² State Status Codes:				
E = listed endangered; commercially exploited	S = species of special concern; T = li	sted threatened; S	S-C = species of special	concern,
³ State Rank:				
S1 = critically imperilec ranks because the exa for different population breeding population	l; S2 = imperiled; S3 = vulnerable; S4 ct rarity of the element is uncertain (e. segments (e.g. S1B, S2N, S4M); S#E	= apparently secu .g., S1S2); Migrato 3 = rank of breedin	ire; S#S# = Denotes a ra ory species may have se ig population; S#N = ran	ange of parate ranks k of non-
⁴ Habitat Codes:				
Y = Species has been N = No records of spec requirements.	documented in existing habitats in stu ies within study area and habitats wit	dy area and suital hin project area do	ble habitat is present o not overlap with specie	s habitat
P = Some habitats with species in study area.	in the project area are consistent with	n species recorded	l habitat preferences, no	records of
P (Limited) = Only hab	tats within the proposed creek crossir	ngs and along the	proposed access route a	are

consistent with species recorded habitat preferences, no records of species in study area.

* Rare, but not state listed

** Species documented within 3 miles (wildlife) 5 miles (plants) and 10 miles (aquatics) of CUF by the TVA Regional Natural Heritage database.

3.10.1.1.1 Terrestrial Animals

<u>Birds</u>

American bitterns reside in wetland or riparian habitats including both freshwater and brackish marshes as well as the edges of lakes or ponds. They typically require areas with emergent aquatic vegetation and scattered shrubs. Generally, larger areas of wetland (6.28 acres or more) are required for nesting, while smaller wetlands can be utilized for foraging for the American bittern (Gibbs, Melvin, and Reid 1992). No records of the American bittern exist within 3 miles of CUF. As the borrow area is largely pasture with no open water features that would support American bitterns, it is unlikely that these areas would provide habitat. A small amount of low quality habitat is located at the proposed bridge crossing at Wells Creek that may provide habitat for incidental use.

Bachman's sparrow is a large sparrow with a large bill and a rounded tail that is state-listed endangered with a rank of S1B. While Bachman's sparrow can be found in old fields, savannas, and woodlands, its preferred habitat is open pine or oak woods with a dense herbaceous understory (NatureServe 2015). The heavily grazed pasture fields in the proposed borrow areas do not provide suitable habitat for Bachman's sparrow. No records of Bachman's sparrow are known to occur within 3 miles of the project sites.

Bald eagles are typically found close to large, open bodies of water such as rivers, lakes, and reservoirs. Bald eagles will nest on cliffs or large trees near water (NatureServe 2015).

A review of the TVA Regional Natural Heritage database shows 19 records of bald eagles within Stewart County. There is one record of a bald eagle nest that was active from 2005 to 2009; the nest was located approximately 0.26 mile north of CUF between the two TVA powerline rights-of-way. Because the trees in the proposed borrow areas are generally too small to support a nest, it is unlikely that bald eagles would utilize that habitat for nesting; however, they may be seen flying over and near the project area as they move between foraging areas along the Cumberland River and tributaries including Wells Creek.

Bewick's wren occurs in farmyards, brushy places, open woods, and overgrown fields. They typically nest in small cavities, both those naturally occurring in trees and small human made cavities. When not nesting, this species can be found in open habitat including weedy fields, farm buildings, hedgerows, and pastures (NatureServe 2015). Based on the vegetation in the project areas, it is possible that this species may be found within the proposed borrow areas; however, no occurrences are known within 3 miles of CUF.

Cerulean warblers typically nest in forest areas with numerous large trees, although they have been known to use other types of nesting habitat opportunistically. These migratory birds may be found in Tennessee while nesting or as migrants. Their non-breeding habitat is in South America (NatureServe 2015). No known occurrences of cerulean warblers have been recorded within 3 miles of CUF, and the lack of large trees in the borrow or access road construction areas indicates that it is unlikely that this species would be found within the project areas.

Golden eagles are most commonly found in semi-open to open habitat such as prairies, savannah, sparse woodlands, or even barren areas that have sufficient mammalian prey and are near nesting sites. Usually, golden eagles nest on rock ledges; however, they are occasionally known to use trees. Tennessee is within the non-breeding resident range for the golden eagle (NatureServe 2015). The TVA Regional Natural Heritage database has one record of a golden eagle perching on a bluff 5.5 miles from CUF at the Cross Creek National Wildlife Refuge. Golden eagles may occasionally be seen flying over or utilizing nearby open areas as hunting grounds; however it is unlikely that they would be found nesting in the project area.

Henslow's sparrows utilize pastures and native grasslands with a preference for areas with tall grass species with a residual layer of dead vegetation (Reinking et al. 2000). This species has not been recorded within 3 miles of CUF. The grazed pasture land within the proposed borrow areas does not provide suitable tall grass habitat for Henslow's sparrow.

Lark sparrows utilize a wide variety of open habitats such as prairies, parkland, shrub thickets, pastures, riparian areas, as well as the edges of woodland. Areas selected by the lark sparrow typically have scattered bushes and trees as woody vegetation is a necessity for nesting (NatureServe 2015). The proposed borrow areas likely contain suitable habitat for the lark sparrow; however, no known records occur within 3 miles of CUF.

Little blue herons can be found in wetland environments such as marshes, ponds, lakes, meadows, mudflats, lagoons, streams and other calm, shallow, freshwater habitats. They nest in trees and shrubs approximately 4 meters off the ground near freshwater; however, this species primarily occurs as a passing migrant in Tennessee (NatureServe 2015). The only potential suitable habitat for the little blue heron occurs at the Wells Creek stream crossing; however, no known records occur within 3 miles of CUF.

Savannah sparrows utilize a wide range of vegetation types for nesting and foraging including tundra, coastal salt marshes, sedge bogs, grassy meadows, pasture, and cropland, although it is most commonly found in idle native and conservation reserve program lands. Generally it avoids areas with extensive tree cover (NatureServe 2015). The proposed borrow areas likely contain suitable habitat for the savannah sparrow; however, no known records occur within 3 miles of CUF.

Swainson's warblers nest in areas with dense shrub vegetation. It is a very secretive bird and is infrequently observed. It is most commonly observed nesting in cane breaks, low floodplain forests, and rhododendron and mountain laurel thickets. Tennessee is within the breading range of the Swainson's warbler (NatureServe 2015). The forested area does not have a dense shrub understory so it is unlikely that the Swainson's warbler would be found in the project area. No known records occur within 3 miles of CUF.

Vesper sparrows are a ground nesting birds that utilize a variety of open habitats including prairies, pastures, fields, woodland clearings, and dry shrub lands. Tennessee is primarily in the migration and non-breeding resident range for vesper sparrows, but nesting does occur in the state (NatureServe 2015). The TVA Regional Natural Heritage database has one record of vesper sparrows foraging at Lake Kyle, 12.7 miles from CUF. The pasture land within the proposed borrow areas may provide habitat for the vesper sparrow.

<u>Mammals</u>

Bats

Eastern small-footed bat is primarily found in hilly or mountainous forests. They forage over ponds and riparian areas, as well as in upland habitats such as open forests, clearings, strip mines, and ridgetops. This species may be found foraging in or near the project area for the proposed access road and north borrow site; however, no records are known to occur within 3 miles of CUF. Warm season roosts are generally in cracks and crevices of rocks along talus slopes or rocky outcroppings. They are also known to use manmade structures for warm season roosts. This species is known to return to the same summer roosts annually. No summer roost habitat is present within the project areas. Winter hibernation occurs in caves or mine tunnels (NatureServe 2015). No winter habitat is present within the project area.

The gray bat is listed as federally endangered by the USFWS. Gray bats almost exclusively roost in large caves found in Alabama, Arkansas, Kentucky, Missouri, and Tennessee with some smaller populations found in nearby states. They are sometimes found roosting in mines or buildings. The TVA database has seven records of gray bats in Stewart County. The closest record is 14.8 miles from CUF. Suitable roosting habitat for gray bats is not present within the proposed project areas because caves are lacking. Foraging habitat for this species may occur over Wells Creek, the Cumberland River and open water areas associated with the impoundments on CUF. Bellamy Cave is within 8 miles of CUF and provides suitable winter habitat (hibernacula) for the gray bat (Brady et al. 1982). Hibernacula are assigned priority numbers primarily based on winter population sizes and to protect essential hibernation sites across the species' range. Bellamy Cave is assigned Priority 1 (highest priority) based on its current and/or historically observed winter population and stable microclimate.

The Indiana bat is listed as federally endangered by the USFWS. The species overwinters in large numbers in caves and forms small colonies under loose bark of trees and snags in

summer months (Barbour and Davis 1974). Indiana bats disperse from wintering caves to areas throughout the eastern U.S. This species' range extends from New York and New Hampshire in the north to Alabama, Georgia, and Mississippi in the south, and as far west as eastern Kansas and Oklahoma (USFWS 2007). The species favors mature forests interspersed with openings. The presence of snags with sufficient exfoliating bark represent suitable summer roosting habitat. Use of living trees, especially species such as shagbark hickory, mature white oaks, and other trees with suitable roost characteristics in close proximity to suitable snags, has also been documented. Multiple roost sites are generally selected. The availability of trees of a sufficient bark condition, size, and sun exposure is another important limiting factor in how large of a population an area can sustain (Tuttle and Kennedy 2002, Harvey 2002, Kurta et al. 2002). A search of the TVA database indicates one record of Indiana bat within 21.1 miles of CUF. Additionally, CUF is within known swarming area for Indiana bats utilizing Bellamy Cave in Montgomery County, which provides winter habitat (a known hibernacula) for this species (USFWS 2015a). An acoustic survey conducted for another TVA project located within 200 feet of the proposed access road project area indicated a high probability that some of the calls recorded during the survey were those of Indiana bats. However, no Indiana bats were captured during mist netting operations within the project area (ESI 2011).

The northern long-eared bat is listed as federally threatened by the USFWS. Northern long-eared bats are found in the U.S. from Maine to North Carolina on the Atlantic Coast, westward to eastern Oklahoma and north through the Dakotas, reaching into eastern Montana and Wyoming, and extending southward to parts of southern states from Georgia to Louisiana. Suitable winter habitat (hibernacula) includes underground caves and cavelike structures (e.g., abandoned or active mines, railroad tunnels). These hibernacula typically have large passages with significant cracks and crevices for roosting; relatively constant, cool temperatures (32 to 48°F), high humidity and minimal air currents. During summer, this species roosts singly or in colonies in cavities, underneath bark, crevices, or hollows of both live and dead trees (typical diameter greater than or equal to 3 inches). Males and non-reproductive females may also roost in cooler places, like caves and mines. Northern long-eared bats forage in upland and lowland woodlots, tree-lined corridors, and water surfaces, feeding on insects. In general, habitat use by northern long-eared bats is thought to be similar to that used by Indiana bats, although northern long-eared bats appear to be more opportunistic in selection of summer habitat (USFWS 2016a). A search of the TVA Regional Natural Heritage database in January 2017 indicates that a known hibernacula for the northern long-eared bat occurs within 2.6 miles of CUF in Houston County. Additionally, CUF is considered swarming habitat (Swarming 1) by USFWS due to the proximity of Bellamy Cave, a known hibernacula for this species (USFWS 2015a). One northern long-eared bat (adult reproductive male) was captured during a mist netting study in 2011 approximately 0.7 mile south of the south borrow area in Houston County in a young lowland forest (ESI 2011).

In November 2016 and February 2017, an assessment was conducted to determine potential bat habitat suitability within forested areas of the proposed borrow areas and the proposed access road. Based on this survey and the 2011 bat surveys (ESI 2011), it was determined that there is limited forested area in both the proposed borrow areas and access road sites that may be utilized by Indiana, northern long-eared, and eastern small-footed bats as low quality foraging habitat. Scott Branch located within the proposed access road project area and Wells Creek may be used as foraging areas for these species. These species may utilize the small forested area within the proposed access road limits and the wooded hedgerows and drainage areas within the southern borrow area. In addition, six

potential suitable summer roost trees were identified along the access road, primarily in the forest area east of the northern borrow area, and within some of the wooded hedgerows and drainage areas in the southern borrow area. TVA determined that forested areas provided low quality summer roosting habitat due to the low number of potential roost trees.

Other Mammals

American pygmy shrews are small primarily nocturnal rodents that can be found in a variety of moist habitats though they appear to prefer openings in boreal forests. They utilize burrows in soil, as well as fallen logs and debris (NatureServe 2015). Due to the relatively small amount of forested area within the proposed project areas, it is unlikely that this species would be found in the project area. No records of the American pygmy shrew are within 3 miles of CUF.

Cinereus shrews are a medium sized burrowing shrew that can utilize a variety of habitats, with a preference for damp forests. Nesting season can last from March-September. Nests are typically above ground in fallen logs or other debris (NatureServe 2015). Cinereus shrews are unlikely to be found in the project areas due to the small amounts of forested habitat, and there are no records of this species within 3 miles of CUF.

Southeastern shrews are small burrowing shrews that utilizes a variety of habitats. It seems to prefer moist habitats such as bogs and damp woods; however, this species has also been observed utilizing upland shrubby and wooded areas. Overall, the southeastern shrew prefers areas with dense ground cover (NatureServe 2015). This species is unlikely to be found in the open habitats of the proposed borrow areas and road construction areas, but may be found in wooded uplands. Additionally there are no records of this species within 3 miles of CUF.

Southern bog lemming is a small burrowing mammal that is most commonly found in wet habitat such as bogs, fens, riparian areas, and wetlands. Occasionally, southern bog lemmings may be found in upland areas, provided there is a thick, moist humus layer. This species is active throughout the day and night year-round (NatureServe 2015). The southern bog lemming is unlikely to be found within the proposed borrow areas. No suitable habitat exists for bog lemming, and no record of this species have been recorded within 3 miles of CUF.

