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ALLEN FOSSIL PLANT
ASH IMPOUNDMENT CLOSURE
ENVIRONMENTAL IMPACT STATEMENT
Shelby County, Tennessee

Prepared by:
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October 2019

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COVER SHEET

Allen Fossil Plant
Ash Impoundment Closure
Environmental Impact Statement

Proposed Action: The Tennessee Valley Authority (TVA) has prepared this Environmental Impact Statement to assess the effects and address environmental, cultural, and socioeconomic concerns associated with the closure of surface impoundments containing coal combustion residuals (CCR) at the Allen Fossil Plant (ALF).

Type of document: Draft Environmental Impact Statement

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Comments due date: Comments may be submitted online www.tva.com/nepa or sent to Mr. White at the above address. Comments must be submitted by November 25, 2019.

Abstract:

TVA needs to make a decision regarding the method of closure of the surface impoundments at ALF as well as how to dispose of CCR removed from the impoundments under the Closure-by-Removal option. In addition to No Action, TVA considered two action alternatives that addressed closure of the impoundments as well as associated component actions related to transport of borrow material, the mode of transport of CCR to potential receiving landfills, and the construction and operation of a potential beneficial re-use facility that would process CCR from ALF. The proposed closure of the impoundments would help support the goal established by the TVA Board of Directors to eliminate wet ash storage at its coal plants and would make the ALF closure area land available for future economic development projects in the greater Memphis area. Both closure alternatives would include the Closure-by-Removal of the impoundments at ALF, offsite transport of CCR and onsite transport of borrow material for site restoration. Impacts associated with these alternatives primarily include temporary short-term impacts during closure activities and minor to large impacts associated with the air emissions, noise emissions, safety risks and disruptions to environmental justice communities that would be associated with the offsite transport of CCR and onsite transport of borrow along public roadways. Transport and disposal of CCR to an offsite landfill is preferred over transport to a beneficial re-use processing facility as construction and operation of a facility would increase the duration of closure which would delay the future economic development of the site and result in greater impacts to the community associated with the air emissions, noise emissions, safety risks and disruptions to the public associated with the extended closure time frame.

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Summary

Background

This Environmental Impact Statement (EIS) addresses the potential environmental effects associated with the closure of surface impoundments containing Coal Combustion Residuals (CCR) at the Allen Fossil Plant (ALF). ALF is located in Shelby County, Tennessee, southwest of Memphis, on the south bank of McKellar Lake and east of the Mississippi River. The Tennessee Valley Authority (TVA) purchased the plant in 1984. ALF's three coal-fired units were retired on March 31, 2018.

Two project areas for ash impoundment closures have been identified at ALF including the East Ash Pond Complex project area and the West Ash Pond project area. The East Ash Pond Complex project area includes dredge cells on the western end, the east ash pond in the central part, a stilling pond and the Coal Yard Runoff Pond. The West Ash Pond project area includes the West Ash Pond and the Metal Cleaning Pond. Collectively, there are approximately 3.5 million cubic yards (yd^3) of CCR remaining in the surface impoundments and below the Coal Yard Runoff Pond and Metal Cleaning Pond at ALF.

With a long-standing commitment to safe and reliable operations and to environmental stewardship, TVA began in 2009 its plan to convert from wet to dry management of CCR. On April 17, 2015, the U.S. Environmental Protection Agency (EPA) published the final Disposal of Coal Combustion Residuals from Electric Utilities Rule (CCR Rule) in the Federal Register (80 Federal Register 21302). The CCR Rule establishes national criteria and schedules for the management and closure of CCR facilities.

In June 2016, TVA issued a Final Programmatic Environmental Impact Statement (PEIS) that analyzed methods for closing impoundments that hold CCR materials at all TVA fossil plants and identified specific screening and evaluation factors to help frame the evaluation of closures at these facilities. Subsequent environmental reviews of CCR impoundment closures tier from the PEIS (TVA 2016b). TVA evaluated the characteristics of the impoundments being considered for closure in this EIS and determined that the nature of activities identified under the proposed closure actions are consistent with the conditions and environmental effects described in the PEIS; accordingly, closure of impoundments at ALF can draw from the analysis results in the PEIS.

The primary action that TVA is considering is the closure of the surface impoundments at ALF, including the East Ash Pond Complex, the Coal Yard Runoff Pond, the West Ash Pond and the Metal Cleaning Pond. TVA is also evaluating the impact of associated component actions that may be undertaken in support of the primary action, including those related to transport of borrow material, the mode of transport of CCR to potential receiving landfills, and the construction and operation of a potential beneficial re-use processing facility that would process CCR from ALF.

Purpose and Need for Action

The purpose of the proposed action is to support the implementation of TVA's goal to eliminate all wet CCR storage at its coal plants by closing CCR surface impoundments across the TVA system, and to assist TVA in complying with the EPA's CCR Rule and other applicable federal and state statutes and regulations. In addition, the proposed actions will make the ALF closure area land available for future economic development projects in the

greater Memphis area. Unlike other TVA power plants, much of the land within the project area is not owned by TVA, but by third parties including the City of Memphis, Shelby County, and MLGW. ALF is also located in a heavily industrialized area, which means that redevelopment is of particular interest as the land holds significant economic potential for the non-TVA owners due to its location within the Frank C. Pidgeon Industrial Park as well as its access to the Port of Memphis via McKellar Lake.

Alternatives Evaluated in the EIS

The following alternatives are considered in detail in this EIS:

- Alternative A – No Action Alternative
- Alternative B – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in an Offsite Landfill Location
- Alternative C – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and West Ash Pond; Disposal of CCR in a Beneficial Re-Use Process & Offsite Landfill Location

Under the No Action Alternative, TVA would not close the East Ash Pond Complex (which includes the Coal Yard Runoff Pond) or the Metal Cleaning Pond, and the West Ash Pond would remain in its current closed state. No closure activities (i.e., no excavation or transport activities) would occur. However, the No Action Alternative is inconsistent with TVA's plans to convert all of its wet CCR systems to dry systems and is inconsistent with the general intent of EPA's CCR Rule. In addition, under the No Action Alternative, the ALF closure area land would not be made available to its owners for future economic development projects in the greater Memphis area. Consequently, this alternative would not satisfy the project Purpose and Need and, therefore, is not considered viable or reasonable. It does, however, provide a benchmark for comparing the environmental impacts associated with implementation of Alternatives B and C.

Under Alternative B, the primary actions include the closure of the East Ash Pond Complex (along with the Coal Yard Runoff Pond), the West Ash Pond and the Metal Cleaning Pond via Closure-by-Removal. Closure-by-Removal involves excavation and relocation of the CCR from the ash impoundments in accordance with federal and state requirements. TVA would stabilize residual ponded areas and then remove CCR material, underlying impacted soil, and support structures within the impoundment footprint. Closure activities would include:

- Excavation of ash using a tracked excavator
- Mechanical moisture conditioning the excavated ash by dumping, scooping, and windrowing the ash within the existing footprint of the impoundment or pond until it is sufficiently dried for hauling
- After drying, ash would be hauled to an existing, offsite permitted landfill
- Over-excavation of soil within the CCR unit footprint
- Upon completion of closure activities, impoundments would be restored to a natural soil and vegetated state

In addition, component actions under Alternative B include the following:

- *Onsite Transport of Borrow Material.* Closure of the surface impoundments at ALF would entail the addition of borrow material to achieve proposed finished grades and provide a suitable medium to support restoration. Closure-by-Removal is expected to require approximately 3 million yd^3 of suitable borrow material. No specific site has been identified at this time and ultimate site selection will be left up to the contractor. As part of the contracting process to obtain borrow, TVA will require that any borrow material be obtained from a previously developed and/or permitted site. Accordingly, potential impacts associated with the transport of borrow material are based upon bounding characteristics of this action that are based upon the use of a range of identified candidate sites in the vicinity of ALF.
- *Offsite Transport and Disposal of CCR.* TVA considered the transport of CCR materials to an existing permitted offsite landfill for disposal by either truck, rail, or barge. It should be noted that ALF has a barge unloading facility available for use, which would have to be modified to load CCR onto a barge. While such modifications could be accomplished, no suitable landfill was identified by TVA that is equipped to receive CCR from barges. Consequently, the transport of CCR by barge as a mode of transportation was eliminated from further consideration.

Under Alternative C, TVA would close the surface impoundments in the same manner as Alternative B, and borrow material suitable for use as backfill within the ALF ponds would also be required under this alternative similar to that described for Alternative B. However, instead of transporting all excavated CCR material to an offsite landfill, most CCR (ranging from approximately 75 to 95 percent) would be transported to a beneficial re-use processing facility to be processed for use in concrete and other building materials. The CCR not suitable for beneficial re-use would be disposed in a previously permitted, existing landfill located within 30 miles of ALF.

No specific provider of the beneficiation services or the specific site at which a beneficial re-use processing facility would be constructed has been identified at this time. However, TVA recognizes that such a facility has the potential to be constructed and operated because TVA has the necessary raw materials (i.e., CCR) to make such a facility viable. Therefore, while TVA does not intend to own or operate the facility, TVA recognizes that such a facility is an action that is “connected” to TVA’s action of potential Closure-by-Removal of TVA’s ash ponds. This alternative, therefore, includes a consideration of the potential effects of a beneficial re-use processing facility as a means of disposal of CCR from ALF. Impacts of this option are based on a bounding analysis of the characteristics of a representative beneficial re-use processing facility based upon information provided by potential vendors. Following completion of this EIS, if a site is identified for use that does not fall within the criteria of the bounding analysis, a supplemental NEPA document will be required.

Summary of Alternative Impacts

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

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

Resource	Alternative A: No Action	Alternative B: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to an Offsite Landfill Location	Alternative C: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to Beneficial Re-Use Process & Offsite Landfill Location
Air Quality	No impact.	Minor localized impacts from fugitive dust and emissions from equipment and vehicles during onsite closure activities and transport of borrow and CCR. Minimized through use of BMPs including truck washing station and dust suppression. No exceedances of regional NAAQS expected.	Similar to Alternative B, but with the additional impacts from fugitive dust and emissions associated with construction and operation of the beneficial re-use processing facility and the delivery of beneficiated product. Although state/federal air permitting may be required for operation of the beneficial re-use processing facility, no exceedance of NAAQS expected with adherence to permit conditions.
Climate Change	No impact.	Construction activities, borrow transport, and CCR transport would contribute to localized GHG emissions. Impacts from CCR transport by rail would be marginally greater than those by truck. De minimis relative to regional GHG levels and no impact to climate change.	Similar to Alternative B, including CCR transport by truck, but with the addition of localized GHG emissions resulting from construction of the beneficial re-use processing facility and operation of the facility including the delivery of beneficiated product.
Geology	No impact. TVA would ensure that all impoundment dikes would be stable under static and seismic conditions and meet appropriate safety factors.	Minor impact from increase in soil erosion, minimized with use of BMPs.	Similar to Alternative B, with additional soil erosion and potential localized alteration of geologic conditions during construction of beneficial re-use processing facility. Minimized with use of BMPs.

Resource	Alternative A: No Action	Alternative B: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to an Offsite Landfill Location	Alternative C: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to Beneficial Re-Use Process & Offsite Landfill Location
Groundwater	Risk to groundwater is not reduced. Groundwater protection processes will be implemented as needed to comply with the TDEC Commissioner's Order and the CCR Rule.	Long term beneficial impacts through reduction of risk to groundwater as CCR is removed from the impoundment which eliminates potential subsurface discharges and contaminants of concern (COC) migrating offsite.	Same as Alternative B for ash impoundment closure. Additional minor impacts if process and potable water for beneficial re-use processing facility are obtained by groundwater well. Potential effects mitigated by effective use of BMPs and adherence to applicable permitting requirements.
Surface Water	No change from existing conditions.	Minor impacts to McKellar Lake and Horn Lake Cutoff due to sedimentation from storm water, limited to the duration of closure activities and minimized through implementation of appropriate BMPs.	Same as Alternative B, with additional minor impacts related to sedimentation from storm water during construction activities and potential continuous discharges and outfall construction associated with the beneficial re-use processing facility.
Floodplains	No impact.	Minor beneficial impacts associated with impoundment closure due to increased availability for storage of flood water.	Same as Alternative B.
Vegetation	No impact.	Minor short term impacts to herbaceous communities during closure activities, but minor, long term improvement following removal of CCR and seeding of non-invasive species.	Similar to Alternative B, with additional minor impacts related to removal of up to 15 acres of low-quality habitat during facility construction.

Resource	Alternative A: No Action	Alternative B: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to an Offsite Landfill Location	Alternative C: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to Beneficial Re-Use Process & Offsite Landfill Location
Wildlife	No impact.	Minor short term impact to previously disturbed, low-quality habitats. Long term minor beneficial impacts following impoundment closure, as these areas may provide a minor expansion of upland wildlife habitat.	Similar to Alternative B, however incrementally greater due to the potential long term impact related to removal of up to 15 acres of low-quality habitat for construction of the beneficial re-use processing facility.
Aquatic Ecology	No impact.	Minor and localized impacts to less mobile aquatic organisms (aquatic macroinvertebrates) in McKellar Lake from outfall removal. Potential indirect impacts to the McKellar Lake and Horn Lake Cutoff could include sedimentation from storm water closure activities. Minimized through site specific BMPs and erosion control plans.	Same as Alternative B, with addition of potential minor localized alternation of aquatic habitats. Unavoidable impacts would be minor and minimized to the extent possible and permitted through the appropriate federal and state agencies.

Resource	Alternative A: No Action	Alternative B: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to an Offsite Landfill Location	Alternative C: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to Beneficial Re-Use Process & Offsite Landfill Location
Threatened and Endangered Species	No impact.	Loss of potential low-quality nesting habitat for interior least tern. Avoidance and minimization efforts to reduce impacts to the least tern would be implemented and impacts would be mitigated in accordance with ESA requirements. For those activities with potential to affect the Indiana bat and northern long-eared bat, TVA committed to implementing specific conservation measures in their programmatic consultation with the USFWS completed in April 2018. These activities and associated conservation measures would be implemented as part of the proposed project. No impact to other threatened and endangered species.	Same as Alternative B.
Wetlands	No impact.	Potential minor impacts to the Horn Lake Cutoff wetland could include sedimentation from storm water during closure activities. Minimized through site-specific BMPs and erosion control plans. Negligible indirect impacts from deposition of fugitive dust on wetlands from loading, unloading, and transport of CCR and borrow materials.	Similar to Alternative B, with addition of potential minor impacts to wetland resources at beneficial re-use processing facility location, which would be minimized to the extent possible and permitted through the appropriate federal and state agencies.

Resource	Alternative A: No Action	Alternative B: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to an Offsite Landfill Location	Alternative C: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to Beneficial Re-Use Process & Offsite Landfill Location
Solid and Hazardous Waste	No impact.	Minor increase in solid waste generated from site preparation, construction, and maintenance of equipment used to transport CCR and borrow during closure activities. Negligible impact to regional disposal needs due to the loss in capacity of offsite landfill used for CCR disposal.	Similar to Alternative B, yet incrementally greater as additional solid waste would be generated from site preparation and construction activities associated with beneficial re-use processing facility and maintenance of equipment used to transport beneficiated product. Long term beneficial impact associated with reduction in solid waste as the majority of CCR would be beneficially re-used.
Visual Resources	No impact.	Long term, minor beneficial impact associated with restoration of former impoundments to natural vegetated state. Temporary visual discord onsite during construction period and to receptors along haul routes from trucks transporting CCR and borrow. No impact associated with the transport of CCR by rail.	Similar to Alternative B, but with the addition of minor impacts to visual receptors within the foreground of the beneficial re-use processing facility and along haul routes for beneficiated product.
Cultural and Historic Resources	No impact.	No impact.	No impact.

Resource	Alternative A: No Action	Alternative B: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to an Offsite Landfill Location	Alternative C: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to Beneficial Re-Use Process & Offsite Landfill Location
Land Use	No impact.	Minor impacts due to use of laydown area during impoundment closure activities. No alteration of future land use.	Same as Alternative B for ash impoundment closure. Impact associated with the conversion of up to 15 acres of undeveloped land to industrial use for beneficial re-use processing facility construction would be minor as the facility would be constructed in an area with compatible land use.
Prime Farmland	No impact.	No impact.	Minor impact associated with the potential conversion of up to 15 acres of prime farmland to industrial use for beneficial re-use processing facility construction.
Transportation	No impact.	Minor impact to the regional transportation network. Moderate, localized impact to low volume roadway segments used jointly by trucks transporting CCR and borrow. Minimized substantially in conjunction with the benefits of a comprehensive traffic management plan.	Similar to Alternative B, but incrementally greater due to additional traffic and safety risks associated with the short-term construction and long-term operation of the proposed beneficial re-use processing facility.
Noise	No impact.	Minor, localized construction noise impacts from equipment and vehicles and increases in traffic noise for sensitive receptors along the CCR and borrow haul routes. Use of roadways with low traffic volumes for borrow hauling would have a large impact on sensitive receptors along these roadways. Impact would be minimized with implementation of a traffic management plan that includes avoidance of borrow sites accessed by low-volume roadways.	Similar to Alternative B, but incrementally greater due to the localized, short term increase in noise during construction of the beneficial re-use processing facility and continuing long term operational noise.

Resource	Alternative A: No Action	Alternative B: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to an Offsite Landfill Location	Alternative C: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to Beneficial Re-Use Process & Offsite Landfill Location
Natural Areas, Parks and Recreation	No impact.	Minor, long- term impacts to Ensley Bottoms Complex and recreational birders due to dewatering of the impoundments. Moderate impact to smaller parks located adjacent to CCR or borrow haul routes due to noise, fugitive dust, and increased traffic.	Similar to Alternative B with an additional minor impact associated with construction and operation of the beneficial re-use processing facility.
Socioeconomics and Environmental Justice	No impact.	Minor short- term direct and indirect beneficial impact due to construction related employment and beneficial economic impacts. Moderate impact to community facilities along the haul routes during closure activities. Minimized with use of a traffic management plan designed to address congestion at these facilities. Moderate to large adverse impacts associated with borrow and CCR transport by truck, disproportionate to environmental justice populations. Minimized by avoiding the use of borrow sites accessed by low volume roadways serving residential areas.	Similar to Alternative B, including CCR transport by truck, but with the addition of minor beneficial impacts associated with employment opportunities during construction and operation of the beneficial re-use processing facility. Minor, long term increase in traffic and associated noise for any environmental justice populations near the facility.

Resource	Alternative A: No Action	Alternative B: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to an Offsite Landfill Location	Alternative C: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to Beneficial Re-Use Process & Offsite Landfill Location
Public Health and Safety	No impact.	Risk to workforce health and safety related to excavation and offsite transport of CCR and borrow due to potential crashes, derailments, road damage and other transportation-related effects. Impacts from CCR transport by rail, while minor, would be marginally greater than those by truck.	Similar but incrementally greater than Alternative B due to additional risks associated with the short term construction and long term operation of the proposed facility as well as the additional trucks on roadways for transport of beneficiated product.
Cumulative Effects	No impact.	Moderate impacts to transportation, noise and environmental justice populations due to potential for deconstruction and demolition activities to occur concurrently with impoundment closures. Mitigated with implementation of traffic control measures and preference for selection of borrow sites that are not within environmental justice communities. Following deconstruction and ash impoundment closure activities, noise levels, exhaust emissions and fugitive dust would return to baseline levels and as such there would only be minor long term cumulative impacts associated with future economic development of the site.	Same as Alternative B.

Preferred Alternative

In this Draft EIS, TVA has identified Alternative B as the preferred alternative. Both of the action alternatives (Alternative B and C) would meet the purpose and need of the project. The primary actions of both alternatives involve excavation and relocation of the CCR from the ash impoundments in accordance with federal and state requirements. In addition, both alternatives include the component action of the onsite transport of borrow to support site restoration activities. However, under Alternative B, CCR removed from the ash impoundments would be transported offsite by truck or rail to an existing permitted landfill.

Alternative B is the preferred alternative as it would achieve the purpose and need of the project to support the implementation of TVA's goal to eliminate all wet CCR storage at its coal plants; close CCR surface impoundments across the TVA system; and comply with the EPA's CCR Rule and other applicable federal and state statutes and regulations. In addition, Closure-by-Removal of the impoundments at ALF will enhance future economic development in the greater Memphis area. Unlike other TVA power plants, much of the land within the project area is not owned by TVA and given that ALF is also located in a heavily industrialized area, redevelopment is of particular interest as the land holds significant economic potential for the non-TVA owners .

Alternative C, would also meet the purpose and need of the project and would have similar impacts as Alternative B. However, construction of a new facility to process CCR from ALF would extend the duration of closure which would delay the future economic development of the site and result in greater direct and cumulative impacts associated with air emissions, noise emissions, impacts to transportation system, impacts to environmental justice communities, safety risks and disruptions to the public associated with the extended time frame for closure.

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Symbols, Acronyms, and Abbreviations

AADT	Annual Average Daily Traffic
ACC	Allen Combined Cycle Plant
ACS	American Community Survey
ACT	Allen Combustion Turbine
ALF	Allen Fossil Plant
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
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
COC	Constituent of Concern
CWA	Clean Water Act
dB	Decibels
dBA	A-weighted decibel
EIS	Environmental Impact Statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right to Know Act
EPRI	Electric Power Research Institute
ESA	Endangered Species Act of 1973
FBC	Fluidized Bed Combustion
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FGD	Flue Gas Desulfurization
FHWA	Federal Highway Administration
FIS	Flood Insurance Study
GHG	Greenhouse Gases
GPM	Gallons per Minute
HAPS	Hazardous Air Pollutants
HUD	U.S. Department of Housing and Urban Development
IPaC	Information for Planning and Consultation
IRA	Interim Response Action
Ldn	Day-Night Sound Level
LOI	Loss on Ignition
LOS	Level of Service
MCL	Maximum Contaminant Level
MGD	Million Gallons Per Day
MLGW	Memphis Light, Gas and Water Division
MS4	Municipal Separate Storm Sewer System
msl	Mean Sea Level
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NLCD	National Land Cover Database

NOI	Notice of Intent
NOx	Nitrogen Oxides
NO_2	Nitrogen Dioxide
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRI	Nationwide Rivers Inventory
OSHA	Occupational Safety and Health Administration
PEIS	Programmatic Environmental Impact Statement
PM	Particulate Matter
POTW	Publicly Owned Treatment Works
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RIR	Remedial Investigation Report
ROD	Record of Decision
SHPO	State Historic Preservation Officer
SO_2	Sulphur Dioxide
SWPPP	Storm Water Pollution Prevention Plan
TDEC	Tennessee Department of Environment and Conservation
TDOT	Tennessee Department of Transportation
TWRA	Tennessee Wildlife Resources Agency
TMSP	Tennessee Storm Water Multi-Sector General Permit for Industrial Activities
TSDF	Treatment, Storage and Disposal Facility
TVA	Tennessee Valley Authority
UIC	Underground Injection Control
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCB	United States Census Bureau
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USWAG	Utilities Solid Waste Activities Group
Veh/Day	Vehicles per Day
WMA	Wildlife Management Area
WQC	Water Quality Certification
WWTP	Wastewater Treatment Plant
yd^3	Cubic Yard

CHAPTER 1 – PURPOSE AND NEED FOR ACTION

1.1 Introduction and Background

Tennessee Valley Authority's (TVA) Allen Fossil Plant (ALF) is located in Shelby County, Tennessee, southwest of Memphis (Figure 1-1). The plant, constructed in the 1950s by the Memphis Light, Gas and Water Division (MLGW), is located on the south bank of McKellar Lake and east of the Mississippi River, on land protected from flooding by an existing U.S. Army Corps of Engineers (USACE) levee system (Ensley Levee). TVA purchased the plant in 1984. ALF's three coal-fired units were retired on March 31, 2018.

While in operation, ALF consumed approximately 7,200 tons of coal a day and produced approximately 5,160 million kilowatt-hours of electricity a year. Coal combustion residuals (CCR) produced by the collective units included approximately 85,000 dry tons of slag and fly ash annually. Two project areas for ash impoundment closures have been identified at ALF - one includes the East Ash Pond Complex and one includes the West Ash Pond (Figure 1-1). The East Ash Pond Complex is located east of the powerhouse and east of the Coal Yard. It includes dredge cells on the western end, the east ash pond in the central part, and a stilling pond on the eastern end. Collectively, there are approximately 3 million cubic yards (yd^3) of CCR remaining in the East Ash Pond Complex. The Coal Yard Runoff Pond is located within the East Ash Pond Complex project area. The Coal Yard Runoff Pond was constructed in 1992 on top of an area that contained CCR, and the north and east dikes consist of CCR material. The pond received runoff from the coal yard.

What is "CCR"?

CCRs are byproducts produced from burning coal and include fly ash, bottom ash, and flue gas desulfurization materials.

Fly Ash: Fly ash is composed mainly of non-combustible inorganic material contained in the coal. Fly ash typically consists of fine particles that are entrained in the combustion exhaust gas.

Bottom Ash: Bottom ash is comprised of the incombustible coarse particles that settle to the bottom of the boiler. Bottom ash or boiler slag slurry is produced from washing the boiler combustion chamber with a water jet stream.

Flue Gas Desulfurization Materials: The burning of coal in boilers produces flue gas, which is the combustion exhaust gas that eventually exits via the stack. It is composed mostly of nitrogen, carbon dioxide, water vapor, and oxygen. Flue gas also contains pollutants such as particulate matter (PM), nitrogen oxides, and sulfur oxides. Flue gas desulfurization (FGD) systems or scrubbers remove sulfur oxides from the flue gas using limestone. Gypsum is produced in the chemical reaction between the limestone and the sulfur oxides in the flue gas.

TVA stopped sluicing CCR to the East Ash Pond Complex in 2018 and rerouted all flows away from the surface impoundment by April 2019.

The West Ash Pond project area includes the West Ash Pond and the Metal Cleaning Pond (Figure 1-1 and 2-3). The West Ash Pond was the original fly ash surface impoundment for ALF and received fly ash and boiler slag until 1978. In 1992-1993, TVA excavated and beneficially reused approximately 173,000 yd^3 of CCR as fill material in the USACE levee. The West Ash Pond intermittently received minimal amounts of CCR between 1992 and October 2015, and TVA rerouted all of its flows by October 19, 2015. Approximately 300,000 yd^3 of CCR material remain in the West Ash Pond. By October 19, 2015, the West Ash pond did not impound water and did not receive any CCR or wastewater.

Figure 1-1. Allen Fossil Plant Project Location and Property Ownership Boundaries

The Metal Cleaning Pond was constructed in 1977 on the east end of the West Ash Pond. The Metal Cleaning Pond is a lined pond that contains storm water and process flows previously received from the plant. Approximately 200,000 yd^3 of CCR material is expected to be located under the Metal Cleaning Pond.

The land on which ALF is located is divided into parcels owned by various entities. Figure 1-1 shows the respective property boundaries of TVA, MLGW, and the City of Memphis/Shelby County. Portions of the East Ash Pond Complex and the West Ash Pond project areas are on property leased from MLGW, the City of Memphis and Shelby County. The Allen Combined Cycle Plant (ACC) is located south of ALF on a site TVA currently leases from the City of Memphis and MLGW. The site is also occupied by the City of Memphis' T.E. Maxson Wastewater Treatment Plant (WWTP).

With a long-standing commitment to safe and reliable operations and to environmental stewardship, TVA began in 2009 its plan to convert from wet to dry management of CCR. On April 17, 2015, the U.S. Environmental Protection Agency (EPA) published the Final Disposal of Coal Combustion Residuals from Electric Utilities rule (CCR Rule) in the Federal Register (80 Federal Register 21302). The CCR Rule establishes national criteria and schedules for the management and closure of CCR facilities.

In June of 2016, TVA issued a Final Programmatic Environmental Impact Statement (PEIS) that analyzed methods for closing impoundments that hold CCR materials at TVA fossil plants and identified specific screening and evaluation factors to help frame its evaluation of closures at additional facilities. The purpose of the programmatic EIS was to support TVA's goal to eliminate all wet CCR storage at its coal plants by closing CCR surface impoundments across TVA's system and to assist TVA in complying with the EPA's CCR Rule. Subsequent environmental reviews of CCR impoundment closures tier from the PEIS (TVA 2016b).

TVA has prepared this Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act (NEPA) to assess the environmental impacts of the proposed closures of the East Ash Pond Complex, the Coal Yard Runoff Pond, the West Ash Pond and the Metal Cleaning Pond at ALF. This EIS will tier from the 2016 PEIS document for surface impoundment closures.

1.2 Purpose and Need

The purpose of the proposed action is to support the implementation of TVA's goal to eliminate all wet CCR storage at its coal plants; close CCR surface impoundments across the TVA system; and comply with the EPA's CCR Rule and other applicable federal and state statutes and regulations. In addition, the proposed actions will help make the property available for future economic development projects in the greater Memphis area. Unlike other TVA power plants, much of the land within the project area is not owned by TVA, but by third parties, including the City of Memphis, Shelby County, and MLGW. ALF is also located in a heavily industrialized area, which means that redevelopment is of particular interest as the land holds significant economic potential for the non-TVA owners due to its location within the Frank C. Pidgeon Industrial Park as well as its access to the Port of Memphis via McKellar Lake.

1.3 Decision to be Made

This EIS is being prepared to inform TVA decision makers and the public about the environmental consequences of the proposed action. Specifically, TVA needs to make a

decision regarding the method of closure of the surface impoundments as well as how to dispose of CCR removed from the impoundments under the Closure-by-Removal option. TVA's decision will consider factors such as potential environmental impacts, economic issues, and TVA's long-term goals.

1.4 Related Environmental Reviews

The following environmental reviews have been prepared for actions related to CCR management and surface impoundment closure at ALF:

Allen Fossil Plant Decontamination and Deconstruction Draft Environmental Assessment (TVA 2019). This Environmental Assessment evaluates the disposition of the buildings and structures at ALF that are no longer needed for their original purpose of power generation. TVA's preferred alternative is full demolition to grade resulting in a brownfield site. Implementation of this alternative would meet the purpose and need of the project to enhance future economic development in the area and would avoid the potential environmental and public safety impacts associated with leaving ALF in the "as-is" condition.

Final Ash Impoundment Closure Programmatic Environmental Impact Statement (TVA 2016b). The PEIS was prepared to address the closure of CCR impoundments at all of TVA's coal-fired power plants. The report consists of two parts: Part I – Programmatic National Environmental Policy Act (NEPA) Review and Part II – Site-Specific NEPA Review. In Part I, TVA programmatically considered environmental effects of closure of ash impoundments using two closure methods: (1) Closure-by-Removal and (2) Closure-in-Place. Part II included a site-specific NEPA review of closure of the West Ash Pond at ALF (TVA 2016c) by closing the ash pond in-place. A ROD was released in July of 2016 that would allow future environmental reviews of CCR impoundment closures to tier from the PEIS.

Allen Fossil Plant Emission Control Project Environmental Assessment (TVA 2014). This EA evaluates the impacts of reducing sulfur dioxide emissions at ALF by retiring the coal units and constructing a natural gas-fired power plant. The reduction in sulfur dioxide emissions at ALF helped TVA comply with the EPA Clean Air Agreements consistent with TVA's mission to provide reliable and affordable power. In addition, the natural gas-fired facility helps TVA achieve and maintain a balanced portfolio of generation resources.

1.5 Scope of the EIS and Summary of the Proposed Action

This EIS evaluates the potential environmental, cultural, and socioeconomic impacts of the proposed ash impoundment closures at ALF. A detailed description of the proposed action and alternatives considered is provided in Chapter 2.

TVA prepared this EIS to comply with 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 EIS.

- Air Quality
- Climate Change
- Land Use
- Prime Farmland
- Geology
- Groundwater
- Surface Water
- Floodplains
- Vegetation
- Wildlife
- Aquatic Ecology
- Threatened and Endangered Species
- Wetlands
- Socioeconomics and Environmental Justice
- Managed and Natural Areas
- Parks and Recreation
- Transportation
- Visual Resources
- Cultural and Historic Resources
- Noise
- Solid and Hazardous Waste
- Public Health & Safety

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

1.6 Public and Agency Involvement

1.6.1 Scoping

Public scoping was initiated with the publication of the Notice of Intent (NOI) to prepare an EIS in the Federal Register on November 30, 2018. In addition to the NOI in the Federal Register, TVA sent a media advisory to over 300 newspaper, radio, and television outlets across the TVA service area, as well as trade publications. A public notice advertisement was also placed in the *Commercial Appeal* and on the TVA website. Additionally, notifications were issued to stakeholders including MLGW, the Economic Development Growth Engine for Memphis & Shelby County, and Protect Our Aquifer.