Meadow jumping mouse is a small soil burrowing mammal that breeds from April to early September. This species utilizes moist lowland habitats with thick, low vegetation, and little canopy cover. Meadow jumping mice are usually nocturnal but may be seen in day light. They hibernate from early fall to late spring (NatureServe 2015). Meadow jumping mice are unlikely to be found within the proposed borrow areas. A small amount of habitat may occur in the emergent wetlands along the proposed access road; however, there are no records of this species within 3 miles of CUF.

Reptiles

Alligator snapping turtle is a highly rare aquatic species that is restricted to drainages, floodplains, swamps, and oxbow lakes associated with large rivers, only emerging from water for nesting and basking. The species does not inhabit isolated wetlands and ponds. Nesting occurs on river banks and sandbars. Eggs are deposited in April-June and hatchlings emerge 11 to 16 weeks from deposition (NatureServe 2015). Wells Creek may provide a limited amount of habitat for alligator snapping turtles within the project areas, but no records of this species have been recorded within 3 miles of CUF.

Copperbelly watersnakes rely on a matrix of shallow or floodplain wetlands surrounded by forest. They move from wetland to wetland while foraging and hibernate in forested wetlands or adjacent upland forests. Hibernation occurs from October to April (USFWS 2016b). The small riparian area at the proposed Wells Creek bridge site may, in part, support copperbelly watersnakes, however there are no records of this species within 3 miles of the project area.

Eastern slender glass lizards rely on sandy soil for burrowing and are primarily found in open areas such as grasslands, pastures, scrubby areas, right of ways, and fallow fields (U.S. National Park Service 2017). Due to the limited amount of sandy soils, it's unlikely that this species would be found in the project area.

Northern pinesnakes are egg laying snakes that breed in spring, with hatchlings emerging in late summer. The preferred habitat of northern pinesnakes is characterized by xeric, pine or pine-oak dominated woodlands with open understory and sandy soils for burrowing (NatureServe 2015). As no pine or pine oak dominated woodlands are within the project boundaries, it is unlikely that this species would be found at CUF.

Western pygmy rattlesnake is a small secretive snake that may utilize a variety of habitats from wetland areas to pine-hardwood forests. Reproduction usually occur in summer (NatureServe 2015). As little is known about the habitat for the Western pygmy rattlesnake, there may be suitable habitat within the project area. No known records of this species exist within 3 miles of CUF according to the TVA database.

Insects

Acuminate snaketail is a green dragonfly that breeds in clear bedrock streams. Adult foraging habitat is unknown. The streams located within the project area are unlikely to provide habitat for this species, and no records of this species are known within 3 miles of CUF according to the TVA database.

Coleman cave beetles are limestone cave dependent insects that have a very restricted range. They are only known to occur in Coleman Cave, Foster Cave, Bellamy Cave, Darnell Spring Cave, and Clarksville Lake Cave (USFWS 2016c). As there are no known caves within the project area, this species is unlikely to be found at this site.

3.10.1.1.2 Aquatic Animals

<u>Amphibian</u>

The eastern hellbender is considered in need of management in Tennessee. Hellbenders are completely aquatic salamanders and prefer fast-flowing, clear, well-oxygenated streams and rivers with substrate consisting of large flat boulders and logs). A small amount of suitable habitat for this species may be present at the Wells Creek crossing, but the habitat in this area would be considered low to marginal quality for hellbenders. There are no known records of occurrence of this species within 3 miles of CUF.

Barking treefrogs can be found in low wet woods, swamps, and sandy areas of pine savannas. When active, they are mostly arboreal but can occasionally be found on the ground. During the cold season, adults burrow under tree roots, vegetation, or in soil. Reproduction occurs in shallow water (NatureServe 2015). There are no known records within the vicinity of CUF. There is no wetland habitat within the project areas that may provide suitable habitat for the barking treefrog.

<u>Fish</u>

Blue sucker is a bottom feeding fish that can be found in large rivers and lower parts of major tributaries in channels and flowing pools with moderate current. Occasionally they can be found in impoundments. Adults migrate upstream to spawn in riffles (NatureServe 2015). One blue sucker was captured upstream and five blue suckers were captured down stream of CUF during gill netting sampling as a part of 2015 biological monitoring of the Cumberland River (TVA 2016a). The portion of Wells Creek within the proposed project areas does not provide suitable habitat for the blue sucker.

Lake sturgeon habitat typically consists of the bottoms of large freshwater rivers and lakes usually at depth of 5 to 10 meters deep. Spawning occurs in shallower waters in areas with swift currents (NatureServe 2015). During gill netting sampling in 2015, two lake sturgeon were identified, one up stream of CUF and one downstream (TVA 2016a). There is no habitat for the lake sturgeon within the project areas.

Southern cavefish is a cave-dwelling species only found in cave streams, underground lakes, wells and spring outlets (NatureServe 2015). There is no habitat for the southern cavefish within the project areas.

Slenderhead darter is a small fish that is usually found in runs and riffles of small to medium rivers with strong current, frequently in gravel shoal areas (NatureServe 2015). There is no habitat for the slenderhead darter within the project area.

Mollusks and Crustaceans

The clubshell mussel is found in small to medium sized rivers and streams. The mussel is known to bury itself into substrate of clean, loose sand and gravel to depths of up to four inches (NatureServe 2015). Surveys performed in the Cumberland River and Wells Creed in 2011 (Third Rock Consultants 2011) found that the habitat near CUF was suboptimal for this species and no individuals were recovered during the survey. Therefore, this habitat does not occur within the project area.

The rabbitsfoot mussel is found in large rivers with sand and gravel substrate (NatureServe 2015). Surveys performed in the Cumberland River and Wells Creek in 2011 found that the habitat near CUF was suboptimal for this species and no individuals were recovered during the survey (Third Rock Consultants 2011). Therefore, this habitat does not occur within the project area

The orangefoot pimpleback is listed as federally endangered by the USFWS. Orangefoot pimpleback is a mussel found in medium to large rivers in sand, gravel, and cobble substrate in deep water with heavy currents (NatureServe 2015). There is no habitat for orangefoot pimpleback in the project area.

The ring pink is listed as federally endangered by the USFWS. Ring pink is a mussel found in medium to large rivers usually near sand and gravel bars (NatureServe2015). There is no habitat for ring pink in the project area.

The rough pigtoe is listed as federally endangered by the USFWS. Rough pigtoe is a mussel usually found over sand, gravel, and cobble substrates in the shoals of medium to large rivers. They can occasionally be found on flats and on muddy sand (NatureServe 2015). There is no habitat for the rough pigtoe in the project area.

The slabside pearly mussel is listed as federally endangered by the USFWS. Slabside pearly mussel is usually found in shallow waters of creeks to large rivers with moderate to swift currents (NatureServe 2015). There is no habitat for this species within the project area.

The tan riffle shell is listed as federally endangered by the USFWS. Tan riffle shell is a mussel found in creeks and medium rivers, usually in headwaters, riffles, shoals and in sand and gravel substrates (NatureServe 2015). There is no habitat for this species in the project area.

The pink mucket is listed as federally endangered by the USFWS. Pink mucket is a mussel that is generally a large river species. Recently it has been found in impoundments with river-lake conditions, but never in standing water (NatureServe 2015). There is no habitat for the pink mucket within the project areas.

Muddy rocksnail is a freshwater snail found in the tail water areas of dams and large rivers. They occur on gravel, cobble, and boulder substrate, but do not tolerate silty conditions (NatureServe 2015). There is no habitat for the muddy rocksnail within the project areas.

An Amphipod (*Stygobromus vitreus*) is a subterranean obligate crustacean (NatureServe 2015). There is no habitat for this species within the project areas, as there are no caves.

Mammoth Cave crayfish occur in a narrow band of karst topography in Kentucky and Tennessee. This species habitat is subterranean streams in cave systems (NatureServe 2015). There is no habitat for the Mammoth Cave crayfish within the project areas, as there are no caves.

3.10.1.2 Plants

A review of the TVA Regional Natural Heritage database indicated that no state-listed or federally listed plant species or associated designated critical habitat are known to occur on or within 5 miles of CUF (TVA 2017b). Two federally listed plant species are known to exist in the surrounding counties, and an additional 49 species of plants listed by the TDEC as threatened, endangered, or species in need of management in Tennessee are known to occur within Stewart, Montgomery, and Houston counties (see Table 3-6). Of these 51 species, none has been observed during field surveys. Within 5 miles of CUF, only swamp lousewort, a state sensitive species, has been recorded in the TVA database. Preferred habitat for each species and the possibility of habitat within the project areas are addressed in Table 3-7.

Common Name	Habitat Requirements	Habitat within Project Area*
American ginseng	Slopes of rich deciduous hardwood forest containing beech, maple, hickory, oak, basswood, and tulip poplar ¹ .	Ν
Beak grass	Lowland riparian or floodplain forests ² .	Ν
Bearded rattlesnake-root	Sandy oak-hickory-pine woodlands, savannahs, prairies, and pine barrens ³ .	Ν
Blue mud-plantain	Shallow water or immersed, at pond edges or roadside ditches ³ .	Ν
Blue sage	Dry prairies, oak cedar hills ⁴ .	Ν
Bristly sedge	Wetland dependent, streams, ponds, bogs, wet meadows. Often in shallow water or on woody debris ³ .	Ν
Buffalo clover	Sandy soils⁴.	Ν
Buffalo currant	Limestone bluffs ⁵ .	Ν
Butternut	Rich woods of river terraces, dry rocky slopes ³ .	Ν
Compass plant	Prairies, both open and disturbed sites ³ .	Ν
Cow-parsnip	Moist, partially shaded places ⁴ .	Р
Cream wild-indigo	Prairies, open woods⁴.	Ν
Creamflower tick- trefoil	Prairies, old fields, roadsides, right of ways, mixed hardwood and temperate forests ⁶ .	Ν
Earleaved false- foxglove	Barrens ¹ .	Ν
Featherfoil	Pools, swamps, streams, quiet backwaters ³ .	P (Limited)
Fen orchid	Moist ravines, bogs, fens, wet meadows, sand edges of lakes. May colonize open and disturbed habitat during reforestation ³ .	Ν
Fraser's loosestrife	Rich woods, open slopes ³ .	Ν
Hair grass	Areas of repeated disturbance. Found on dry/baked soils of prairies, gravels, and rocky slopes, edges of forests, wet bottomland woods and at marsh edges ⁶ .	Ν
Hairy hawkweed	Fields, prairies, roadsides ³ .	Р
Lake cress	Areas surrounding rivers such as oxbows, forested floodplains, pools, lake margins, slow moving streams, roadside sloughs, marshes ⁶ .	Ν
Lamance iris	Open moist woodlands ³ .	Ν
Lance-like spike- rush	Shores, stream beds, pine woods, disturbed places ³ .	Ν
Limestone blue star	Wet woods, streambanks, gravel bars, and rocky streams on limestone habitat ⁶ .	Ν
Maryland milkwort	Sandy alluvial woods and disturbed areas ¹ .	Ν

Table 3-7.Habitat Requirements for Plant Species of Conservation Concern
Within Stewart and Surrounding Counties and Within 5 Miles of the
Cumberland Fossil Plant

Common Name	Habitat Requirements	Habitat within Project Area*
Matted spike-rush	Wetland areas, lake shores, tidal meadows, disturbed areas ³ .	Ν
Missouri gooseberry	Upland woods, thickets, prairie ravines, pastures ³ .	Р
Muskingum sedge	Deciduous, lowland, wet, floodplain woods and thickets ³ .	Ν
Naked-stem sunflower	Open areas with sandy soil ³ .	Ν
Nuttall's waterweed	Aquatic plants, mostly calcareous lakes and rivers ³ .	Ν
Ovate-leaved arrowhead	Streams and lakes ³ .	Ν
Ozark downy phlox	Rocky, dry, open woods, valleys, thickets, meadows, prairies, glades ⁵ .	Ν
Pale false-foxglove	Open, wet to xeric, grassland communities ⁶	Ν
Pale-purple coneflower	Rocky prairies, open woodlands, glades ³ .	Ν
Prairie ragwort	Prairies, meadows, open woods, highways, railroads, and similarly disturbed areas. Usually over limestone ³ .	Ν
Price's potato-bean	Open rocky wooded slopes and floodplain edges ⁶ .	Ν
Purple milkweed	Dry-moist, open woods, ridgetops, thickets, glades, prairie openings, streambanks, wet meadows ⁵ .	Ν
Rock goldenrod	Riverbanks ³ .	Ν
Sand grape	Gravelly banks, river bottoms, stream beds, washed, usually on calcareous soils ³ .	Ν
Sessile-fruited arrowhead	Calcareous or brackish shallow water, shores of ponds, swamps and rivers ³ .	Ν
Short-beaked arrowhead	Ponds, lakes ⁶ .	Ν
Short's bladderpod	Open rocky areas, talus, ledges, and open cedar glades ³ .	Ν
Short's rock-cress	Bluffs, rock ledges, wooded slopes, floodplains ³ .	Ν
Silky dogwood	Alluvial woods, river, stream banks, wet meadows, marshes, ditches ³ .	P (Limited)
Southern prairie- dock	Usually over limestone parent material in open barrens, glades, and prairies ⁶ .	Ν
Spreading false- foxglove	Steep limestone bluffs in open mixed hardwood forests. Parasitic on oak roots ⁶ .	Ν
Sticky hedge-hyssop	Wet Barrens and Marshes ¹ .	Ν
Swamp lousewort	Wet meadows with limestone soils ⁴ .	Ν
Sweet coneflower	Prairies, stream banks, woodland openings ³ .	Ν
Sweet-scented Indian-plantain	Rich woods, wet shaded areas bordering streams ³ .	P (Limited)
White water- buttercup	Ponds, lakes, streams, ditches, edges of rivers ³ .	P (Limited)
Yellow water- crowfoot	Shallow water or drying mud ³ .	Ν

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Common Name	Habitat Requirements	Habitat within Project Area*
Sources:		
¹ TDEC 2017		
² O'Conner and Penskar 2004		
 ³ Flora of North America Editorial Committee 1993 ⁴ NPIN 2013 		

⁵ Missouri Botanical Garden

⁶ NatureServe, USFWS 2016b

⁷ Hilty, J. Illinois Wildflowers 2016

*Habitat Codes:

Y = Species has been documented in existing habitats in study area and suitable habitat is present N = No records of species within study area and habitats within project area do not overlap with species habitat requirements.