Following publication of the NOI in the Federal Register, TVA received requests to extend the duration of the public scoping comment period and to hold a public scoping meeting. The public comment period for the NOI was originally scheduled to close January 4, 2019. After thoughtful consideration, TVA extended the public comment period by 27 days and considered comments received through January 31, 2019. In addition, TVA hosted a public information session in Memphis on January 17, 2019, at the Mitchell Community Center from 5:00 to 8:00 p.m. CST. This information session was a combined effort to inform the public about several environmental activities underway at ALF, including the Proposed Environmental Investigation Plan (EIP) that is being undertaken in accordance with an administrative order issued by the Tennessee Department of Environment and Conservation (TDEC) in 2015 (the "TDEC Commissioner's Order"), the current Interim Response Actions (IRAs) for groundwater that are part of a remedial investigation (RI) directed by TDEC that began in 2017, and this EIS.

TVA's efforts to notify local residents of the January 2019 public information meeting included issuing an additional media advisory and notifying the 35 people who had attended a previous meeting related to activities underway at ALF. TVA also sent letters to all residents within a 5-mile radius of the plant and contacted three neighborhood associations surrounding the plant to inform them of the meeting. In addition, TVA distributed 540 flyers throughout the Memphis Public Library System. A total of 77 people

attended the public meeting. Attendees included members of the general public, media representatives, and other special interest groups.

1.6.2 Scoping Feedback

TVA received a wide variety of comments and opinions regarding the proposed closure of the surface impoundments at ALF and considered this input in developing the Draft EIS.

TVA received 63 comment submissions from members of the pubic and federal agencies. The submissions consisted of:

- Two submissions from federal agencies (EPA and U.S. Fish and Wildlife Service [USFWS])
- Two submissions from the Southern Environmental Law Center on behalf of Protect Our Aquifer and the Tennessee Chapter of the Sierra Club
- Thirty-eight submissions from members of the public
- Twenty-one additional submissions from members of the public via a form letter

As noted above, comments received in relation to extending the scoping period and holding a public meeting were addressed by TVA during the public scoping period. Comments received on the proposed alternatives generally expressed support for the complete removal of CCR and remediation of the site. Other commenters stressed the need to ensure the safe transport and disposal of CCR. Comments also included requests that the EIS include analysis of impacts to the following resources: groundwater, surface water, impacts to the surrounding community and onsite workers, impacts to wildlife that frequent the impoundments and impacts to recreationists who enjoy observing the wildlife that frequent the impoundments. Comments were received requesting the EIS provide more detail regarding the beneficiation process and its potential environmental impacts and the EIS consider the cumulative impact of future economic development of the ALF site. TVA also received comments requesting the analysis of the operation of the ACC be included in the scope of the project. The remaining comments were general in nature. Additional detail regarding comments received during the scoping process are included in the Scoping Report, which is available on TVA's Web site *(https://www.tva.gov/Environment/Environmental-Stewardship/Environmental-Reviews/Allen-Ash-Impoundment-Closure)*. TVA has considered these comments in the preparation of this Draft EIS.

1.6.3 Public and Agency Review of the Draft EIS

TVA's public and agency involvement for the Draft EIS includes publication of a public notice and a 45-day public review of this Draft EIS. To solicit public input, the availability of this Draft EIS was announced in regional and local newspapers and TVA's social media accounts. A news release was issued to the media and posted on TVA's web site. The Draft EIS was posted on TVA's website, and hard copies were made available by request.

TVA's agency involvement includes sending notices to local, state and federal agencies and federally recognized tribes to inform them of the availability of the Draft EIS. A list of agencies and tribes notified of the availability of the Draft EIS is provided in Chapter 5.

Once the public and other agencies have reviewed and provided comments on the document, TVA will make revisions, if necessary, and issue a Final EIS. TVA will not make final decisions any earlier than 30 days after the Notice of Availability of the Final EIS is published in the Federal Register.

1.7 Necessary Permits or Licenses

TVA will 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 National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction Activities or an Individual Construction Storm Water permit may be required for the proposed project, and a Storm Water Pollution Prevention Plan (SWPPP) would be required to detail sediment and erosion control best management practices (BMPs)
- Actions involving wetlands and/or stream crossings would be subject to federal CWA Section 404 permit requirements
- A Section 401 Water Quality Certification (WQC)/TDEC Aquatic Resource Alteration Permit (ARAP) may be required for any alterations to the streams and wetlands
- Section 408 (Rivers and Harbors Act) by the USACE for work near the Ensley Levee
- Placement of fill below the ordinary high water mark of McKellar Lake would be subject to Section 10 (Rivers and Harbors Act) permit requirements
- Actions involving placement of fill below the ordinary high water mark of McKellar Lake would be subject to federal CWA Section 404 permit requirements
- ALF's SWPPP would be revised to include the closed ash impoundments
- TVA will submit an Ash Management Plan in support of TDEC's review under Tennessee Code Annotated Section 68-211-106(j)

Any other necessary permits would be evaluated based on site-specific conditions. Details of permitting requirements to be determined based upon final design.

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CHAPTER 2 – ALTERNATIVES

Alternatives considered in this EIS consist of both “primary” actions that directly relate to the project purpose and need and several “component” actions that must be undertaken in support of the primary action. Primary actions are those that address the particular options associated with the disposition and closure of the surface impoundments at ALF, whereas component actions are those that may be undertaken by TVA or others and include those related to transport of borrow material, mode of transport of CCR to potential receiving landfills, and the construction and operation of a potential beneficial re-use facility that would process CCR from ALF. Figure 2-1 depicts the relationship between each of the primary actions and their dependent component actions.

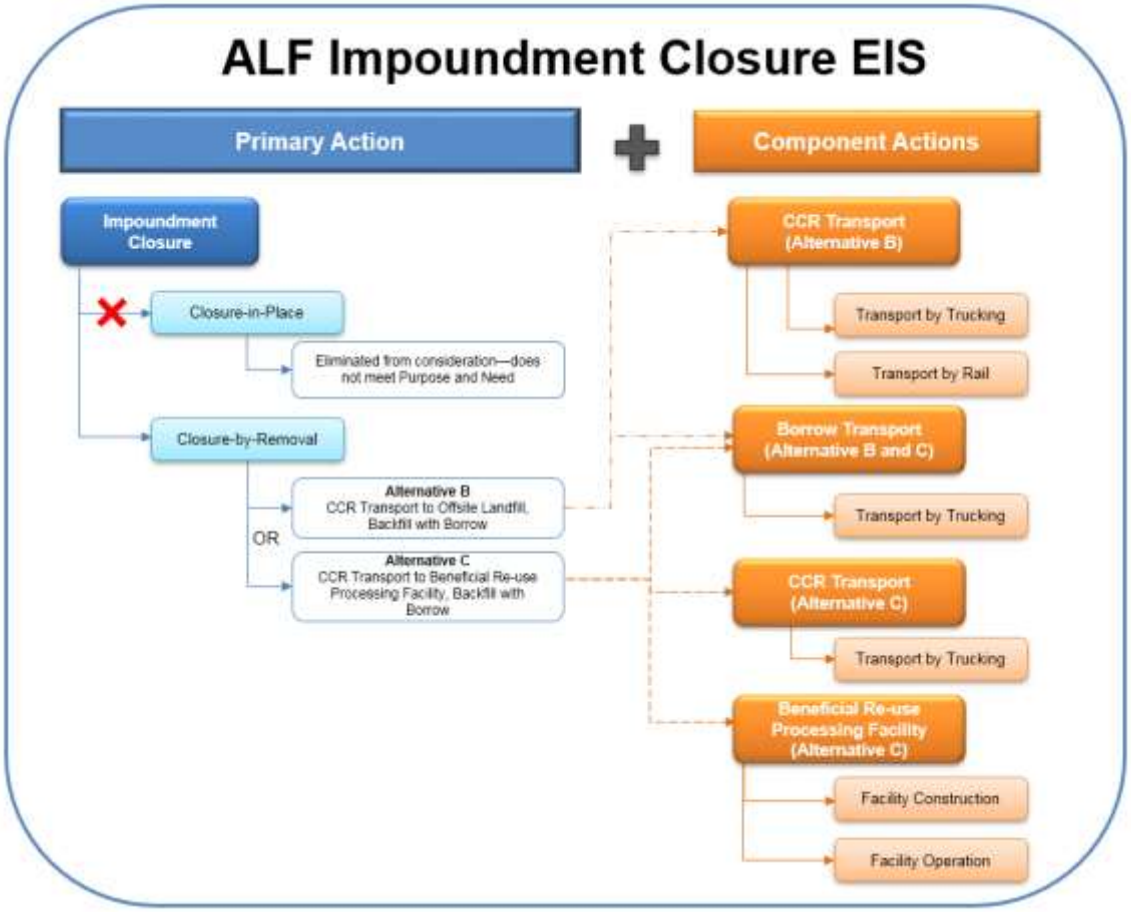


Figure 2-1. Primary and Component Actions Evaluated

2.1 Ash Impoundment Closure Programmatic Environmental Impact Statement

2.1.1 Overview of the Programmatic Environmental Impact Statement

As described in Section 1.1, this EIS is intended to tier from the 2016 PEIS document for surface impoundment closures.

TVA issued a Final PEIS that analyzed methods for closing impoundments that contain CCR materials at TVA fossil plants. The PEIS identified specific screening and evaluation factors to help frame the assessment of future closure actions at TVA facilities. TVA determined future environmental reviews of CCR impoundment closures at TVA facilities could tier from the PEIS if the impoundments fit into the framework established in the PEIS. Figure 2-2 provides the conceptual framework used to evaluate ash impoundment closures to determine if the conclusions reached from the PEIS would be applicable to the proposed impoundment closures at ALF.

The PEIS programmatically considered all TVA ash impoundment closures and the environmental effects of two ash impoundment closure methods:

1. *Closure-in-Place*. Closure-in-Place involves dewatering and stabilizing the CCR in place and installing an approved cover system to prevent future infiltration of water.

2. *Closure-by-Removal*. Closure-by-Removal involves dewatering, excavating, and relocating the CCRs from the ash impoundment in accordance with federal and state requirements to an approved onsite or offsite disposal facility. The CCR may also be beneficially used in products or structural fills.

At the programmatic level, EPA and TVA have concluded that both closure options can be equally protective of human health and the environment, provided they are implemented properly. In most situations, Closure-in-Place would more likely be environmentally beneficial and less costly than Closure-by-Removal, especially when the amount of CCR material that must be moved from the site exceeds 600,000 yd^3 and the amount of borrow that needs to be delivered to the site exceeds 200,000 yd^3.

For Closure-in-Place, TVA's analyses also confirmed EPA's determination that dewatering and closing impoundments using an approved cover system would reduce groundwater contamination and structural stability risks because the hydraulic head (water pressure) would be reduced. Compared to Closure-by-Removal, this alternative would have significantly less risk to workforce health and safety than those related to offsite transportation of CCR (crashes, derailments, road damage and other transportation-related effects). However, as described further in Section 2.3.4, TVA has eliminated Closure-in-Place as a reasonable alternative in this EIS.

The PEIS stated that Closure-by-Removal would reduce groundwater contamination risks more than Closure-in-Place over the long term when CCR intersects with groundwater because CCR material would be excavated and moved to a permitted landfill. However, this alternative would result in notably greater impacts associated with other environmental factors (air quality, noise, transportation and environmental justice) and would increase the potential for impacts on worker-related and transportation-related health and safety.

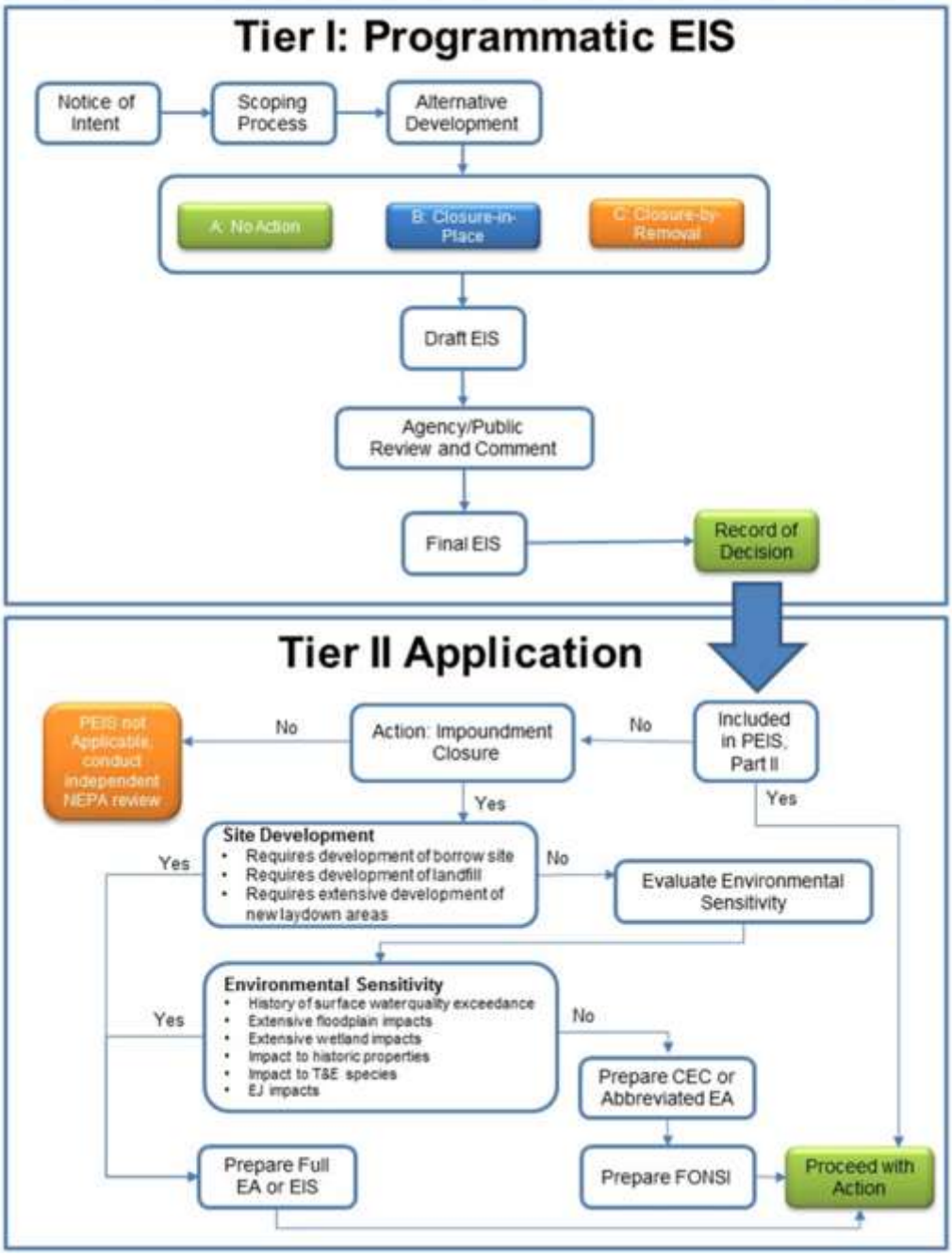


Figure 2-2. Tiered NEPA Process for TVA Ash Impoundment Closure

2.1.2 Tiering from Ash Impoundment Closure PEIS

This section considers the applicability and appropriateness of the ash impoundment closures at ALF for second tier NEPA analysis under the PEIS. As such, this analysis considers both the characteristics of the impoundments being considered for closure and the nature of activities proposed under the closure action. Substantial deviations in either impoundment characteristics or the type and extent of proposed actions to conduct closure

may either negate the applicability of tiering or necessitate additional specialized site specific analyses.

Recognizing the potential pathways for exposure and risk related to existing ash impoundments, TVA developed a series of factors to screen and evaluate project alternatives to determine whether an alternative is a “reasonable” action. Applicability of the impoundment closure under consideration at ALF to the characteristics of impoundment closures considered in the PEIS is demonstrated in Table 2-1.

2.1.3 Deviations from the PEIS

As illustrated in Table 2-1, the volume of CCR in the East Ash Pond Complex at ALF exceeds threshold conditions established in the PEIS to determine if it would be reasonable to consider Closure-by-Removal. In the PEIS (TVA 2016b), TVA determined that for sites with CCR volumes exceeding 600,000 yd^3, insufficient time would be available within the construction schedule to effectively remove the CCR materials by truck or rail and achieve closure of impoundments within five years. However, unlike other TVA power plants, much of the land at ALF is not owned by TVA and the site holds significant economic potential for non-TVA landowners due to its location. Therefore, TVA is considering Closure-by-Removal in its analysis, which would support the future economic development of the ALF site.

In addition, TVA determined that loading operations are highly dependent on the rate at which CCR can be safely excavated, dried and moved to truck loading facilities. TVA considered these factors and determined programmatically that the rate of truck loading would be 100 truckloads per day, with a capacity of approximately 10 yd^3 of CCR each, for 150 working days per year. Given an analysis of site-specific conditions at ALF, such as its location in an industrial area, and as interstate access generally does not require transport through residential or other sensitive areas, TVA is able to use larger trucks (capacity of 17 yd^3) and increase trucking to 120 truckloads per day. In addition, TVA considered the current industrial nature of the site and the surrounding operations and determined that TVA could conduct closure activities for 210 working days per year at ALF. Therefore, the parameter established in the PEIS related to trucking and duration of closure, which assumed fewer, smaller trucks and fewer working days per year, is not applicable to the evaluation of this closure option at ALF. Specifically, at ALF, TVA is able to use a larger number of trucks with a greater capacity and at a higher frequency, resulting in a decreased duration of closure than would be expected using the broader set of conservative assumptions identified in the programmatic analysis.

Primary actions common to all impoundment closures under Closure-in-Place and Closure-by-Removal were identified in the PEIS. However, as described more fully in Section 2.3.4, TVA is considering only Closure-by-Removal of the impoundments at ALF. Table 2-2 summarizes actions under this closure alternative identified in the PEIS and demonstrates the consistency and applicability of the Closure-by-Removal alternative for the impoundments at ALF with the constraints of the analyses performed as part of the PEIS. As such, because the characteristics and proposed actions associated with the closure of the surface impoundments at ALF are sufficiently bounded by the conditions and environmental effects described in the PEIS, closure of the impoundments at ALF can tier off the analysis in the PEIS. The impacts of the increase in number of truckloads, truckload capacity, and annual working days and the impacts of the associated change in duration of the closure activities are evaluated in the analysis of resources which could potentially be impaired due to this change. Specifically, these resources include air quality, transportation, noise, solid waste, natural areas, parkland and socioeconomic impacts.

Table 2-1. Factors Evaluated to Determine Reasonability of Closure Activities in the PEIS and Related Attributes of the Impoundments at ALF

Screening Factor	Programmatic Attribute	ALF Characteristics
Volume of CCR Materials	The size of an ash impoundment and volume of CCR affect closure activities, potential environmental impacts and cost. CCR volume within ash impoundments considered in the PEIS ranged from 10,000 to 25,000,000 yd^3.	Volume of CCR in the impoundments at ALF are: East Ash Pond Complex (including the Coal Yard Runoff Pond) = approximately 3,000,000 yd^3 West Ash Pond = approximately 300,000 yd^3 Under the Metal Cleaning Pond = approximately 200,000 yd^3 Total = approximately 3,500,000 yd^3
Schedule/Duration of Closure Activities	Time necessary to complete closure activities at an ash impoundment affects the reasonability of closure alternatives. The range of closure durations for Closure-by-Removal determined in the PEIS were as follows: Closure-by-Removal: 2.7 years to 170 years	Time to close all the impoundments via Closure-by-Removal ranges from approximately 8.2 years to 15 years, depending on mode of transportation of CCR.
Risk to Human Health and Safety Relating to Closure Activities	Closure activities entail a range of construction activities that represent a potential risk to the health and safety of the workforce and the public. Excavations associated with the Closure-by-Removal alternative are particularly dangerous as noted by reports of accidents leading to injury or death in the industry. As discussed in the PEIS, sites having large volumes of CCR that are considered for Closure-by-Removal would also result in extensive trucking operations that would increase transportation risks.	TVA considered worker safety in the evaluation of closure options for the impoundments at ALF. Closure-by-Removal would require a large number of truck movements into and out of the site, which represents a risk of injuries and fatalities associated with truck crashes.
Surface Water Resources	As described in the PEIS, TVA anticipates that either closure method would have positive effects on surface water, if conducted properly. However, the results of the EPRI model indicated that for the configuration modeled, the Closure-by-Removal alternative would have a greater beneficial impact on surface water.	Initial screening analysis by TVA determined Closure-by-Removal would not cause or contribute to violations of any applicable state water quality standard, violate any applicable toxic effluent standard or prohibition, or jeopardize the continued existence of endangered or threatened species or critical habitats.

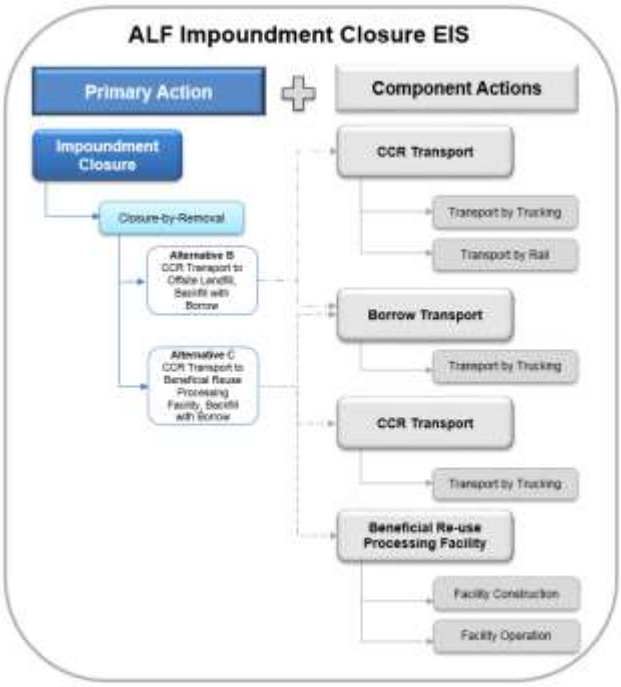
Screening Factor	Programmatic Attribute	ALF Characteristics
Groundwater Resources	Closure-by-Removal reduces groundwater contamination by removing the potential source of constituents of concern (COCs) from the site.	During TVA's routine groundwater monitoring around the East Ash Pond Complex in 2017, arsenic, lead, and fluoride (COCs) were detected in groundwater at concentrations above EPA and TDEC maximum contaminant levels (MCLs). Elevated pH values in groundwater were also observed. In May 2017, TVA voluntarily initiated an investigation to evaluate groundwater conditions on the north and south sides of the East Ash Pond Complex where COCs had been detected. TVA subsequently received a letter in July 2017 from TDEC initiating a remedial investigation. Since then, TVA, under the oversight of TDEC, completed a remedial investigation into the nature and extent of the contamination. TVA will continue to collect groundwater samples from existing monitoring wells and review the analytical results in accordance with TDEC requirements. In addition to any federal requirements that may apply to the impoundments at ALF after closure is completed, TVA will implement supplemental mitigative measures as required by the TDEC Commissioner's Order, as well as its closure plan, which could include additional monitoring, assessment or corrective action programs. However, as noted in the PEIS, TVA expects any groundwater impacts to be notably reduced following impoundment closure.
Wetlands	Analyses presented in the PEIS determined that for the Closure-by-Removal alternative, proposed actions would not cause or contribute to significant degradation of wetlands because laydown areas were minimized and wetlands are generally lacking from ash impoundments. Additionally, appropriate measures could be taken to avoid and minimize or compensate for impacts to wetlands and ensure no net loss of wetlands.	No jurisdictional wetlands are in the footprints of the ash impoundments at ALF or any associated laydown areas.

Screening Factor	Programmatic Attribute	ALF Characteristics
Risk to Other Adjacent Environmental Resources	The analyses performed as part of the PEIS determined that risk of potential release and degradation of environmental resources (cultural resources, ecological receptors, and factors related to the human environment) was generally low for the Closure-by-Removal alternative. However, potential air and noise emissions were expected to be markedly greater for the Closure-by-Removal alternative due to offsite transport.	Potential areas of disturbance associated with impoundment closure at ALF would be largely confined to previously disturbed lands. The interior least tern has been known to occasionally nest at the East Ash Pond Complex. Avoidance and minimization efforts to reduce impacts to this species would be implemented as required. Additionally, no adjacent sensitive receptors for air or noise are located proximate to the ash impoundments at ALF.
Mode and Duration of Transport Activities – Trucking	For those sites with CCR volumes exceeding 600,000 yd^3, TVA determined that insufficient time is available within the construction schedule to effectively remove the CCR materials by truck or rail and achieve closure of impoundments within the 5-year period for closure.	Volume of CCR to be removed from the existing impoundments at ALF is 3.5 million yd^3. Based upon the total volume of CCR, Closure-by-Removal with offsite transport of CCR by truck of all ash impoundments at ALF would require approximately 8.2 years. Closure-by-Removal of all ash impoundments with offsite transport of CCR by rail would require approximately 15 years.

Table 2-2. Actions Associated with Closure-by-Removal of ALF Impoundments

Closure Activity	Programmatic Impoundment Closure Activity	Proposed ALF Impoundment Closure Activity
Consider opportunities for beneficial use of ash	Beneficial re-use is considered by TVA as part of all ash management activities. Such re-use may include incorporation of ash from CCR impoundments as part of the impermeable cover system.	TVA is considering beneficial re-use of CCR removed from the surface impoundments at ALF under one of the proposed closure alternatives. The main beneficial uses of CCR are in the manufacture of wallboard, roofing, cement, concrete and other products.
Lower ash impoundment water level	Dewatering could include decanting and drawdown (which is the removal of free or ponded liquid from an impoundment), must meet current permit limits, and could include the removal of pore water from the impoundment. These activities could require additional monitoring or meeting additional limits from state regulators.	Dewatering of surface impoundments at ALF would comply with applicable NPDES permit requirements and additional TDEC approval requirements.
Identify temporary laydown areas and borrow areas	TVA anticipates temporarily using approximately 5 to 10 acres of previously undisturbed lands per site for vehicle and equipment parking, materials storage, and construction administration.	TVA has identified approximately 2.7 acres of previously disturbed land west of the West Ash Pond that could be used for temporary laydown during construction activities. Borrow is anticipated to be obtained from one or more previously permitted offsite borrow area(s) near ALF (see Section 2.5).
Identify facilities for CCR disposal	Identify onsite or offsite permitted management facilities for CCR disposal.	TVA is considering disposal of the CCR in an offsite permitted landfill as well as the beneficial re-use of CCR removed from the impoundments.
Install or expand groundwater monitoring system	A groundwater monitoring system will be installed to ensure that an adequately robust system is in place that meets or exceeds federal or state requirements. States may require groundwater monitoring, assessment, and if appropriate, corrective action.	As appropriate, TVA is operating a groundwater monitoring system per federal and state requirements.
Closure documentation	Prepare documentation to demonstrate that appropriate closure activities were successfully implemented.	Closure documentation will be prepared following the implementation of closure activities.

2.2 Proposed Impoundment Closure



The "primary action" that TVA is considering consists of the closure of the surface impoundments at ALF including the East Ash Pond Complex, the Coal Yard Runoff Pond, the West Ash Pond and the Metal Cleaning Pond. Each of these impoundments are described below and are shown on Figure 2-3.

The East Ash Pond Complex project area encompasses approximately 137.4 acres and includes the East Ash Pond Complex and the Coal Yard Runoff Pond (Figure 2-3). The East Ash Pond Complex includes dredge cells in the western part, the east ash pond in the central part, and a stilling pond. The stilling pond is a separate cell formed by a north-south aligned interior divider dike. Water from the sluice lines had been previously discharged from the plant into the northwest portion of the dredge cell area, and subsequently conveyed via a channel to the ash pond basin. All flows from the plant to the East Ash Pond Complex ceased by April 17, 2019. Discharge from the stilling pond is to McKellar Lake through two discharges that comprise NPDES Outfall 001. Discharge is accomplished by the use of discharge pipes through the Ensley Levee near the northeast corner of the East Ash Pond Complex and via three siphon pipes that pass over the levee and into McKellar Lake. In addition, an overflow spillway with outfall pipes through the east perimeter dike discharges to the wetland area known as the Horn Lake Cutoff. NPDES permitted Outfall 001A is located at the end of these outlet pipes.

The Coal Yard Runoff Pond is located west of the East Ash Pond Complex and south of the coal yard. It is not a CCR surface impoundment and was not designed to accumulate CCR. However, there is CCR underneath the Coal Yard Runoff Pond and the north and east dikes consist of beneficially reused CCR material. Storm water from the Coal Yard Runoff Pond has been rerouted to construction storm water outfalls or Tennessee Stormwater Multi-Sector General Permit (TMSP) permitted outfalls per CCR Rule requirements.

The East Ash Pond Complex is bounded on the west by the Coal Storage Area, on the north by a 2,200-foot-long USACE flood control levee (Ensley Levee), and on the south and east by a dike constructed by TVA. The 2,300-foot-long south dike has an approximate height of 25 feet and supports a rail spur along its crest. The 1,300-foot long east dike is approximately 20 feet in height and is bordered on the east by the Horn Lake Cutoff.

Figure 2-3. Proposed Project Areas

The West Ash Pond project area encompasses approximately 39.5 acres, which includes the West Ash Pond and the Metal Cleaning Pond. As of October 19, 2015, the West Ash Pond did not impound water and did not receive CCR or flows. Consequently, the West Ash Pond is considered a “closed” surface impoundment and is not subject to the CCR Rule.

The Metal Cleaning Pond is a lined pond that contains storm water and process flows previously received from the plant. It is not a CCR surface impoundment and was not designed to accumulate CCR. However, there is CCR underneath the Metal Cleaning Pond.

TVA has also identified an approximately 2.7-acre previously disturbed site proposed for use as a temporary laydown area during closure activities. This area is located on land leased by TVA southwest of the West Ash Pond.

2.3 Alternatives Evaluated in the EIS

The following alternatives are considered in detail in this EIS:

- Alternative A – No Action Alternative
- Alternative B – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in an Offsite Landfill Location
- Alternative C – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and West Ash Pond; Disposal of CCR in a Beneficial Re-Use Process & Offsite Landfill Location

Each of these alternatives is described below.

2.3.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not close the East Ash Pond Complex or the Metal Cleaning Pond, and the West Ash Pond would remain in its current closed state. No closure activities (i.e., no excavation or transport activities) would occur. However, the No Action Alternative is inconsistent with TVA’s plans to convert all of its wet CCR systems to dry systems and is inconsistent with the general intent of EPA’s CCR Rule. In addition, under the No Action Alternative, the ALF closure area land would not be made available to its owners for future economic development projects in the greater Memphis area. Consequently, this alternative would not satisfy the project Purpose and Need and, therefore, is not considered viable or reasonable. It does, however, provide a benchmark for comparing the environmental impacts associated with implementation of Alternatives B and C.

TVA will continue to collect groundwater samples from existing monitoring wells and review the analytical results as a part of the TDEC Commissioner’s Order, the EPA’s CCR Rule, and other regulatory requirements. TVA is also implementing the IRAs and corrective measures to control and begin treating impacted groundwater identified in some shallow aquifer monitoring wells around the East Ash Pond Complex.

2.3.2 Alternative B – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in an Offsite Landfill Location

Under Alternative B, the primary actions include the closure of the East Ash Pond Complex, the West Ash Pond and the Metal Cleaning Pond via Closure-by-Removal. Closure-by-Removal involves excavation and relocation of the CCR from the ash impoundments in accordance with federal and state requirements. TVA would stabilize residual ponded areas and then remove CCR material, underlying impacted soil, and support structures within the impoundment footprint. Closure activities would include:

- Excavation of ash using a tracked excavator
- Mechanical moisture conditioning the excavated ash by dumping, scooping, and windrowing the ash within the existing footprint of the impoundment or pond until it is sufficiently dried for hauling
- After drying, ash would be hauled to an existing, offsite permitted landfill
- Over-excavation of soil within the CCR unit footprint
- Upon completion of closure activities, impoundments would be restored to a natural soil and vegetated state

The following are approximate amounts of CCR in the East Ash Pond Complex (includes the Coal Yard Runoff Pond) project area and the West Ash Pond project area:

- East Ash Pond Complex: 3,000,000 yd^3
- West Ash Pond: 500,000 yd^3 (includes CCR located under the metal cleaning pond)

Other specific actions proposed for the East Ash Pond Complex project area would include:

- All or part of the Stilling Pond east containment dike would be regraded or removed and used for fill onsite
- Up to two storm water outfalls would be constructed into the Horn Lake Cutoff drainage area (directly east of the Stilling Pond). TVA intends to construct these outfalls above the ordinary high water mark elevation (210 feet)
- Outfall 001A would be abandoned. This would likely consist of a combination of excavation and demolition of the existing risers/outfall pipes and/or placement of graded aggregate/rip-rap and may result in minor fill placement below the ordinary high water mark elevation (210 feet)
- Potential minor modifications to the Ensley Levee (subject to USACE approval) which may include near surface utility relocation/abandonment on (or near) the levee, removal of existing CCR/fill materials against the levee, and placement of engineered fill against the levee

- Subsurface utility relocation north and south of the Ensley Levee. The relocated utilities would be located along the same general alignment area and depths as the existing force main pipe that crosses the East Ash Pond. The portion of this work north of the USACE levee would require minor excavation and backfilling operations

- Temporary construction access along the toe of the Ensley Levee to access Outfall 001 and the toe of the south containment dike to access the City of Memphis sewers

- Installation of erosion control measures such as silt fencing, wattles, and other measures as appropriate

TVA would also close the Coal Yard Runoff Pond as part of the closure of the East Ash Pond Complex. Closure of the Coal Yard Runoff Pond would include:

- Dewatering and drying the sediments and CCR underneath the Coal Yard Runoff Pond to a condition that they can be excavated

- After drying, the sediments, CCR dikes, and CCR foundation materials would be excavated and disposed of with the rest of the CCR materials excavated from the East Ash Pond Complex project area

Other specific actions proposed for the West Ash Pond project area would include:

- Potential minor modifications to the Ensley Levee (subject to USACE approval) which may include near surface utility relocation/abandonment on (or near) the levee, removal of existing CCR/fill materials against the levee, and placement of engineered fill against the levee

- CCR under the metal cleaning pond would be removed, and the area would be backfilled and closed

- Installation of erosion control measures such as silt fencing, wattles, and other measures as appropriate

The procurement and transport of borrow material is a “component action” under this alternative. Closure of the surface impoundments at ALF would entail the addition of borrow material to achieve proposed finished grades and provide a suitable medium to support restoration of the former impoundment with approved, non-invasive seed mixes designed to quickly establish desirable vegetation. As part of this component action, Closure-by-Removal of the ponds is expected to require approximately 3 million yd^3 of suitable borrow material. No specific site has been identified at this time and ultimate site selection will be left up to the contractor. As part of the contracting process to obtain borrow, TVA will require that any borrow material be obtained from a previously developed and/or permitted site. Accordingly, potential impacts associated with the transport of borrow material to ALF are based upon bounding characteristics of this action that are based upon the use of a range of identified candidate sites in the vicinity of ALF. Details regarding the development of bounding attributes is provided in Section 2.5.

Offsite transport of CCR is another component action to be undertaken in conjunction with this alternative. As described in detail in Sections 2.4.1.3 to 2.4.1.5, TVA considered the

transport of CCR materials to an existing permitted offsite landfill for disposal by either truck or rail, or barge.

It should be noted that ALF has a barge unloading facility available for use, which would have to be modified to load CCR onto a barge. With minor modification and repairs, the existing reclamation hoppers and associated conveyors from the coal yard to the transfer station could be re-configured for use. However, the following additional infrastructure would also be needed:

- Motors within the current barge unloader conveyor would need to be reversed to convert to a barge loader conveyor
- A hopper would need to be installed within the transfer station to transport CCR up onto the converted barge loader conveyor
- A dust suppression system would need to be installed at the transfer station, prior to loading onto the barge

While such modifications can be accomplished, no suitable landfill was identified by TVA that is equipped to receive CCR from barges (see further information in Section 2.4.1.5). Consequently, the transport of CCR by barge as a mode of transportation was eliminated from further consideration.

2.3.3 Alternative C – Closure of the Metal Cleaning Pond, Closure-in-Place of the East Ash Pond Complex and West Ash Pond; Disposal of CCR in a Beneficial Re-Use Process & Offsite Landfill Location

Under Alternative C, TVA would close the surface impoundments in the same manner as Alternative B. However, instead of transporting all excavated CCR material to an offsite landfill, most CCR (ranging from approximately 75 to 95 percent) would be transported to a beneficial re-use facility to be processed for use in concrete and other building materials. Borrow material suitable for use as backfill within the ALF ponds would also be required under this alternative similar to that described for Alternative B.

No specific provider of the beneficiation services or the specific site at which a beneficial re-use processing facility would be constructed has been developed at this time. However, TVA recognizes that such a facility has the potential to be constructed and operated because TVA has the necessary raw materials (i.e., CCR) to make such a facility viable. Therefore, while TVA does not intend to own or operate the facility, TVA recognizes that such a facility is an action that is “connected” to TVA’s action of potential Closure-by-Removal of TVA’s ash ponds. As described in 40 Code of Federal Regulations (CFR) 1508.25, connected actions are those that “…are closely related and therefore should be discussed in the same impact statement. Actions are connected if they:

> (i) Automatically trigger other actions which may require environmental impact statements.
>
> (ii) Cannot or will not proceed unless other actions are taken previously or simultaneously.
>
> (iii) Are interdependent parts of a larger action and depend on the larger action for their justification.”

Because it is expected that such a facility would not be sited and constructed in the vicinity of ALF but for the presence of available CCR at ALF, this facility is also evaluated as a "component action" in this EIS. Based upon information provided by potential vendors, TVA has developed information to characterize the beneficiation facility and its associated processes to support an analysis of environmental impacts of such a facility in conjunction with Alternative C in Chapter 3.

This alternative, therefore, includes a consideration of the potential effects of a beneficial re-use facility as a means of processing and reusing the CCR from ALF.

A specific site for the potential beneficial re-use processing facility has not been identified. Therefore, impacts of this option for CCR disposal are based on a bounding analysis of the characteristics of a representative beneficial re-use processing facility. Further information regarding the development of bounding characteristics is provided in Section 2.6. Following completion of this EIS, if a site is identified for use that does not fall within the criteria of the bounding analysis, a supplemental NEPA document will be required.

2.3.4 Alternatives Considered but Eliminated from Further Evaluation

The following alternative was considered by TVA but was eliminated from further evaluation:

Alternative D – Closure of the Metal Cleaning Pond and Closure-in-Place of the East Ash Pond Complex and West Ash Pond

Under Alternative D, the free water and ash pore water of the East Ash Pond Complex would be dewatered, and it would be Closed-in-Place. The West Ash Pond would also be Closed-in-Place. Similarly, the Metal Cleaning Pond and Coal Yard Runoff Pond would be dewatered and Closed-in-Place. TVA would abide by state and federal post-closure monitoring and corrective action requirements. In accordance with the IRAs in areas where the concentrations of CCR constituents in groundwater are above groundwater protection standards, the groundwater would be extracted, treated, tested, and discharged to an existing NPDES outfall or the T.E. Maxson WWTP (all options will be considered). Groundwater extraction in the vicinity of the East Ash Pond Complex at ALF until test results indicate that would control the movement of groundwater, keeping it within the TVA property. The groundwater extraction would continue until test results indicate that the groundwater protection standards are achieved.

TVA carefully considered this alternative and determined that Closure-in-Place should be eliminated from further consideration for the following reasons:

1. *Land Use Considerations.* Land use limitations associated with closed facilities under Alternative D would reduce the type and nature of projects that may be considered in conjunction with re-use of the site. Therefore, Alternative D does not meet the Purpose and Need of making the land available for future economic development projects. Importantly, unlike other coal facilities, TVA does not own all of the property where the ash is located. TVA's preference is to leave the property in a re-usable state for the property owners.

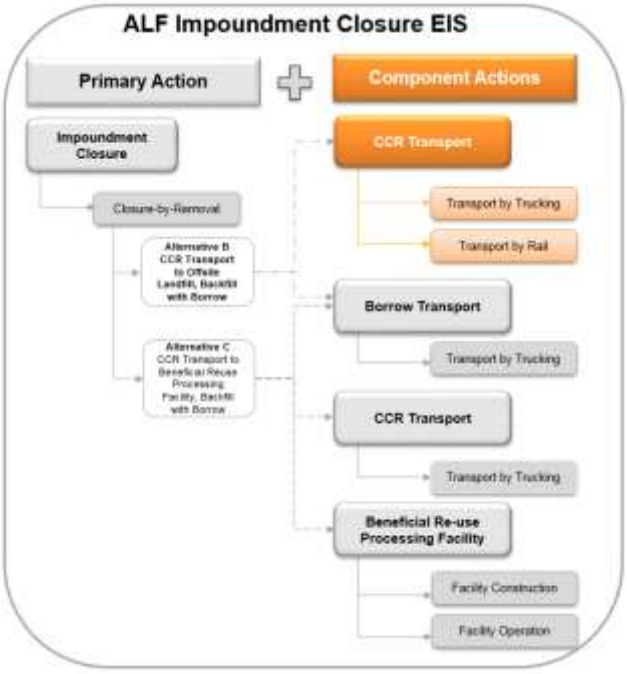
2. *Remedial Investigation for East Ash Pond Complex*. TVA is currently engaged in a RI for the East Ash Pond Complex under the direction of TDEC. A Remedial Investigation Report (RIR) was prepared by TVA to present the results of an

investigation conducted in 2017-2018. A copy of the report can be viewed on the TVA website *(https://www.tva.gov/Environment/Environmental-Stewardship/TDEC-Order/Allen.)*

During TVA's groundwater monitoring around the East Ash Pond Complex in 2017, arsenic, lead, and fluoride (COCs) were detected in groundwater at concentrations above EPA and TDEC maximum contaminant levels (MCLs). Elevated pH values in groundwater were also observed. In May 2017, TVA initiated an investigation to evaluate groundwater conditions on the north and south sides of the East Ash Disposal Area where COCs had been detected. TVA subsequently received a letter in July 2017 from TDEC initiating an RI.

A Closure-in-Place solution for the East Ash Pond Complex is not anticipated to fully address the complexities of the site and surrounding area that are detailed in the RIR.

2.4 Disposal of CCR Removed from the Impoundments at ALF



TVA is considering two "component action" options for disposal of the CCR removed from the surface impoundments at ALF: transport and disposal of CCR in an existing offsite permitted landfill (Alternative B) and transport of CCR to a beneficial re-use processing facility to be processed for use in concrete and other building materials (Alternative C). The transport and disposal of CCR in an existing offsite permitted landfill is described below. Transport of CCR to a beneficial re-use processing facility is described in Section 2.6.

2.4.1 Transport and Disposal of CCR to an Existing Offsite Permitted Landfill

Transport of CCR to an offsite landfill is a "component action" under Alternative B. CCR removed from the ash impoundments would be transported offsite to an existing permitted landfill. Because the selection of a particular receiving landfill is dependent upon TVA's NEPA decision, contract arrangements and other factors, identification of a receiving landfill is premature. Actual landfill selection will be determined during the project implementation phase. Under this alternative TVA will consider only previously developed and/or permitted landfills having sufficient excess capacity and the ability to construct dedicated cells to accommodate a monofill for CCR from a single generator. TVA would not own or operate the landfill to which CCR from ALF is transported. Therefore, TVA has conducted a bounding analysis of potential environmental effects associated with transport of CCR to an offsite landfill.

The bounding analysis under this component action considers several potential modes of transport of CCR that could include truck, rail and barge. However, as described in Section 2.3.2 and further in Section 2.4.1.5 below, transport via barge was eliminated as a viable option.

TVA has not selected a landfill for disposal of CCR from the surface impoundments at ALF. Therefore, the most impactful or bounding characteristics of CCR transport to these suitable landfills will be incorporated into a set of bounding attributes for each potential mode of transportation. TVA has developed a set of bounding attributes related to the transport of CCR from ALF to an offsite landfill via truck, rail and barge. The first step in this analysis is to identify suitable landfills.

2.4.1.1 Landfill Screening Analysis

In April 2019, Wood completed a landfill screening analysis for TVA in order to identify existing, permitted landfills that are suitable for disposal of CCR from ALF (Wood 2019).

Due to the distance economies associated with rail and barge, TVA determined that landfills within a 600-mile radius of ALF could be utilized for long-term storage of CCR excavated from the ash ponds at ALF if CCR were transported by rail or barge. Landfills within a 30-mile radius of ALF could be utilized if CCR were transported by truck. The process used to identify landfills suitable for disposal of CCR is summarized below. The complete analysis is provided in Appendix A. Utilizing these bounding distances, TVA implemented the process described in the following subsections to identify landfills that could be considered for long-term storage of CCR from ALF.

2.4.1.1.1 Initial Landfill Identification

Landfills are regulated under Resource Conservation and Recovery Act (RCRA) Subtitle D (solid waste) and Subtitle C (hazardous waste) or under the Toxic Substances Control Act. Landfills that can accept nonhazardous solid waste, such as household garbage and nonhazardous industrial solid waste are RCRA Subtitle D landfills. CCR is nonhazardous under 40 CFR 261.4(b)(4) and thus regulated under Subtitle D. A search of state regulatory databases was conducted to identify all Subtitle D RCRA landfills located within the twenty-three states that are encompassed within a 600-mile radius of ALF. This search identified 1,158 landfills, of which 784 were located within the 600-mile radius of ALF.

2.4.1.1.2 Proximity to Rail Lines or Navigable Waterways

The list of landfills was then screened to eliminate those that were located more than 30 miles from an existing rail line or navigable waterway. As most landfills do not have the ability to accept waste directly by rail or barge, over-the-road trucking would be required to haul the CCR from the rail line or port to the receiving landfill. The trucking distance would be limited to a distance of 30 miles, consistent with the travel distance that TVA would truck CCR material directly from ALF to a receiving landfill. The results of this screening analysis indicated that all 784 landfills are within 30 miles of a rail line and 204 landfills are within 30 miles of a navigable waterway.

2.4.1.1.3 Management by Large Commercial Carriers

Additional screening was conducted to eliminate those landfills that are not operated by large commercial carriers. Commercial carriers offer established management systems, reliability, and are assumed to comply with environmental practices consistent with TVA standards. As such these large commercial carriers are expected to have robust

environmental control plans, effective project designs and a history of compliance that ensures that offsite impacts to surrounding receptors is low. Landfills operated by the following commercial carriers were retained for additional analysis:

- Advanced Disposal
- Republic Services
- Tunnel Hill Partners
- Waste Connections
- Waste Industries
- Waste Management

A total of 226 of the 784 landfills originally identified are operated by large commercial carriers.

2.4.1.1.4 Direct Service by Rail Spur or Port

To avoid impacts associated with construction of unloading infrastructure and over-the-road trucking, the 226 landfills remaining were inspected using available aerial imagery for the presence of rail or port access either at or near the landfill site. Landfills without rail or port access were eliminated from further consideration.

All landfills located within 30 miles of ALF were retained, as the presence of a rail spur or port would not be required at that distance. CCR would be transported to landfills within a 30-mile radius via truck.

The results of the screening identified 22 landfills that would meet the requirements established for disposal of CCR from ALF via truck, rail or barge. These landfills are within the established radius for rail or barge transport (600 miles) or truck transport (30 miles), are operated by large commercial carriers, and are serviced by a rail spur or established port if outside the 30-mile trucking radius. These landfills are shown on Figure 2-4.

2.4.1.1.5 Internet Characterization of Landfill Attributes

The 22 remaining landfills were then screened for specific attributes using readily available information obtained from an internet search of commercial carrier websites, state and county waste management reports, and EPA data. Each landfill was characterized using the following attributes:

- Modes of transport available
- Remaining capacity
- Types of waste accepted
- Geographic restrictions on waste origin
- Documented record of EPA violations
- Proximity to sensitive communities requiring environmental justice consideration

Landfills that do not accept waste from outside a specific geographic area (of which ALF is not included), do not accept CCR or special waste, or that reported insufficient capacity were eliminated from further consideration. Not all attribute information was readily ascertainable for each landfill, and a lack of information alone did not result in the elimination of a landfill. Four landfills were eliminated using the internet characterization data, leaving 18 landfills for further consideration.

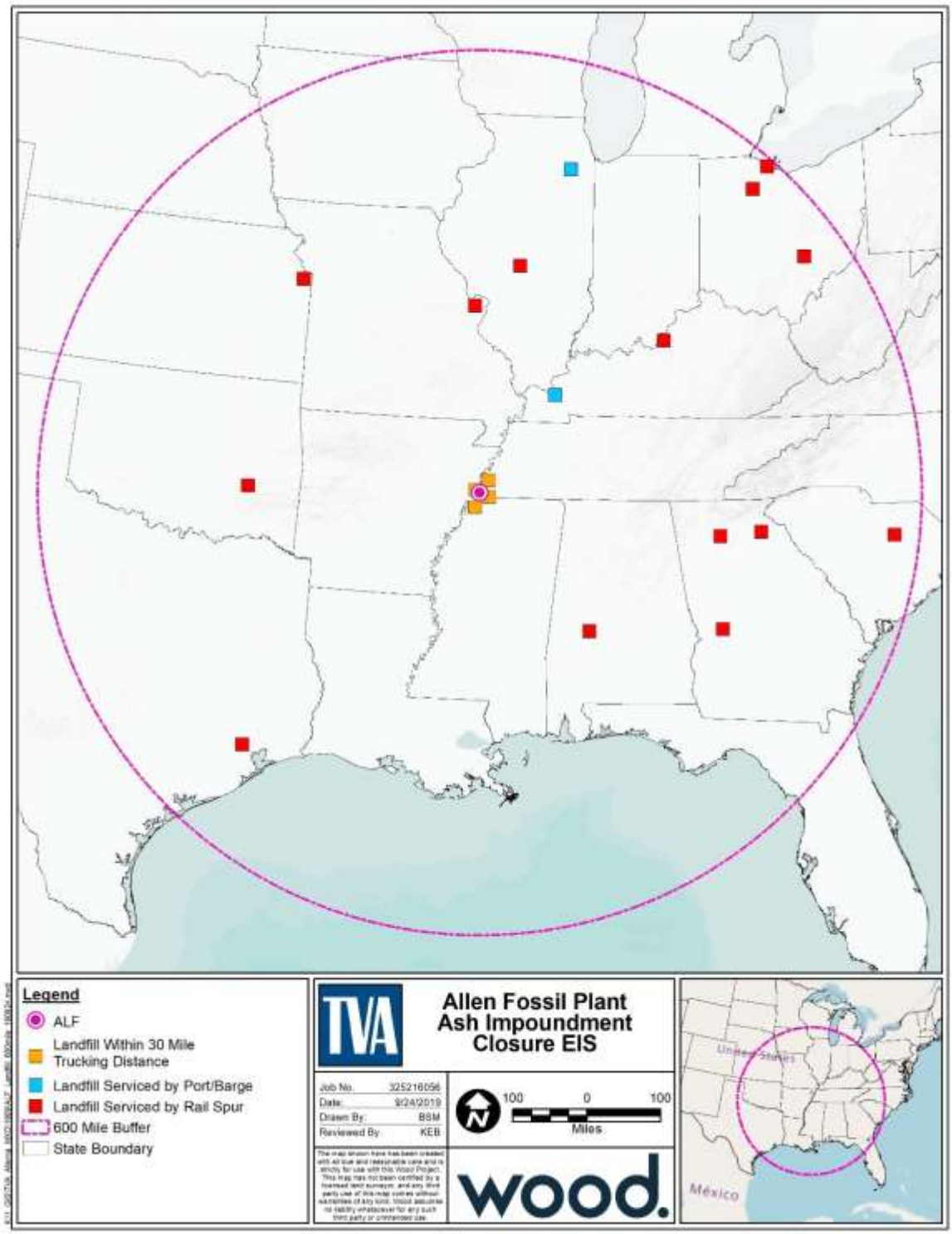


Figure 2-4. Landfill Screening Results

Additional data collection was performed to validate the information obtained during the internet characterization screening. The additional data collection determined that three landfills were identified that have operational rail spurs on-site that also meet all of the remaining criteria, and none of the identified landfills within 600 miles are currently directly serviced by barge. Among the two landfills located near ports, one was eliminated due to insufficient capacity. The other, Laraway Recycling and Disposal Facility, while not directly served by barge, is located within 1 mile of an active port. The direct route between the port and landfill currently serves industrial facilities and would require use of a public roadway for a relatively short distance. Because this was the only viable landfill potentially served by barge (with the exception of the short roadway haul from the barge terminal to the receiving landfill), this landfill was provisionally retained as a potentially viable option for barge transport.

Based on the results of the additional analysis, seven of the previously identified Subtitle D landfills met all of the identified screening criteria.

2.4.1.1.6 Results

Table 2-3 provides a list of landfills that met all screening criteria and will be considered as part of the bounding transportation analysis for disposal of CCR from ALF.

Table 2-3. Landfills Suitable for Accepting CCR from ALF

Facility	Commercial Carrier	City, State	Distance to ALF (point to point)	Transport Method
South Shelby Landfill	Republic Services	Memphis, Tennessee	14 miles	Truck
Tunica Landfill	Waste Management	Robinsonville, Mississippi	20 miles	Truck
North Shelby Landfill	Republic Services	Millington, Tennessee	21 miles	Truck
Arrowhead Landfill	Green Group Holdings	Uniontown, Alabama	240 miles	Rail
Taylor County Disposal Landfill	Waste Industries	Mauk, Georgia	380 miles	Rail
Lee County Landfill	Republic Services	Bishopville, South Carolina	565 miles	Rail
Laraway Recycling and Disposal Facility	Waste Management	Joliet, Illinois	455 miles	Barge

2.4.1.2 Transportation Bounding Analysis

Each of the candidate landfill sites are existing permitted landfills with the ability to accept CCR and have the existing infrastructure in place such that construction of additional roads, rail lines, or unloading facilities outside of the existing landfill footprint would not be required. All landfills that met the screening criteria for transport by truck, rail and barge are located in geographic areas with air quality that meet or exceed national clean air standards (i.e., designated by the EPA as “attainment” areas), and all landfills are located in areas that

contain communities that meet the requirements for environmental justice considerations. Disposal of CCR from ALF is not anticipated to affect these attributes. As such, impacts to the natural environment from disposal of CCR at these landfills are not anticipated. The analysis of potential environmental impacts of the disposal of CCR to an offsite landfill is limited to those associated with the effects of transport of CCR to the facility and include:

- Air emissions – potential impact from fugitive dust and emissions from equipment and vehicles during excavation and transport of CCR
- Climate change and Greenhouse Gases (GHG) – Excavation and trucking operations of CCR contributes to emissions of GHG
- Noise emissions – potential impact from noise emissions from equipment and vehicles during excavation and transport of CCR
- Impacts to transportation – Increased duration and frequency of offsite trucking has potential to result in additional impacts to local traffic and increased need for roadway maintenance
- Impacts to public health and safety – Impacts from excavation activities and high truck transport on local road network results in increased risk of injuries and deaths
- Disruption to natural areas, parks and recreational areas – potential impact to recreators associated with transport of borrow material through or adjacent to natural areas, parks, or recreational areas
- Environmental justice – Potential impacts associated with the transport of borrow material (construction related noise, exposure to fugitive dust and exhaust emissions) within sensitive communities requiring environmental justice consideration

TVA examined the proposed transport routes and the environmental attributes of the existing conditions along each route to determine the most impactful or bounding characteristics of CCR transport to existing landfills via each potential mode of transportation. As part of this analysis, TVA used such factors as haul route distance, length through established environmental justice communities and other factors to develop a set of bounding attributes that may be used in conjunction with impact analyses for each affected resource considered in the EIS as appropriate. The purpose of the bounding analysis was to identify a range of potential impacts and to provide a conservative estimate as to the magnitude of impacts that could result from the transport of CCR. The bounding analysis presents the scenario with the largest extent of potential impacts, but the ultimate haul route chosen may result in less severe impacts. The summary of bounding attributes for each resource are described below.

2.4.1.3 Transport to Landfill Via Over-the-Road Truck

Trucking is a technically feasible mode of transport because trucks would not require special loading/unloading infrastructure at ALF and would use the existing roadway infrastructure that already serves the plant site and potential receiving landfills. Truck loading operations are highly dependent on the rate at which CCR can be safely excavated, dried and moved to truck loading facilities. Prior to leaving a site, all trucks would be required to pass through a truck washing station. Based on the estimated volumes of CCR in the ash impoundments and under the Metal Cleaning Pond, and the use of over the road dump trucks (capacity of 17 yd^3), approximately 120 truckloads of CCR per day would be needed to transport CCR to the offsite landfill. This would result in a traffic count of 240 truck trips per day along the haul route for approximately 8.2 years.

Bounding attributes selected for use in impact analyses for the landfills that were identified as suitable for the potential transport of CCR via truck are summarized in Table 2-4.

Table 2-4. Summary of Bounding Attributes Associated with the Transport of CCR to Offsite Landfill via Truck

Attribute	Bounding Value
Distance by Road to ALF (mile)	29.1
Average No. Truck Trips per day (17 yds^3/truck)	240
Estimated Transport-Related Injuries[1]	3.6
Estimated Transport-Related Fatalities[2]	0.2
Length Through Low Income Environmental Justice Population (mile)	18.6
Length Through Minority Environmental Justice Population (mile)	24.4
No. Potential Sensitive Air Receptors (within 200 feet)[3]	223
No. Potential Sensitive Noise Receptors (within 500 feet)[4]	1,350
Is the Landfill Located in a Low Income Community?	Yes
Is the Landfill Located in a Minority Community?	Yes
Length Through or Adjacent to Natural Areas or Parks (mi)	1.2
Air Quality Attainment Status of Landfill Location and Haul Route	In Attainment for All Criteria Pollutants

[1]Based on a rate of 32.953 per billion ton-miles for freight transport by truck (FHWA 2016b)
[2]Based on a rate of 1.375 per billion ton-miles for freight transport by truck (FHWA 2016b)
[3]Potential sensitive air receptors are homes, churches and recreational areas located within 200 feet of the proposed haul road
[4] Potential sensitive noise receptor locations are homes, churches and recreational areas within 500 feet of the proposed haul road

2.4.1.4 Transport to Landfill Via Rail

The rail facilities at ALF are insufficiently developed to support loading and transport of CCR by rail. As such, transport of CCR by rail would require construction of a CCR loading facility adjacent to an existing rail spur within the boundary identified in Figure 2-3. The current rail siding at ALF services Harsco Minerals, but the rail infrastructure would need to be refurbished to support additional railcar storage and staging.

Based on loading rates established in the Ash Impoundment Closure PEIS (TVA 2016b), it is assumed that TVA could load 11 rail cars per day (approximately 1,000 yd^3 of CCR), and therefore TVA would take approximately 9 days to load one unit train (100 cars per train). Assuming 210 working days per year, it is estimated that rail transport would take approximately 15 years to transport and dispose approximately 3.5 million yd^3 of CCR.

Transport of CCR to an offsite landfill via rail would utilize the existing rail line system. While trains are more energy efficient than automobiles, they also result in emissions of nitrogen dioxide, carbon dioxide, and particulate matter that can contribute to air pollution and adverse health effects (Environmental Literacy Council 2019). Because transport by rail

would be relatively intermittent, trains carrying CCR from ALF are expected to be integrated within the existing rail freight system and would not result in increased rail congestion, delays or idling time. As such, potential localized effects to air and noise receptors, environmental justice populations, and parks located along these existing rail lines would not experience notably greater impacts due to the transport of CCR by rail than those they already experienced under current rail operating conditions. Therefore, specific environmental features along the rail haul routes were not identified for landfills served by rail. The bounding attributes considered for these landfills were determined to be distance traveled as an indicator of potential impacts associated with regional air and GHG emissions, health and safety and location in a community with environmental justice considerations.

Due to the varying ownership of rail lines, the exact haul routes between ALF and the rail-accessed landfills have not been determined. Rail distances to the candidate landfills accessible by rail were estimated based on the determination of the average increase in actual rail distance, as identified in other studies conducted by TVA, relative to a straight measure of the point-to-point distance between the landfill and the subject fossil plant. Therefore, in order to estimate the bounding distance between ALF and the rail-accessed landfill, the point-to-point distance between ALF and the landfills accessible by rail was increased by approximately 85 percent. Bounding attributes selected for use in impact analyses for the landfills identified as suitable for the transport of CCR via rail are summarized in Table 2-5.

Table 2-5. Summary of Bounding Attributes Associated with the Transport of CCR to Offsite Landfill via Rail

Attribute	Bounding Value
Estimated Distance by Rail to ALF (mi)	1,047
Estimated Transport-Related Injuries[1]	8.6
Estimated Transport-Related Fatalities[2]	1.1
Is the Landfill Located in Low Income Community?	Yes
Is the Landfill Located in Minority Community?	Yes

[1]Based on a rate of 2.172 per billion ton-miles for freight transport by rail (FHWA 2016b)
[2]Based on a rate of 0.278 per billion ton-miles for freight transport by rail (FHWA 2016b)

2.4.1.5 Transport to Landfill via Barge

Transport of CCR to an offsite landfill via barge would utilize an existing transportation network of navigable waterways. Similar to rail transport, given the expected capacity of a river barge (average of 1,500 tons [USDOT 1994]), sensitive air and noise receptors, Environmental Justice populations, and parks located along existing waterways would not experience significantly greater and disproportionate impacts due to the transport of CCR by barge than those already experienced under current conditions. In addition, as identified above, based on the characteristics of the screening analysis (i.e., landfill would be located within 1 mile of the port and transport of CCR would occur on roadways that serve industrial facilities), specific environmental features along the haul route were not identified for landfills accessed by barge. Accordingly, the bounding attributes considered for landfills

accessible by barge were distance traveled as an indicator of potential impacts associated with air and GHG emissions, health and safety risks and the location of the landfill within a community with environmental justice considerations. Bounding attributes selected for use in impact analyses for transport of CCR to the landfill identified as suitable for the transport of CCR via barge are summarized in Table 2-6.

Table 2-6. Summary of Bounding Attributes Associated with the Transport of CCR to Offsite Landfill via Barge

Attribute	Bounding Value
Distance by River to ALF (mi)	732.5
Estimated Transport-Related Injuries[1]	0.55
Estimated Transport-Related Fatalities[2]	0.14
Is the Landfill Located in a Low Income Community?	Yes
Is the Landfill Located in a Minority Community?	Yes

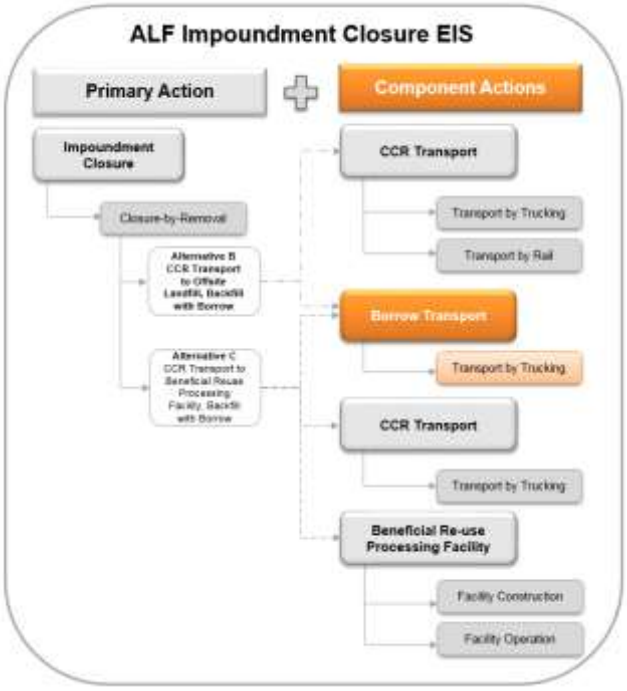
[1]Based on a rate of 0.199 per billion ton-miles for waterborne freight transport (FHWA 2016b)
[2]Based on a rate of 0.050 per billion ton-miles for waterborne freight transport (FHWA 2016b)

While the aforementioned analysis has produced certain bounding values that may be used to support an assessment of potential environmental impacts, the sole candidate landfill identified by this analysis has challenges that make transport and delivery of CCR from ALF problematic. These include the following:

- *Absence of direct port service to the receiving landfill*. As described in Section 2.4.1.1.5, Laraway Recycling and Disposal Facility is located within 1 mile of an active port (Port of Will County) and is not directly served by barge. As such, CCR transported from ALF via barge would have to be offloaded within the port onto trucks, transported via public roadways, and then disposed of within the landfill. These issues represent potential challenges that complicate CCR transport and increase risk.
- *Limited landfill capacity in Chicago region.* Discussions with the representative of the Laraway facility indicated landfill capacity within the Chicago region is limited. While not definitive, it is believed this issue may limit TVA's ability to execute a contract with the receiving landfill as this could limit landfill capacity for local communities.
- *Excessively high disposal costs.* Because of the limited availability of landfill capacity in the Chicago region (as stated above), any contract for receipt of CCR from outside the region may be vulnerable to excessively high tipping fees. As such total transportation costs for this transportation option may be cost prohibitive.