P = Some habitats within the project area are consistent with species recorded habitat preferences, no records of species in study area.

P (Limited) = Only habitats within the proposed creek crossings and along the proposed access route are consistent with species recorded habitat preferences, no records of species in study area.

Of the 51 federally or state-listed plant species known to occur within the counties surrounding CUF, seven species may have habitat requirements that potentially overlap with the habitats of the proposed project areas, specifically three in the borrow areas and four in the project area for the bridge crossing at Wells Creek. However, because the proposed borrow areas, haul road and bridge project areas consist of previously disturbed herbaceous vegetation and second growth hardwood forest that generally lack specialized habitats (rich mesic woodlands, bluffs, rock ledges, glades, prairie, etc.) the potential for occurrence within the proposed project areas is considered to be low. Notably, none of these species have been recorded within CUF to date, and only the swamp lousewort has been observed within 5 miles of the plant site.

The federally threatened Price's potato bean has been recorded in Stewart County. These records are in or near Land Between the Lakes National Recreation Area (USFWS 2016b). Price's potato bean relies on openings in forests, rocky slopes, and is generally found on the edges of floodplains. Because the access road, bridge and borrow project areas are disturbed and contain only small forest fragments, these areas would not support the Price's potato bean. Similarly, none of the habitats within the project areas is considered to be suitable for the federally endangered Short's bladderpod. Therefore, proposed project activities are considered to have no effect to federally listed species and no additional surveys are required. No records of this species are known to occur within 5 miles.

3.10.2 Environmental Consequences

3.10.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would continue current plant operations and would not develop borrow areas or an access road on TVA property. Therefore, no impacts to threatened or endangered species, or species of conservation concern or any suitable habitat would occur under this alternative.

3.10.2.2 Alternative B – Develop and Operate Two Borrow Sites, Construct an Access Road and Bridge on CUF Property

The project areas for the two borrow sites consist of a generally disturbed and fragmented landscape that consists of primarily herbaceous vegetation. The northern borrow site contains 0.3 acre of deciduous forest with the remainder being herbaceous vegetation. The southern borrow site is larger and is primarily composed of an herbaceous community typical of a grazed pasture. Approximately 13.8 acres of deciduous forest occur in the southern proposed borrow area hedgerows and WWC/ephemeral stream drainage areas TVA would avoid forested areas located along the northern end of the access road project area and the forested hedgerows along the southern perimeter of the project area for the southern borrow site. This would result in an impact to 11.9 acres of deciduous forest.

Of the 51 federally or state-listed plant species known to occur within the counties surrounding CUF, nine species may have habitat requirements that potentially overlap with the habitats of the proposed project areas, specifically four in the borrow areas and five in the project area for the bridge crossing at Wells Creek. The habitat along the remainder of the proposed access road does not provide high quality habitat for any of the listed plant species. Only swamp lousewort, a state sensitive species, has been recorded within 5 miles of CUF. In general, the habitat within the proposed borrow and access road project areas is not known to be of high quality as it is primarily pastureland with small fragmented forested corridors along WWC/ephemeral channels.

The habitat within the proposed project areas ranges from unsuitable to very low quality for federal and state threatened and endangered plant species. No listed species are known to occur within the project areas as there have been no records to date. Similar habitat with characteristics that are consistent with the published habitats of these species is readily available in the vicinity of CUF. Therefore, impacts to federally and state-listed species would either result in no effect for those species whose habitat requirements are not consistent with site conditions, or are not likely to adversely affect those species that are reported to have more generalized habitat preferences that overlap with some site conditions. Such species are considered to be unlikely to be present within project areas due to its disturbed and fragmented characteristics.

The project areas for the proposed borrow sites, access road and bridge may provide potential low quality habitat for 13 of the wildlife species listed in Table 3-6, however, no species are known to occur within the project areas. Only the bald eagle and a northern long-eared bat have been observed within 3 miles of CUF. During construction/operation of the access road and borrow sites, mobile species would be able to avoid the construction site and move to the abundant similar habitat surrounding the project area. For example, the nearby Cross Creek National Wildlife Refuge may provide high quality habitat for some listed species. Upon completion of the borrow areas, the land would be graded and reseeded.

Less mobile species could be impacted during the construction/operation of the borrow areas and access road resulting in direct mortality to some individuals. However, no listed species are known to occur within the project area limits. Therefore, the potential for direct impacts is considered very low.

Despite the lower quality of potential summer bat roosting habitat, the presence of some suitable roosting trees as well as the proximity to known records for the bats, forested areas within the access road and borrow sites were determined to provide potential suitable

summer roosting habitat for the Indiana bat and northern long-eared bat. Wetlands, streams and hedgerows, and forested habitat in the proposed project areas provides foraging habitat for Indiana bat and northern long-eared bat. Wetlands and streams also provide foraging habitat for gray bat. In total, 11.9 acres of potentially suitable Indiana bat and northern long-eared bat habitat including six roosting trees would be removed under the proposed action. Potential effects to federally listed tree roosting bat species would be minimized by adherence to seasonal tree clearing restrictions (August 16 through March 31).

On June 7, 2017, TVA consulted with USFWS regarding impacts of project activities on Price's potato bean, clubshell, pink mucket, rabbitsfoot, gray bat, Indiana bat, and northern long-eared bat. In a correspondence letter on June 14, 2017, the USFWS agreed that the proposed activities would have no effect on Price's potato bean, clubshell, pink mucket, rabbitsfoot, and gray bat. The USFS, however, concluded that the project may affect, and is likely to adversely affect, the Indiana bat and northern long-eared bat. Based on a commitment to Implement conservation measures established in the USFWS 2015 *Conservation Strategy for Forest-Dwelling Bats in Tennessee*, as well as mitigation through Tennessee's Imperiled Bat Conservation Fund to compensate for the proposed clearing of 11.9 acres of potentially suitable roosting habitat for the Indiana and northern long-eared bats, the USFWS determined on July 10, 2017, that the proposed action is not likely to jeopardize the continued existence of the listed tree-dwelling bat species. The USFWS letter on July 10, 2017, served to document that the requirements of Section 7 of the ESA had been fulfilled. For these reasons, impacts to threatened and endangered species would be minor under Alternative B.

3.11 Wetlands

3.11.1 Affected Environment

The USACE regulates the discharge of fill material into waters of the United States, including wetlands, pursuant to Section 404 of the CWA (33 USC 1344). Additionally, 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.

As defined in Section 404 of the CWA, wetlands are those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands and wetland fringe areas can also be found along the edges of many watercourses and impounded waters (both natural and man-made). Wetland habitat provides valuable public benefits including flood storage, erosion control, water quality improvement, wildlife habitat, and recreation opportunities.

Wetlands identified on National Wetland Inventory (NWI) maps within the project areas include a total of 1.5 acres of freshwater ponds and lakes, 0.3 acre of riverine, and 0.1 acre of forested wetlands (Table 3-8). Wetlands were delineated within the project areas in August 2014 and confirmed in December 2016 (Amec Foster Wheeler 2017). Potential jurisdictional wetlands were evaluated in accordance with the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0).

Land use/land cover data shows that wetlands comprise approximately 2.5 percent (2,207 acres of emergent herbaceous and woody wetlands) of the lands within the surrounding 5 mile radius (see Table 3-3).

As shown in Table 3-8, the field delineation identified a total of 0.83 acre of wetland within the project areas defined for the access road and borrow sites. These areas are shown on Figure 3-4. The USACE performed a jurisdictional determination and concurred with the identified wetland areas listed in Table 3-8.

	•	
Feature Type	Access Road (acres)	Borrow Area (acres)
NWI Mapped		
Lake/Pond	0.5	1.0
Riverine	0.002	0.3
Forested/Shrub Wetland	0.1	
Total	0.6	1.3
Field Delineated		
Forested Wetland	0.03	
Emergent Wetland	0.8	
Total	0.83	0

Table 3-8.Summary of Wetland Features Identified Within
the Project Area

Source: NWI and Amec Foster Wheeler 2017

3.11.2 Environmental Consequences

3.11.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would continue current plant operations and would not implement the proposed projects. As a result, no new work would be conducted that could potentially alter project-related environmental conditions within the project area. Therefore, there would be no impacts to wetland resources with this alternative.

3.11.2.2 Alternative B – Develop and Operate Two Borrow Sites, Construct an Access Road and Bridge on CUF Property

The proposed borrow sites would be developed on land that is currently undeveloped with forested or pasture vegetative cover. A total of 0.83 acre of jurisdictional wetlands would be impacted under this alternative. The effects of wetland impacts at the project sites would be minor when viewed in the context of the 2,033 acres of forested wetland resources and a total of 2,207 acres of all wetland resources (forested and emergent) within the surrounding 5-mile region (see Table 3-3). Unavoidable direct impacts to wetlands would be mitigated as required by both state and federal agencies in accordance with the Tennessee Water Quality Control Act and Section 404 of the CWA. Therefore, development of the proposed borrow sites and access road would be consistent with EO 11990.

Potential indirect impacts resulting from access road construction and borrow site development could include erosion and sedimentation from stormwater runoff during construction into offsite or nearby jurisdictional and non-jurisdictional wetlands. BMPs in accordance with site-specific erosion control plans would be implemented to minimize this

potential. Indirect impacts to wetland areas due to construction activities would be short-term and minor.

3.12 Land Use

The CUF facility is located near Cumberland City, Stewart County, Tennessee, along the southern banks of the Cumberland River. The plant property occupies approximately 2,400 acres of land that supports industrial development for the facility itself and supporting infrastructure. Land use within the property is dominated by various developed uses and barren land. The facility is bordered to the north by the Cumberland River and to the west and south by undeveloped lands. The nearest residence is located approximately 0.3 mile east of CUF in Cumberland City, a rural community located to the east of the project area.

As summarized in Table 3-3 and shown in Figure 3-6, land use within the vicinity (i.e., 5-mile radius around CUF or 86,336 acres) is dominated by undeveloped lands with various vegetative cover types including: deciduous forest (61,203 acres or approximately 71 percent of the total), hay/pasture (6,612 acres or approximately 8 percent), herbaceous (5,484 acres or approximately 6 percent), and cultivated crops (3,535 acres or 4 percent). Developed lands in the vicinity include both industrial (e.g., CUF plant) and non-industrial uses (primarily rural residential) land uses.

3.12.1 Environmental Consequences

3.12.1.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would continue current plant operations and there would be no change in land use.

3.12.1.2 Alternative B – Develop and Operate Two Borrow Sites, Construct an Access Road and Bridge on CUF Property

The proposed borrow sites, access road and bridge would be developed on land that is currently in an undeveloped state and covered with various vegetation cover types (see Table 3-3). Project activities related to the borrow areas would involve clearing, grubbing, grading, and excavation that would result in the conversion of approximately 99 acres of undeveloped land for industrial use. The construction of the access road would result in the permanent conversion of approximately 14 acres of primarily undeveloped land to support access road construction. The disturbance of undeveloped lands would be minor when compared to the abundance of undeveloped land within a 5-mile radius of the site (see Table 3-3). In addition, the land area proposed for the access road is on CUF property which supports industrial use. Additionally, upon completion of excavation activities, the borrow sites would be regraded and seeded or sodded to re-establish herbaceous vegetation. Therefore, overall impacts to land use from the construction of the borrow sites, access road and bridge would be minor.

There would be a short-term impact to land use associated with the temporary conversion of approximately 1 acre of currently vacant area on CUF property for use as a laydown area to support various construction-related activities. Upon completion of construction activities, it is anticipated that this area would be restored to its previous state. Therefore, this impact would be minor.

3.13 Prime Farmland

3.13.1 Affected Environment

The 1981 Farmland Protection Policy Act (FPPA) (7 Code of Federal Regulations [CFR] Part 658) requires all federal agencies to evaluate impacts to prime and unique farmland prior to permanently converting to land use incompatible with agriculture. Prime farmland soils have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber and oilseed crops. These characteristics allow prime farmland soils to produce the highest yields with minimal expenditure of energy and economic resources. In general, prime farmlands have an adequate and dependable water supply, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. Prime farmland soils are permeable to water and air, not excessively erodible or saturated for extended period, and are protected from frequent flooding.

Prime farmland soils within the proposed borrow areas and access road, and within a 5-mile radius of those sites are summarized in Table 3-9 and illustrated in Figures 3-7 and 3-8. Within the proposed project areas, approximately 31.1 acres (27.1 percent) of the soils are considered prime farmland. Overall, the prime farmland soils within the proposed project area comprise less than 0.2 percent of the total prime farmland soils found within a 5-mile radius around CUF. Prime farmland soil types within the proposed borrow areas and access road are predominantly Nolin silt loam (18.1 percent) and Lindell silt loam (8.9 percent), with lesser amounts of Trace silt loam (3.8 percent) and Humphreys gravelly silt loam (0.3 percent).

Soil Type	Project Areas ¹ (ac)	5-mile Radius (ac)
All prime farmland soils	31.1	18,589.1
Not prime farmland Prime farmland (if drained and either protected from flooding or not frequently flooded during the growing season)	83.7 0	68,858.4 5.4
Totals	114.8	87,453.0

Table 3-9.Prime Farmland of the Project Areas and in the Vicinity
of Cumberland Fossil Plant in Steward County, Tennessee

Source: NRCS 2017

¹ Includes the north borrow area, south borrow area, laydown area and access road project areas.