Based on these challenges, the candidate landfill previously retained for screening analysis as a landfill potentially served by barge transport is eliminated from further consideration as impractical. Because no other candidate landfills have been identified that may potentially be served by barge transport, this mode of CCR transport is therefore eliminated from detailed consideration in the EIS.

2.5 Borrow Needs



The procurement and transport of borrow for use in backfilling the excavated impoundments at ALF is a "component action" under both Alternatives B and C.

Closure-by-Removal is expected to require approximately 3 million yd^3 of suitable borrow material. All borrow material would be obtained from a previously developed and/or permitted site. No specific site has been identified at this time and ultimate site selection would be left up to the contractor. Because the selection of a particular borrow site(s) is dependent upon TVA's NEPA decision, and would be left up to the contractor, identification of a particular borrow site is premature. Under this alternative, TVA would require that the contractor consider only previously developed and/ or permitted borrow sites. Therefore, TVA has conducted a bounding analysis of potential environmental effects associated with transport of borrow from potential offsite borrow areas in the vicinity of ALF.

To assess potential direct and indirect effects associated with the transport of borrow material, TVA performed a search to identify candidate borrow sites near ALF that may be considered for use. Figure 2-5 identifies seven potential borrow sites and the recommended haul routes that may be considered by contractors providing borrow in conjunction with closures of the surface impoundments at ALF. Table 2-7 provides a listing of the candidate sites, their size, their expected capacity, and a determination of their applicability for the bounding analysis.

Figure 2-5. Candidate Borrow Sites

Table 2-7. Candidate Borrow Sites and Potential Capacity

Candidate Borrow Site	Area (acres)[1]	Available Capacity (cubic yards)[2]	Retained for Borrow Site Bounding Analysis
A	119	959,933	Yes
B	133	1,072,867	Yes
C	56	451,733	Yes
D	13	104,867	Yes
E	260	2,097,333	Yes
F	22	177,467	Yes
G	8	64,533	Yes

[1] Acreages determined from "area of interest" in borrow study (Stantec 2015)
[2] Volume assumes average depth of cut of 5 feet

As part of the contracting process to obtain borrow, TVA will require that any borrow material be obtained from a previously developed and/or permitted site. Therefore, potential environmental impacts associated with procurement of borrow material are limited to those associated with the transport via trucking. In the context of the candidate borrow sites in the vicinity of ALF, relevant factors considered in this analysis are the same as those described in Section 2.4.1.2 and include the following:

- Air Quality
- Climate Change and Greenhouse Gases (GHG)
- Noise
- Transportation
- Public Health and Safety
- Environmental Justice
- Natural Areas, Parks, and Recreation

TVA examined the potential trucking routes and the environmental attributes of the affected environment along each route to determine the most impactful or bounding characteristics of borrow transport. As part of this analysis, TVA used such factors as haul route distance, length through identified environmental justice communities and other factors to develop a set of bounding attributes that may be used in conjunction with impact analyses for each resource in Chapter 3, as appropriate. Notably, while Sites E and F are located close to ALF and would not require transport through identified environmental justice communities, the bounding analysis preferentially utilized other sites at greater distances from ALF to establish the bounding condition.

Based upon the characteristics and estimated capacity of borrow at each candidate site, TVA concluded that a bounding analysis of borrow would include obtaining some material from each of the candidate sites. Bounding attributes selected for use in impact analyses are summarized in Table 2-8.

Table 2-8. Summary of Bounding Attributes Associated with the Transport of Borrow Material to ALF

Attribute	Bounding Value
Maximum Distance per One-Way Trip to ALF (mi)	12.6
Average No. Truck Trips per day (15 yds^3/truck)	232
Estimated Total Transport-Related Injuries	0.96
Estimated Total Transport-Related Fatalities	0.04
Length Through Low Income Environmental Justice Population	8.4*
Length Through Minority Environmental Justice Population	11.0*
No. Potential Sensitive Air Receptors (within 200 feet)[1]	271*
No. Potential Sensitive Noise Receptors (within 500 feet)[2]	725*
Is Borrow Site Located in a Low Income Community	Yes, Except E and F
Is Borrow Site Located in a Minority Community	Yes, Except E and F
Length Through or Adjacent to Natural Areas or Parks (mi)	1.8*
Air Quality Attainment Status of Borrow Site and Haul Route	In Attainment for All Criteria Pollutants

[1]Potential sensitive air receptors are homes, churches and recreational areas located within 200 feet of the proposed haul road
[2] Potential sensitive noise receptors are homes, churches, recreational areas within 500 feet of the proposed haul road
*Aggregate value assuming utilization of all borrow sites

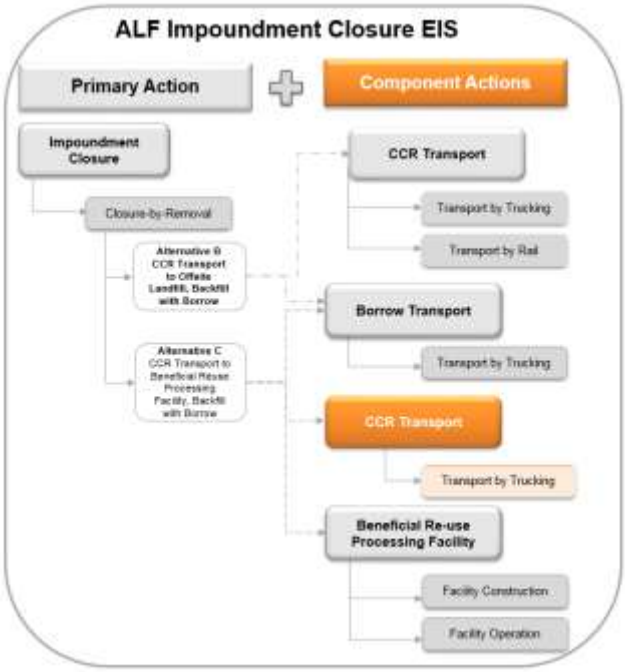
2.6 Beneficial Re-Use Facility

As described in Section 2.3.3, TVA is evaluating a potential CCR beneficial re-use processing facility as an action by others that is connected to the Closure-by-Removal of the ash impoundments at ALF. This action has two “component actions” that will be evaluated in this EIS: the transport of CCR to the beneficial re-use processing facility and the construction/operation of the facility.

Because the site selection and the particular beneficiation technology to be used is dependent upon the vendor, identification of the location of the beneficial re-use processing facility and its operation is premature. Therefore, TVA has conducted a bounding analysis of potential environmental effects associated with transport of CCR and the potential effects of construction and operation using bounding attributes obtained from candidate beneficiation vendors.

Under Alternative C, TVA would transport up to 95 percent of the CCR removed from the surface impoundments to a facility where it would be processed for beneficial re-use and distributed to third parties for use in concrete and other construction materials. As described in Section 2.3.3, no specific provider of the beneficiation services or the specific site on which a beneficial re-use processing facility would be constructed has been identified at this time.

2.6.1 Transport and Disposal of CCR to a Beneficial Re-use Processing Facility



Under Alternative C, the "component action" related to CCR disposal would entail the transport of CCR by truck to an offsite beneficial re-use processing facility. Because such a facility is not assumed to be served by an existing rail facility, trucking is considered to be the only viable mode of transportation.

Based on the estimated volumes of CCR in the ash impoundments that could be processed at the beneficial re-use facility (up to 95 percent or approximately 3.3 million yd^3) and the use of over-the-road trucks (capacity of 17 yd^3), 120 truckloads of CCR per day would be needed to transport CCR to a beneficial re-use facility. This would result in a traffic count of 240 truck trips per day along the haul road to the beneficial re-use facility for approximately 7.8 years.

Only the remaining percentage of CCR, not suitable for beneficial re-use, would be transported by truck to an offsite landfill for disposal. Given the estimate that between 75 and 95 percent of CCR would be beneficially re-used under this alternative, the remaining material (assume bounding value of 25 percent or 875,000 yd^3) would be disposed of in an offsite landfill. The disposal of the CCR not suitable for re-use would take approximately 2 years. Given the relatively small amount of CCR that would need to be disposed of under this alternative, CCR that could not be beneficially re-used would be transported by truck to a suitable landfill within a 30-mile radius of ALF.

2.6.2 Overview of the Process to Beneficially Re-use CCR

Previously-impounded CCR can be processed for reuse into other products. CCR contains technical properties that makes it a valuable resource in certain commercial manufacturing operations. Beneficiation is the treatment of raw materials to improve the physical and chemical properties to make them suitable for subsequent use. For example, the Harsco Minerals facility at ALF utilizes bottom ash to produce products, including roofing granules for shingles and abrasives for sand blasting applications. Under Alternative C, fly ash would also be re-used as a raw material at a beneficiation processing facility that would re-process the fly ash for other commercial uses such as encapsulated construction material.

EPA (2019) encourages the beneficial use of CCR in an appropriate and protective manner, because this practice can produce positive environmental, economic, and product benefits such as:

- reduced use of virgin resources
- lower greenhouse gas emissions
- reduced cost of coal ash disposal
- improved strength and durability of materials

What is CCR "Beneficiation"?
CCR beneficiation is a process whereby raw CCR material is treated to improve the physical and chemical properties to make them suitable for subsequent use. Encapsulated uses of beneficiated products include aggregate in concrete or bricks and use as raw material in the manufacture of a product like wallboard.

Encapsulated beneficial uses of CCR are those uses where the CCR is bound in a solid matrix that minimizes mobilization into the surrounding environment. Examples of encapsulated uses include aggregate in concrete or bricks and use as raw material in the manufacture of a product like wallboard. Unencapsulated beneficial uses are those where the material is used in a loose or unbound form and involves the direct placement of the material on land, for example use as structural fills (EPA 2016b).

EPA evaluated the potential environmental impacts from fly ash used as a direct substitute for Portland cement in concrete and from FGD gypsum used as a replacement for mined gypsum in wallboard. EPA's evaluation concluded that the beneficial use of encapsulated CCR in concrete and wallboard is appropriate because environmental releases are comparable to or lower than those from analogous non-CCR products or are at or below relevant regulatory and health-based benchmarks (EPA 2019b).

A common problem limiting the use of fly ash in concrete is high concentrations of residual carbon. Unburned carbon (typically measured as loss on ignition [LOI]) interferes with air entrainment in the concrete, which is important for freeze-thaw resistance. The ASTM C618 standard for use of fly ash in concrete requires a LOI of no more than 6%. Varying technologies that have been developed to recondition fly ash to make it suitable as a marketable commodity include electrostatic separation, thermal beneficiation and chemical passivation. Two beneficiation technologies considered to have the potential for application at a beneficial re-use processing facility that may be constructed in connection to ash impoundment closure at ALF are the thermal beneficiation and chemical passivation processes.

2.6.2.1 Thermal Beneficiation Process

Thermal beneficiation is a process that uses combustion to reduce the level of carbon in the ash. Thermal beneficiation also eliminates ammonia from fly ash impacted by nitrous oxide controls issues and can improve fineness and uniformity of the resulting product. Successful thermal beneficiation technologies have been commercially deployed for over 15 years and represent more than a million tons of marketable fly ash per year. In general, technologies that utilize thermal beneficiation use atmospheric fluidized bed combustion (FBC), which is capable of operating on fuels with low heating values. As a result, in the FBC technology the process is largely "self-fueled" and does not require external fuel inputs (Oberlink et al. 2017).

2.6.2.2 Chemical Passivation

Chemical passivation uses chemicals to reduce the activity of the carbon in the ash. This process does not include a combustion process and reduces the need to add large or variable amounts of air entraining agents to the concrete mix. Several passivation methods have been developed and a few are commercially available from large concrete marketers. One approach has been to add low dosages of a "sacrificial chemical" to the ash which react with the active sites on the carbon thereby neutralizing them. Another approach uses chemicals to encapsulate the carbon. Both result in the ash having less effect on air entrainment with more predictable results (Oberlink et al. 2017).

2.6.3 Bounding Characteristics

In order to assess potential direct and indirect effects associated with the construction and operation of the beneficial re-use processing facility, TVA solicited information from a number of vendors to describe and characterize facility siting requirements, construction characteristics, and operational features. However, because the particular beneficiation technology or location of the beneficial re-use processing facility has not yet been determined, TVA has compiled and summarized bounding attributes to support the analysis of potential environmental impacts. Table 2-9 provides a bounding summary of attributes of a beneficial re-use processing facility and characteristics of activities associated with facility construction and operations. Similarly, Table 2-10 provides a summary of the bounding values associated with various environmental attributes of the facility. Characteristics of the facility and its associated activities as summarized in each of these tables will be used to assess direct and indirect impacts of the beneficial re-use of fly ash from ALF in each of the resources analyzed in Chapter 3. Tables 2-9 and 2-10 provide a list of bounding attributes and characteristics that a beneficial re-use processing facility should meet in order to fall within the analysis of this EIS. Following completion of this EIS, if a site is identified for a beneficial re-use facility that does not meet the listed threshold conditions, a supplemental NEPA document would be required.

Table 2-9. Beneficial Re-use Facility – Table of Facility Attributes

Feature	Characteristic	Specifications
Facility Attributes		
Facility Elements	General Arrangements	Three Primary Facility Areas onsite a. Area 1 - Process to Reclaim b. Area 2 - Process Island c. Area 3 - Storage and Load Out
	Land Requirements	Site area up to 15 acres
	Storm Water Management	Onsite storm water basins or storm sewers
Access	Facility Access	Direct access to site from a collector road or major highway that can support truck traffic without noticeable effects to level of service (LOS)
Electric Use	Electric Requirements	Maximum use of 7.5 MW power needed. Would be obtained from local distribution line
Water Use	Process Water	Up to 150 gallons per minute (GPM) (obtained from local publicly owned treatment works [POTW] or wells) – no surface water intake Can use gray water, if available
	Potable Water	Up to 25 GPM (obtained from local POTW or wells) – No surface water intake
	Cooling System	Closed loop system – heat is re-used to dry ash
Wastewater Management	Treatment and Discharge	Up to 50 GPM. Processed onsite and discharged to POTW or discharge covered under NPDES permit. NPDES permit and limits subject to state requirements.
Capacity	Total Operating Capacity	400,000-800,000 yd^3 per year
Material storage	Raw Material Onsite Storage	Approximately 15,000 yd^3 (3 to 4 days) of pre-processed material stored in a covered onsite structure prior to processing
	Product Onsite Storage	Processed material stored onsite in silo or dome or equivalent structure that provides protection from elements Onsite storage (up to 45,000 yd^3)
Construction Phase Attributes		
Construction	Duration	Up to 14 months
	Construction Laydown Areas	Laydown areas onsite only. No offsite laydown.
Excavation	Process Island Occupied Buildings	Deep foundations, ~ 40 feet piers depending on geotechnical report No basement or deep foundations for occupied buildings

Feature	Characteristic	Specifications
	Pipelines	Minor trenching may be required
Borrow	Amount of Borrow Needed to Support Construction	None anticipated. If needed would obtain from an existing permitted site within 30 miles of the facility.
Operational Characteristics		
Schedule	Hours of Operation	24 hours per day / 7 days per week
Operation	Duration	50 weeks per year 350 operating days per year (2 outages per year)
Fuel	Operational Fuel Requirement	Natural gas/propane, may be supplied by pipeline. If no pipeline, total quantity stored onsite: up to 200,000 gallons maximum capacity.
	Start-up Operations	Natural gas/propane. Total quantity stored onsite would support two (2) cold system start-up per month (4,000 gallons maximum capacity).
Trucking from Fossil Generation Station to Beneficial Re-use Facility (by Utility or Vendor)	Truck Type and Capacity	Reclaimed material is transported in either off road heavy haul trucks or covered on-road trucks. Capacity of 25 yd^3 per truck for off-road and 17 yd^3 per truck for on-road trucks.
	Distance from Utility	Up to 10 miles from utility to the nearest interstate system
Trucking from Beneficial Re-use Facility (Beneficiated Product)	Peak Truck Volume	Beneficiated product is transported in pneumatic trucks, up to 27 tons per truck (25 yd^3); up to 90 truckloads per day (180 truck trips)
	Average Truck Volume	50-60 truckloads per day (100 to 120 truck trips)
Trucking from Beneficial Re-use Facility (Beneficiated Product)	Trucking Schedule	250 days per year. Monday-Friday during normal operating hours. Occasional weekends.
	Shipping Distance	Up to 250 miles

Table 2-10. Beneficial Re-use Facility – Table of Environmental Characteristics and Bounding Values

Resource	Parameter	Bounding Value/ Characteristic
Air Quality	Emissions	SO_2: less than 110 tons per year NO_X and CO: Operational restrictions not to exceed 120 tons per year Particulate matter may exceed 100 tons per year; would obtain a Title V permit Hazardous air pollutants (HAPs): Not a major source. Major source thresholds for HAPs are 10 tons/year for a single HAP or 25 tons/year for any combination of HAPs
	Area Attainment Status	Prefer areas with attainment status for priority air pollutants
Land Use	Preferred Land Use	Previously disturbed site
Zoning	Preferred Zoning	Facility would be located in an area zoned for compatible uses. Prefer industrial zoning or ability to be rezoned
Water Quality	Potential Impacts to Receiving Streams.	Onsite storm water basins; wastewater process on-site and discharged to POTW or via NPDES permit to receiving waterbody. Implement BMPs to minimize soil erosion during construction.
Floodplains		Avoid the Federal Emergency Management Agency (FEMA) 100-yr floodplain
Vegetation/Land Cover	Forested Lands, Rare/Sensitive Vegetation Communities and Habitats	Avoidance of rare/sensitive vegetation communities Minimize impacts to forested lands
Species of Concern	Listed Species, Heronry, Osprey, Eagles, etc.	Avoidance of impacts to state for federally listed species. Furthermore, actions must not result in the need to consult with USFWS for potential impacts to federally listed species under the ESA. Activities must be in compliance with the National Bald Eagle Management Guidelines. Avoid potential impacts to bats by avoiding impacts to trees, caves, water bodies, sinkholes, buildings, and bridges.
Waters of the US	Jurisdictional Waters: Streams, Wetlands, Lakes, etc.	Avoid/minimize stream or wetland impacts (except for potential construction of localized NPDES outfall, impacts would not require a Section 404 and 401 individual permit). Any unavoidable impacts mitigated as per permitting requirements.
Historic Properties	National Register of Historic Places (NRHP)-Listed Properties	Avoidance of previously identified NRHP-listed and eligible sites.
Hazardous Waste	Avoid Hazardous Waste Impacts	Conduct a Phase I Environmental Survey. Phase II studies conducted if needed.

Resource	Parameter	Bounding Value/ Characteristic
	Management of Hazardous Waste	Generation of regulated hazardous substances/wastes not expected. However, any regulated hazardous waste would be managed in accordance with RCRA requirements.
Solid Waste Disposal	Management of Solid Waste	Solid wastes from production process expected to be minor. Solid waste generated during outages/maintenance activities varies. Solid wastes to be disposed of in appropriate licensed landfill.
Noise	Noise Emissions	Not to exceed 65 dBA at property boundary (commercial properties)
Socioeconomics	Employment	Construction Phase: Up to 150 people Operational Phase: up to 36 people total Workforce Geography: 90 percent from surrounding area; 10 percent from outside local area
Visual/Aesthetics	Maximum height of facility components	140 feet
	Appearance	Industrial facility

2.7 Comparison of Alternatives

The environmental impacts of each of the alternatives under consideration are summarized in Table 2-11. These summaries are derived from the information and analyses provided in the Affected Environment and Environmental Consequences sections of each resource in Chapter 3.

Table 2-11. Summary and Comparison of Alternatives by Resource Area

Resource	Alternative A: No Action	Alternative B: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to an Offsite Landfill Location	Alternative C: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to Beneficial Re-Use Process & Offsite Landfill Location
Air Quality	No impact.	Minor localized impacts from fugitive dust and emissions from equipment and vehicles during onsite closure activities and transport of borrow and CCR. Minimized through use of BMPs including truck washing station and dust suppression. No exceedances of regional NAAQS expected.	Similar to Alternative B, but with the additional impacts from fugitive dust and emissions associated with construction and operation of the beneficial re-use processing facility and the delivery of beneficiated product. Although state/federal air permitting may be required for operation of the beneficial re-use processing facility, no exceedance of NAAQS expected with adherence to permit conditions.
Climate Change	No impact.	Construction activities, borrow transport, and CCR transport would contribute to localized GHG emissions. Impacts from CCR transport by rail would be marginally greater than those by truck. De minimis relative to regional GHG levels and no impact to climate change.	Similar to Alternative B, including CCR transport by truck, but with the addition of localized GHG emissions resulting from construction of the beneficial re-use processing facility and operation of the facility including the delivery of beneficiated product.

Resource	Alternative A: No Action	Alternative B: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to an Offsite Landfill Location	Alternative C: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to Beneficial Re-Use Process & Offsite Landfill Location
Geology	No impact. TVA would ensure that all impoundment dikes would be stable under static and seismic conditions and meet appropriate safety factors.	Minor impact from increase in soil erosion, minimized with use of BMPs.	Similar to Alternative B, with additional soil erosion and potential localized alteration of geologic conditions during construction of beneficial re-use processing facility. Minimized with use of BMPs.
Groundwater	Risk to groundwater is not reduced. Groundwater protection processes will be implemented as needed to comply with the TDEC Commissioner's Order and the CCR Rule.	Long term beneficial impacts through reduction of risk to groundwater as CCR is removed from the impoundment which eliminates subsurface discharges and contaminants of concern (COC) migrating offsite.	Same as Alternative B for ash impoundment closure. Additional minor impacts if process and potable water for beneficial re-use processing facility are obtained by groundwater well. Potential effects mitigated by effective use of BMPs and adherence to applicable permitting requirements.
Surface Water	No change from existing conditions.	Minor impacts to McKellar Lake and Horn Lake Cutoff due to sedimentation from storm water, limited to the duration of closure activities and minimized through implementation of appropriate BMPs.	Same as Alternative B, with additional minor impacts related to sedimentation from storm water during construction activities and potential continuous discharges and outfall construction associated with the beneficial re-use processing facility.
Floodplains	No impact.	Minor beneficial impacts associated with impoundment closure due to increased availability for storage of flood water.	Same as Alternative B.

Resource	Alternative A: No Action	Alternative B: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to an Offsite Landfill Location	Alternative C: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to Beneficial Re-Use Process & Offsite Landfill Location
Vegetation	No impact.	Minor short term impacts to herbaceous communities during closure activities, but minor, long term improvement following removal of CCR and seeding of non-invasive species.	Similar to Alternative B, with additional minor impacts related to removal of up to 15 acres of low-quality habitat during facility construction.
Wildlife	No impact.	Minor short term impact to previously disturbed, low-quality habitats. Long term minor beneficial impacts following impoundment closure, as these areas may provide a minor expansion of upland wildlife habitat.	Similar to Alternative B, however incrementally greater due to the potential long-term impact related to removal of up to 15 acres of low-quality habitat for construction of the beneficial re-use processing facility.
Aquatic Ecology	No impact.	Minor and localized impacts to less mobile aquatic organisms (aquatic macroinvertebrates) in McKellar Lake from outfall removal. Potential indirect impacts to the McKellar Lake and Horn Lake Cutoff could include sedimentation from storm water closure activities. Minimized through site specific BMPs and erosion control plans.	Same as Alternative B, with addition of potential minor localized alternation of aquatic habitats. Unavoidable impacts would be minor and minimized to the extent possible and permitted through the appropriate federal and state agencies.

Resource	Alternative A: No Action	Alternative B: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to an Offsite Landfill Location	Alternative C: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to Beneficial Re-Use Process & Offsite Landfill Location
Threatened and Endangered Species	No impact.	Loss of potential low-quality nesting habitat for interior least tern. Avoidance and minimization efforts to reduce impacts to the least tern would be implemented and impacts would be mitigated in accordance with ESA requirements. For those activities with potential to affect the Indiana bat and northern long-eared bat, TVA committed to implementing specific conservation measures in their programmatic consultation with the USFWS completed in April 2018. These activities and associated conservation measures would be implemented as part of the proposed project. No impact to other threatened and endangered species.	Same as Alternative B.
Wetlands	No impact.	Potential minor impacts to the Horn Lake Cutoff wetland could include sedimentation from storm water during closure activities. Minimized through site-specific BMPs and erosion control plans. Negligible indirect impacts from deposition of fugitive dust on wetlands from loading, unloading, and transport of CCR and borrow materials.	Similar to Alternative B, with addition of potential minor impacts to wetland resources at beneficial re-use processing facility location, which would be minimized to the extent possible and permitted through the appropriate federal and state agencies.

Resource	Alternative A: No Action	Alternative B: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to an Offsite Landfill Location	Alternative C: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to Beneficial Re-Use Process & Offsite Landfill Location
Solid and Hazardous Waste	No impact.	Minor increase in solid waste generated from site preparation, construction, and maintenance of equipment used to transport CCR and borrow during closure activities. Negligible impact to regional disposal needs due to the loss in capacity of offsite landfill used for CCR disposal.	Similar to Alternative B, yet incrementally greater as additional solid waste would be generated from site preparation and construction activities associated with beneficial re-use processing facility and maintenance of equipment used to transport beneficiated product. Long term beneficial impact associated with reduction in solid waste as the majority of CCR would be beneficially re-used.
Visual Resources	No impact.	Long term, minor beneficial impact associated with restoration of former impoundments to natural vegetated state. Temporary visual discord onsite during construction period and to receptors along haul routes from trucks transporting CCR and borrow. No impact associated with the transport of CCR by rail.	Similar to Alternative B, but with the addition of minor impacts to visual receptors within the foreground of the beneficial re-use processing facility and along haul routes for beneficiated product.
Cultural and Historic Resources	No impact.	No impact.	No impact.

Resource	Alternative A: No Action	Alternative B: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to an Offsite Landfill Location	Alternative C: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to Beneficial Re-Use Process & Offsite Landfill Location
Land Use	No impact.	Minor impacts due to use of laydown area during impoundment closure activities. No alteration of future land use.	Same as Alternative B for ash impoundment closure. Impact associated with the conversion of up to 15 acres of undeveloped land to industrial use for beneficial re-use processing facility construction would be minor as the facility would be constructed in an area with compatible land use.
Prime Farmland	No impact.	No impact.	Minor impact associated with the potential conversion of up to 15 acres of prime farmland to industrial use for beneficial re-use processing facility construction.
Transportation	No impact.	Minor impact to the regional transportation network. Moderate, localized impact to low volume roadway segments used jointly by trucks transporting CCR and borrow. Minimized substantially in conjunction with the benefits of a comprehensive traffic management plan.	Similar to Alternative B, but incrementally greater due to additional traffic and safety risks associated with the short-term construction and long-term operation of the proposed beneficial re-use processing facility.

Resource	Alternative A: No Action	Alternative B: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to an Offsite Landfill Location	Alternative C: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to Beneficial Re-Use Process & Offsite Landfill Location
Noise	No impact.	Minor, localized construction noise impacts from equipment and vehicles and increases in traffic noise for sensitive receptors along the CCR and borrow haul routes. Use of roadways with low traffic volumes for borrow hauling would have a large impact on sensitive receptors along these roadways. Impact would be minimized with implementation of a traffic management plan that includes avoidance of borrow sites accessed by low-volume roadways.	Similar to Alternative B, but incrementally greater due to the localized, short term increase in noise during construction of the beneficial re-use processing facility and continuing long term operational noise.
Natural Areas, Parks and Recreation	No impact.	Minor, long-term impacts to Ensley Bottoms Complex and recreational birders due to dewatering of the impoundments. Moderate impact to smaller parks located adjacent to CCR or borrow haul routes due to noise, fugitive dust, and increased traffic.	Similar to Alternative B with an additional minor impact associated with construction and operation of the beneficial re-use processing facility.

Resource	Alternative A: No Action	Alternative B: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to an Offsite Landfill Location	Alternative C: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to Beneficial Re-Use Process & Offsite Landfill Location
Socioeconomics and Environmental Justice	No impact.	Minor short-term direct and indirect beneficial impact due to construction-related employment and beneficial economic impacts. Moderate impact to community facilities along the haul routes during closure activities. Minimized with use of a traffic management plan designed to address congestion at these facilities. Moderate to large adverse impacts associated with borrow and CCR transport by truck, disproportionate to environmental justice populations. Minimized by avoiding the use of borrow sites accessed by low volume roadways serving residential areas.	Similar to Alternative B, including CCR transport by truck, but with the addition of minor beneficial impacts associated with employment opportunities during construction and operation of the beneficial re-use processing facility. Minor, long term increase in traffic and associated noise for any environmental justice populations near the facility.
Public Health and Safety	No impact.	Risk to workforce health and safety related to excavation and offsite transport of CCR and borrow due to potential crashes, derailments, road damage and other transportation-related effects. Impacts from CCR transport by rail, while minor, would be marginally greater than those by truck.	Similar but incrementally greater than Alternative B due to additional risks associated with the short term construction and long term operation of the proposed facility as well as the additional trucks on roadways for transport of beneficiated product.

Resource	Alternative A: No Action	Alternative B: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to an Offsite Landfill Location	Alternative C: Closure-by-Removal of the East Ash Pond Complex, West Ash Pond and Metal Cleaning Pond; Disposal of CCR to Beneficial Re-Use Process & Offsite Landfill Location
Cumulative Effects	No impact.	Moderate impacts to transportation, noise and environmental justice populations due to potential for deconstruction and demolition activities to occur concurrently with impoundment closures. Mitigated with implementation of traffic control measures and preference for selection of borrow sites that are not within environmental justice communities. Following deconstruction and ash impoundment closure activities, noise levels, exhaust emissions and fugitive dust would return to baseline levels and as such there would only be minor long term cumulative impacts associated with future economic development of the site.	Same as Alternative B.

2.8 TVA's Preferred Alternative

TVA's preferred alternative is Alternative B- Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in an Offsite Landfill Location.

The primary actions of this alternative involve excavation and relocation of the CCR from the ash impoundments in accordance with federal and state requirements. Transport of CCR to an offsite landfill by truck or rail and the onsite transport of borrow are "component actions" under Alternative B. CCR removed from the ash impoundments would be transported offsite by truck or rail to an existing permitted landfill. Closure-by-Removal is expected to require approximately 3 million yd^3 of suitable borrow material. All borrow material would be obtained from a previously developed and/or permitted site.

Impacts associated with this alternative primarily include temporary short-term impacts during closure activities and minor to large direct and cumulative impacts associated with air emissions, noise emissions, impacts to the transportation system, impacts to environmental justice communities, safety risks and disruptions to the public that would be associated with the offsite transport of CCR and onsite transport of borrow along public roadways. However, these impacts would be realized under both of the action alternatives and would be minimized through the implementation of mitigation measures and BMPs identified in this EIS.

Alternative B is the preferred alternative as it would achieve the purpose and need of the project to support the implementation of TVA's goal to eliminate all wet CCR storage at its coal plants; close CCR surface impoundments across the TVA system; and comply with the EPA's CCR Rule and other applicable federal and state statutes and regulations. In addition, Closure-by-Removal of the impoundments at ALF will enhance future economic development in the greater Memphis area. Unlike other TVA power plants, much of the land within the project area is not owned by TVA, and given that ALF is also located in a heavily industrialized area, redevelopment is of particular interest as the land holds significant economic potential for the non-TVA owners .

Alternative C, Closure of the Metal Cleaning Pond, Closure-in-Place of the East Ash Pond Complex and West Ash Pond; Disposal of CCR in a Beneficial Re-Use Process & Offsite Landfill Location would also meet the purpose and need of the project and would have similar impacts as Alternative B. However, construction of a new facility to process CCR from ALF would extend the duration of closure which would delay the future economic development of the site and result in greater impacts to the community associated with the site and result in greater direct and cumulative impacts associated with air emissions, noise emissions, impacts to transportation system, impacts to environmental justice communities, safety risks and disruptions to the public associated with the extended time frame for closure.

2.9 Summary of Mitigation Measures and Best Management Practices

This section provides a summary of BMPs and mitigation measures that TVA would employ to avoid or reduce adverse impacts from the alternatives analyzed. TVA's analysis of potential impacts includes consideration of BMPs and mitigation implemented as required to reduce or avoid adverse effects. BMPs and mitigation measures are discussed in Chapter 3 and summarized below:

Mitigation Measures include:

- TVA would mitigate traffic impacts by developing a traffic management plan that considers alternate access locations to/from ALF (i.e., Plant Road vs. Riverport Road to the west), staging and management of truck ingress/egress, borrow site selection to optimize use of borrow sites that do not require truck use of common roadway segments, potential alternate routing during train operations on Rivergate Rd, and installation of temporary signals at key intersections.
- To avoid potential for indirect impacts to the interior least tern, TVA would implement certain measures that may include seasonal restrictions on earth moving adjacent to the ash ponds during the nesting season (late May to September), as per consultation with the appropriate state and federal agencies.
- Should the osprey nest located north of the East Ash Pond Complex on a mooring cell structure in McKellar Lake be active in future years, ash pond closure activities would be minimized within a 660-foot diameter buffer around the nest during the osprey nesting season. These avoidance measures would result in no adverse impacts to these birds.
- TVA may elect to remove the osprey nest during the non-nesting season in conjunction with other on-going site decommissioning activities unrelated to ash pond closure. As such, TVA would ensure nest removal would follow guidance from the U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services Program.
- TVA will require that borrow material be obtained from a previously developed and/or permitted site. Once the borrow site has been identified, the contractor would notify TVA to determine if additional reviews are necessary.
- TVA will require that CCR be disposed of in a previously-developed and/or permitted site having sufficient previously-permitted capacity.
- Borrow would be obtained from one or more previously-developed and/or permitted commercial borrow site(s) within 30 miles of ALF. No specific site has been identified at this time and ultimate site selection would be left up to the contractor. However, TVA would perform all necessary due diligence and consultation as required under Section 106 of the National Historic Preservation Act (NHPA) related to any offsite work.
- TVA will continue to collect groundwater samples from existing monitoring wells and review the analytical results as a part of the TDEC Commissioner's Order, the EPA's CCR Rule, and other regulatory requirements. TVA is also implementing the IRAs and corrective measures to control and begin treating impacted groundwater identified in some shallow aquifer monitoring wells around the East Ash Pond Complex.
- A TDEC Section 401 WQC/ARAP and U.S. Army Corps of Engineers (USACE) 404 permit would be required for disturbance to wetlands and stream features, and the terms and conditions of these permits would include mitigation for unavoidable adverse impacts, as appropriate.
- Several proposed actions were addressed in TVA's programmatic consultation with the USFWS on routine actions and federally listed bats in accordance with ESA Section 7(a)(2) and completed in April 2018. For those activities with potential to affect Indiana bats and northern long-eared bat, TVA committed to implementing specific conservation measures. These activities and associated conservation measures would be implemented as part of the proposed project.

- To minimize adverse impacts on natural and beneficial floodplain values, BMPs would be used during construction activities. In addition, TVA would obtain documentation from permitted landfill(s) receiving ash that the ash would be disposed in an area outside the 100-year floodplain, and if Alternative C is selected, the beneficial re-use processing facility would be constructed at a location outside the FEMA mapped 100-year floodplain.

BMPs employed to minimize impacts include:

- Fugitive dust emissions from site preparation and construction would be controlled by wet suppression, installation of a truck washing station and other BMPs, as appropriate (CAA Title V operating permit incorporates fugitive dust management conditions).
- Erosion and sedimentation control BMPs (e.g., silt fences) would ensure that surface waters are protected from construction impacts.
- Consistent with EO 13112 as amended by EO 13751, disturbed areas would be revegetated with native or non-native, non-invasive plant species to avoid the introduction or spread of invasive species.
- BMPs as described in the project-specific SWPPP and the Tennessee Erosion and Sediment Control Handbook-4th Edition, 2012 would be used during construction activities to minimize impacts and restore areas disturbed during construction.

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CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the baseline environmental conditions (affected environment) of environmental resources in the project area and the anticipated environmental consequences (or impacts) that would occur from implementation of the alternatives identified for further study as described in Chapter 2.

Impacts may be beneficial or adverse and may apply to the full range of natural, aesthetic, historic, cultural, and socioeconomic resources within the project area and within the surrounding area. Impact severity is dependent upon their relative magnitude and intensity and resource sensitivity. In this document, four descriptors are used to characterize the level of impacts (NRC 2018). In order of degree of impact, the descriptors are as follows:

- No Impact (or "absent") – Resource not present or affected by project alternatives under consideration
- Minor (or "SMALL") – Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.
- MODERATE – Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.
- LARGE – Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

3.1 Air Quality

3.1.1 Affected Environment

Through passage of the Clean Air Act, Congress mandated the protection and enhancement of our nation's air quality resources. The EPA has established National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment for the following criteria pollutants:

- Sulfur dioxide (SO_2)
- Ozone
- Nitrogen dioxide (NO_2)
- Particulate matter with particle sizes are less than or equal to 10 micrometers (PM_{10})
- Particulate matter with particle sizes are less than or equal to 2.5 micrometers ($PM_{2.5}$)
- Carbon monoxide (CO)
- Lead

The Clean Air Act identifies two types of NAAQS. Primary standards provide public health protection. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings (EPA 2018b). The Clean Air Act also requires EPA to set standards for emissions of hazardous air pollutants (HAPs).

In accordance with the Clean Air Act 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 (EPA 2018b).

Shelby County, Tennessee, and the surrounding counties (Crittenden, DeSoto, Fayette, Marshall, Mississippi, and Tipton) are all currently in attainment with applicable NAAQS (EPA 2019d) and with Tennessee ambient air quality standards referenced in the Tennessee Air Pollution Control Regulations Chapter 1200-3-3.

3.1.1.1 Other Pollutants and Air Quality Concerns

Nitrogen oxides (NO_X) are a group of highly reactive gases, including NO_2 that contain varying amounts of nitrogen and oxygen. NO_X emissions contribute to ground-level ozone, fine particulate matter, regional haze, acid deposition and nitrogen saturation. Natural sources of NO_X include lightning, forest fires and microbial activity; major sources of human-produced NO_X emissions include motor vehicles, electric utilities, industrial boilers, nitrogen fertilizers and agricultural burning (TVA 2016b).

Sulfur Oxides (SO_x) are compounds of sulfur and oxygen molecules. Sulphur dioxide (SO_2) is the predominant form found in the atmosphere. Most SO_2 is produced from the burning of fossil fuels (coal and oil), as well as petroleum refining, cement manufacturing and metals processing. In addition, geothermic activity, such as volcanoes and hot springs, can be a significant natural source of SO_2 emissions (World Bank Group 1998).

HAPs, commonly referred to as air toxics, are pollutants that are known or suspected to cause cancer or other serious health effects or adverse environmental effects. The Clean Air Act identifies 187 pollutants as HAPs (EPA 2019a). Most HAPs are emitted by human activity, including mobile sources (motor vehicles), stationary sources (factories, refineries and power plants) and indoor sources (building materials and activities such as dry cleaning). There are two types of stationary sources that generate emissions of air toxics:

- Major sources: Sources that emit 10 tons per year or more of any of the listed HAPs, or at least 25 tons per year of a mixture of HAPs.
- Area Sources: Sources that emit less than 10 tons per year of a single HAP or less than 25 tons per year of a combination of HAPs. Emissions from individual area sources are relatively small. However, if located in heavily populated areas that contain a number of area sources, emissions can be of concern.

The proposed impoundment closure 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, no closure activities would occur and there would be no additional emissions related to project construction activities or the offsite transport of CCR materials. Therefore, no impacts to air quality are anticipated.

3.1.2.2 Alternative B – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in an Offsite Landfill Location

Potential air quality impacts associated with the proposed Closure-by-Removal of the ash ponds includes dust and emissions from equipment, earth-moving activities (dozing, grading, and fill placement), emissions from transport of CCR to an offsite landfill and the onsite transport of borrow to support site restoration. Fugitive dust produced from construction activities would be temporary and controlled by using truck washing stations and BMPs (e.g., wet suppression) as stated in the TVA's fugitive dust control plans required under existing Clean Air Act Title V operating permits.

Onsite construction equipment expected to be required for the proposed impoundment closures includes bulldozers, excavators, over-the-road dump trucks (diesel engines), pickup trucks (gasoline engines), loaders, telehandlers and rough terrain vehicles. TVA estimates that up to 20 vehicles would be onsite at any one time during site preparation and mobilization and up to 37 vehicles during disposal and hauling activities. Combustion of gasoline and diesel fuels by internal combustion engines would generate local emissions of CO, NO_X, PM, SO_2, and volatile organic compounds during construction activities. However, new emission control technologies and fuel mixtures have significantly reduced vehicle and equipment emissions. Additionally, it is expected that all vehicles and equipment would be properly maintained, which would also reduce emissions. Air quality impacts from construction activities would depend on both man-made factors (intensity of activity, control measures, etc.) and natural factors such as wind speed and direction, soil moisture and other factors. 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.

CCR excavated from the impoundments of ALF would be transported to an offsite landfill for disposal via truck or rail. A specific landfill accessible by each of these modes of transportation has not been selected. Therefore, the impacts to air quality for each of the proposed modes of transportation are based upon the bounding analysis which presents the largest extent of potential impacts as identified in Tables 2-4 and 2-5. The impacts may be less severe depending on the ultimate route chosen.

As per the bounding analysis, CCR from ALF could be transported up to 29 miles (58-miles roundtrip) using over-the-road trucks (capacity of 17 yd^3). CCR would be deposited in an existing landfill at a rate of 120 truckloads (240 truck trips) of CCR per day. Transport of all of the CCR from the impoundments would occur over an approximate 8-year timeframe (closure period). As some land uses such as homes, churches, and recreational areas may contain occupants that are considered more sensitive to changes in air quality than others, TVA identified these land uses as locations of sensitive receptors along the potential haul routes to the candidate landfills accessible by over-the-road truck. The bounding analysis determined that up to 223 sensitive receptors could be located along the haul route to an offsite landfill that would receive CCR from ALF. These receptors would be potentially

exposed to increased fugitive dust and exhaust emissions during the closure period. TVA requires all contractors to keep construction equipment properly maintained and use BMPs (such as covered loads and watering unpaved haul roads) to minimize dust, if necessary. Therefore, given the number of truck trips, estimated distance traveled, and expectation that all trucks used to transport CCR would be maintained in good working condition and with current emission control technologies and the use of BMPs to control fugitive dust, impacts to air quality would be minor and localized but would not result in exceedances of NAAQS.

As stated in Chapter 2.4, sensitive air receptors along existing rail lines are not expected to experience notably greater impacts related to the transport of CCR from ALF to an existing landfill by rail. However, use of this mode of transportation would result in localized fugitive emissions associated with CCR loading and unloading. In addition, locomotives typically utilize very large diesel or gas combustion engines, resulting in emissions of CO, CO_2, NO_X, SO_2, PM, hydrocarbons, and greenhouse gases (Bergin et al. 2012). Fugitive dust emissions produced during loading and unloading would be temporary and controlled through the use of dust suppression systems and by BMPs (e.g., wet suppression) as stated in the TVA's fugitive dust control plans required under existing Clean Air Act Title V operating permits. In addition, sensitive receptors are not located in the vicinity of ALF and are not expected to be located in the vicinity of the receiving landfill and, therefore, would not be impacted by fugitive dust from loading and unloading of CCR. Emissions during transport along rail lines would be temporary and distributed within a region over a distance of up to 1,047 miles (Table 2-5) and would not impact regional air quality.

Closure-by-Removal is expected to require approximately 3 million yd^3 of suitable borrow material. All borrow material would be obtained from one or more previously developed and/or permitted sites. Persons proximate to haul routes would potentially be exposed to fugitive dust and exhaust emissions from equipment and vehicles during transport of borrow material. Based on the bounding analysis presented in Table 2-8, TVA estimates that an average of 232 truck trips (116 truckloads) per day (using dump trucks with a capacity of 15 yd^3 per truck) would be needed intermittently throughout the closure period of approximately 8 years. Given the amount of borrow needed, transport of borrow would have a potential localized impact to receptors near the haul routes due to exposure to fugitive dust and exhaust emissions during transport operations. However, transport of borrow would be intermittent throughout the closure period. In addition, TVA requires all contractors to keep construction equipment properly maintained and use BMPs (such as covered loads and watering unpaved haul roads) to minimize dust, if necessary. Therefore, although there would be a minor localized temporary impact to air quality associated with the transport of borrow material, regional impacts on air quality are not anticipated.

Overall, the impact to air quality resulting from the primary action and component actions undertaken by TVA would result in minor localized effects on air quality that would be temporary in duration and well below the applicable ambient air quality standards.

3.1.2.3 Alternative C – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and West Ash Pond; Disposal of CCR in a Beneficial Re-Use Process & Offsite Landfill Location

Activities conducted under primary actions associated with Alternative C would result in the similar magnitude and intensity of impact to air quality as described for Alternative B. Additionally, impacts to air quality associated with the transport of CCR to the beneficial re-

use processing facility and offsite landfill by truck would be similar to those described for Alternative B and would be localized and short-term but would not result in exceedances of NAAQS.

In conjunction with TVA actions associated with this alternative, TVA is also assessing the potential impacts associated with a component action consisting of the construction and operation of a beneficial re-use processing facility. Site preparation and vehicular traffic over paved and unpaved roads at the construction site would result in the emission of fugitive dust and combustion of gasoline and diesel fuels by internal combustion engines (vehicles, generators, construction equipment, etc.), which would generate local emissions of particulate matter, NO_X, CO, volatile organic compounds, and SO_2 during the site preparation and active construction periods. 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. Air quality impacts from construction would be temporary (up to 14 months) and would be minimized through use of BMPs (e.g., dust control measures) as required to reduce offsite emissions. Although the actual site for the beneficial re-use processing facility has not been identified, a site that is located in an area classified as in attainment for priority pollutants is preferred. However, even if the proposed site is constructed in an area designated as non-attainment for any of the priority pollutants, construction-related emissions would have a minor transient impact on offsite air quality and would be well below the applicable ambient air quality standards, as regional construction activities are typically accounted for in the attainment status designation.

Emissions associated with the operation of the beneficial re-use processing facility include NO_X, CO, PM_{10}, and $PM_{2.5}$. Although NO_X and CO from typical beneficial re-use facilities do not exceed 100 tons per year, under the bounding condition (Table 2-10), PM_{10} emissions may exceed 100 tons per year. If so, the facility would obtain a Title V permit and emissions would conform to the terms and conditions of that permit. Therefore, adherence to permit conditions would ensure that the impact to air quality would be minor.

Under the bounding facility condition, CCR raw material would be heated to drive off excess carbon (see Section 2.6.2.1). As part of this process most metals are retained in the ash matrix and are entombed in the product matrix. For example, as oxidized mercury vapor and fly ash are conveyed by the hot flue gases through the process, the entire mass is cooled to temperatures below the condensation temperature of the oxidized mercury. As such, the vast majority of the mercury is deposited on the fly ash and collected along with the processed fly ash.

Additionally, the operation of the facility would result in emissions from mobile sources that include workforce commuting and delivery of beneficiated product to various markets within the region. Up to 90 truckloads of product are expected to be delivered on a daily basis that would result in additional pollutant emissions (see Table 2-9). However, as described in Section 3.1.2.2, such a volume of trucking is expected to result in only minor increases in pollutant emissions on a regional scale and are not expected to adversely affect regional air quality.

3.1.3 Summary of Impacts to Air Quality

As summarized in Table 3-1, TVA has determined that all air quality impacts related to the proposed primary and component actions for the proposed ash impoundment closures at ALF are minor and would not have an impact on NAAQS.

Table 3-1. Summary of Impacts to Air Quality

Alternative	Action	Impact	Severity
		Impoundment Closures	
B, C	Impoundment closure	Temporary construction impacts associated with emissions from onsite vehicles and equipment as well as generation of fugitive dust.	Minor. No exceedance of NAAQS expected.
		Transport of All CCR to an Offsite Landfill	
B	Truck transport to landfill	Temporary localized increase in exposure to fugitive dust and exhaust along the haul route from trucks transporting CCR.	Minor and localized, minimized with the use of BMPs including dust suppression. No exceedances of NAAQS expected.
B	Rail transport to landfill	Temporary localized increase in fugitive dust from loading and unloading of CCR.	Minor and localized, minimized with the use of BMPs including dust suppression. No exceedances of NAAQS expected.
		Increase in exhaust from locomotive engines.	Temporary and regionally distributed and would not impact regional air quality.
		Borrow Transport to ALF	
B, C	Truck transport to ALF	Temporary localized increase in exposure to fugitive dust and exhaust emissions along the haul routes from trucks transporting borrow to ALF.	Minor and localized, minimized with the use of BMPs including dust suppression. No exceedances of NAAQS expected.
			.
		Transport of CCR to a Beneficial Re-use Processing Facility	
C	Truck transport to beneficial re-use processing facility and to an offsite landfill	Temporary increase in exposure to fugitive dust and exhaust along the haul route from trucks transporting CCR to the beneficial re-use facility and offsite landfill.	Minor. No exceedances of NAAQS expected.

Alternative	Action	Impact	Severity
	Construction and Operation of Beneficial Re-use Facility		
C	Construction and operation of a beneficial re-use processing facility	Temporary impacts associated with localized onsite emissions from vehicles and equipment as well as generation of fugitive dust during construction activities. Emissions associated with operation of the beneficial re-use processing facility and the delivery of beneficiated product.	Minor. Although state/federal air permitting may be required for operation of the beneficial re-use facility, no exceedance of NAAQS expected with adherence to permit conditions.

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 2016a). The 2018 National Climate Assessment concluded that the earth's climate is now changing faster than at any point in the history of modern civilization. The amount of warming projected by these studies beyond the next few decades is directly linked to the cumulative global emissions of GHGs (e.g., carbon dioxide [CO_2], methane). Results from a wide range of climate model simulations suggest that with significant reductions in emissions, global temperature increase could be limited to 3.6°F (2°C) or less. Without significant reductions, our planet's average temperature could rise by 9°F (5°C) by the end of the century (Hayhoe et al. 2018).

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 impoundment closures at ALF that produce CO_2 are mostly related to emissions from fossil-fuel-powered equipment (e.g., bulldozers, loaders, haulers, trucks, generators, etc.) during construction and transport of material (borrow, CCR, and beneficiated product).

In 2014, U.S. GHG emissions totaled 6.870 million metric tons (15.1 trillion pounds) of carbon dioxide equivalents. This 2014 total represents a 7 percent increase since 1990 but a 7 percent decrease since 2005 (EPA 2016a). This carbon overload is caused mainly by activities that burn fossil fuels such as coal, oil, and gas or by releasing stored carbon by cutting down forests.

The City of Memphis is a member of the Global Covenant of Mayors for Climate and Energy. As part of membership in this coalition, the Memphis-Shelby County Office of Sustainability completed a community-wide GHG inventory using a baseline year of 2016 (Memphis-Shelby County Office of Sustainability 2018). The inventory applies to community-wide emissions within the City of Memphis boundaries and does not include emissions for all of Shelby County. According to the inventory, the City of Memphis produces 16,061,257 metric tons of GHG emissions (expressed as carbon dioxide equivalent or CO_2e) per year. The largest source of emissions is residential and commercial

building energy use (7,062,038 tons CO_2e per year), followed by transportation (7,741,416 tons CO_2e per year).

3.2.2 Environmental Consequences

3.2.2.1 Alternative A – No Action Alternative

Under this alternative, no closure activities would occur and there would be no additional emissions related to project construction activities or the offsite transport of CCR materials. Therefore, no impacts to regional GHG levels or climate change would occur.

3.2.2.2 Alternative B – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in an Offsite Landfill Location

As discussed in Section 3.1, exhaust emissions from construction equipment would contribute CO_2 to the atmosphere. Due to the expected amounts of construction equipment involved at each closure site (up to 20 vehicles during site preparation and mobilization and up to 37 vehicles during disposal and hauling activities), only a minor temporary localized increase in CO_2 emissions would be anticipated. Such emission levels are de minimis in comparison to the regional and world-wide volumes of CO_2. Therefore, regional GHG levels would not be adversely impacted by emissions from construction activities.

TVA estimates that it could safely transport CCR up to approximately 29 miles (58 miles roundtrip) and deposit CCR to an existing landfill at a rate of 120 truckloads (240 truck trips) per day. Using estimates of GHG emissions developed by the Environmental Defense Fund (EDF 2018), and the bounding distance to the offsite landfill (Table 2-4), the transport of CCR to an offsite landfill would produce approximately 5,630 metric tons of GHG emissions per year during the closure period. These emissions would be temporary and less than 1 percent of regional emissions and would not impact climate change.

GHG emissions from rail transport of CCR would be temporary and regionally distributed over a distance of up 1,047 miles (Table 2-5). GHG emissions are directly related to fuel consumption and, in general, moving freight by rail is more efficient than moving freight by truck. Accordingly, GHG emissions from rail accounts for 2 percent of the total emissions from all transportation sources (EPA 2019c). TVA estimates that it could load 11 rail cars of CCR per day (approximately 1,000 yd^3 of CCR). Using estimates of GHG emissions developed by the Environmental Defense Fund (EDF 2018), and the bounding distance to the offsite landfill, 1,047 miles (Table 2-5), the transport of CCR to an offsite landfill by rail would produce approximately 4.2 metric tons of GHG emissions per year during the closure period which would be distributed throughout the transport distance. Therefore, GHG emissions would be incrementally greater than emissions by truck due to the longer distance travelled but would be de minimis relative to regional GHG levels or climate change.

Borrow needed to support closure activities at ALF would be transported using dump trucks which would result in emissions of GHG. Based on the bounding analysis presented in Table 2-8, TVA estimates that an average of 232 truck trips (116 truckloads) per day would be needed to achieve the proposed finished grades over a period of 8 years. As indicated in the bounding analysis, borrow could be obtained from more than one site. Using estimates of GHG emissions developed by the Environmental Defense Fund (EDF 2018), and the estimate of vehicle miles traveled, the transport of borrow to ALF would produce approximately 2,085 metric tons of GHG emissions per year during the closure period.

Aggregate emissions associated with the transport of CCR and borrow would be de minimis (less than 1 percent of regional emissions and would not impact climate change.

3.2.2.3 Alternative C – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and West Ash Pond; Disposal of CCR in a Beneficial Re-Use Process and Offsite Landfill Location

Activities conducted under Alternative C would result in the similar magnitude and intensity of GHG emissions and impacts to climate change in conjunction with closure activities, transport of borrow and transport of CCR as described for Alternative B. Overall, impacts to climate change in conjunction with TVA actions are minor and relatively short term in duration.

In conjunction with TVA actions associated with this alternative, TVA is also assessing the potential impacts associated with a component action of the construction and operation of a beneficial re-use processing facility.

Onsite construction activities in support of the construction of the beneficial re-use processing facility are expected to result in a temporary minor increase in construction-related emissions from internal combustion engines. Additionally, the operation of the facility would result in emissions from mobile sources that include workforce commuting, and daily delivery of up to 90 truckloads of beneficiated product to various markets within the region (see Table 2-9). However, these emissions would be relatively minor in comparison to regional emissions and would not impact climate change.

3.2.3 Summary of Impacts to Climate Change and Greenhouse Gases

As summarized in Table 3-2, TVA has determined that there would be minor, localized temporary increases in GHG emissions associated with the primary and component actions proposed for the ash impoundment closures at ALF. However, regional GHG levels and climate change would not be impacted.

Table 3-2. Summary of Impacts to Climate Change and Greenhouse Gases

Alternative	Action	Impact	Severity
		Impoundment Closures	
B, C	Impoundment closure	Temporary increase in construction-related emissions from internal combustion engines during site preparation and closure activities.	Minor and localized. De minimis relative to regional GHG levels. No impact to regional GHG levels or climate change.
		Transport of All CCR to an Offsite Landfill	
B	Truck transport to landfill	Temporary increase in GHG emissions associated with transport of CCR by truck.	De minimis relative to regional GHG levels. No impact to climate change.
B	Rail transport to landfill	Temporary increase in GHG emissions from transport of CCR by rail.	Marginally greater than transport by truck. De minimis impact to regional GHG levels. No impact to climate change.

Alternative	Action	Impact	Severity
		Borrow Transport to ALF	
B, C	Truck transport to ALF	Increase in GHG emissions associated with transport of borrow to ALF.	De minimis relative to regional GHG levels. No impact to climate change.
		Transport of CCR to a Beneficial Re-use Processing Facility	
C	Truck transport to beneficial re-use processing facility and to an offsite landfill	Temporary increase in exposure to fugitive dust and exhaust along the haul route from trucks transporting CCR to the beneficial re-use facility and offsite landfill.	De minimis relative to regional GHG levels. No impact to regional GHG levels or climate change.
		Construction and Operation of Beneficial Re-use Processing Facility	
C	Construction and operation of a beneficial re-use processing facility	Temporary increase in construction-related emissions from internal combustion engines during facility construction. Emissions associated with operation of the beneficial re-use processing facility and the delivery of beneficiated product.	De minimis relative to regional GHG levels.. No impact to regional GHG levels or climate change.

3.3 Geology

3.3.1 Affected Environment

3.3.1.1 Geologic Setting

ALF is located on top of the Mississippi Embayment, in the Mississippi Alluvial Plain section of the Gulf Coast Coastal Plain. The Mississippi Embayment is a geologic basin filled with 3,000 feet or more of sediments of Cretaceous, Tertiary, and Quaternary age (dating 66 million years ago to present day) (Carmichael et al. 2018) (Figure 3-1). The upper Cretaceous sedimentary sequence is dominated by unconsolidated sand, silt, and clay with minor lignite and the Tertiary, and older units form the Mississippi embayment aquifer system (Hosman and Weiss 1991; Carmichael et al. 2018). The plant and surrounding areas are underlain by artificial fill and Quaternary age alluvial deposits (Stantec 2019). The fill generally consists of alluvium dredged from McKellar Lake, materials from cut and fill excavations from the surrounding floodplain, and possibly loess in select locations (Hosman and Weiss 1991). The alluvium consists of irregular lenses of fine sand, silt, and clay in the upper part and coarse sands, gravelly sands, and sandy gravels in the lower part. The alluvium varies in thickness from about a few feet in some areas to 45 feet to 90 feet adjacent to the loess bluffs to as much as 175 feet in the floodplain. The alluvium is underlain by a series of highly consolidated clays and dense sands of the Claiborne Group (Hardeman et al. 1966).

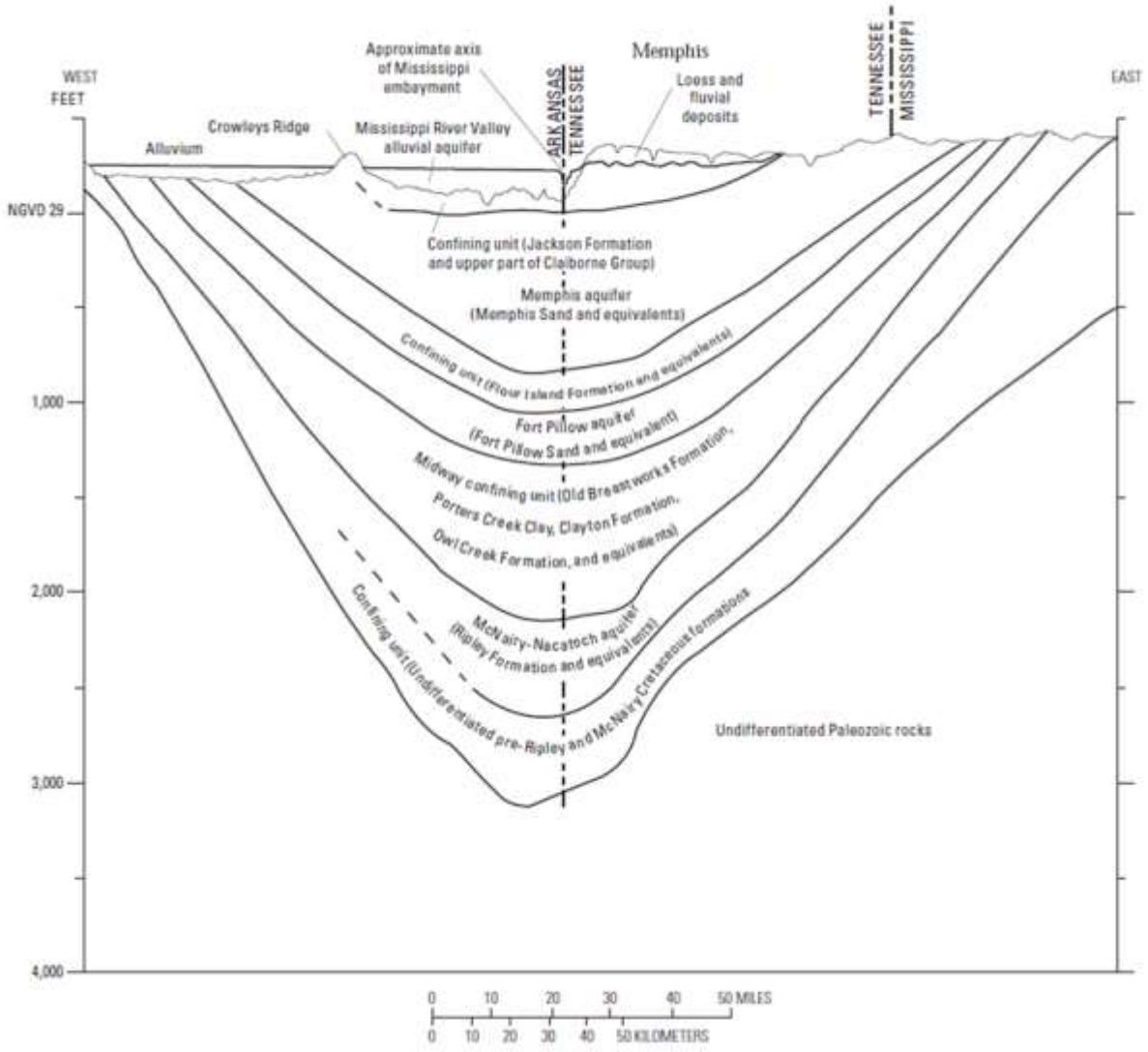
According to the U.S. Department of Agriculture, Natural Resources Conservation Service (USDA NRCS) web soil survey (USDA NRCS 2019b), soils in the ash impoundment project areas are mapped as filled land, Commerce silt loam, and Robinsonville silt loam. Soils in the laydown area are filled land and Commerce silt loam.

3.3.1.2 Geologic Hazards

3.3.1.2.1 Seismicity & Slope Stability

ALF is located on the southeast edge of the New Madrid Seismic Zone of the Central Mississippi Valley. This zone is an area considered to have high seismic hazard, based on multiple historical records (early 1800s) of earthquakes ranging up to a magnitude of 7 to 8 on the Richter scale. However, the majority of earthquakes from the New Madrid Seismic Zone are too small to be felt at the surface. In the vicinity of ALF, which is the edge of the zone, the seismic hazard is considered to be moderate (Stantec 2009). The main hazard associated with the geology of the area is the potential for the presence of very soft loose soils that may become unstable under seismic loading.

As required by the CCR Rule, TVA evaluated the structural integrity of the East Ash Pond Complex under static and seismic loads. Using data collected from a subsurface and laboratory investigation completed in October of 2015, and consideration of data collected in 2010, 2011 and 2013, it was determined that the East Ash Pond Complex meets or exceeds factors of seismic safety established by the CCR Rule (Geocomp 2016). In addition, TVA performed an analysis of the static stability of the East Ash Pond Complex in 2016, which included geotechnical explorations and laboratory testing. The analysis concluded that the East Ash Pond Complex meets or exceeds factors of static safety established by the CCR Rule (Stantec 2016)



Source: Carmichael et al. 2018

Figure 3-1. Schematic Cross Section Showing the Hydrostratigraphy of the Northern Mississippi Embayment East and West of Memphis, Tennessee

The West Ash Pond does not impound water, and based on visual assessment, it was determined that the West Ash Pond dike embankments and outlet structure are stable under normal static conditions (Dewberry Consultants 2013).

3.3.1.2.2 Faulting

Based on detailed site investigations performed at the East Ash Pond Complex, TVA identified an inferred fault within a portion of the East Ash Pond Complex project area (Stantec 2019). The inferred fault was discovered in the alluvial aquifer sedimentary sequence, upper Claiborne confining unit, and upper part of the Memphis Sand aquifer and is discussed in detail in Section 3.4.

The 1811-1812 sequence of earthquakes in the New Madrid Seismic Zone formed a fault scarp immediately west of Reelfoot Lake in extreme northwestern Tennessee, which resulted the formation of Reelfoot Lake. Consequently, surface faulting may have occurred in conjunction with the New Madrid earthquakes well to the north of ALF. Based on a review of the U.S. Geological Survey (USGS) website, which contains information on faults and associated folds in the United States that are believed to be sources of earthquakes of 6.0 magnitude or above during the Quaternary Period (the past 1,600,000 years including Holocene Epoch), there are no known faults of this age located within the vicinity of ALF (USGS 2006).