Figure 3-7. Prime Farmland Soils on the Proposed Areas of Disturbance Located in Stewart County, Tennessee



Figure 3-8. Prime Farmland within the Vicinity of the Cumberland Fossil Plant Located in Stewart County, Tennessee

3.13.2 Environmental Consequences

3.13.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, no excavations would occur in conjunction with development of the borrow sites, access road and bridge; therefore, there would be no impacts to prime farmland soils.

3.13.2.2 Alternative B – Develop and Operate Two Borrow Sites, and Construct an Access Road and Bridge on CUF Property

Under Alternative B, the proposed borrow sites and access road would impact approximately 31.1 acres of prime farmland soils. The minor loss of lands mapped as including prime farmland and the subsequent loss of potential crop production to industrial facilities, is minor when compared to the amount of land designated as prime farmland (less than 0.2 percent) within the surrounding region. Therefore, the minor loss of onsite lands designated as having prime farmland is minor.

TVA coordinated with the NRCS regarding the proposed conversion of prime farmland soils. The NRCS determined that per the FPPA manual (523.11, C., viii), surface mining where restoration is planned is not subject to the provisions of the FPPA. Therefore, TVA has met requirements under the FPPA. This coordination is included in Appendix A.

3.14 Visual Resources

3.14.1 Affected Environment

This assessment provides a review and classification of the visual attributes of existing scenery, along with the anticipated attributes resulting from the proposed action. The classification criteria used in this analysis are adapted from a scenic management system developed by the U.S. Forest Service (USFS) and integrated with planning methods used by TVA (USFS 1995). Potential visual impacts to cultural and historic resources are not included in this analysis as they are assessed separately in Section 3.15.

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

Views of the landscape are described in terms of what is seen in the foreground, middleground, and background distances. In the foreground, an area within 0.5 mile of the observer, details of objects are easily distinguished. In the middleground, from 0.5 mile to 4 miles from the observer, objects may be distinguishable but their details are weak and tend to merge into larger patterns. In the distant part of the landscape, the background, details and colors of objects are not normally discernible unless they are especially large, standing alone, or have a substantial color contrast. In this assessment, the background is measured as 4 to 10 miles from the observer. Visual and aesthetic impacts associated with

an action may occur as a result of the introduction of a feature that is not consistent with the existing viewshed. Consequently, the visual character of an existing site is an important factor in evaluating potential visual impacts.

The affected environment is considered to include the project areas within the proposed borrow areas and access road that encompasses both permanent and temporary impact areas, as well as the physical and natural features of the landscape. The proposed borrow areas and access road are located southwest of the CUF facility and consist of lands that are currently undeveloped. Except for the CUF facility, the surrounding region is largely undeveloped with some pockets of residential development. There is one residence located between the two borrow areas along Old Scott Road and light residential development to the west. Undeveloped forested and pasture land occurs south and east of the project area. Transmission lines are located to the north and east of the project area, between the borrow sites and the CUF facility. Major visual components of the adjacent CUF facility to the northeast include the powerhouse buildings, emission control buildings and ducts, and the coal pile and coal handling facilities.

Most of the area encompassed by the proposed borrow areas and access road include a naturally appearing landscape that shows minimal evidence of human development. The composition of vegetation and the patterns of vegetation are the prominent features and consist of a variety of deciduous trees, ephemeral stream channels, and pastureland. Scenic attractiveness of the affected environment is considered common, and scenic integrity is considered moderate due to human alteration in the surrounding area.

The rating for scenic attractiveness is due to the ordinary or common visual quality. The forms, colors and textures in the affected environment are normally seen through the characteristic landscape. Therefore, the landscapes are not considered to have distinctive quality. In the foreground, the scenic integrity has been lowered by slight human alteration such as agricultural practices and residential development. However, in the middleground and background these alterations are not substantive enough to dominate the view of the landscape. Based on the criteria used for this analysis, the overall scenic value class for the affected environment is considered good.

3.14.2 Environmental Consequences

The potential impacts to the visual environment from a given action are assessed by evaluating the potential for changes in the scenic value class ratings based upon landscape scenic attractiveness, integrity and visibility. Sensitivity of viewing points available to the public, their viewing distances and visibility of the proposed action are also considered during the analysis. These measures help identify changes in visual character based on commonly held perceptions of landscape beauty and the aesthetic sense of place. The extent and magnitude of visual changes that could result from the proposed facility were evaluated based on the process and criteria outlined in the USFS scenic management system.

3.14.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would continue current plant operations, and no work would be conducted that could change the aesthetics of the project area.

3.14.2.2 Alternative B – Develop and Operate Two Borrow Sites, Construct an Access Road and Bridge on CUF Property

During the construction phase of the proposed projects, there would be slight visual discord from the existing conditions due to an increase in personnel and equipment in the area. Impacts from additional vehicular traffic are expected to be minor as the roads are already predominately used by employees of CUF and for industrial activity related to CUF operations. This small increase in visual discord would be temporary and only last until all activities have been completed by TVA.

The proposed borrow areas, access road and bridge would primarily be seen by a limited number of nearby residents and motorists on the adjacent roadways, Old Scott Road and Old Hwy 149. The development of the proposed borrow areas would contrast with the color of the landscape during some phases of operation. The current landscape at the proposed site is predominantly green and brown due to the existing vegetation on the site. While the borrow sites are being actively used, the increase in personnel and equipment would contrast with the natural landscape color. The dominant shapes in the landscape include the vertical lines of existing transmission structures and forested areas. The color and shape contrast would be greatest in the foreground to passing motorists and residents, although the contrasts would be less noticeable in the middleground and background.

The 0.5-mile area around the affected environment includes undeveloped forested lands, residences and CUF. Sensitive visual receptors within this foreground of the proposed actions include the Graveyard Hill Cemetery located northeast of the northern borrow area and access road. The residence along Old Scott Road, the Hollister House, is listed in the NRHP and, therefore, impacts to it are assessed in Section 3.15. In the foreground viewing distance, individual details of specific objects are important and easily distinguished, and details are the most significant within the immediate foreground up to 300 feet. In the middleground viewing distance, details are weak as they tend to merge into larger patterns. Visibility of the proposed actions is expected to be limited to receptors within this viewing distance, the proposed actions are not expected to be discernible due to the screening effects of terrain and overall distance, nor would they contrast with the overall landscape.

The proposed actions would contribute to a change in visual integrity of the landscape, which would result in a minor impact to the local viewshed. However, after borrow materials are exhausted from within each site, the area would be graded and seeded or sodded to support the establishment of native vegetation. Therefore, it is not expected that the existing scenic class would be reduced by two or more levels, which is the threshold of significance of impact to the visual environment. Scenic attractiveness may be reduced to minimal in the foreground during excavation because of the use of the access roads and increase in activity, but would remain common in the middleground and background. Similarly, scenic integrity may be reduced to low in the foreground during excavation as deviations to the landscape character due to increased activity would dominate the landscape being viewed during the use of the borrow area. During this period, impacts to scenic integrity are anticipated to be greatest in the foreground for area residents and other passing motorists along local roads. In the middleground and background, impacts are not considered to be significant as they are not expected to alter the overall landscape, therefore, scenic integrity would remain moderate. Based on the USFS scenic management system criteria used for this analysis, the scenic value class for the affected environment is considered to remain good; therefore, there would be no impacts.

3.15 Cultural and Historic Resources

3.15.1 Affected Environment

3.15.1.1 Regulatory Framework for Cultural Resources

Cultural resources or historic properties 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) (54 USC 300101 et seq.) and by 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 affect 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 NHPA by following the process outlined in the regulations implementing Section 106 of NHPA at 36 CFR Part 800. Additional cultural resource laws that protect historic resources include the Archaeological and Historic Preservation Act (54 USC 300101 et seq.), Archaeological Resources Protection Act (16 USC 470aa-470mm), and the Native American Graves Protection and Repatriation Act (25 USC 3001-3013).

Section 106 of the NHPA requires that federal agencies consider the potential effects of their actions on historic properties and to 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 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 NRHP. The NRHP eligibility of a resource is based on the Secretary of the Interior's criteria for evaluation (36 CFR 60.4), 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.

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 (based on the criteria for evaluation at 36 CFR Part 60.4 above), 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 of feeling or setting.

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.

3.15.1.2 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. Direct effects on cultural resources can result from ground disturbing activities that damage the resource or alter its setting. Indirect impacts to cultural resource sites are not always as obvious or immediate as direct impacts, and could include impacts that occur offsite from project areas. Indirect impacts could include accelerated erosion due to increased traffic, construction, loss or changes of vegetation, and changes in drainage patterns. Potential indirect impacts could also include deterioration of structures from vibration, dust, or exhaust produced by construction or operation.

For Alternative B, TVA would develop two borrow areas, an access road and bridge, and a laydown area. All proposed construction activities would occur within CUF property (see Figure 2-1). The archaeological APE consists of the footprints for these components. The northern borrow area measures approximately 6 acres and would be located about 0.25 mile west of the main plant area. The southern borrow area is a 93-acre site and would be located approximately 0.5 mile south of the main plant site. Land use within both borrow areas consists primarily of open pasture land. A two-lane gravel access road would be constructed on CUF property to provide access to the borrow sites. The approximately 0.6-mile long road would be 50 feet wide (40-feet-wide with 5-foot shoulders) and would extend from Old Scott Road in the west to the CUF perimeter road in the east. The access route would require the construction of a new bridge over Wells Creek. TVA would stabilize 500 feet of shoreline on both the right and left descending bank of Wells Creek (1.3 R and L) where the new bridge is proposed. The proposed laydown vard measures approximately 1 acre and would be situated north and south of the new bridge on the right descending bank of Wells Creek. TVA would use a portion of the existing Old Scott Road, a two-lane gravel county road, for access to the southern borrow area. The road would be graded and regular maintenance provided throughout its use. The APE for architectural resources consists of the 0.5-mile radius viewshed surrounding all proposed activities described above. Potential adverse effects to the NRHP eligible Hollister House, namely potential physical affects related to vibration and noise due to the use of Old Scott Road, which passes very near the house, was also considered.

3.15.1.3 Previous Studies

TVA has conducted records searches at the Tennessee Historical Commission and the Tennessee Division of Archaeology located in Nashville, Tennessee, to identify previously recorded archaeological and architectural properties listed on, or eligible for inclusion in, the NRHP within the APE. No archaeological sites or historic architectural resources have been recorded within the plant boundary.

TVA has conducted archaeological investigations and historic architectural assessments under Section 106 of the NHPA within the APE. The archeological investigations consisted of Phase I archaeological surveys and involved systematic subsurface shovel testing at 100-foot intervals, and a visual examination of ground surfaces with greater than 50 percent surface exposure and any terrain with a slope greater than 20 percent. The first investigation took place in the summer of 2012 and covered a large area encompassing approximately 1,180 acres south of the CUF main plant site that was acquired by TVA (Barrett and Holland 2013). In that investigation, a total of 26 new archaeological sites were identified (40SW697 through 40SW722) and evaluated. Of these, 24 were recommended as not eligible for the NRHP. Two sites, 40SW702 and 40SW710, which are prehistoric in nature, were recommended as undetermined as to their NRHP eligibility status and further work was recommended if they were to be adversely effected. The survey also re-evaluated one previously identified archaeological site, 40SW63 and conducted a surface reconnaissance at site 40SW219 (Brunsoni Furnace). Investigations at 40SW63, a multi-component prehistoric open habitation, resulted in the site being labeled as undetermined as to NRHP eligibility status, and further work was recommended. Investigations at the previously NRHP listed Brunsoni Furnace (40SW219) were limited to surface reconnaissance only. A more detailed map was created for the site components and an extension of the NRHP boundary was recommended based on new surface findings. Further work was also recommended at 40SW219 if deposits were to be adversely affected by future development. The Tennessee SHPO concurred with the findings described above in a letter dated November 5, 2012 (Appendix A).

In November and December 2012, TVA contracted for the second intensive archaeological survey surrounding the NRHP listed Hollister House. The survey area for the project included the entire 4.7-acre NRHP boundary area (Barrett and McKee 2013). The investigation included the excavation of a full systematic 10-meter interval shovel test grid, a ground penetrating radar and gradiometer geophysical survey of the survey area and the Hollister Cemetery, and the excavation of 13 test units that in general measured 1-meter by 0.5-meter. As a result, the entire survey area was incorporated into the NRHP-listed boundary at one archaeological site (40SW723), and this site was recommended as eligible for the NRHP. The Tennessee SHPO concurred with these findings in a letter dated May 2, 2013 (Appendix A).

In January 2017, TVA contracted for an architectural assessment of the proposed construction and operations of an onsite landfill at CUF (Mohr et al. 2017). The APE for historic architectural resources was defined as the area within a 0.5-mile radius of the proposed landfill site, an access road, and two borrow areas. A total of 17 resources over 50 years of age were identified and included six previously surveyed structures, as well as 11 newly documented resources. The structures located within the APE date between the mid-1800s and 1968 and consist of single family dwellings, agricultural outbuildings, a church, and a bridge.

One of the previously documented resources, SW00745, was listed in the NRHP in 1988 and is collectively known as the Brunson/Hollister House and Hollister Cemetery (NRHP 88000262). TVA re-assessed the house's current condition in May 2012 and determined that although the house had undergone some interior alterations in the 1950s, these alterations did not compromise the NRHP eligibility status of the house or the Hollister Cemetery. In addition, the report recommended that the NRHP boundary be expanded to include the Graveyard Hill Cemetery located just northeast of the Hollister House (Karpynec 2012). Three of the previously documented structures, SW00744, SW00747, and SW00748, have been demolished since they were initially surveyed in 1981. The remaining two previously documented structures, SW00746 and SW00801, were not evaluated for NRHP significance when they were originally surveyed. All 11 of the newly documented resources, as well as SW00746 and SW00801, were recommended as NRHP not eligible due to a lack of integrity and/or the failure to meet any of the criteria for eligibility. The Tennessee SHPO concurred with these findings in a letter dated October 24, 2012 (Appendix A).

Pursuant to 36 C.F.R. Part 800.3(f)(2), TVA consulted with 11 federally recognized Indian tribes regarding historic properties within the proposed project's APE that may be of religious and cultural significance and are eligible for the NRHP. Responses received are provided in Section 3.15.2.2 below.

3.15.2 Environmental Consequences

3.15.2.1 Alternative A – No Action Alternative

Implementation of Alternative A would require no new ground disturbance activities or changes to current operations. Therefore, no direct or indirect impacts to cultural resources would occur under Alternative A.

3.15.2.2 Alternative B – Develop and Operate Two Borrow Sites, Construct an Access Road and Bridge on CUF Property

The footprints (i.e., APE) for the two proposed borrow sites underwent archaeological survey for the presence or absence of NRHP eligible archaeological sites as part of the 2012 investigation described above (Barrett and Holland 2013). One archaeological site, 40SW700, was identified and evaluated within the boundary of the northern borrow site, within its extreme southeastern portion. The site is prehistoric in nature, but no diagnostic artifacts were recovered and no intact cultural deposits were noted. The site was recommended NRHP ineligible. The 2012 survey identified and evaluated three archaeological sites (40SW703, 40SW704, and 40SW711) and four isolated finds (IF-3, IF-4, IF-5, and IF-7) within the footprint of the southern borrow site. All three archaeological sites were recovered and no intact cultural deposits noted. The four isolated finds represent the recovery of a minimal number of prehistoric artifacts and are NRHP ineligible. The development of the northern and southern borrow sites would not adversely affect NRHP eligible cultural resources.

The western portion of the APE for the proposed construction of a new access road that overlaps the northern borrow site was also surveyed in 2012 (Barrett and Holland 2013). No cultural resources were identified. The remaining portion of the proposed access road, from the eastern boundary of the northern borrow site east to Wells Creek, underwent archaeological survey in January 2017 (Mohr et al. 2017). The APE for this investigation consisted of a corridor measuring approximately 1,000 feet in length by 300 feet in width. Eighteen shovel tests were excavated but none of yielded cultural material. TVA determined that the proposed construction of the access road would not adversely affect NRHP eligible cultural resources.

TVA personnel examined areas to be affected within the APE for bank stabilization related to new bridge construction in association with the access road in May 2017. The investigation consisted of a visual survey of the creek banks and limited shovel testing in areas with less than 12 percent slope. Visual inspection of the proposed stabilization area on the right bank revealed evidence of previous disturbance, including adjacent ash tailings, a fossil plant access road, derelict bridge, and previous bank stabilization. The right bank is steeply sloped and a visual inspection of the cut bank revealed exposed limestone bedrock and shallow topsoil, underlain by subsoil. No cultural deposits and/or artifacts were identified within the exposed cut bank or along the exposed shoreline, and it was determined that it is unlikely that intact cultural deposits exist along the right bank. The proposed location along the left bank is in secondary growth adjacent to a pasture. A visual inspection of the cut bank revealed exposed, with a shallow topsoil,

underlain by subsoil. A single shovel test was excavated above the cut bank, which revealed a 0 to 5 centimeters thick plow zone, underlain by subsoil. There were no cultural deposits and/or artifacts identified within the shovel test or by the visual inspection of the exposed cut bank and along the exposed shoreline. Cultural resources would not be adversely affected in relation to proposed back stabilization activities.

No ground disturbing activities are proposed in the laydown yard along the east bank of Wells Creek north and south of new bridge construction. No previously recorded cultural resources are located within the laydown yard footprint. Use of the laydown yard, therefore, would have no effect on cultural resources.

A 2017 architectural historic survey (Mohr et al. 2017) determined there are 17 resources over 50 years of age within the APE for indirect impacts. One of these resources, the Brunsoni/Hollister House and Hollister Cemetery, is listed on the NRHP. However, TVA recommended that there would be No Adverse Visual Impact to these resources from the proposed access road, and borrow site areas due to their distance from the proposed construction areas and the obstructed views provided by the surrounding topography and vegetation within the APE.

Access from the southern borrow site to CUF would occur via Old Scott Road to the new access road. TVA estimates that seven articulated dump trucks would be traversing the road to haul the fill (for an estimated three loads per truck per hour (210 truckloads per day). The primary use of the borrow area would be during the closure of the Dry Fly Ash Stack and Gypsum Stack which is estimated to last about 2 years. After this time period, use of the borrow areas would be more sporadic. As increased usage of the portion of Old Scott Road near the Hollister House may result in increased vibrations, TVA would ensure that this portion of the road is well maintained with a motor grader, and speed of the trucks would be kept to a minimum to minimize any indirect effects to the Hollister House. Therefore, TVA determined that the proposed activities would have no indirect adverse impacts related to vibrations from truck traffic.

The Tennessee SHPO concurred with these findings in a letter dated June 21, 2017 (Appendix A). To date, TVA received responses from the Chickasaw Nation and the Cherokee Nation with no objections to the proposed project. Other tribes did not respond within 30 days; therefore in accordance with applicable regulations, no further coordination is required.

If an unidentified archaeological site is discovered during construction, TVA would cease all construction activities in the immediate area where archaeological material is discovered. TVA would contact the SHPO and tribes to determine what further action, if any, would be necessary to comply with Section 106 of the NHPA.

3.16 Transportation

3.16.1 Affected Environment

CUF lies just west of Cumberland City, Tennessee on the Cumberland River. The plant is served by highway, railway and waterway modes of transportation. The transportation network surrounding CUF contains roads and bridges, rail lines and navigable waterways. Interstate Hwy 24 is approximately 25 miles to the east of CUF.

Traffic generated by existing operations at CUF is composed of a mix of cars and light duty trucks, as well as medium duty to heavy duty trucks. State highways provide ample access in the immediate vicinity of CUF. Principal access at CUF is via SR 233 (Cumberland City Road), which is two lanes wide. SR 149, another two-lane roadway, is approximately 1.2 miles east of CUF. The Cumberland City Ferry, which operates just east of CUF, provides a connection for SR 46 across the Cumberland River. To the west, SR 49 connects SR 233 to US 79 at Dover, Tennessee. US 79 crosses the Cumberland River at Dover (see Figure 2-1).

The 2013 Annual Average Daily Traffic on the roadways in the immediate vicinity of CUF including SR 233 (Cumberland City Road), and SR 49 are indicated in Table 3-10.

Existing levels of service (LOS) on the roadways in the immediate vicinity of CUF are LOS A. LOS is a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. LOS is described accordingly:

- LOS A: describes free flow traffic conditions;
- LOS B: free flow conditions although presence of other vehicles begins to be noticeable;
- LOS C: increases in traffic density become noticeable but remain tolerable to the motorist;
- LOS D: borders on unstable traffic flow; the ability to maneuver becomes restricted; delays are experienced;
- LOS E: traffic operations are at capacity; travel speeds are reduced, ability to maneuver is not possible; travel delays are expected; and
- LOS F: designates traffic flow breakdown where the traffic demand exceeds the capacity of the roadway; traffic can be at a standstill.

Roadway	Existing Average Annual Daily Traffic	Number of Lanes	Existing Level of Service
SR 233 (Cumberland City Road) at CUF	2,348	2	А
SR 233 (Cumberland City Road) just east of SR 49 at Carlisle	1,238	2	А
Old Hwy 149 between SR 233 and SR 149	424	2	А
SR 149 south of Old Hwy 149	3,560	2	А
SR 49 just north of SR 233 at Carlisle	1,601	2	А
SR 49 just east of Dover at Lick Creek Bridge	3,369	2	А
US 79 just north of Dover at Cumberland River Bridge	8,678	4	А

Table 3-10.Average Daily Traffic Volume (2013) on Roadways in Proximity to
Cumberland Fossil Plant in Stewart County, Tennessee

Source: Tennessee Department of Transportation 2013.

3.16.2 Environmental Consequences

3.16.2.1 Alternative A – No Action

Under the No Action Alternative, TVA would not develop borrow areas, an access road or bridge on CUF property; therefore, there would be no impact to transportation on CUF property. However, to support ongoing plant operations, TVA would still require borrow, which it would obtain, as needed, from one or more existing offsite commercial sources.

Impacts to transportation would result from increased traffic volumes on public roadways between the offsite commercial borrow site (or sites) and CUF. It is expected that suitable borrow material would be available within a 30-mile radius of CUF. Under Alternative B, the amount of borrow available onsite at the north and south borrow areas is estimated to be approximately 630,000 yd³. To support current and future operations under Alternative A, this same amount of borrow coming from offsite commercial borrow site or sites would result in 33 percent more truckloads over public roadways. This increase is realized as smaller over-the-road dump trucks would be required to haul the borrow from an offsite commercial borrow location; whereas, under Alternative B, larger articulated dump trucks could be used to transport borrow from the proposed onsite location.

The demand for borrow would vary over the course of ongoing plant operations; thus, a daily traffic count is not available but it is expected to be intermittent and dependent upon specific needs at CUF. Based on this level of use, impacts to traffic operations are expected to be relatively minor. Therefore, this alternative would cause minor disturbances to the roadway network, localized roadway degradation and minor potential effects to adjacent environmental receptors along the route to an offsite source because of increased truck traffic.

The proposed transport of borrow material over public roadways would result in an increase in the number of vehicle miles traveled on those roadways, which is a factor in injury and fatal traffic crash rates. The number of truck-related crashes associated with the transport of borrow to CUF could increase and could compromise driver safety.

3.16.2.2 Alternative B – Develop and Operate Two Borrow Sites, Construct an Access Road and Bridge on CUF Property

Under Alternative B, TVA would develop two borrow areas on CUF property, a gravel access road between Old Scott Road and the CUF perimeter road and as both borrow sites are located on the west side of Wells Creek, TVA would build a bridge over Wells Creek. An approximately 0.6-mile new two-lane gravel road would be used to provide access from the plant to Old Scott Road. Access to the southernmost borrow site would incorporate existing Old Scott Road which is currently a two-lane gravel road. TVA would grade and maintain that portion of the existing Old Scott Road to support the truck traffic.

The daily workforce during construction of the access road and borrow area development is expected to be 25 workers. Workforce traffic would predominantly consist of a mix of passenger cars and light duty trucks (such as delivery trucks). Traffic is assumed to be distributed during a peak morning period (to the site) and during a peak evening period (away from the site). Assuming one person per commuting vehicle, there would be a daily morning inbound traffic volume of 25 vehicles and a daily outbound traffic volume of 25 vehicles for a total of 50 vehicles per day. This traffic volume is expected to disperse into the surrounding road network and have negligible effect on these roads.

Prior to the completion of the proposed access road, borrow would be transported from the southern borrow site to CUF along existing roadways. Under this interim condition, which would last approximately 6 to 9 months, borrow would be transported along a route from the southern borrow site south along Old Scott Road to Buckeye Road. From there it would be transported easterly to SR 149, then north to Old Hwy 149, then north to SR 233, then west to CUF. It is anticipated that up to 135 truckloads per day would make this trip. These truckloads equate to an additional traffic count of 270 trips along the interim haul route when borrow is needed. The LOS on SR 149 and Old Hwy 149 are good (LOS A) and these additional truck trips are not expected to result in a degradation of these levels of service. Therefore, impacts are expected to minor and temporary.

Once the access road is completed, it is anticipated that up to 210 truckloads of borrow per day could be used to haul borrow material from the borrow sites along Old Scott Road to the new access road to the CUF perimeter road. Since the northern borrow site can be accessed from the new access road, truck traffic would not use public roadways to access the northern borrow site and thus would have no impact on public roadways.

The anticipated that up to 210 truckloads of borrow per day would be hauled from the southern borrow site to the CUF perimeter road, which would result in a truck trip count of 420 trucks per day on Old Scott Road. There is not a published traffic volume for Old Scott Road but it is assumed to be very low, likely less than 100 vehicles per day as there are only two residences along the road. Therefore, the effects on traffic LOS on Old Scott Road is expected to be negligible. The hauling of borrow material is not assumed to have an effect on any of the other public roads listed in Table 3-10.

It is possible that TVA would seek borrow material from other permitted commercial offsite sources to support ongoing plant operations. The impacts to transportation would result from increased traffic volumes on public roadways between the borrow site (or sites) and CUF. As the use of an offsite source would only be needed to supplement the proposed

borrow sites, the impact would be minor and less than Alternative A, due to the presumably lower quantities of borrow that would be obtained from offsite sources and correspondingly fewer truck trips envisioned under Alternative A.

Therefore, the predicted traffic increases resulting from the development of the proposed borrow sites and access road are negligible and the impacts are expected to be minor.

3.17 Noise

3.17.1 Affected Environment

Noise is unwanted or unwelcome sound usually caused by human activity and added to the natural acoustic setting of a locale. Noise is further defined as sound that disrupts normal activities and diminishes the quality of the environment. Community response to noise is dependent on the intensity of the sound source, its duration, the proximity of noise-sensitive land uses, and the time of day the noise occurs. For instance, higher sensitivities to noise would be expected during the quieter overnight periods at noise sensitive receptors such as residences. Other receptors might include developed sites where frequent human use occurs such as churches and schools.

Sound is measured in units of decibels (dB) on a logarithmic scale. Because not all noise frequencies are perceptible to the human ear, A-scale weighting decibels (dBA), which filter out sound in frequencies above and below human hearing, are typically used in noise assessments. A noise level change of 3 dBA or less is barely perceptible to average human hearing. However, a 5 dBA change in noise level is clearly noticeable. A 10 dBA change is perceived as a doubling or halving of noise loudness; whereas a 20 dBA change is considered a "dramatic change" in loudness.