3.3.1.3 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 sink holes, caves, springs and underground drainage systems. Karst topography forms in areas where limestone and dolomite are near the surface. Due to the lack of carbonate rocks in the region, it is unlikely that karst conditions exist at the site. Furthermore, no evidence of a karst environment near or at the facility has been found in published literature.

3.3.1.3.1 Soils

Quaternary age alluvium deposits of sand, gravel, silt, and trace clays underlie the ALF site. These sandy deposits range from 0-175 feet thick. The main hazard associated with the site soils is the potential for the presence of very soft loose soils that may become unstable under seismic loading. Structural and seismic stability assessments at ALF are addressed in Section 3.3.1.2.1 above.

3.3.2 Environmental Consequences

3.3.2.1 Alternative A – No Action Alternative

Under Alternative A, no excavations or other closure activities would occur. Therefore, there would be no project-related impacts to geologic resources or soils. TVA would ensure that all impoundment dikes would be stable under static and seismic conditions and would meet appropriate safety factors. Thus, continued operations at ALF under the No Action Alternative would not be expected to result in reduced safety under either static or seismic conditions.

3.3.2.2 Alternative B – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in an Offsite Landfill Location

Under this alternative, impoundments would be dewatered and all CCR would be excavated and transported to an existing offsite landfill. No impacts or risks of failure would occur at the removal site from geological and seismic considerations. Grading and construction activities have the potential to disturb soil stability and increase erosion. Despite these proposed actions, impacts to soil resources associated with surface disturbances related to the proposed closure activities are expected to be minor, as BMPs described in The Tennessee Erosion and Sediment Control Handbook (TDEC 2012) and outlined in the project-specific SWPPP would be implemented to minimize erosion during clearing and site preparation.

The excavated impoundments would be backfilled with borrow material obtained from a previously developed and/or permitted site. CCR excavated from the impoundments would

be transported offsite to an existing permitted facility. Therefore, there would be no additional direct impacts to the local geology or soils as a result of the component actions of the procurement and transport to borrow or the disposal of CCR excavated from the impoundments at ALF.

3.3.2.3 Alternative C – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and West Ash Pond; Disposal of CCR in a Beneficial Re-Use Process & Offsite Landfill Location

Under Alternative C, impacts associated with closure of impoundments, transport of CCR offsite, and transport of borrow material onsite would be the same as identified under Alternative B.

Construction of the beneficial re-use processing facility would involve ground disturbing activities that would include grubbing, grading, and excavation. As identified in the table of bounding characteristics of the beneficial re-use processing facility (Table 2-10), the site would be constructed on an area that was previously disturbed. Removal of vegetation, grading and construction activities have the potential to disturb soil stability and increase erosion. Despite this, impacts to soil resources associated with surface disturbances related to the proposed construction, excavation, clearing, and grubbing activities are expected to be minor, as BMPs outlined in a SWPPP designed to minimize erosion during land clearing and site preparation would be implemented.

Per the bounding attributes identified in Table 2-9, construction of a portion of the facility would require excavation below the existing ground surface, and deep foundations with up to 40-foot piers may be required. Depending on the site selected, foundations would be designed as required based on local geologic conditions. Operational impacts would be associated with the potential impact of earthquakes on the proposed beneficial re-use processing facility operations. Once selected, the actual conditions at the project site would be investigated during detailed design and, if warranted, seismic considerations may be incorporated into final design of the facility.

As such, although construction and operation of the beneficial re-use processing facility may result in minor potential localized alteration of site soils and geologic conditions, these effects are not expected to result in notable alteration or degradation of these resources. Therefore, impacts to geology and soils resulting from the development and operation of the proposed beneficial re-use processing facility would be minor.

3.3.3 Summary of Impacts to Geology

Based on the analysis summarized above, impacts to geology and soils associated with the proposed projects would be short term and minor. Impacts are summarized in Table 3-3.

Table 3-3. Summary of Impacts to Geology

Alternative	Action	Impact	Severity
		Impoundment Closures	
B, C	Impoundment closure	Temporary increase in soil erosion during site preparation and closure activities.	Minor impact; minimized with the use of BMPs.
		Transport of All CCR to an Offsite Landfill	
B	Truck transport to landfill	No impact.	No impact.
B	Rail transport to landfill	No impact.	No impact.
		Borrow Transport to ALF	
B, C	Truck transport to ALF	No impact.	No impact.
		Transport of CCR to a Beneficial Re-use Processing Facility	
C	Truck transport to beneficial re-use processing facility and to an offsite landfill	No impact.	No impact.
		Construction and Operation of Beneficial Re-use Processing Facility	
C	Construction and operation of a beneficial re-use processing facility	Temporary increase in soil erosion during construction. Potential localized alteration of geologic conditions.	Minor impact; minimized with the use of BMPs.

3.4 Groundwater

3.4.1 Regulatory Framework for Groundwater

The regulatory framework established to protect groundwater is defined in the PEIS. This framework includes the Safe Drinking Water Act of 1974, Wellhead Protection Program, Tennessee Solid Waste Disposal and Water Quality Control Acts, and the CCR Rule. As this document tiers off the Final PEIS, the standards established by these requirements are also applicable to the proposed actions.

3.4.2 Affected Environment

ALF is located in southwestern Tennessee and resides 2.1 miles east of the Mississippi River, on top of the Mississippi embayment, in the Mississippi Alluvial Plain section of the Gulf Coast Coastal Plain. The Mississippi embayment is a geologic basin filled with 3,000 feet or more of Cretaceous to recent age sediments deposited primarily in a Coastal Plain setting. The sedimentary sequence is dominated by unconsolidated sand, silt, and clay and

the principal aquifers of the region include (in descending order) the Mississippi River Valley alluvial aquifer, the Memphis Sand, and the Fort Pillow Sand (Figure 3-1).

The materials constituting the Mississippi River Valley aquifer range in size from coarse gravel to clay. They commonly grade downward from fine sand, silt, and clay at the top to coarse sand or gravel at the base, and the thickness of the alluvium may vary significantly over very short distances with thicknesses of 0 to approximately 230 feet (Carmichael et al. 2018). At ALF the alluvial aquifer is approximately 110-245 feet thick (Stantec 2019). Additionally, an interbedded “blue clay” interval, not to be confused with the Claiborne unit, in the upper portion of the alluvial aquifer has been identified and appears to impede vertical movement of groundwater locally in the upper portion of the aquifer (Stantec 2019).

The Mississippi River Valley alluvial aquifer sediments are underlain by a low permeability confining unit comprised of the Jackson Formation and upper Claiborne Group that are lithologically similar and often difficult to subdivide (Brahana and Broshears 2001) (Figure 3-1). Overall thickness of the Jackson Formation and upper Claiborne Group varies from 0 to 370 feet regionally (Brahana and Broshears 2001). Both the Jackson Formation and upper Claiborne Group act as a confining layer, and locally the confining unit is referred to as the upper Claiborne unit at this location (Carmichael et al. 2018). The upper Claiborne confining unit is a low permeability clayey layer and at ALF has a thickness of approximately 30-70 feet and defines the bottom of the alluvial aquifer (Stantec 2019). Thus, when present, the upper Claiborne confining unit limits vertical movement of groundwater into the underlying Memphis Sand.

Where present, the upper Claiborne confining unit is underlain by the Memphis Sand and separates the Memphis Sand from the Mississippi River Valley alluvial aquifer sediments. The Memphis Sand is characterized by predominantly very fine to very coarse-grained sand with lenses of fine-grained material and is referred to as the Memphis Aquifer (Brahana and Broshears 2001; Stantec 2019). Depending on location, the top of the Memphis Aquifer is approximately 190 to 255 feet below ground surface near the ALF.

The Memphis Sand is separated from the underlying Fort Pillow aquifer by 140 to 310 feet of clay, silt, and sand sediments of the Flour Island aquitard (Brahana and Broshears 2001) (Figure 3-1). The Fort Pillow aquifer is not widely used in the Memphis region because of the availability of shallower groundwater resources (Brahana and Broshears 2001).

Based on detailed site investigations, TVA identified a local, inferred “fault” or discontinuity within a portion of the East Ash Pond Complex project area (Figures 3-2 to 3-4). This inferred fault has an approximate northeast trend that has resulted in an offset (i.e., lowered) of the alluvial aquifer sedimentary sequence, upper Claiborne confining unit, and upper part of the Memphis Sand aquifer (Stantec 2019). Results from deep exploratory drilling near ALF-202 indicate the upper Claiborne confining unit is absent locally in the southeast portion of the project area but is present within the central and northern portions of the East Ash Pond Complex project area.

Monitoring wells installed around the East Ash Pond Complex and near the West Ash Pond indicate groundwater movement in the alluvial aquifer immediately beneath the site is generally northward toward McKellar Lake. Depth to groundwater is generally 15 to 40 feet below ground surface and seasonally fluctuates with lake levels (Stantec 2019).

McKellar Lake, an artificial cut-off meander of the Mississippi River, is the only major surface water feature in the vicinity of the site as the Mississippi River is approximately 2.1 miles west of ALF. In general, groundwater in the region flows from south to north, towards McKellar Lake. However, McKellar Lake can rise and fall by almost 40 feet, and this can affect the groundwater flow direction in the shallow portion of the alluvial aquifer. When the lake level is high, groundwater can temporarily flow to the south away from McKellar Lake. Groundwater elevations obtained from monitoring wells indicate that groundwater flow in the alluvial aquifer is predominately horizontal, not vertical (Stantec 2019).

3.4.2.1 Groundwater Use

The Memphis and Fort Pillow aquifers are the primary drinking water sources for the surrounding area, including portions of eastern Arkansas and northern Mississippi (Carmichael et al. 2018). The Memphis Aquifer serves as the primary drinking water aquifer for the area including the City of Memphis (Carmichael et al. 2018). The Memphis Aquifer is the most productive aquifer in the region, providing approximately 98 percent of the total water pumped to the City of Memphis in 1980, and it remains the primary supply of drinking water in the area (Brahana and Broshears 2001).

Even though it is a major water-bearing zone and can supply large quantities of water to wells, the surficial alluvial aquifer of the Mississippi embayment is documented as not being used as a primary drinking water aquifer near the site (Stantec 2019). The limited use of the Mississippi River Valley aquifer is due to its limited area of occurrence and to the hardness and high iron concentration of the water (Brahana and Broshears 2001).

While the alluvial and bedrock aquifers underlying the ALF are productive, there are no well fields within a mile of ALF. The Davis Well Field is the closest wellfield at approximately two miles south of ALF. Other well fields are more than 5.5 miles east of ALF. Additionally, based on the water well search (Stantec 2019) there are no known public water supply wells completed in the alluvial aquifer within at least 1 mile of ALF. Two industrial wells are located within 1 mile and are associated with industrial water use by Harsco Minerals. Harsco no longer uses these wells, which are screened in the alluvial aquifer. A series of four additional wells have been established by TVA in conjunction with the ACC. These wells, however, are being maintained in a non-operational mode.

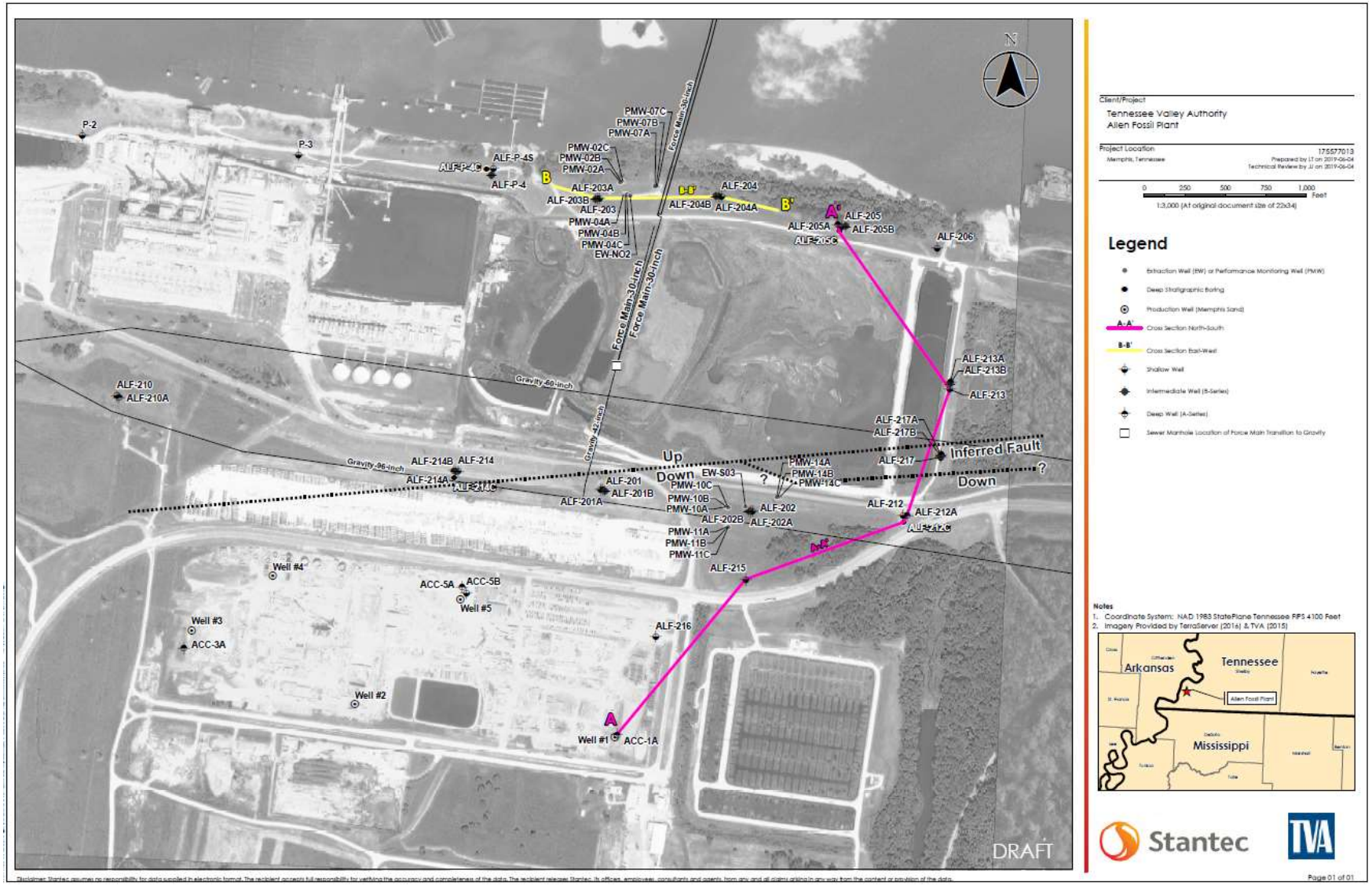


Figure 3-2. East Ash Pond Complex Geologic Cross Section Locations

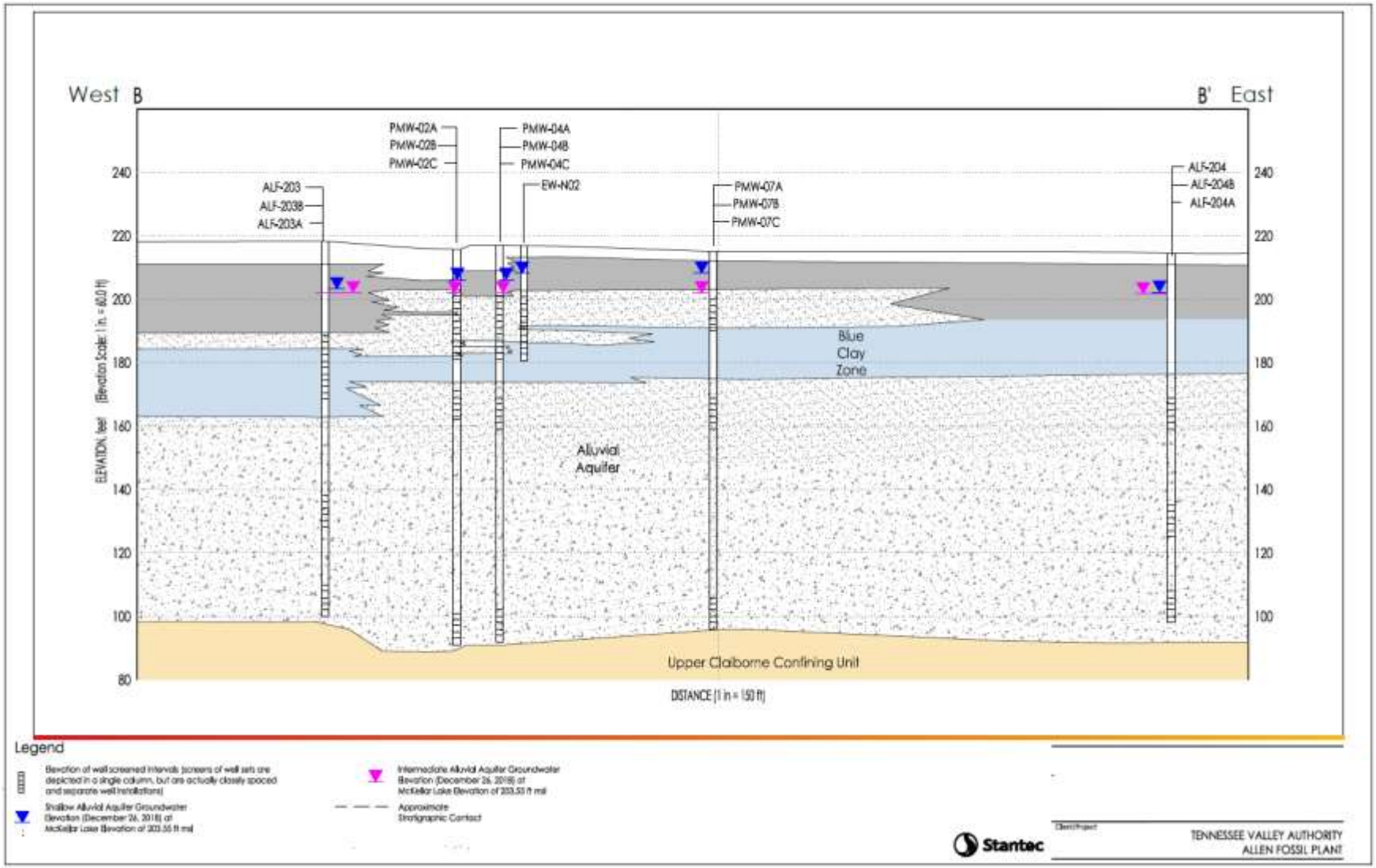


Figure 3-3. East Ash Pond Complex Geologic Cross Section B-B'

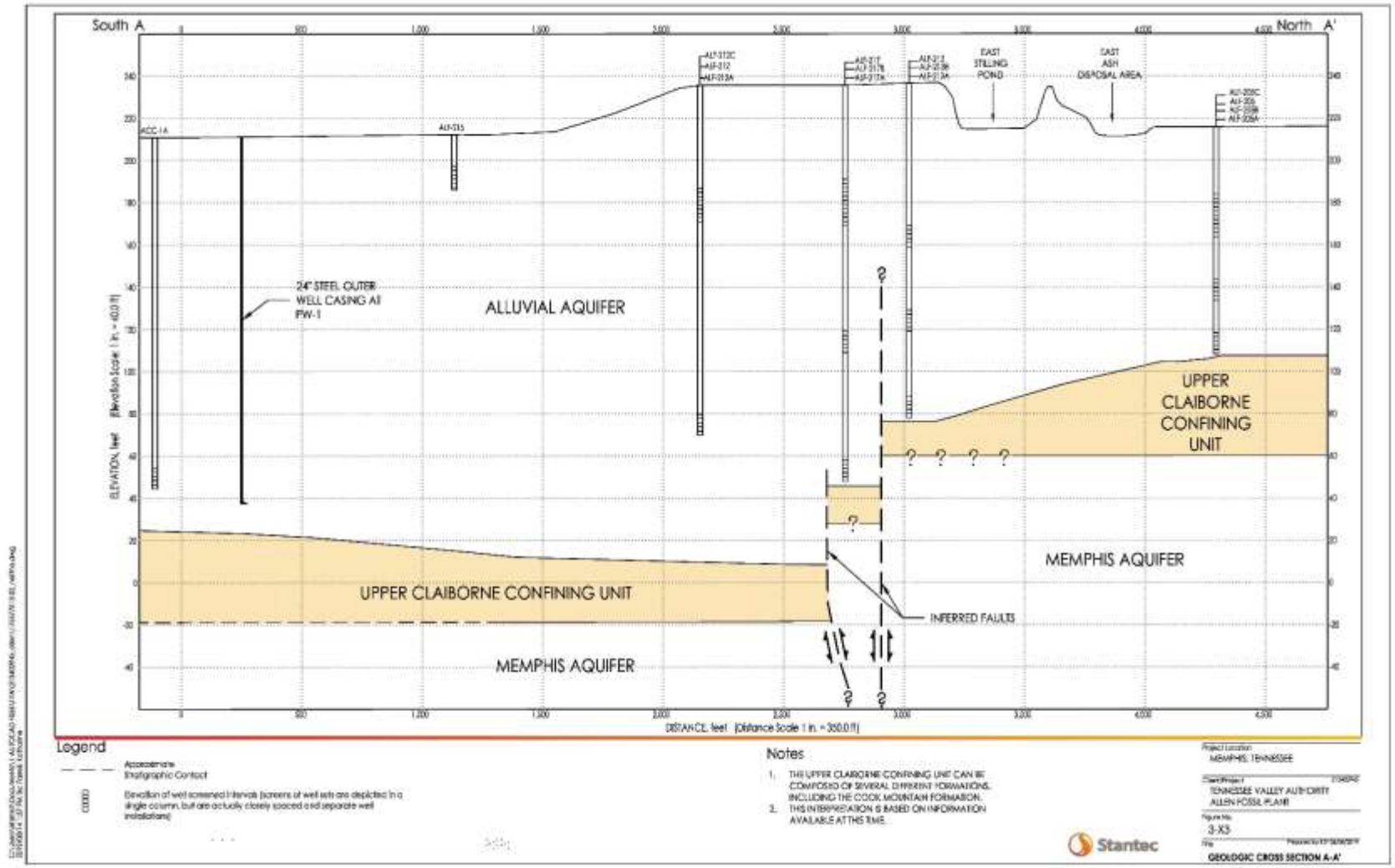


Figure 3-4. East Ash Pond Complex Geologic Cross Section A-A'

3.4.2.2 Groundwater Quality

Groundwater monitoring data for ALF was collected from the East Ash Pond Complex monitoring well network. The monitoring well network was initially installed in early 1988 as part of a TVA initiated, non-regulatory, groundwater quality assessment of the facility. TVA conducted groundwater sampling as part of the Utilities Solid Waste Activities Group (USWAG) voluntary sampling initiative and an additional well was installed as part of the USWAG voluntary sampling initiative in 2010 (TVA 2016a). The wells were monitored for USWAG from 2011 through 2014. Thereafter, the voluntary (e.g., non-regulatory) monitoring program was discontinued for budgetary reasons. The voluntary program has subsequently been restarted, and the federal CCR rule Appendix III and IV constituents have been added to the list of monitored analytical parameters.

Water quality sampling results indicate that CCR constituents such as arsenic (and to a lesser extent fluoride and lead) have been detected at elevated levels in groundwater samples collected from the alluvial aquifer underlying the East Ash Pond Complex. Additionally, elevated pH values in groundwater generally greater than 7.5 standard units have also been observed. Within the upper 40 feet of the shallow Alluvial aquifer there are two localized areas at the northwest and southeast corners of the East Ash Pond Complex where detections of arsenic, fluoride and lead have exceeded MCLs in some samples and are therefore considered the primary COCs at ALF (Stantec 2019). Because of initially identified elevated concentrations of COCs, TVA began a voluntary investigation on May 30, 2017 to delineate arsenic in groundwater. Subsequently a July 18, 2017 letter from TDEC to TVA requested the development of a Remedial Investigation (RI) Work Plan. TVA's investigation was already underway when the letter from TDEC was received; therefore, TVA's ongoing investigative approach was incorporated into the RI Work Plan and continues to be implemented in cooperation with TDEC.

The area of impact by these primary COCs is generally limited to the shallow portion of the alluvial aquifer within and just above the lower permeability clay/silt "blue clay" layer near monitoring wells ALF-203 and ALF-204 in the north area and in the south area near ALF-202 and ALF-212 (Stantec 2019) (Figures 3-2 and 3-3). While the detections are in the near vicinity of the East Ash Pond Complex, recent investigations into the source concluded that several factors have possibly contributed to arsenic in groundwater near the East Ash Pond Complex. These factors may include arsenic in ash and ash pore water, naturally occurring arsenic in soil and groundwater, potential releases from industrial and municipal sewers, and nearby industrial operations that might have resulted in releases (Stantec 2019).

The upper Claiborne confining unit is located at the base of the alluvial aquifer and is a clay layer approximately 30-70 feet thick. Where this confining unit is present, it separates the alluvial and Memphis Aquifers providing a barrier to downward groundwater flow. During recent investigations an offset in the upper Claiborne confining unit in the southeast corner of the East Ash Pond Complex was identified and represents the potential for more direct communication between the alluvial and Memphis Aquifer as shown in a south to north cross-section (Figures 3-2 and 3-4). However, groundwater sampling results do not indicate adverse impacts to the Memphis Aquifer or the public drinking water supply (Stantec 2019).

Because sampling events performed at the East Ash Pond Complex have exhibited unusually high exceedances of arsenic and lead above the MCL in groundwater samples around the East Ash Pond Complex, TVA, under the oversight of TDEC, initiated an RI into the nature and extent of the contamination. As a part of requirements associated with the

CCR Rule, groundwater monitoring is ongoing. However, in cooperation with TDEC, TVA is also implementing an IRA that is designed to control and address groundwater contamination. The IRA is planned to be a groundwater extraction system to control and begin treating groundwater with elevated concentrations of arsenic beginning in 2020. As described in the Initial Remedial Design – Interim Response Action (Stantec 2018), the IRA will focus on two areas north and south of the East Ash Pond Complex to achieve the following objectives:

1. Provide hydraulic control of groundwater in the target capture areas; and
2. Reduce the amount of arsenic and other constituents in groundwater.

The IRA includes the following:

- Installation of a groundwater extraction system and conveyance piping that was developed from groundwater modeling simulations
- Groundwater removal and aquifer testing/monitoring to verify the groundwater modeling simulations and identify potential system design enhancements
- Above-ground (i.e., ex situ) groundwater treatment
- Discharge of treated water to an existing NPDES outfall or the T.E. Maxson WWTP (all options will be considered)

No representative monitoring records specific to the West Ash Pond or Metal Cleaning Pond regarding groundwater quality are available. However, in cooperation with TDEC pursuant to the TDEC Commissioner's Order, TVA is installing a well monitoring network within the West Ash Pond project area to obtain site specific groundwater quality data at this location. Based upon results of that sampling, TVA will continue to work with TDEC to report and assess groundwater quality trends as appropriate.

3.4.3 Environmental Consequences

3.4.3.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not close the surface impoundments. Under this alternative, corrective measures would be implemented in conjunction with the planned IRAs. TVA would also continue to conduct groundwater monitoring at regular intervals using appropriate methodologies. Groundwater monitoring of the impoundments would be undertaken using a certified groundwater monitoring network and in conjunction with continued coordination with TDEC according to the RI Work Plan and IRA to obtain and evaluate groundwater quality associated with the CCR management facilities at ALF and remediate areas of identified contamination. Additionally, while no long-term measures have yet been developed to address MCL exceedances, TVA will continue to work with TDEC to evaluate groundwater monitoring trends and develop and implement appropriate long term corrective measures to address groundwater quality.

However, because all plant process flows to the ponds have been eliminated, it is expected that there would be some reduction of hydraulic inputs to the subsurface beneath the impoundments. The reduction of a groundwater mound would conceivably lower the hydraulic head pressures driving a downward gradient of water and associated constituents. Accordingly, this alternative potentially would reduce any ongoing movement of constituents to groundwater or surface water.

Therefore, in consideration of the elimination of all plant flows to the ponds and the reduction of a groundwater mound associated with the ponds, and the beneficial effects of the IRA and a future long term remedy in addressing MCL exceedances of groundwater, impacts of this alternative are likely to be beneficial and minor in the short term and moderate in the long term in improving groundwater quality.

3.4.3.2 Alternative B – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in an Offsite Landfill Location

Under Alternative B, TVA would close the East Ash Pond Complex, the West Ash Pond and the Metal Cleaning Pond via Closure-by-Removal. Closure-by-Removal involves dewatering followed by excavating and relocating CCR from the surface impoundments in accordance with federal and state requirements. For purposes of the Metal Cleaning Pond, the CCR located underneath the pond would be removed and the area backfilled and closed.

Impacts from the primary action of ash impoundment closure are expected to be positive under the Closure-by-Removal option as excavation and removal of the CCR materials in the impoundment provides a direct reduction in the potential for groundwater releases to surface waters. As a result, a potential future source of CCR constituents would be removed. As EPA identified in the CCR Rule, removal of the CCR materials would reduce groundwater risk in the impoundment area. The CCR being removed from an impoundment would be dried to an acceptable level and transported to an offsite landfill.

Closure-by-Removal activities would reduce risk to groundwater and improve water quality in comparison to the No Action Alternative. Alternative B provides the following benefits:

1. Elimination of the source of potential ash contaminants, and the potential migration of ash contaminants into groundwater
2. Allows infiltration of rainfall through the placed borrow material within the impoundments, providing a downward migration of fresh water that will support reestablishment of natural groundwater quality
3. Natural groundwater quality would eventually be reestablished

Groundwater benefits associated with this alternative include eliminating the potential interaction between the CCR and the uppermost aquifer. It would eliminate new groundwater risk from groundwater COCs migrating offsite.

As described in the PEIS, no federal post-closure care measures are required if the impoundment is closed under the Closure-by-Removal option. State requirements for post-closure care would be implemented as needed. However, remedial actions documented in the IRA and any future long term remedy would continue to be implemented and groundwater quality would be restored where arsenic contamination is present.

The CCR removed from the impoundments would be dried to an acceptable level prior to being loaded for offsite transport. The permitted landfill that receives CCR would be lined and have groundwater monitoring systems as required by their respective permits to minimize potential impacts to groundwater. As such, no impacts to groundwater are anticipated in conjunction with the component actions related to transport of CCR to a permitted landfill. Additionally, because borrow would be obtained from a previously

permitted borrow site, TVA's action is limited to the transport of borrow material. Transport of borrow by truck on the existing roadway network would not impact groundwater.

Therefore, in consideration of the elimination of CCR in the impoundments, and the beneficial effects of the IRA and a future long-term remedy in addressing MCL exceedances, groundwater impacts of this alternative are beneficial and would improve groundwater quality.

3.4.3.3 Alternative C – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and West Ash Pond; Disposal of CCR in a Beneficial Re-Use Process & Offsite Landfill Location

Under Alternative C, impacts associated with closure of impoundments, transport of CCR offsite, and transport of borrow material onsite would be the same as identified under Alternative B.

Per the bounding analysis performed by TVA (see Section 2.6), the construction and operation of a beneficial re-use processing facility is expected to have minor if any direct impact on local groundwater aquifers. The potential impacts relative to groundwater are related to excavation for foundations, wastewater management, materials storage, and process and potable water use. Process and potable water would be obtained from either a local POTW or wells. The process water use would be up to 100 GPM and potable use up to 25 GPM. In the event that groundwater is used as a source for process water or potable water, the impacts on groundwater associated with the extraction of groundwater are dependent on the actual site conditions, which will not be known until the facility location is selected. If the wells are located within a permeable aquifer of moderate saturated thickness, the impacts would be minimal to nearby groundwater users. However, if the wells are producing from a lower permeability aquifer within a relatively close distance of other production wells, the drawdown resulting from the process and potable water production for the facility could impact nearby water users and their ability to continue to produce the same quantity of water. These impacts would be mitigated by effective use of BMPs and adherence to applicable permitting requirements. If wells are needed for the process and potable water supply, the associated state permitting requirements would require demonstration of potential impacts on groundwater systems and local groundwater users prior to approval. As such, although construction and operation of the beneficial re-use facility may result in minor potential localized alteration of groundwater, these effects are not expected to result in notable alteration or degradation of groundwater resources. Therefore, impacts to groundwater resulting from the development and operation of the proposed beneficial re-use processing facility would be minor.