Ambient noise in the area is anticipated to range between a Day-Night Sound Level (Ldn) of 35 and 50 dB, which are typical background day/night noise levels for rural areas whereas higher-density residential and urban areas background noise levels range from 43 dB to 72 dB (EPA 1974).

The EPA 1974 guidelines recommend that Ldn not exceed 55 dBA for outdoor residential areas. The U.S. Department of Housing and Urban Development (HUD) considers an Ldn of 65 dBA or less to be compatible with residential areas (HUD 1985). For traffic-related noise, the Federal Highway Administration (FHWA) has set a threshold of 67 dBA as the sound level at which noise abatement should be considered. The Tennessee Department of Transportation has adopted this same threshold for projects in Tennessee.

3.17.1.1 Noise Receptors

The southernmost proposed borrow site lies on CUF property and is bordered by wooded ridges to the west, and open pasture with a mix of trees to the south, east and north. The northernmost borrow site is nearly surrounded by wooded area with the CUF situated to the east. The noise environment of the proposed borrow sites, access road and bridge is characterized by noise from industrial activities at CUF, transportation noise and construction noise. Nearby noise sensitive receptors include residents living near the borrow sites and along the access route used to transport borrow material to the plant site. The closest sensitive receptors to the proposed borrow sites are two homes located approximately 1,900 feet south of the southernmost borrow site on Buckeye Road.

3.17.1.2 Sources of Noise

Noise generating activities associated with the existing plant include coal unloading activities, periodic dozer operations associated with coal pile management and truck operations. Existing noise emission levels associated with these activities typically range from 59 to 87 dBA when measured 50 feet from the source (TVA 2014). Transportation noise related to activities evaluated in this EA primarily include noise from truck traffic. Three primary factors influence highway noise generation: traffic volume, traffic speed, and vehicle type. Generally, heavier traffic volumes, higher speeds, and greater numbers of trucks increase the sound level of highway traffic noise. Other factors that affect the sound level of traffic noise include a change in engine speed and power, such as occurs at traffic lights, hills, and intersecting roads, as well as pavement type. Highway traffic noise is not usually a serious problem for people who live more than 500 feet from heavily traveled freeways or more than 100 to 200 feet from lightly traveled roads (FHWA 2011). Due to the nature of the decibel scale and the attenuating effects of noise with distance, a doubling of traffic volume would result in approximately a 3 dBA increase in noise levels, which would not normally be a perceptible noise increase (FHWA 2011).

The level of construction noise is dependent upon the nature and duration of the project. Construction activities for most large-scale projects would be expected to result in increased noise levels due to operation of construction equipment onsite and the movement of construction-related vehicles (i.e., worker trips, and material and equipment trips) on the surrounding roadways. Noise levels associated with construction activities would increase ambient noise levels adjacent to the construction site and along roadways used by construction-related vehicles. Construction noise is generally temporary and intermittent in nature as it generally occurs on weekdays during daylight hours which minimizes the impact to receptors.

3.17.2 Environmental Consequences

3.17.2.1 No Action Alternative

Under the No Action Alternative, TVA would not develop borrow areas, an access road or bridge on CUF property; therefore, there would be no change in the existing noise environment under this alternative. However, to support ongoing plant operations, TVA would still require borrow, which it would obtain, as needed, from one or more existing offsite commercial sources.

Traffic associated with the transport of borrow material would result in an increase in intermittent noise at residences or other sensitive receptors located along any local roads that may be utilized during the hauling period due to the additional truck traffic. It is expected that suitable borrow material would be available within a 30-mile radius of CUF. For borrow sites at greater distances from CUF, trucks are expected to use larger arterial roadways for much of the travel to and from the borrow site. Noise impacts from the additional transport of borrow along these arterial roadways is expected to be minor relative to existing baseline traffic-related noise. However, for receptors along the local roadway system serving CUF, noise related effects would be notably greater under Alternative A than under Alternative B during hauling periods.

Noise impacts from traffic related to the hauling of offsite borrow are expected to be minor as construction-related traffic would utilize interstate highways or major arterial roadways as much as possible and likely would not have a noticeable increase on traffic volume and consequently traffic noise near those major roadways.

3.17.2.2 Alternative B – Develop and Operate Two Borrow Sites, Construct an Access Road and Bridge on CUF Property

Noise impacts under this alternative would be associated with construction of the access road and bridge, construction and operation of the borrow sites, construction-related traffic (construction workforce and the shipment of goods and equipment) to and from the project site, and the transport of borrow material to CUF.

Typical noise levels from construction equipment are expected to be 85 dBA or less at a distance of 50 feet from the construction equipment. Typical construction equipment would consist of front-end loaders, dozers, excavators, graders and dump/haul trucks. Based on straight line noise attenuation, it is estimated that noise levels from these sources would attenuate to 53.4 dBA at the nearest residence 1,900 feet from the southern borrow site. However, the actual noise would probably be lower in the field, where objects and topography would cause further noise attenuation. This level is less than the EPA noise guideline for Ldn of 55 dBA and the HUD guideline for Ldn of 65 dBA. Given the temporary and intermittent nature of construction noise, the impact of noise generated from construction activities is expected to be minor. Noise resulting from operation of the southern borrow site would be basically the same as noise resulting from its construction as similar construction equipment would be used during operations.

The nearest residence to the north borrow site is approximately 0.52 mile north of the borrow site. At this distance, there would be no noise impact at this residence resulting construction or operations at the north borrow site.

As noted in Section 3.16 (Transportation), construction-related traffic on local roads near CUF is expected to be negligible and, therefore, these additional vehicles would result in negligible noise impacts.

There is a potential for indirect noise impacts associated with an increase in traffic related to the transport of borrow material to CUF. There is one residence located on Old Scott Road within 120 feet of the access route to the southernmost borrow area. As noted in Section 3.16 (Transportation), there are no public traffic records for this roadway; however, the traffic volume for Old Scott Road is assumed to be very low, likely less than 100 vehicles per day. Traffic volume along this road is projected to increase by up to 210 truckloads per day (420 trips per day). Although this increase in traffic may result in a perceptible noise increase at this receptor, operations would generally only occur during normal workdays. In addition, the impact would only occur during specific construction periods (when borrow is needed at CUF), which would vary with plant operations and is not expected to occur every day. Furthermore, this is the only noise receptor along the access route. Given this, the noise impacts associated with the hauling of borrow from the southernmost borrow area to CUF are expected to be minor.

Prior to the completion of the proposed access road, borrow would be transported from the southern borrow site to CUF along existing roadways as described above. It is anticipated that up to 135 truckloads per day (270 truck trips) would use this route when borrow is needed at CUF. There are 13 noise sensitive receptors within 500 feet of this interim route. The projected truck traffic along the interim route would not double the existing traffic volumes on SR 149 or Old Highway 149; therefore, based on the nature of the decibel scale and the attenuating effects of noise with distance, the noise level increases along these routes would not exceed 3 dBA and would not be perceivable (FHWA 2011). In addition, this route would only be used for 6 to 9 months and transport of borrow would

occur during a normal workday and only during specific construction periods. Given this, the noise impacts associated with the hauling of borrow from the southernmost borrow area to CUF along this interim and temporary route are expected to be minor. Once the access road is completed, the haul route for the borrow material would shift to the newly constructed access road via Old Scott Road and use of the interim route would be discontinued.

If needed to supplement the proposed borrow sites, TVA may obtain borrow from other permitted commercial offsite sources to support ongoing plant operations. Although the exact haul route from these potential borrow site or sites is not known, noise impacts associated with the transport of borrow material are anticipated to be minor as borrow would only be obtained when needed to support operations and if onsite material is not available.

3.18 Unavoidable Adverse Impacts

Unavoidable adverse impacts are the effects of the proposed action 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 CEQ and the courts. Impacts associated with the proposed activities have the potential to cause unavoidable adverse effects to several environmental resources.

Specifically, temporary impacts to water quality from runoff could impact nearby receiving water bodies during initial construction activities. Adverse impacts would also occur to two small wetland areas, one perennial stream, and three ephemeral streams located within the proposed project sites. In addition, soil excavation and transport of soil would generate noise and fugitive dust; however, these activities would occur within CUF property where fugitive dust controls are in place and where workers use appropriate protection and adhere to safety standards designed to minimize worker-related injuries.

With the application of appropriate BMPs and adherence to permit requirements, these unavoidable adverse effects would be minor.

3.19 Relationship of Short-Term Uses to 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. This EA focuses on the analyses of environmental impacts associated with the development of two borrow sites and construction of an access road. For the purposes of this section, these activities are considered short term uses of the environment, and the long term is considered to being upon the cessation of borrow activities.

Most environmental impacts during construction activities would be relatively short term and would be addressed by BMPs and mitigation measures. Construction activities would have a limited, yet favorable short-term impact to the local economy through the creation of construction jobs and associated revenue.

Because CUF is dedicated to power production, no loss of productivity of other natural resources is anticipated. Upon cessation of borrow excavation, the borrow sites would be regraded and seeded or sodded and would eventually provide wildlife habitat which would have a beneficial impact on long-term productivity.

3.20 Irreversible and Irretrievable Commitments of Resources

An irreversible or irretrievable commitment of resources refers to impacts on or losses to resources that cannot be recovered or reversed. The term irreversible commitments of resources describes environmental resources that are potentially changed by the construction or operation of the proposed projects that could not be restored to their prior state by practical means at some later time. A commitment of a resource would be considered irretrievable when the project would directly eliminate the resource, its productivity, or its utility for the life of the project or longer.

Resources required by construction activities, including labor, fossil fuels and construction materials, would be irretrievably lost. However, it is unlikely that their limited use in these projects would adversely affect the overall future availability of these resources.

The excavation and transport of borrow material to the Dry Fly Ash and Gypsum stacks would be both an irreversible and irretrievable commitment of resources. Productive soils from the borrow areas would be removed, but would cover the Dry Fly Ash and Gypsum stacks with productive soils that would support vegetation. The transfer of soils from the borrow sites to the stacks would be both an irreversible and irretrievable commitment of resources. Restoration of the borrow sites would return these areas to productive status. Thus, the loss of vegetation until the areas are successfully reclaimed would be an irretrievable, but not irreversible, commitment of resources.

3.21 Cumulative Impacts

This section supplements preceding analyses that include the potential for cumulative adverse impacts to the region's environment that could result from the implementation of the proposed development of borrow areas and access road. A cumulative impact analysis must consider the potential impact on the environment that may result from the incremental impact of a project when added to other past, present and reasonably foreseeable future actions (40 CFR 1508.7). Baseline conditions reflect the impacts of past and present actions. The impact analyses summarized in preceding sections are based on baseline conditions including the following actions which are either explicitly or implicitly considered cumulative impacts:

- Flue Gas Desulfurization System on CUF Units 1 and 2
- Selective Catalytic Reduction Systems on CUF Units 1 and 2
- Sale of TVA property for development of a gypsum wallboard plant and gypsum processing plant
- Partial Closure of the Dry Fly Ash Stack and Gypsum Stack

Because these actions are considered part of the baseline, they are not addressed separately in the cumulative effects analysis.

TVA evaluated a full range of environmental resource issues for inclusion in the cumulative effects analysis. The proposed action and its connected actions identified under Alternative B would occur mostly on land that is largely undeveloped. The surrounding landscape is primarily undeveloped except for the adjacent CUF facility, which is already subject to environmental stressors associated with continuing industrial operations. Consequently, as has been described in prior subsections of this EA, the existing quality of

environmental resources with the potential to be directly or indirectly affected by project activities is generally low.

3.21.1 Geographic Area of Analysis

The appropriate geographic area over which past, present, and future actions could reasonably contribute to cumulative effects is variable and dependent on the resource evaluated. Based upon the defined list of resources potentially affected by cumulative effects, the lands and water resources within a 5-mile radius of the proposed actions were considered appropriate for consideration in this analysis.

3.21.2 Identification of "Other Actions"

The only reasonably foreseeable future action that is appropriate for consideration in this cumulative analysis is the change in the management of CCR produced at CUF and the construction of a waste water treatment plant on CUF property. Although a decision regarding specific actions associated with these activities has not been finalized, the change in CCR management and construction of a waste water treatment plant are reasonably foreseeable and are, therefore, considered in this evaluation of cumulative impacts as having the potential to, in the aggregate, result in larger cumulative impacts.

TVA is deciding how best to convert management of CCRs produced at CUF from a wet to a dry system. TVA is considering managing CCRs at CUF through the construction and operation of several projects. Specifically, the construction and operation of a Bottom Ash Dewatering Facility and the closure of the existing CCR impoundments (Main Ash Impoundment, Bottom Ash Impoundment and North Ditch). As noted above, material from the borrow sites would be used to support partial closure of the Dry Ash and Gypsum stacks in accordance with their existing permits. However, borrow could also be used to support future operations at TVA which may include CCR impoundment closure activities. TVA is also evaluating a range of alternatives for the long-term management and storage of future CCR generated at CUF including construction of a landfill on CUF property.

3.21.3 Analysis of Cumulative Effects

To address cumulative impacts, the existing affected environment surrounding the project area was considered in conjunction with the environmental impacts presented in Chapter 3. These combined impacts are defined by the CEQ as "cumulative" in 40 CFR 1508.7 and may include individually minor, but collectively significant, actions taking place over a period of time.

The potential for cumulative effects associated with the proposed action in conjunction with reasonably foreseeable actions (i.e., the CCR Management actions and construction of a waste water treatment plant), is a function of several factors that include the magnitude of the impact, the sensitivity of the resource affected (including the quality and condition of the baseline), and the timing of each action. As described in the resources analysis in Chapter 3, the proposed action would be located on lands that are currently disturbed and of relatively low environmental quality, or is relatively limited in scope such that it would have a minor impact magnitude on climate change, land use, geology, floodplains, groundwater, natural communities, cultural resources, visual resources, natural areas, transportation, parks or recreational facilities, and socioeconomic resources.

Primary adverse cumulative effects of the proposed action as described in the preceding sections of Chapter 3 are related to the potential additive and overlapping effects on air quality, aquatic and wetland ecosystems, noise, and prime farmland. It is likely that the

construction phase of the other reasonably foreseeable future actions identified within the region may overlap with the long-term operations associated with the proposed action. The proposed action would primarily avoid public roadways, and the other reasonably foreseeable future actions are located within CUF property and would not use public roads. Therefore cumulative impacts to the local transportation network are not anticipated.

The potential for cumulative effects to the identified environmental resources of concern are analyzed below for Alternative B.

3.21.3.1 Air Quality

CCR management actions have the potential to impact air quality. Emissions from the operation of a dewatering facility and onsite landfill would be subject to applicable operating permit and fugitive dust regulations. Emissions associated with the interim use of public roadways to transport borrow is expected to be completed before any activities associated with CCR Management actions. As such, such emissions are not expected to result in an increase in aggregate effect on local air quality to receptors along roadways. Emissions from potential CCR Management activities are expected to be minor and together with minor onsite emissions associated with excavation and transport of borrow would result in potential localized increase in air emissions. However, given the nature of these activities, exceedances of applicable ambient air quality standards are not expected; therefore, cumulative impacts to air quality would be localized and minor.

3.21.3.2 Aquatic and Wetland Ecosystems

The potential for cumulative effects to wetlands and the aquatic environment are largely driven by the loss of WWC/ephemeral/intermittent streams and wetland areas. As described in Section 3.5, impacts to WWC and ephemeral streams from the proposed action are minor and would be mitigated, as appropriate. Stream alteration associated with CCR Management activities would comply with applicable TDEC and USACE 404/401 permits obtained for the proposed actions and unavoidable impacts to resources would be mitigated, as appropriate. Additionally, BMPs would be used for all construction activities to minimize and reduce indirect impacts on receiving streams. Impacts associated with the proposed actions would result in the permanent loss of 0.8 acre of wetlands and approximately 110 feet of Wells Creek and approximately 90 linear feet of Scott Branch. Any permanent impacts would be mitigated in accordance with requirements of Section 404 of the CWA.

Given the local abundance of similar aquatic resources and wetland areas within the region, the relatively low quality of the resources affected, and the implementation of BMPs during construction for all identified projects, cumulative impacts to aquatic and wetland resources at a watershed level are not anticipated.

3.21.3.3 Noise

Transport of borrow from the proposed borrow sites together with construction traffic associated with the proposed CCR management actions would result in a localized increase in noise levels at noise receptors identified near the access road when these operations are occurring at the same time. The cumulative effect would be localized and not exceed significance levels as the transport of borrow would only occur when needed to support plant operations and operations-related noise would occur during normal working hours.

Emissions associated with the interim use of public roadways to transport borrow is expected to be a greater potential concern as truck-related emissions may impact nearby residential receptors. However, it is expected that interim transport of borrow using existing public roadways would be completed before any activities associated with CCR Management actions. Therefore, cumulative effects to noise quality are anticipated to be localized and minor.

3.21.3.4 Prime Farmland

Construction of the proposed landfill considered as part of future CCR management at CUF may impact soils with prime farmland characteristics. The conversion of these soils to landfill use, together with the conversion of 31 acres of prime farmland associated with the proposed action would be minor, comprising less than 0.2 percent of the approximately 18,589 acres of prime farmland within 5 miles of CUF.

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Appendix A – Correspondence

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Boulware, Karen

From: Sent: To: Subject: McMillen, David - NRCS, Nashville, TN <david.mcmillen@tn.usda.gov> Thursday, June 15, 2017 9:27 AM Kinzinger, Emily FPPA: Cumberland Fossil Plant Borrow Areas

Dear Emily,

I have received your request for information pertaining to the Farmland Protection Policy Act (FPPA) and/or prime farmland in Stewart County.

This project will not convert areas of prime farmland as defined by the FPPA. This determination is based solely on the information provided by you, your organization, and other relevant resource data for the area of the project. No site visit has been made.

Per the FPPA manual (523.11, C., viii), surface mining where restoration is planned is not subject to the provisions of FPPA.

As always, please feel free to contact me via phone or email if I can help further.

Dave

David McMillen, LPSS

State Soil Scientist 801 Broadway, Suite 675 Nashville, TN 37203 (615) 277-2550 office (615) 390-1507 SMS/cell



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TENNESSEE HISTORICAL COMMISSION DEPARTMENT OF ENVIRONMENT AND CONSERVATION 2941 LEBANON ROAD NASHVILLE, TN 37243-0442 (615) 532-1550

Mr. Clinton E. Jones Tennessee Valley Authority 400 W. Summet Hill Dr.

Knoxville, Tennessee, 37902-1499

RE: TVA, HENRY HOLLISTER HOUSE, UNINCORPORATED, STEWART COUNTY

Dear Mr. Jones:

October 24, 2012

In response to your request, received on Wednesday, October 17, 2012, we have reviewed the documents you submitted regarding your proposed undertaking. Our review of and comment on your proposed undertaking are among the requirements of Section 106 of the National Historic Preservation Act. This Act requires federal agencies or applicant for federal assistance to consult with the appropriate State Historic Preservation Office before they carry out their proposed undertakings. The Advisory Council on Historic Preservation has codified procedures for carrying out Section 106 review in 36 CFR 800. You may wish to familiarize yourself with these procedures (Federal Register, December 12, 2000, pages 77698-77739) if you are unsure about the Section 106 process. You may find additional information concerning the Section 106 process and the Tennessee SHPO's documentation requirements at. http://www.tennessee.gov/environment/hist/federal/sect106.shtml

Considering available information, we find that the project as currently proposed will NOT ADVERSELY AFFECT ANY PROPERTY THAT IS ELIGIBLE FOR LISTING IN THE NATIONAL REGISTER OF HISTORIC PLACES. Therefore, this office has no objection to the implementation of this project. Please direct questions and comments to Joe Garrison (615) 532-1550-103.

We appreciate your cooperation.

Sincerely

E. Patrick McIntyre, Jr. Executive Director and State Historic Preservation Officer

EPM/jyg




TENNESSEE HISTORICAL COMMISSION DEPARTMENT OF ENVIRONMENT AND CONSERVATION 2941 LEBANON ROAD NASHVILLE, TN 37243-0442 (615) 532-1550

November 5, 2012

Mr. Clinton Jones Tennessee Valley Authority 400 West Summit Hill Drive WT11D Knoxville, Tennessee 37902-1499

RE: TVA, PHASE I ARCHAEOLOGICAL ASSESSMENT, CUMBERLAND FOSSIL PLANT/1180 ACRES, UNINCORPORATED, STEWART COUNTY,

Dear Mr. Jones:

At your request, our office has reviewed the above-referenced archaeological survey report in accordance with regulations codified at 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739). Based on the information provided, we concur that the project area contains archaeological resources potentially eligible for listing in the National Register of Historic Places. Sites 40SW63, 40SW219, 40SW702 and 40SW710 should either be avoided by all ground-disturbing activities, or subjected to Phase II archaeological evaluation. The additional 24 sites identified during the survey investigations do not contain resources eligible for inclusion in the National Register, and thus require no additional archaeological investigations.

Upon receipt of the Phase II testing report or avoidance strategy, we will complete our review of this undertaking as expeditiously as possible. Please submit a minimum of two copies of each final report to this office in accordance with the Tennessee Historical Commission Review and Compliance Section Reporting Standards and Guidelines. Complete and/or updated Tennessee Site Survey Forms should be submitted to the Tennessee Division of Archaeology. Until such time as this office has rendered a final comment on this project, your Section 106 obligation under federal law has not been met. Please inform this office if this project is canceled or not permitted or funded by the federal agency. Questions and comments may be directed to Jennifer M. Barnett (615) 741-1588, ext. 105.

Your cooperation is appreciated.

Sincerely,

E. Patrick McIntyre, Jr. Executive Director and State Historic Preservation Officer

EPM/jmb



TENNESSEE HISTORICAL COMMISSION DEPARTMENT OF ENVIRONMENT AND CONSERVATION 2941 LEBANON ROAD NASHVILLE, TN 37243-0442 (615) 532-1550

May 2, 2013

Mr. Clinton Jones Tennessee Valley Authority 400 West Summit Hill Drive WT11D Knoxville, Tennessee 37902-1499

RE: TVA, ARCHAEOLOGICAL ASSESSMENT, HENRY HOLLISTER HOUSE/40SW723, UNINCORPORATED, STEWART COUNTY

Dear Mr. Jones:

At your request, our office has reviewed the above-referenced archaeological survey final report in accordance with regulations codified at 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739). We concur with your agency that archaeological site 40SW723 contains resources eligible for inclusion in the National Register of Historic Places

Your continued cooperation is appreciated.

Sincerely,

E. Patrick Miduly . L.

E. Patrick McIntyre, Jr. Executive Director and State Historic Preservation Officer

EPM/jmb



TENNESSEE HISTORICAL COMMISSION STATE HISTORIC PRESERVATION OFFICE 2941 LEBANON PIKE NASHVILLE, TENNESSEE 37243-0442 OFFICE: (615) 532-1550 www.tnhistoricalcommission.org

June 21, 2017

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

RE: TVA / Tennessee Valley Authority, Cumberland Fossil (CUF) Plant Access Roads and Borrow Area, , Stewart County, TN

Dear Mr. Jones:

Pursuant to your request, this office has reviewed documentation concerning the abovereferenced undertaking. Our review of and comment on your proposed undertaking are among the requirements of Section 106 of the National Historic Preservation Act. This Act requires federal agencies or applicants for federal assistance to consult with the appropriate State Historic Preservation Office before they carry out their proposed undertakings. The Advisory Council on Historic Preservation has codified procedures for carrying out Section 106 review in 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739).

Based on the information provided, we concur that the project area contains a cultural resource eligible for listing in the National Register of Historic Places. We further concur that the project as currently proposed will not adversely affect the Henry Hollister House.

This office has no objection to the implementation of this project as currently planned. If project plans are changed or previously unevaluated archaeological resources are discovered during project construction, please contact this office to determine what further action, if any, will be necessary to comply with Section 106 of the National Historic Preservation Act. Questions and comments may be directed to Casey Lee (615 253-3163). We appreciate your cooperation.

Sincerely,

E. Patrick MEIntyre, Jr.

E. Patrick McIntyre, Jr. Executive Director and State Historic Preservation Officer

EPM/cjl

From:	Ezzell, Patricia Bernard
То:	McCampbell, Amy Boardman; Shuler, Marianne M; Wells, Edward William III; Harle, Michaelyn S
Subject:	FW: TVA, CUMBERLAND FOSSIL PLANT (CUF), PROPOSED ACCESS ROADS AND BORROW AREA, STEWART COUNTY, TENNESSEE
Date:	Tuesday, June 13, 2017 2:27:19 PM

Fyi – comments from Chickasaw.

From: Karen Brunso [mailto:Karen.Brunso@chickasaw.net]
Sent: Friday, June 09, 2017 3:45 PM
To: Ezzell, Patricia Bernard
Subject: RE: TVA, CUMBERLAND FOSSIL PLANT (CUF), PROPOSED ACCESS ROADS AND BORROW AREA, STEWART COUNTY, TENNESSEE

TVA External Message. Please use caution when opening.

Pat,

Thank you for the letter of notification about the proposed new borrow area associated with the partial closure of an existing gypsum and ash stack on the Cumberland Fossil Plant in Stewart County, Tennessee. The project is located outside of the Chickasaw Nation's area of interest. Please contact us with any questions. Respectfully, Karen

Karen Brunso

Tribal Historic Preservation Officer The Chickasaw Nation Department of Culture & Humanities Division of Historic Preservation P.O. Box 1548 Ada, OK 74821-1548 Phone: 580-272-1106 Cell: 580-399-6017 Email: <u>karen.brunso@chickasaw.net</u>

From: Ezzell, Patricia Bernard [mailto:pbezzell@tva.gov]

Sent: Tuesday, May 30, 2017 12:47 PM

To: <u>elizabeth-toombs@cherokee.org</u>; <u>hollymaustin94@gmail.com</u>; Eric Oosahwee-voss (<u>eoosahwee-voss@ukb-nsn.gov</u>>; 'section106@mcn-nsn.gov'

<<u>section106@mcn-nsn.gov</u>>; HPO <<u>HPO@chickasaw.net</u>>; <u>AQhpo@mail.com</u>;

<u>dc13.dc4@gmail.com;</u> 'Emman Spain' <<u>espain@tttown.org</u>>; <u>ethompson@astribe.com;</u> 'Robin

Dushane' <<u>RDushane@estoo.net</u>>; Tonya Tipton (<u>tonya@shawnee-tribe.com</u>) <<u>tonya@shawnee-</u> <u>tribe.com</u>>

Cc: 'Russell Townsend' <<u>RussellT@nc-cherokee.com</u>>; 'karen pritchett' <<u>kpritchett@ukb-nsn.gov</u>>; <u>David.Cook@kialegeetribe.net;</u> 'Dee Gardner' <<u>dgardner@estoo.net</u>>; Harle, Michaelyn S <<u>mharle@tva.gov</u>> **Subject:** TVA, CUMBERLAND FOSSIL PLANT (CUF), PROPOSED ACCESS ROADS AND BORROW AREA, STEWART COUNTY, TENNESSEE

Good Afternoon,

I hope this email finds you well. By this email, I am transmitting the attached letter regarding TVA's proposal to open a new borrow area associated with the partial closure of an existing gypsum and ash stack on the CUF reservation.

You should have received an invitation from Michaelyn Harle to visit our Secure Workspace (Accellion) to access the referenced report. If you did not, or if you have problems accessing this space, please contact Michaelyn. She is copied to this email.