3.4.4 Summary of Impacts to Groundwater

Based on the analysis summarized above, impacts to groundwater associated with the proposed projects would be short term and minor with the potential for long term beneficial impacts. Impacts to groundwater are summarized in Table 3-4.

Table 3-4. Summary of Impacts to Groundwater

Alternative	Action	Impact	Severity
		Impoundment Closures	
B, C	Impoundment closure	Reduces risk to groundwater by removing CCR from the impoundment. Implementation of IRA and future remedy would restore groundwater quality over the long term	Beneficial impact as it eliminates subsurface discharges and eliminates COCs from the former CCR impoundment when the removal project is completed.
		Transport of All CCR to an Offsite Landfill	
B	Truck transport to landfill	No impact.	No impact.
B	Rail transport to landfill	No impact.	No impact.
		Borrow Transport to ALF	
B, C	Truck transport to ALF	No impact.	No impact.
		Transport of CCR to a Beneficial Re-use Processing Facility	
C	Truck transport to beneficial re-use processing facility and to an offsite landfill	No impact.	No impact.
		Construction and Operation of Beneficial Re-use Processing Facility	
C	Construction and operation of a beneficial re-use processing facility	Potential groundwater extraction and associated localized drawdown effects, but only if process and potable water are obtained by groundwater wells.	Minor potential impact. Potential effects mitigated by effective use of BMPs and adherence to applicable permitting requirements.

3.5 Surface Water

3.5.1 Affected Environment

ALF is located adjacent to the Mississippi River, approximately 5 miles southwest of downtown Memphis, Tennessee. The proposed project areas are located entirely within the McKellar Lake surface water system, which is located within the Lower Mississippi-Memphis (HUC – 08010100) and Horn Lake-Nonconnah (HUC 08010211) watersheds. The Tennessee portion of the Mississippi River watershed is located in western Tennessee and includes parts of Dyer, Lake, Lauderdale, Shelby and Tipton Counties. It is approximately 1,086 square miles (590 square miles in Tennessee) and drains to the Mississippi River (TDEC 2019a). The Horn Lake-Nonconnah watershed is in Tennessee and Mississippi. The Tennessee portion of the watershed is located in the western portion of the state and includes parts of Shelby and Fayette counties. The whole watershed is approximately

281 square miles, 184 square miles in Tennessee, and it drains to the Mississippi River (TDEC 2019a).

McKellar Lake was created around 1950 when the Tennessee Chute (the Mississippi River side channel flowing around the eastern side of Presidents Island) was blocked by an earthen embankment at the upstream end (Lauderdale 2011). The embankment supports Jack Carley Causeway, which provides access to the industrial area developed on the island. A separate smaller island, Treasure Island, is located within McKellar Lake. McKellar Lake is a 6.6-mile-long, 1,550-acre water body (excluding Treasure Island) and has designated uses that include industrial water supply, fish and aquatic life, recreation, and navigation (TVA 2014, TDEC 2013).

The hydrodynamics of McKellar Lake are important for water quality conditions in the lake, as it controls mixing and flushing. The hydrodynamic conditions are complex, however, being influenced by watershed runoff inflow and river stage changes. River stage changes, and therefore McKellar Lake stages, span a range of greater than 50 feet from low stage to flood stage.

3.5.1.1.1 Surface Water Quality

The CWA requires states to identify all waters where required pollution controls are not sufficient to attain or maintain applicable water quality standards and to establish priorities for the development of limits based on the severity of the pollution and the sensitivity of the established uses of those waters. States are required to submit reports to the USEPA. The term “303(d) list” refers to the list of impaired and threatened streams and water bodies identified by the state. There are water quality concerns in many of the stream segments in both the Mississippi River-Memphis and the Horn Lake-Nonconnah watersheds. Additionally, EPA has approved Total Maximum Daily Loads for chlordane, dioxins, polychlorinated biphenyl (PCB), *Escherichia coli* (*E. coli*) and arsenic in the Horn Lake-Nonconnah watershed (TDEC 2018).

McKellar Lake has been negatively impacted by the surrounding industrial and urbanized land uses. McKellar Lake is listed as impaired by TDEC for PCBs, dioxins, and chlordane from contaminated sediments. Additionally, McKellar Lake is listed for *E. coli*, low dissolved oxygen, and nitrate + nitrite, from sanitary sewer overflows and discharges from municipal discharges from urbanized high density areas. It is also listed as impaired for sedimentation/siltation due to dredging and discharges from municipal discharges from urbanized high density areas and for mercury due to atmospheric deposition. The nearby Mississippi River and the Horn Lake Cutoff are generally listed for similar pollutants from similar sources (TDEC 2018). Fish consumption advisories have been issued for all of McKellar Lake and the Mississippi River in Shelby County with chlordane, mercury and other organics listed as the pollutants of concern. A fish consumption advisory has also been issued for Nonconnah Creek based on chlordane and other organic pollutants (TDEC 2019b).

As shown on Figure 3-5, ALF has a number of permitted outfalls that include Outfall 001 (East Ash Pond Complex to McKellar Lake), Outfall 001A (Emergency Overflow to Horn Lake Cutoff), Outfall 002 (West Ash Pond to the Mississippi River); and Outfall 003 (Condenser Cooling Water to Mississippi River). The surface water limits and regulatory requirements of these outfalls are detailed in the TDEC NPDES Permit No. TN0005355 and in Table 3-5 (TDEC 2008). Additionally, storm water discharges are authorized by the TMSP Permit No. TNR053184. Because the fossil plant is no longer operating, all process

water flows have ceased being sent to the East Ash Pond Complex or are being discharged to the local POTW. Storm water flows have been diverted to TMSP Outfalls and only precipitation driven flows are being discharged from Outfall 001, which has decreased flows to less than 2 million gallons per day (MGD).

Table 3-5. NPDES Regulatory Limits and Requirements at ALF

Outfall	Parameters and Effluent Limitations	Frequency
Outfall 001 and 001A	Flow (MGD)	Weekly
	pH – Range 6.0 – 9.0 u.s.	Weekly
	Oil and Grease 15.0 mg/L Avg Monthly and 20.0 mg/L Daily Max	Monthly
	TSS 30.0 mg/L Avg Monthly and 100.0 mg/L Daily Max	Monthly
	Metals Samples will be reported on an annual basis. Including Total (T.) Copper, T. Lead, T. Mercury, T. Selenium, T. Cadmium, T. Chromium, T. Iron, T. Manganese, and T. Silver.	Annually
	Toxicity Testing – 48-Hr LC50	Annually
	Ammonia as N Plant Intake	Twice per Month
	Ammonia as N Effluent	Twice per Month
	Ammonia as N Net Discharge	Twice per Month
Outfall 002	Flow (MGD)	Weekly
	pH – Range 6.0 – 9.0 u.s.	Weekly
	Oil and Grease 15.0 mg/L Avg Monthly and 20.0 mg/L Daily Max	Monthly
	TSS 30.0 mg/L Avg Monthly and 100.0 mg/L Daily Max	Monthly
	Metals Samples will be reported on an annual basis. Including Total (T.) Copper, T. Lead, T. Mercury, T. Selenium, T. Cadmium, T. Chromium, T. Iron, T. Manganese, and T. Silver.	Annually
Outfall 003	Flow (MGD)	Daily
	Temperature Intake - Report	Daily
	Temperature Effluent – 44.4 C	Daily
	Total Residual Chlorine – Daily Max 0.20 mg/L	Weekly
	Time of Chlorine Addition	Daily
	Toxicity Testing – 48-Hr LC50	Once if biocides are added

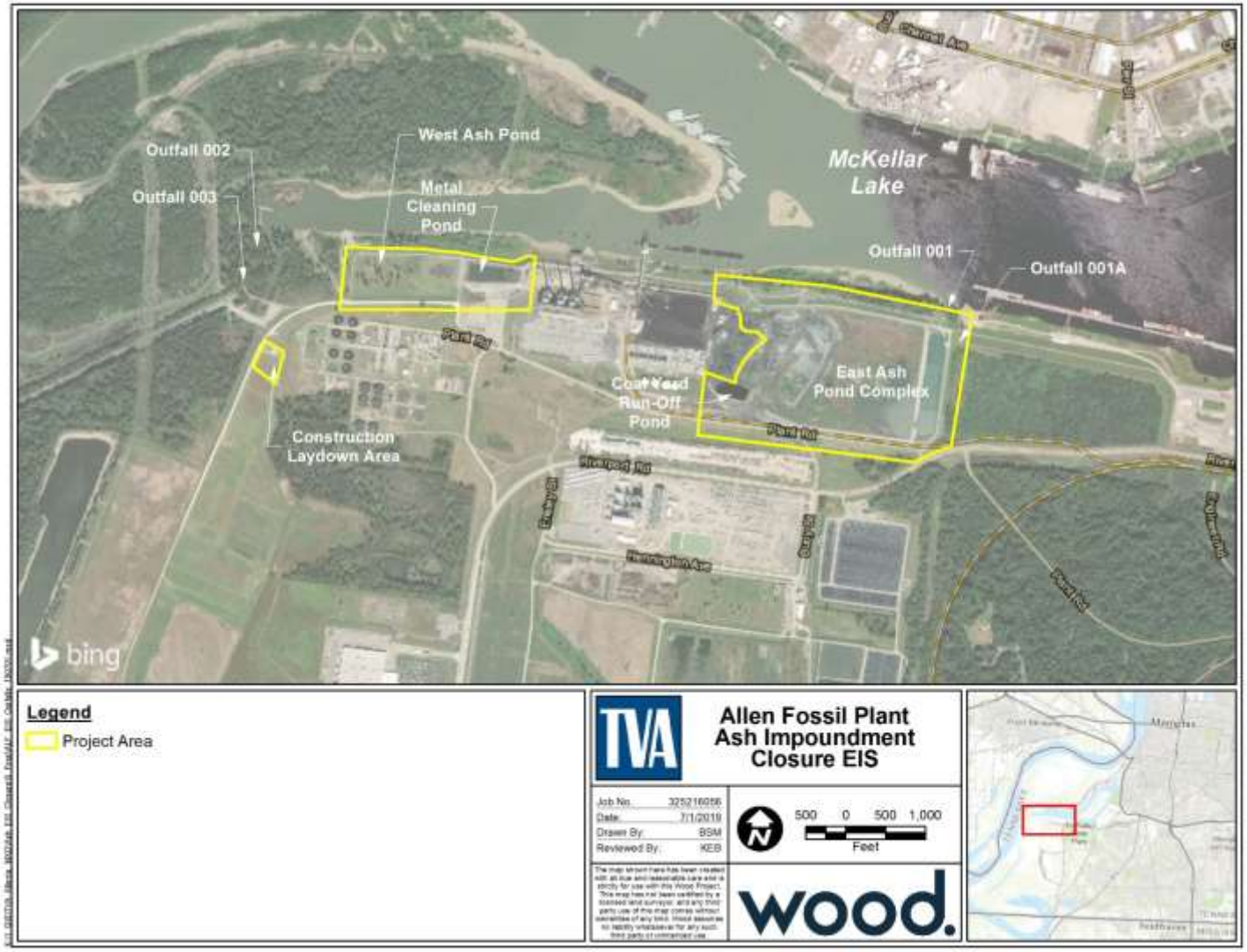


Figure 3-5. ALF NPDES Outfalls

3.5.2 Environmental Consequences

3.5.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not close the impoundments in the East Ash Pond Complex project area or the West Ash Pond Project Area. Surface water runoff has been rerouted to construction storm water outfalls or TMSP permitted outfalls per CCR Rule requirements, and only precipitation driven flows are being discharged from Outfall 001. Therefore, onsite discharges are now storm water driven and this would not be expected to change under this alternative. The existing discharges would continue to be authorized under NPDES Permit TN0005355 and TMSP Permit TNR053184 and discharges would continue to comply with all applicable permit limits.

Thus, continued discharges at ALF under the No Action Alternative would not be expected to cause any additional direct or indirect impacts to local surface water resources and, therefore, would not change existing conditions.

3.5.2.2 Alternative B – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in an Offsite Landfill Location

3.5.2.2.1 Construction Impacts

Wastewaters generated during closure activities may include earth moving-related storm water runoff, drainage of work areas, non-detergent equipment washings, dust control, hydrostatic test discharges and domestic sewage. All of the proposed ash impoundment closure activities would be located within the proposed project areas. Construction activities would have the potential to temporarily affect surface water via storm water runoff. TVA would comply with appropriate state and federal permit requirements.

Appropriate BMPs would be implemented, and proposed project activities would be conducted in a manner to ensure that waste materials are contained, and the introduction of pollutants to the receiving waters would be minimized. A General Permit for Storm Water Discharges Associated with Construction Activities TNR100000 (TDEC 2016) or an Individual Construction Storm Water Permit would be required for this project and this permit would require development of a project-specific SWPPP. The SWPPP would identify specific BMPs to address construction-related activities that would be adopted to minimize storm water impacts. BMPs identified in the SWPPP would be based on the Tennessee Erosion and Sediment Control Handbook (TDEC 2012). Therefore, only minor temporary impacts to receiving surface waters would be expected due to surface water runoff from the construction site.

Additionally, during construction activities, the City of Memphis can inspect the site to ensure the site remains in compliance with the City's storm water ordinances; however, no additional permitting is required. It should be noted in the SWPPP that the site is located in the City of Memphis, which is designated as an area that operates a large separate storm sewer system (MS4).

Since McKellar Lake is impaired for siltation and sedimentation, storm water discharges to this waterbody may be more stringently regulated by the permit obtained for this project and may require additional BMPs to protect water quality, such as expanded buffer zones or Total Maximum Daily Loads. Additionally, any work conducted in jurisdictional waters such as the introduction of new storm water discharge pipes, ditches and/or outfalls may require

Section 401 WQC/ARAP and USACE Section 404 permits. Equipment washing and dust control discharges would be handled in accordance with BMPs described in the SWPPP required by the site's NPDES Permit TN0005355 to minimize construction impacts to surface waters.

Onsite hydrostatic testing will have the option to use potable or surface waters and would be covered under the current NPDES Permit TN0005355.

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

With the implementation of appropriate BMPs and adherence to permit requirements, only temporary and minor impacts to surrounding surface waters would be expected from activities associated with ash impoundment closures at ALF.

Existing flows of the comprised impoundments have already been rerouted or discontinued prior to closure of these ponds. Dewatering of the ponds and stabilization of the ash is required in areas where ponding is currently present. Dewatering of the pond(s) would comply with applicable NPDES permit requirements and all TDEC approval requirements. Ponded water would be pumped to and discharged from Outfall 002 to the Mississippi River. Supplementary piping and pumps would be required for these dewatering activities. Additional monitoring would be implemented during dewatering operations and treatment would be employed to meet NPDES limits and Tennessee Water Quality Criteria (TVA 2018a).

This proposed alternative would require removing CCR material to comply with closure by removal standards of the CCR Rule. This may also include some perimeter dike material and support structures within the footprint of the impoundments. These proposed closures would require active utility pipes, the sewer force main and possibly the water main, to be relocated outside the closure limits and inactive utility pipes within the closure limits would be properly abandoned to meet CCR Rules.

Under this alternative closure areas would be graded to appropriately drain storm water and would be vegetated with permanent non-invasive plant species mix. Storm water drainage would be directed as appropriate to ensure compliance with all applicable regulations and permits. New storm water outfalls would be installed to direct storm water runoff towards McKellar Lake and/or Horn Lake Cutoff and discharges would either be covered by the site NPDES permit or the TMSP. These closure processes and changes may require the modification/update of the NPDES permit and/or the TMSP.

CCR and borrow materials would be covered during transportation to reduce the release of dust particulate matter. Consequently, there would be no indirect impacts to surface water associated with the transport of borrow and CCR materials over any surface water features along the haul routes.

3.5.2.2.2 Groundwater to Surface Water Impacts

Under-seepage from berms at ALF's West Ash Pond and East Ash Pond Complex is not known to occur. It is anticipated that the closure of the impoundments would reduce the

hydraulic head and hydraulic conductivity of groundwater to surface water, thus reducing potential seepage discharges, should they be occurring. Since the CCR would be removed, there would be no possibility of inundation of a CCR layer. These possible reductions have the potential to reduce future associated water quality impacts. Please refer to the groundwater sections of this document for additional information and evaluation of these impacts.

Because surface water flow and potential groundwater releases to surface waters would be reduced or eliminated, and because all work would be done in compliance with applicable regulations, permits, and best management practices, potential direct and indirect impacts of this alternative to surface waters would be minor and beneficial in the long term.

3.5.2.3 Alternative C – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and West Ash Pond; Disposal of CCR in a Beneficial Re-Use Process & Offsite Landfill Location

Impacts associated with the closure of impoundments, transport of CCR offsite, and transport of borrow material onsite would be the same as identified under Alternative B. A portion (up to 95 percent) of the CCR removed from the impoundments would be transported to a beneficial re-use processing facility. CCR not suitable for beneficial re-use would be disposed in an existing offsite commercial landfill.

Because the particular beneficiation technology or location of the beneficial re-use processing facility has not yet been determined, a bounding analysis performed by TVA was used to support the analysis of potential impacts to surface water resources (see Section 2.6).

3.5.2.3.1 Construction Impacts

Construction of the beneficial re-use processing facility has the potential to temporarily affect surface water via storm water runoff. It is expected that the site developer would comply with all appropriate state and federal permit requirements. Appropriate BMPs would be implemented, and all proposed project activities would be conducted in a manner to ensure that waste materials are contained, and the introduction of pollutants to the receiving waters would be minimized. As detailed in Table 2-9, onsite storm water basins would be constructed to aid in onsite storm water treatment. If located in Tennessee, a General Permit for Storm Water Discharges Associated with Construction Activities TNR100000 (TDEC 2016) would be required for this project and this permit would require development of a project-specific SWPPP as per TDEC General Construction Storm Water permit (TDEC 2016) and the Tennessee Erosion and Sediment Control Handbook for BMP guidance and details (TDEC 2012). The SWPPP would identify specific BMPs to address construction-related activities that would be adopted to minimize storm water impacts. If this site was to be located outside of Tennessee, an equivalent state storm water construction permit may be required.

As identified in Table 2-10, construction of the facility would avoid and/or minimize stream or wetland impacts. Any unavoidable impacts would be mitigated per the appropriate permit requirements (i.e. a Section 404 permit administered by the USACE and Section 401 WQC administered by TDEC through the ARAP permitting program depending on the project impacts and location). It is assumed that these permits may be required for an NPDES outfall; however, the criteria for a future site would limit the impacts to aquatic features and would not be expected to require mitigation from proposed activities.

Portable toilets would be provided for the construction workforce as needed. It is expected that these toilets would be pumped out regularly, and the sewage would be transported by tanker truck to a publicly-owned wastewater treatment works that accepts pump out.

With the implementation of appropriate BMPs, temporary and minor impacts to surrounding surface waters would be expected from construction activities associated with the beneficial re-use processing facility. Should additional impacts to this site be identified that do not fall within the criteria identified for the construction of the beneficial re-use processing facility, a supplemental NEPA document would be required.

3.5.2.3.2 Operational Impacts

Wastewater would be processed on site and either released in accordance with the conditions of an NPDES permit or discharged to a POTW. The facility would be expected to have restroom facilities to accommodate the staff of the finished facility. If a more permanent system is installed for this facility, permits may be required depending on the type of system installed and the state. For the purposes of permitting the Tennessee regulations are detailed; however, if the site is in another state, then all federal, state, and local regulations would be followed and proper permits would be obtained.

If the system includes a septic tank with a subsurface sewage disposal field than a Septic System Construction Permit, which includes an application for ground water protection services, would be required by the TDEC Division of Water Resources Ground Water Protection Program as per TDEC Regulations over Subsurface Sewage Disposal System 0400-48-01. Depending on the size and capacity of the system, an Underground Injection Control Permit may also be required.

If the facility restrooms consisted of a sewage treatment system, the system would require submittal and approval of the plans by TDEC to obtain a TDEC State Operating Permit and depending on the number of people using the facility, a UIC Permit. This system would also require Tennessee water and wastewater operator certification for those operating the system.

Equipment washing and dust control discharges would be handled in accordance with BMPs described in the SWPPP for water-only cleaning, and/or and onsite NPDES Permit. Hydrostatic testing discharges would be handled in accordance with an onsite NPDES Permit or the TDEC General NPDES Permit for Discharges of Hydrostatic Test Water (TN670000).

<u>Beneficial Re-use Processing Facility Water Use and Discharges</u>

The facility would either use thermal or chemical means to convert the CCR material from its current state for use in an encapsulated construction material. Both of these processes would require different resources to perform this conversion. Since a vendor has not yet been selected, this evaluation considers the more impactful attributes of the two options. The primary facility areas would include the storage area for the reclaimed CCR material, the area to process and convert the CCR material to construction material and the storage and load out area for the converted material.

The facility would need to have access to potable or well water. As identified in Table 2-9, water usage for process water could be up to 100 GPM. Because this facility would expect to operate 24 hours per day, seven days per week, this would be the equivalent to

0.144 MGD. This source water would be obtained from a local POTW, wells or even from a gray water source. Other potable water needs could be up to 25 GPM for on-site restrooms and other worker water needs.

The facility has the potential to have process water, contact storm water, non-contact storm water, and potentially sewage discharges as a result of operation of the facility. For the purposes of this evaluation contact storm water refers to storm water that has come in contact with CCR material. The facility could possibly discharge up to 25 GPM or 0.036 MGD of process water; this does not include contact storm water. Process water and possibly contact storm water discharges would be discharged by means of either an existing POTW via a pre-treatment permit or an onsite NPDES outfall, which would require an Individual NPDES permit for industrial activities. Storm water, if a permit is required, would most likely fall under a TMSP for industrial storm water discharges. Sewage discharges would be handled appropriately either by sending them to a POTW, treat and release or by pump and haul. If this facility is in a MS4 area, then any applicable permits may apply to this facility.

Facility discharges would have to meet all NPDES limitations and State Water Quality Criteria for the receiving stream's designated uses. If the receiving stream is impaired, more strident limitations may apply. Because these beneficial reuse processes may utilize chemical additives, the facility would ensure that discharges and the chemicals utilized in the process would not adversely impact water quality of the receiving stream. Chemicals would be evaluated to ensure that they would not contribute to aquatic toxicity.

The operator would conduct a characterization of the new waste streams to confirm that no significant impacts to the receiving stream would occur from this action. Additionally, no direct negative (toxic) impacts on the receiving stream would be anticipated because discharges would be required to meet NPDES toxicity limits or pre-treatment requirements. If the operational characterization showed impacts, then mitigation measures, potentially including water treatment and/or additional BMPs, would be implemented to ensure discharges would meet NPDES or pre-treatment requirements and not cause an exceedance of in-stream State Water Quality Criteria.

Construction and operation of the beneficial re-use processing facility would comply with applicable regulations, permits, and BMPs; therefore, potential impacts of this alternative would be minor and would not be expected to adversely impact surface waters.

3.5.3 Summary of Impacts to Surface Water

Impacts to surface water associated with the proposed projects would be short term and minor with the potential for long term beneficial impacts. Impacts to surface water are summarized in Table 3-6.

Table 3-6. Summary of Impacts to Surface Water

Alternative	Action	Impact	Severity
		Impoundment Closures	
B, C	Impoundment closure	Potential direct and indirect impacts to the McKellar Lake and Horn Lake Cutoff associated with sedimentation from storm water during closure activities.	Temporary and minor, minimized with implementation of appropriate BMPs.
		Transport of All CCR to an Offsite Landfill	
B	Truck transport to landfill	No impact.	No impact.
B	Rail transport to landfill	No impact.	No impact.
		Borrow Transport to ALF	
B, C	Truck transport to ALF	No impact.	No impact.
		Transport of CCR to a Beneficial Re-use Processing Facility	
C	Truck transport to beneficial re-use processing facility and to an offsite landfill	No impact.	No impact.
		Construction and Operation of Beneficial Re-use Processing Facility	
C	Construction and operation of a beneficial re-use processing facility	Potential direct and indirect impacts to surface waters from sedimentation from storm water during construction activities.	Temporary and minor. Minimized with implementation of appropriate BMPs. Site would be selected that does not include surface water features on-site that would require mitigation.
		Potential direct and indirect impacts to surface water from potential continuous discharges and outfall construction activities.	Minor and would not be expected to adversely impact surface waters. Compliance with all permit requirements and limitations and characterization would be performed of discharge waters to ensure compliance.

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 one-percent chance of flooding in any given year is normally called the 100-year floodplain. The area subject to a 0.2-percent chance of flooding in any given year is normally called the 500-year floodplain. It is necessary to evaluate development in the 100-year floodplain to ensure that the project is consistent with the requirements of EO 11988.

The ash impoundment project areas are located between Mississippi River miles 725.2 and 725.4, left descending bank, and McKellar Lake miles 1.0 and 2.7, left descending bank, in Shelby County, Tennessee. According to Profile 75P of the 2013 Shelby County Flood Insurance Study (FIS), the 100-year flood elevation in the project area at this location would be 225.0 feet above mean sea level (msl). The 500-year flood elevation would be 230.5 feet above msl (TVA 2014). The floodplains within the project areas are shown in Figure 3-6.

The East Ash Pond Complex at ALF is located between McKellar Lake miles 2.1 and 2.7, left descending bank, in Shelby County, Tennessee. The ALF East Ash Pond Complex is shown on Map Number 47157C0385F of the 2007 Shelby County, Tennessee, Flood Insurance Rate Map (FIRM) as being located outside the 100-year floodplain of McKellar Lake and outside the boundary of the Ensley Levee. The Shelby County FIS was updated in 2013; however, Map Number 47157C0385F was brought forward in the 2013 FIS without revision, thus retaining its original publication date of 2007. The lowest crest elevation of the East Ash Pond Complex berm is 235.9 feet, which is over ten feet above the 100-year flood elevation, and five feet above the 500-year flood elevation of McKellar Lake. Thus, the East Ash Pond Complex is located outside the 100- and 500-year floodplain of McKellar Lake. The northern portion of the East Ash Pond Complex project area is outside the Ensley Levee and within the 100-year floodplain as shown on the FIRM and illustrated in Figure 3-6.

The West Ash Pond at ALF is located between McKellar Lake miles 1.0 and 1.5, left descending bank, in Shelby County, Tennessee. The lowest crest elevation of the West Ash Pond berm is 226.9 feet. Although the West Ash Pond is shown on the FIRM as being within the 100-year floodplain of McKellar Lake, the low crest elevation would be above the 100-year flood elevation and below the 500-year flood elevation. Consequently, the area within the West Ash Pond berm is more correctly designated as occurring outside the 100-year floodplain but within the 500-year floodplain.

The proposed laydown area would be located south of the Ensley Levee at Mississippi River Mile 725.2 and is protected from river flooding by the Ensley Levee. As such it is protected from inundation from the Mississippi River 100-year flood.

Figure 3-6. Floodplains within the ALF Ash Impoundment Closure Project Areas

3.6.2 Environmental Consequences

As a federal agency, 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 (U.S. Water Resources Council 1978). The EO requires that agencies avoid the 100-year floodplain unless there is no practicable alternative. For certain "critical actions", the minimum floodplain of concern is the 500-year floodplain.

The U.S. Water Resources Council defines "critical actions" as "any activity for which even a slight chance of flooding would be too great" (U.S. Water Resources Council 1978). Critical actions can include facilities producing hazardous materials (such as liquefied natural gas terminals), facilities whose occupants may be unable to evacuate quickly (such as schools and nursing homes), and facilities containing or providing essential and irreplaceable records, utilities, and/or emergency services (such as large power-generating facilities, data centers, hospitals, or emergency operations centers). CCR material could enter floodplains and streams and alter the flood-carrying capacity of those streams, and thus create an added dimension to a disaster.

3.6.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, no closure activities would occur; therefore, there would be no change to the existing conditions. The existing berms would be maintained as part of ongoing care and maintenance of the TVA facility. Therefore, there would be no project related direct or indirect impacts to floodplains because there would be no physical changes to the current conditions.

As discussed in the Ash Impoundment Closure PEIS (TVA 2016b), flood events greater than a 500-year flood could potentially occur at the ALF site that could inundate the surface impoundments at ALF. Material within the impoundments could potentially be washed out of the ponds and into the receiving stream. The downstream extent of ash deposition in the receiving stream would be dependent upon the nature of both the flood event and the amount of ash released. Based upon hydraulic modeling done following the release of ash at the Kingston coal-fired plant in 2008, ash deposition in certain receiving streams may result in a potential increase in upstream flood elevations (TVA 2009). However, because of the magnitude of the Mississippi River at ALF, this potential effect is not expected.

3.6.2.2 Alternative B – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in an Offsite Landfill Location

Closure-by-Removal of the East Ash Pond Complex by removing the ash to an offsite landfill would be consistent with EO 11988, because the East Ash Impoundment Complex is located outside the 100-year floodplain. Closure-by-Removal of the West Ash Impoundment and Metal Cleaning Pond would have a slight beneficial impact on floodplains, because the completed finished elevation of the area would be lower than the 100-year flood elevation. As such the area would again be available for the storage of flood water.

CCR removed from the surface impoundments would be hauled over existing roads or rail lines to an existing, permitted offsite landfill for final disposal. TVA would ensure that disposal of CCR removed from the surface impoundments at ALF to an offsite landfill would not promote unwise use of the floodplain by obtaining documentation from a permitted landfill.

As shown in Figure 3-6 the laydown area would be located outside the designated 100-year floodplain, which would be consistent with EO 11988.

Other minor actions proposed within the East Ash Pond Complex Project Area that would occur within the 100-year floodplain include the abandonment of Outfall 001A, subsurface utility relocation, and potential minor modifications to the Ensley Levee. These actions would not result in the placement of fill in the floodplain, which would be consistent with EO 11988. Additionally, a review of the project by the USACE pursuant to Section 408 of the Rivers and Harbors Act is being conducted by USACE regarding work near the Ensley Levee. Final design details would include placement of fill material in place of excavated CCR to ensure levee stability in accordance with USACE requirements.

Additionally, transport of borrow and CCR materials would be along established roads or rail lines. Consequently, there would be no impact floodplains associated with these component actions.

In consideration of the minor benefits to floodplains associated with the closure of the West Ash Pond and the Metal Cleaning Pond, and the assurance of final design details that would ensure the stability of the Ensley Levee in conjunction with the closure of the East Ash Pond Complex, impacts to floodplains would be minor and slightly beneficial.

3.6.2.3 Alternative C – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in a Beneficial Re-Use Process & Offsite Landfill Location

Activities conducted under primary actions and the transport of borrow associated with Alternative C would result in the similar magnitude and intensity of impact as described for Alternative B, and therefore impacts would be minor and slightly beneficial.

Under this alternative most CCR would be transported over existing roads to a beneficial re-use processing facility for commercial use. Although a specific location for the beneficial re-use processing facility has not been determined, as per the bounding parameters identified in Table 2-10, the facility would be constructed in an area outside the FEMA-mapped 100-year floodplain. As such this component action would be consistent with EO 11988.

3.6.3 Summary of Impacts to Floodplains

As summarized in Table 3-7, TVA has determined that Alternatives B and C would result in minor and slightly beneficial impacts to floodplains and their natural and beneficial values and would be consistent with EO 11988.

To minimize adverse impacts on natural and beneficial floodplain values, the following mitigation measures would be implemented:

- BMPs would be used during construction activities
- TVA would obtain documentation from permitted landfill(s) receiving ash that the ash would be disposed in an area outside the 100-year floodplain
- The beneficial re-use processing facility would be constructed at a location outside the FEMA-mapped 100-year floodplain

Table 3-7. Summary of Impacts to Floodplains

Alternative	Action	Impact	Severity
		Impoundment Closures	
B, C	Impoundment closure	Impacts associated with West Ash Pond closure, minor effects to floodplain areas within East Ash Pond Complex project area	Minor and overall beneficial
		Transport of All CCR to an Offsite Landfill	
B	Truck transport to landfill	No impact	No impact
B	Rail transport to landfill	No impact	No impact
		Borrow Transport to ALF	
B, C	Truck transport to ALF	No impact	No impact
		Transport of CCR to a Beneficial Re-use Processing Facility	
C	Truck transport to beneficial re-use processing facility and to an offsite landfill	No impact	No impact
		Construction and Operation of Beneficial Re-use Processing Facility	
C	Construction and operation of a beneficial re-use processing facility	No impact	No impact

3.7 Vegetation

3.7.1 Affected Environment

The project area is located within the Lower Mississippi Riverine Forest Province (Bailey 1995) of the Mississippi Alluvial Plain Level III ecoregion (Griffith et al. 2001). The province consists of flat to gently sloping broad floodplains and low terraces underlain by alluvium and loess. Prior to being converted to agriculture, this area historically was dominated by bottomland deciduous forest and had an abundance of ash, elm, cottonwood, sugarberry, sweetgum, water tupelo, oak, and bald cypress. Pecan, associated with eastern sycamore, American elm, and roughleaf dogwood, was also regionally present (TVA 2006).