With the conditions referenced in the letter, TVA finds that the proposed undertaking would have no adverse effect to historic properties.

Please respond by June 29, 2017, if you have any comments on the proposed undertaking. If you have any questions, please contact me at (865) 632-6461 or by email at <u>pbezzell@tva.gov</u>.

Thank you.

Sincerely,

Pat

Pat Bernard Ezzell Senior Program Manager and Federal Preservation Officer Community Relations Communications and Marketing Tennessee Valley Authority 400 W. Summit Hill Drive 460 WT 7-K Knoxville, Tennessee 37902 865-632-6461 (office) 865-304-9251 (work cell) pbezzell@tva.gov



June 22, 2017

Patricia B. Ezzell Senior Program Manager Tennessee Valley Authority 400 West Summit Hill Drive Knoxville, TN 37902 GWY29 D3P CHEROKEE NATION® P.O. Box 948 • Tahlequah, OK 74465-0948 • 918-453-5000 • cherokee.org Office of the Chief

Bill John Baker Principal Chief OP Gh JSS& DY OEOGA

S. Joe Crittenden Deputy Principal Chief ወ. KG. JEYወሃ WPA DLሪብ ውደፅርብ

Re: Cumberland Fossil Plant Proposed Access Roads and Borrow Area, Stewart County

Ms. Patricia B. Ezzell:

The Cherokee Nation (CN) is in receipt of your correspondence about **Cumberland Fossil Plant Proposed Access Roads and Borrow Area, Stewart County**, and appreciates the opportunity to provide comment upon this project. The CN maintains databases and records of cultural, historic, and pre-historic resources in this area. Our Historic Preservation Office reviewed this project, cross referenced the project's legal description against our information, and found no instances where this project intersects or adjoins such resources. Thus, the CN does not foresee this project imparting impacts to Cherokee cultural resources at this time. However, the CN requests that the Tennessee Valley Authority (TVA) halt all project activities immediately and re-contact our Offices for further consultation if items of cultural significance are discovered during the course of this project.

Additionally, we would request TVA conduct appropriate inquiries with other pertinent Tribal and Historic Preservation Offices regarding historic and prehistoric resources not included in the CN databases or records. If you require additional information or have any questions, please contact me at your convenience.

Thank you for your time and attention to this matter.

Wado,

the foombo

Elizabeth Toombs, Special Projects Officer Cherokee Nation Tribal Historic Preservation Office elizabeth-toombs@cherokee.org 918.453.5389



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

June 7, 2017

Ms. Mary Jennings Field Supervisor U. S. Fish and Wildlife Service 446 Neal Street Cookeville, TN 38501

Dear Ms. Jennings:

TENNESSEE VALLEY AUTHORITY – CUMBERLAND FOSSIL PLANT ACCESS ROAD AND BORROW AREAS

The Tennessee Valley Authority (TVA) is proposing to develop borrow sites at the Cumberland Fossil Plant (CUF) located in northern Tennessee on the Cumberland River in Stewart County. TVA proposes to develop two borrow sites to support partial closure of the existing Dry Fly Ash and Gypsum stacks in accordance with their existing Special Waste Permit. The proposed borrow areas would be on CUF property. The project also includes the construction of a road on CUF property from the plant to Old Scott Road to provide access to the potential borrow areas and construction of a bridge over Wells Creek. The total potentially affected acreage is approximately 110.7 acres. There are approximately 20.3 acres of forest within the project action area. Approximately 11.9 acres of forest could be removed in association with the proposed actions. Tree clearing along the access road is proposed to occur August 16 through March 31. See attached Technical Report for more detailed project description, figures, and photos.

Review of the TVA Regional Natural Heritage database and the U.S. Fish and Wildlife Service IPaC website indicated seven species listed as endangered, threatened, a candidate for listing, or proposed for listing under the Endangered Species Act occur in the project area, Stewart County, Tennessee, or within 10 miles of the project area. These species include one plant (Price's potato-bean), three mussels (clubshell, pink mucket, and rabbitsfoot), and three mammals (gray bat, Indiana bat, and northern long-eared bat) that have the potential to occur within Stewart County based on historic range, proximity to known occurrence records, biological characteristics and/or physiographic characteristics. In addition, the federally protected bald eagle has been reported in Stewart County, Tennessee. No designated critical habitat for any of these species is present within the project action area.

Field reviews were conducted by TVA biologists in February 2017 and by AMEC Foster Wheeler staff in November 2016 to determine whether suitable habitat for federally listed Ms. Mary Jennings Page Two June 7, 2017

species occurs within the project action area. No habitat for federally listed plant or aquatic species was found within the project footprint during these reviews. In addition, surveys for

freshwater mussels conducted in October 2011 by Third Rock Consultants LLC, in the Cumberland River and Well's Creek did not encounter any threatened or endangered species.

The habitat was determined to be degraded and of sub-optimal quality for federally listed Mussels (see attached CUF Mussel Survey). Nonetheless, Best Management Practices (BMPs) would be utilized in stream management zones (SMZs) found within the project footprint in order to minimize disturbance in riparian areas, erosion and sediment inputs in streams. TVA has determined that the proposed actions would have no effect on Price's potato-bean, clubshell, pink mucket, and rabbitsfoot.

The closest known bald eagle nesting record is approximately 0.5 miles from the project action area. This nest was last known to be active in 2009. Proposed actions would not be visible from the nest. No additional bald eagle nests were observed during field reviews. TVA has determined that the proposed actions would have no effect on bald eagle.

Phase 1 Habitat Assessments (2016 Range-Wide Indiana Bat Summer Survey Guidelines, April 2016) were conducted TVA biologists in February 2017 and by AMEC Foster Wheeler staff in November 2016. No caves were observed during field reviews. The nearest documented cave record is approximately 1.6 miles from the proposed project area. No other suitable winter roosting structures for gray bat, Indiana bat and northern long-eared bat (NLEB) were identified within the action area.

Foraging habitat for gray bat, Indiana bat and NLEB exists over Wells Creek, emergent wetlands, streams, forested tree lines, and forest fragments within the proposed action areas. BMPs would be used in and along all streams potentially impacted by the proposed actions. Thus streams would still be available for use by foraging bats following the proposed actions. Any impacts to wetlands that cannot be avoided would have regulatory requirements associated with the USACE Section 404 permitting program and would provide mitigation sufficient to offset impacts. TVA has determined that the proposed actions may affect but are not likely to adversely affect gray bat.

Suitable summer roosting habitat and foraging habitat for federally-listed endangered Indiana bat and federally-listed threatened NLEB was identified within the project area. In total, 11.9 acres of potentially suitable Indiana bat and NLEB roosting trees would be removed for the development of the access road, borrow areas, and laydown site. Summer roosting habitat ranged from low to moderately suitable due to the presence of snags, white oaks and other mature hardwoods with exfoliating bark, cracks, or crevices. Suitable summer roosting habitat was comprised of mixed coniferous-deciduous hardwood forests and fencerows dominated by honey locust, tulip poplar, hackberry, and cedar. All requested information is contained within the Technical Report (e.g., project description, methods, survey locations, maps, summary of results, photos etc.).

Ms. Mary Jennings Page Three June 7, 2017

There are several records of Indiana bat and NLEB in Stewart County and surrounding counties. The closest Indiana bat records are summer records from Ft. Campbell (11.5 miles away) and a winter hibernaculum in Montgomery County (Bellamy Cave, 8.5 miles away). Due

to proximity of the project to Bellamy cave, the proposed actions are within known swarming habitat for Indiana bat. The closest known NLEB hibernaculum is Richardson cave approximately 1.6 miles away in Houston County. This is the closest known cave to the project action areas. A male northern long-eared bat was also capture in 2011 approximately 0.6 miles from the proposed action area in Houston County.

Despite the lower quality of potential summer roosting habitat, the presence of some suitable roosting trees as well as the proximity to known records has led TVA biologists to determine that this area could present suitable summer roosting habitat for Indiana and NLEB. Wetlands, streams, and fence rows, forested habitat on site provides foraging habitat. The project proposes to clear all potentially suitable roosting habitat between August 16 and March 31.

TVA proposes that a contribution of \$110,075 to Tennessee's Imperiled Bat Conservation Fund would be provided by TVA to promote the conservation and recovery of imperiled bats in Tennessee per the Tennessee Field Office's Conservation Strategy for Forest-Dwelling Bats.

As per the 2016 Programmatic Biological Opinion on Final 4(d) Rule for the Northern Long-Eared Bat and Activities Excepted from Take Provisions (2016 BO), this clearing schedule avoids removal of trees during the NLEB pup season (June 1 to July 31). No known NLEB maternity roosting sites are present within 150 feet of the project area. No known NLEB hibernacula are present within 0.25 miles of the project area. All tree removal would occur outside of the time (June 1 - July 31) when NLEB pups would be present in maternity roosts.

TVA has determined that while removal of suitable roosting habitat would have indirect adverse effects on NLEB and result in 'take' as defined in the Endangered Species Act (ESA), this 'take' is excepted from ESA Section 9 Take Prohibitions. Determinations regarding potential effects on NLEB were made per the Key to Northern Long-Eared Bat 4(d) Rule for Federal Actions that May Affect Northern Long-Eared Bats (USFWS - January 2016) and the Programmatic Biological Opinion on Final 4(d) Rule for the Northern Long-Eared Bat and Activities Excepted from Take Prohibitions (2016 BO).

TVA requests confirmation from your office that any incidental take of NLEB (as measured by removal of suitable roosting habitat) resulting from this action is covered by the 2016 BO. It is our understanding that TVA's actions are in compliance with the Conservation Strategy and that TVA's obligations regarding ESA compliance would be fulfilled following contributions to the Tennessee's Imperiled Bat Conservation Fund.

Ms. Mary Jennings Page Four June 7, 2017

Should you have any questions or wish to discuss the project in more detail, please contact Liz Hamrick at 865-632-4011.

Sincerely,

20 Jon

John T. Baxter, Jr. Manager, Endangered Species Act Compliance Resources and River Management

EBH:ABM Enclosures



United States Department of the Interior

FISH AND WILDLIFE SERVICE Tennessee ES Office 446 Neal Street Cookeville, Tennessee 38501



July 10, 2017

John T. Baxter, Jr. Manager Endangered Species Compliance Act Tennessee Valley Authority 400 West Summit Hill Drive Knoxville, Tennessee 37902

Subject: FWS# 2017-I-0592. Tennessee Valley Authority – Proposed Development of an Access Road and Borrow Areas at the Cumberland Fossil Plant in Stewart County, Tennessee.

Dear Mr. Baxter:

The U.S. Fish and Wildlife Service (Service) received notice from the Kentucky Natural Lands Trust (KNLT) on July 10, 2017, that a contribution to Tennessee's Imperiled Bat Conservation Fund was received on behalf of the Tennessee Valley Authority (TVA), in association with the proposed development of an access road and borrow areas at the Cumberland Fossil Plant in Stewart County, Tennessee. This enters TVA into a cooperative process as a partner in bat conservation. We have analyzed the effects of the subject action through a compliance process under the 2015 Biological Opinion: *Tennessee Field Office's Participation in Conservation Memoranda of Understanding for the Indiana Bat and/or Northern Long-eared Bat* (BO).

The TVA project involves clearing 11.9 total acres of suitable Indiana bat roosting habitat. Conservation measures to be implemented for this project in association with the *Conservation Strategy for Forest-dwelling Bats in Tennessee* and the 2015 BO have been evaluated by the Service to assess the direct, indirect, and cumulative effects of the proposed project on the Indiana bat. Suitable Indiana bat habitat would be removed between August 16 and March 31. Note that, as a result of conservation measures implemented by the project, take of the northern long-eared bat is considered to have been adequately addressed by the 4(d) rule for this species.

As discussed, the TVA has chosen to contribute to Tennessee's Imperiled Bat Conservation Fund (IBCF) for this project. The contribution rate to enter into the Tennessee IBCF is \$3,700 per acre for this project, with the equivalent of 11.9 acres of suitable Indiana bat roosting habitat to be removed. However, due to the proposed tree clearing occurring between August 16 and March 31 and the site being located within known swarming habitat, a 2.5 multiplier is applied due to bats potentially being on the landscape. Therefore, the total amount to be submitted to

KNLT for this project is 110,075.00 (11.9 acres x 9,250.00 = 110,075.00), and we understand that a check in this amount has been provided to the KNLT.

We conclude that impacts to Indiana bat and northern long-eared bat habitat would be adequately covered by the conservation measures agreed upon above. Any incidental take of these species that will or could result from the forest habitat removal associated with this project would be authorized under the 2015 BO. Therefore, we have determined that the TVA project is not likely to jeopardize the continued existence of the Indiana bat or northern long-eared bat or result in the destruction or adverse modification of designated critical habitat for either species.

This letter serves as documentation that the requirements of section 7 of the Endangered Species Act of 1973 (the Act), as amended, are fulfilled; and it applies to any associated federal agency action(s) that require coordination with the Service, such as federal permits or federal funding. We believe that the project plans adequately address potential direct, indirect, and cumulative effects upon the Indiana bat, northern long-eared bat, and other threatened and endangered species. Therefore, it is appropriate to initiate the tree-clearing activity upon receipt of this letter. Obligations under section 7 of the Act must be reconsidered if (1) new information reveals impacts of the proposed action that may affect listed species or critical habitat in a manner not previously considered, (2) the proposed action is subsequently modified to include activities which were not considered during this consultation, or (3) new species are listed or critical habitat designated that might be affected by the proposed action.

Thank you for working with us to address concerns about impacts to the Indiana bat, northern long-eared bat, and the associated habitats. Feel free to contact Dustin Boles of my staff with any questions at 931/525-4984 or by email at *dustin_boles@fws.gov*.

Sincerely,

Mary E. Jenninge

Mary E. Jennings Field Supervisor