The vegetation within a 5-mile radius surrounding ALF and within the proposed project areas was evaluated with land use/land cover information obtained from the National Land Cover Dataset (NLCD) (USGS 2011). Analysis of the NLCD indicated that land cover within a 5-mile radius of ALF within Shelby County is primarily cultivated crops (9,297.4 acres), woody wetlands (6,456.6 acres), and mixed forest (6,365.6 acres), as shown in Table 3-8 and Figure 3-7.

Table 3-8. Land Use/Land Cover in the West Ash Pond, East Ash Pond Complex, and Laydown Area and Within the Vicinity of ALF

Land Cover Type	Project Areas (acres)[1]	5-mi Radius (acres)[2]
Barren Land	0	221.3
Cultivated Crops	0	9,297.4
Deciduous Forest	5.3	4,252.2
Developed, High Intensity	0	1,404.6
Developed, Low Intensity	75.5	2,930.7
Developed, Medium Intensity	0	2,230.0
Developed, Open Space	5.4	4,129.0
Emergent Herbaceous Wetlands	0.1	236.2
Evergreen Forest	0	44.9
Hay/Pasture	0	138.8
Herbaceous	55.4	117.6
Mixed Forest	0	6,365.6
Open Water	36.3	449.7
Shrub/Scrub	0	503.7
Woody Wetlands	1.5	6,456.6
Total	**179.6**	**38,778.3**

[1]Derived from USGS 2011 supplemented by field surveys and aerial photography
[2]USGS 2011

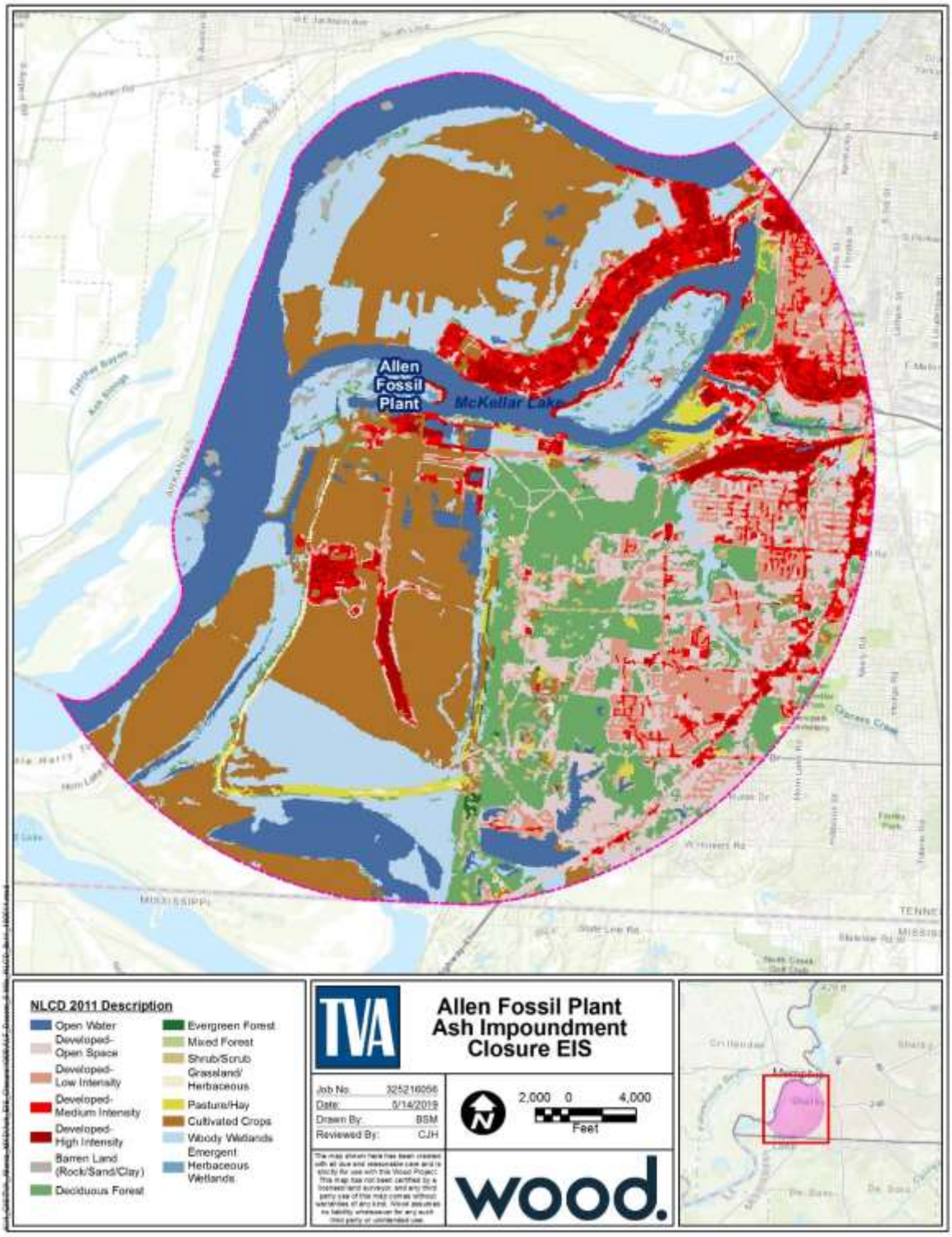


Figure 3-7. Land Cover Types Within a 5-Mile Radius of ALF

The NLCD is based on aerial/satellite observations of large areas based on a spatial resolution of 30-meter pixels and, therefore, is useful for gaining a general understanding of land cover in a region. Land cover within the project areas was developed based upon field observations and aerial photography and is shown on Figure 3-8.

The majority (22 acres) of the 39.5-acre West Ash Pond project area consists of grassland (herbaceous) vegetation, and it lacks surface water under most conditions. The area is characterized mostly by mowed turf grass with small-patch inclusions of early successional weeds. Several small cottonwood trees are found both within the impoundment and along the north side of the maintained berm adjacent to McKellar Lake. The Metal Cleaning Pond is an open water feature fringed by a narrow upland border of early successional scrub and ruderal vegetation.

The proposed 2.7-acre laydown area is mowed field characterized by weedy species including Johnson grass, false dandelion, pokeweed, vasey grass, brome grass, and sneezeweed (TVA 2006). The laydown area also includes a small gravel parking area (0.8 acre).

The largest proportion of land cover in the 137.4-acre East Ash Pond Complex project area is developed land (64.6 acres), followed by open water (34.3 acres), grassland/herbaceous (31.5 acres), deciduous forest (5.3 acres), woody wetlands (1.5 acres), and emergent herbaceous wetlands (0.1 acre). A few small saplings of cottonwood, sycamore, and black willow occur in portions of the East Ash Pond Complex project area. Emergent plant species established within the pond include common reed, cattails, water primrose and water lily. Some small shrubs, primarily eastern baccharis, were found throughout the drier areas of the complex. Vegetation of the perimeter roads, dike roads, and mowed areas adjacent to roads within and surrounding the East Ash Pond Complex project area include Johnson grass, white clover, crabgrass, and Bermuda grass (Amec Foster Wheeler 2017). A narrow linear strip of deciduous forest is associated with the south shore of McKellar Lake. Additionally, the fringe of Horn Lake Cutoff, east of the Stilling Pond, is characterized by common trees along the perimeter of the open water zone including boxelder, green ash, sycamore, eastern cottonwood and black willow. The herbaceous component of this area is dominated by sedges, slender rush, swamp rose mallow, and cattails (Amec Foster Wheeler 2017).

Executive Order 13751 (Safeguarding the Nation from the Impacts of Invasive Species [2016]) 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 previously disturbed areas such as those within the vicinity of ALF. Some of the invasive plant species observed within the East Ash Pond Complex project area during June 2017 surveys include Japanese honeysuckle, Johnson grass, and common reed (Amec Foster Wheeler 2017).

Based on a desktop review coupled with site reconnaissance, no unique plant communities are present within the proposed project areas at ALF. No federally listed plant species are known to occur in Shelby County, and for those state listed species with historical records in the county, little potential habitat for them is known to occur within ALF (see Section 3.10 Threatened and Endangered Species).

Figure 3-8. Land Cover Types Associated with Ash Impoundments, Metal Cleaning Pond, and Laydown Yards at ALF

3.7.2 Environmental Consequences

3.7.2.1 Alternative A – No Action Alternative

Under this alternative, no closure activities would occur. As a result, no new work would be conducted that would result in the loss or disturbance of vegetation, and therefore no project-related environmental impacts to vegetation would occur.

3.7.2.2 Alternative B – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in an Offsite Landfill Location

Potential vegetation impacts within the project areas would result from earthmoving activities related to closure of the surface impoundments. While most of the existing herbaceous vegetation would be disturbed during construction activities, impacts to larger trees within the East Ash Pond Complex project area would be avoided. Since the surface impoundments are largely characterized by low-quality, early successional plant communities and maintained lawn, impacts to the quality or stability of local vegetation resources is minor. In order to reduce the initial severity of invasive species establishment, exposed backfilled sites within the former ash ponds would be re-seeded with a pre-approved non-invasive herbaceous mix. However, it is unlikely that native plants would establish to the point of effectively excluding adventive weedy and invasive species or develop into a natural plant community. Consequently, this option is expected to result in short term impacts to existing disturbed land cover types, and long-term impacts to the vegetation are expected to be negligible.

Vegetation impacts would occur in the laydown area due to vehicle and equipment parking and material storage during construction. Post construction, the laydown area would revert to its original use; consequently, any impacts to the vegetation resulting from equipment movement and storage are expected to be short term and minor.

Potential indirect impacts to vegetation relate to the transportation of CCR excavated from the surface impoundments and transported to an offsite landfill. CCR transported by truck or rail would use previously constructed roads or railways. Additional trucks and rail cars hauling CCR materials along the routes to the landfill would potentially result in minor increases of fugitive dust. However, BMPs such as covered loads to prevent dust deposition on vegetation, use of paved roads and existing rail lines and responsible equipment maintenance would be implemented as appropriate to minimize impacts.

Similar to the offsite transport of CCR, potential indirect impacts on vegetation adjacent to the haul routes to transport borrow material to ALF would include deposition of fugitive dust and exhaust emissions that could indirectly impact vegetation resources along the route. BMPs such as covered loads and equipment maintenance would be implemented as appropriate to minimize impacts. Therefore, indirect impacts to vegetation are expected to be negligible.

Impacts to vegetation under this alternative would not affect any species or communities with special conservation value. Weedy, early-successional communities that characterize the project areas would quickly re-establish following closure or would be replaced by non-invasive herbaceous cover types as part of site restoration.

3.7.2.3 Alternative C – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and West Ash Pond; Disposal of CCR in a Beneficial Re-Use Process & Offsite Landfill Location

Under Alternative C, impacts associated with closure activities identified in the East Ash Pond Complex and West Ash Pond project areas would be similar to those identified under Alternative B and would be minor.

A specific site for the potential beneficial re-use processing facility has not been identified. According to the proposed bounding characteristics listed in Table 2-10, the facility would be preferentially constructed on previously disturbed land. Potential site development activities under the bounding condition would result in disturbance of up to 15 acres of lands with minimal impacts to forested land cover types.

Potential indirect impacts to vegetation occurring near the haul routes could include the deposition of dust from the transportation of CCR material to the facility. To minimize these impacts, materials would be covered during transportation to reduce the release of dust particulate matter. Indirect impacts associated with offsite transport of beneficiated product is not anticipated given the nature of the product and the use of pneumatic trucks.

Therefore, disturbance to vegetation is expected to be limited to ubiquitous, common, and/or weedy species and assemblages. Loss of these resources is not expected to impact the status of any individual plant species or community type locally. Therefore, based on the bounding attributes identified in Tables 2-9 and 2-10, impacts to vegetation from the construction and operation of the proposed beneficial re-use processing facility would be minor.

3.7.3 Summary of Impacts to Vegetation

As summarized in Table 3-9, TVA has determined that all impacts to vegetation related to the primary action and associated component actions associated with the proposed ash impoundment closures at ALF would be minor.

Table 3-9. Summary of Impacts to Vegetation

Alternative	Action	Impact	Severity
		Impoundment Closures	
B, C	Impoundment closure	Loss of low-quality early successional, weedy, herbaceous communities and plant species.	Minor short term impact to herbaceous communities; negligible long term improvement of resource following removal of CCR and seeding of non-invasive species.
		Transport of All CCR to an Offsite Landfill	
B	Truck transport to landfill	Potential indirect impacts from deposition of fugitive dust on vegetation.	Negligible impacts minimized with the use of BMPs, including covered loads, transport on paved roads and equipment maintenance.
B	Rail transport to landfill	Potential indirect impacts from deposition of fugitive dust on vegetation.	Negligible impacts minimized with the use of BMPs, including covered loads, transport on existing rail lines and equipment maintenance..
		Borrow Transport to ALF	
B, C	Truck transport to ALF	Potential indirect impacts from deposition of fugitive dust on vegetation.	Negligible impacts minimized with the use of BMPs, including covered loads, transport on paved roads, roads and equipment maintenance.
		Transport of CCR to a Beneficial Re-use Processing Facility	
C	Truck transport to beneficial re-use processing facility and to an offsite landfill	Potential indirect impacts from deposition of fugitive dust on vegetation.	Negligible impacts minimized with the use of BMPs, including covered loads transport on paved roads, roads and equipment maintenance.
		Construction and Operation of Beneficial Re-use Processing Facility	
C	Construction and operation of a beneficial re-use processing facility	Removal of up to 15 acres of low-quality habitat during facility construction; emissions associated with operation of facility.	Minor due to selection of previously disturbed site with little to no forested areas impacted.

3.8 Wildlife

3.8.1 Affected Environment

The proposed project areas for the ash impoundment closures have been heavily impacted and altered due to former construction and operation of ALF. As described in Section 3.7 vegetation, plant communities in these areas have been heavily disturbed; consequently, the wildlife communities associated with these habitats consist of common species that readily adapt to utilizing disturbed habitats.

The East Ash Pond Complex project area consists of developed land, herbaceous species opportunistically established within the East Ash Pond Complex, some small saplings and shrubs, open water with a vegetated fringe, and a small forested wetland just southeast of the east Stilling Pond berm (Horn Lake Cutoff) (see Figure 3-8). The open water and shallow vegetated areas of the East Ash Pond Complex provide low quality habitat and foraging opportunities for aquatic birds, amphibians, and mammals. Wading birds and waterfowl, including great blue heron, green heron, great egret, and mallard, have been observed using edges of open water in this area.

The West Ash Pond project area includes terrestrial habitat with some scattered, small cottonwood trees, both within the impoundment and along the north side of the maintained berm adjacent to McKellar Lake, and ruderal/early successional habitat consisting of non-native weedy species. It is not currently inundated and does not provide habitat for wading birds. Limited areas with standing water from rainfall within the West Ash Pond could provide seasonal habitat for a variety of amphibians and reptiles, such as bullfrogs, cricket frogs, and American toads. The Metal Cleaning Pond contains open industrial water and provides limited habitat for aquatic birds and other aquatic wildlife. The proposed laydown area consists of disturbed and mowed herbaceous vegetation.

The herbaceous early successional habitats within the proposed project areas may provide some limited nesting and foraging habitat for common grassland and shrubland bird species and small mammals. Birds commonly observed in urban landscapes with early successional habitat interspersed with human infrastructure include killdeer, indigo bunting, gray catbird, northern mockingbird, northern cardinal, eastern bluebird, American goldfinch, European starling, mourning dove, house sparrow, house finch, common grackle, song sparrow, field sparrow, and American robin. Red-tailed hawk and American kestrel also forage along road rights-of-way and other early successional areas. Mammals routinely observed in this type of landscape include Virginia opossum, raccoon, eastern cottontail, white-tailed deer, eastern mole, woodchuck, and rodents such as white-footed mouse and hispid cotton rat. Common reptiles include black racer, black rat snake, and eastern garter snake (TWRA 2019a). During the 2017 site visit, several of these common wildlife species were observed within and adjacent to the project areas (Amec Foster Wheeler 2017).

Important Bird Areas in Tennessee are designated by the Tennessee Wildlife Resources Agency (TWRA), partnered with the National Audubon Society's Audubon Important Bird Area program, and are identified as being important for the conservation of bird populations. The proposed project areas and temporary laydown area are included within the boundaries of the Ensley Bottoms Complex, part of the Mississippi Alluvial Valley in the Tennessee Important Bird Areas Program. According to the Tennessee Important Bird Areas Program website, the Ensley Bottoms Complex contains sewage “sludge treatment ponds, fields for drying sludge, some agricultural experimental plots, industrial areas, agricultural fields, lakes, grasslands, and bottomland forest.” It also includes the West Ash

Pond and East Ash Pond Complex project areas, McKellar Lake, Presidents Island Wildlife Management Area north of McKellar Lake, T. O. Fuller State Park, the T.E. Maxson WWTP, and other public and private lands in the vicinity of ALF. One of the few breeding populations of painted buntings in Tennessee is found in the Ensley Bottoms Complex, in scrubby forested lands that lie west and south of ALF (TN IBA 2019; eBird 2019). The Ensley Bottoms Complex is also “the most important shorebird site in Tennessee and one of the most important inland shorebird sites in the southeast.” In addition, waterfowl (ducks, geese, and swans) are common and “the Mississippi River is a major migration corridor for American White Pelicans, raptors, wading birds, gulls, and terns” (TN IBA 2019).

One heron rookery has been documented by the Tennessee Natural Heritage Program and the TVA Regional Natural Heritage database approximately 3.5 miles from ALF (TDEC 2019c, TVA 2018). No heron colonies are known to occur in the project areas, and none were observed during the June 2017 site visit. Review of the TVA Regional Natural Heritage database resulted in no records of caves or any other unique terrestrial habitat within 3 miles of the proposed project areas. Should wading bird colonies or caves be identified during impoundment closure activities, actions would be taken to preserve these resources.

Review of USFWS Information for Planning and Consultation (IPaC) database (https://ecos.fws.gov/ipac/) resulted in identification of twelve migratory birds of conservation concern that have the potential to be impacted by the proposed actions: least tern, American golden-plover, bald eagle, cerulean warbler, Kentucky warbler, Le Conte's sparrow, lesser yellowlegs, prothonotary warbler, red-headed woodpecker, rusty blackbird, semi-palmated sandpiper, and wood thrush. Two species of birds, the lark sparrow and Mississippi kite, that are known to occur within three miles of the proposed project areas (TVA 2018; eBird 2019), were previously listed by the TWRA as “in need of management”; however, they were removed from this list in 2018 (TWRA 2018). These species are still species of concern as protected migratory birds under the Migratory Bird Treaty Act. Ospreys, which are also protected under the Migratory Bird Treaty Act, are also known to occur in the vicinity of the project. An active osprey nest was recently documented on top of a mooring cell structure in McKellar Lake, approximately 600 feet northwest of the East Ash Pond Complex. In addition, shorebirds use the ash impoundments within the proposed project area. Information regarding threatened and endangered species within and surrounding the project site can be found in Section 3.10.

3.8.2 Environmental Consequences

3.8.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not close any impoundments at ALF. Therefore, no project-related environmental impacts with respect to wildlife would occur under this alternative.

3.8.2.2 Alternative B – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in an Offsite Landfill Location

Under this alternative, proposed ash impoundment closure activities would occur within a highly disturbed and fragmented industrial landscape that offers minimal habitat for wildlife. Suitable scrubby forested habitat for the painted bunting would not be affected by project activities. Similarly, no deciduous forested lands that would be suitable for neotropical migrant bird species including cerulean warbler, Kentucky warbler, prothonotary warbler,

and wood thrush would be impacted. Although the Ensley Bottoms Complex is noted to be an important shorebird site in Tennessee and one of the most important inland shorebird sites in the southeast, the closure of the East Ash Pond Complex would only result in a loss of marginally suitable waterfowl, marsh bird, and wading bird habitat. Higher quality shorebird and waterfowl habitat exists elsewhere in the project vicinity, including sandbars on the Mississippi River, McKellar Lake, and the Horn Lake Cutoff area. The proposed actions also may result in a loss of a small amount of marginally suitable herbaceous early successional and shallow vegetated/open water habitat for other wildlife species common to the area, including reptiles and amphibians. However, higher quality wetlands and herbaceous habitats for these species are available in the vicinity within the Horn Lake Cutoff area, T.O. Fuller State Park, Presidents Island Wildlife Management Area, and numerous Wetlands Reserve Program Conservation Easements along the Mississippi River. Therefore, given the disturbed nature of the project area, any impacts would be minor and would not have measurable impacts to overall populations of any wildlife species, including migratory birds of conservation concern. Resident and migratory wildlife found in the project areas would continue to opportunistically use available habitats within the areas surrounding ALF.

Direct temporary effects to some individuals may occur in project areas if those individuals are immobile during the time of construction, especially if closure activities would occur during breeding/nesting seasons as the species are less mobile during those times. Limited clearing of trees would occur in conjunction with closure activities, including 45 to 50 scattered trees within the West Ash Pond and some small saplings within the East Ash Pond Complex. No trees would be removed from the area north of the East Ash Pond Complex or from the forested wetland area east of the East Ash Pond Complex. Although a December 2015 field review of the trees within the West Ash Pond determined that the trees do not represent suitable summer roosting habitat for federally listed bat species, tree removal would be seasonally restricted to avoid nesting and roosting seasons of birds and bats. As a result, potential impacts to tree roosting/nesting bird or mammal species would be minimized.

There is an osprey nest located north of the East Ash Pond Complex on a mooring cell structure in McKellar Lake. This nest was constructed in early spring 2019 but then abandoned in May 2019, likely due to a strong storm that damaged the nest. Should the nest be active in future years, ash pond closure activities would be minimized within a 660-foot buffer around the nest during the osprey nesting season. Although the northwest corner of the East Ash Pond Complex project area is included within this buffer, only minor activities are proposed for this small area, such as utility relocation and/or silt fencing. Osprey nest removal would not be required as part of the impoundment closures, as the nest does not fall within the project area boundary. These avoidance measures would result in no adverse impacts to these birds. TVA may elect to remove the osprey nest during the non-nesting season in conjunction with other on-going site decommissioning activities unrelated to ash pond closure. As such, TVA would ensure nest removal would follow guidance from the U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services Program.

The proposed temporary laydown area is located on land previously disturbed, fragmented, and of poor quality for use by wildlife. During use of the laydown area, wildlife habituated to the area are expected to move to other plentiful suitable environments offsite; however, as described above, immobile species may be impacted. Post construction, this area would

return to its previous state. Impacts to wildlife utilizing this area would be minor and temporary.

CCR excavated from the impoundments at ALF would be transported via truck or rail for disposal to an existing offsite permitted landfill. In addition, borrow material would be transported by truck to the project areas from a previously permitted borrow site. Therefore, component actions consisting of the transport of CCR offsite and the transport of borrow onsite would not result in in additional impacts to offsite wildlife and habitats.

Lands within the former ash impoundments would be restored using approved, noninvasive seed mixes designed to establish desirable vegetation that would support periodic use by wildlife. Following construction these lands may be expected to be maintained in as an herbaceous plant community that may offer low quality value for upland wildlife species. As such, ash impoundment closure may be expected to offer a minor beneficial impact for common upland wildlife species that have adapted to industrial/urban areas.

While the proposed actions under Alternative B would result in alteration of habitats and displacement of resident wildlife species, these effects are not expected to result in notable alteration or destabilization of populations of any species. In consideration of the highly disturbed habitats present within the project areas, and the availability of higher quality wildlife habitat in proximity, potential direct and indirect impacts to wildlife would be minor.

3.8.2.3 Alternative C – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and West Ash Pond; Disposal of CCR in a Beneficial Re-Use Process & Offsite Landfill Location

Impacts associated with closure of impoundments, transport of CCR offsite, and transport of borrow material onsite would be the similar to those identified under Alternative B and would be minor.

A specific site for the potential beneficial re-use processing facility has not been identified. However, according to the bounding attributes listed in in Table 2-10, previously disturbed industrial land is preferred for construction of the facility, disturbance of rare/sensitive vegetation communities would be avoided, and removal of forested lands would be avoided. As such, although construction and operation of the beneficial re-use processing facility would result in alteration of habitats and displacement of common wildlife species, these effects are not expected to result in notable alteration or destabilization of populations of any species. Therefore, impacts to wildlife resulting from the construction and operation of the proposed beneficial re-use processing facility, would be minor.

3.8.3 Summary of Impacts to Wildlife

As summarized in Table 3-10, TVA has determined that all impacts to wildlife related to the proposed primary and component actions for the proposed ash impoundment closures at ALF are minor.

Table 3-10. Summary of Impacts to Wildlife

Alternative	Action	Impact	Severity
		Impoundment Closures	
B, C	Impoundment closure	Loss of low quality open water, CCR impoundment and maintained area habitats and displacement of common wildlife species. Impacts to active osprey nests would be avoided.	Minor adverse impacts in the short-term, due to the abundance of high quality wildlife habitat near ALF. Beneficial impact to common upland species in the long-term.
		Transport of All CCR to an Offsite Landfill	
B	Truck transport to landfill	No impact.	No impact.
B	Rail transport to landfill	No impact.	No impact.
		Borrow Transport to ALF	
B, C	Truck transport to ALF	No impact.	No impact.
		Transport of CCR to a Beneficial Re-use Processing Facility	
C	Truck transport to beneficial re-use processing facility and to an offsite landfill	No impact.	No impact.
		Construction and Operation of Beneficial Re-use Processing Facility	
C	Construction and operation of a beneficial re-use processing facility	Potential removal of up to 15 acres of low quality habitat associated with facility construction.	Minor due to small scale disturbance and the avoidance of sensitive, rare, and forested habitat for development.

3.9 Aquatic Ecology

3.9.1 Affected Environment

ALF is located southwest of downtown Memphis, Tennessee just 1.8 miles east of the Mississippi River (River Mile 725) immediately adjacent to McKellar Lake. McKellar Lake is an oxbow lake, a lake formed in the bend of a river, which has a watershed area of 2,176 acres.

Fish are the top of the trophic ladder in most aquatic ecosystems and can be an indicator of biological integrity (Fausch et al. 1990). The fish community in McKellar Lake has been repeatedly evaluated by TVA during electrofishing sampling in 1974 (TVA 2007), entrainment monitoring in 1975 (as cited in TVA 2014), impingement monitoring in 1974 to 1976 (TVA 2007), cove rotenone sampling in 1979 and 1980 (as cited in TVA 2014), and

additional impingement monitoring in 2005 to 2007 (TVA 2007). These studies found the fish community of McKellar Lake consisted primarily of warmwater species with a mix of both lake and riverine species due to the proximity and connectivity to the Mississippi River. The community also included a large number of both prey and predatory species, indicating a relatively balanced ecosystem. However, as discussed in Section 3.5 Surface Water Resources, reduced water quality due to sedimentation and historic contamination from multiple industrial users has led to the listing of McKellar Lake in the state's CWA Section 303(d) list for impaired waterbodies (TDEC 2018b). The entire lake is listed with a fish consumption impairment due to elevated levels of chlordane, other organics, and mercury (TDEC 2018a). Sources of impairment may include storm water runoff from numerous industrial facilities and urban development in the area, sanitary sewer overflows, dredging for navigation channels, contaminated sediments, and discharges from separate municipal storm sewer systems.

Entrainment monitoring that focused on the identification of larval fish and eggs at ALF in 1975 identified fishes belonging to seven families (TVA 2014). Collections were dominated by fishes more typical of a riverine environment including shad, suckers, minnows, and freshwater drum. Rotenone sampling in 1979 and 1980 produced a total catch of 45 species including 15 commercially valuable and 21 recreationally valuable species (TVA 2014). Gizzard shad was the dominant species by number and biomass. Other species collected are listed below:

- Common centrarchid (sunfish) species present at ALF included black crappie, white crappie, bluegill, green sunfish, longear sunfish, orangespotted sunfish and warmouth

- Benthic invertivore (fish that primarily feed on invertebrates) species were dominated by freshwater drum

- Top carnivore species present included white bass, yellow bass, striped bass, spotted bass, largemouth bass, black crappie, white crappie, sauger, spotted gar, bowfin, black bullhead catfish, walleye, yellow bullhead catfish, channel catfish and flathead catfish (TVA 1995)

Impingement of fishes collected on ALF traveling water screens was monitored during 2005 to 2007 and compared with historical data collected during 1974 to 1976 (TVA 2007). Gizzard shad were the most abundant species collected in both studies, followed by other herring species, and freshwater drum. Notably, silver carp presence began in 2005 to 2006 and were a larger proportion of the catch for both years combined.

Overall, the species composition found in the above referenced studies for McKellar Lake was typical of a warmwater community commonly found in this section of the Mississippi River watershed.

Discharges from ALF are permitted and in compliance with the required water quality standards set forth under the existing NPDES permits that are designed to be protective of aquatic life in receiving waters (McKellar Lake). Therefore, regulated discharges from the East and West Ash Impoundments are likely having little impact to the McKellar Lake ecosystem. The West Ash Impoundment no longer impounds water, while the East Ash Impoundment and the Metal Cleaning Pond are considered treatment systems and not aquatic habitat. Aside from McKellar Lake and the Horn Lake Cutoff, there are no other

waters directly adjacent to the ash impoundments and Metal Cleaning Pond. Horn Lake Cutoff does not hold water year-round and thus is expected to provide only seasonal habitat for aquatic species.

Nearby water resources that are crossed by the local transportation network include Nonconnah Creek (east of ALF) and Horn Lake Creek (south of ALF). These and other stream systems in the vicinity would be expected to have an aquatic community consisting of warmwater fishes typical of Coastal Plain streams (Etnier and Starnes 1993). Both Nonconnah Creek and Horn Creek are listed as 303(d) impaired because of degraded water quality and physical habitat alteration (TDEC 2018b).

3.9.2 Environmental Consequences

3.9.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, no closure activities would occur and there would be no additional construction activities or offsite transport. As a result, no activities would be conducted that would potentially alter project-related environmental conditions within the project area. Therefore, there would be no impacts to aquatic resources.

3.9.2.2 Alternative B – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in an Offsite Landfill Location

Under the primary action considered as part of Alternative B, no direct impacts are expected to occur to aquatic ecosystems for the Closure-by-Removal of the East Ash Pond Complex and Metal Cleaning Pond. Because these ponds are considered treatment systems and not aquatic habitats, direct impacts to aquatic habitat would be avoided with closure activities. All construction activities to drain and remove CCR from the impoundments would adhere to NPDES permit requirements, follow standard operating procedures, and use BMPs to minimize potential impacts to aquatic resources in McKellar Lake and Horn Lake Cutoff. The proposed closure of the East Ash Pond Complex would include the installation of two storm water outfalls that would drain into the Horn Lake Cutoff.

The existing Outfall 001 and Outfall 001A would no longer be in use and would be removed, which would likely consist of a combination of excavation and demolition of the existing outfall pipes and/or placement of graded aggregate/rip-rap. Actual impacts to surface waters in conjunction with the placement of rip-rap are expected to be either avoided entirely or very minor. However, for any potentially affected areas below the active waterline, mobile aquatic biota, such as fish, would be displaced temporarily during outfall removal activities along the McKellar Lake shoreline but would quickly re-establish following these activities. Less mobile aquatic organisms (aquatic macroinvertebrates) would be directly impacted by the removal of the outfall. However, the area of impact would be small and macroinvertebrate species would repopulate quickly. These activities would be designed to minimize impacts to the aquatic resources (McKellar Lake) and meet the terms and conditions of applicable USACE and TDEC permits.

Potential indirect impacts to aquatic resources (McKellar Lake and Horn Lake Cutoff) could result from storm water runoff. However, surface water runoff during construction activities could be mitigated through the implementation of storm water erosion controls in accordance with an SWPPP, which will be prepared for this project. To minimize the potential of sedimentation due to storm water runoff, BMPs would be implemented in

accordance with the SWPPP. Such BMPs could include site-specific designs that consist of the placement of riprap rock at the new outfalls to function as storm water runoff dissipation to reduce scour and erosion near the outfalls.

Additionally, transport of borrow and CCR materials would be along established roads or rail lines and as such are not expected to impact aquatic ecosystems. Materials transported would be covered during transportation to reduce the release of dust particulate matter. Consequently, there would be no indirect impacts to aquatic ecosystems with regards to unforeseen storm water runoff or transport of borrow and CCR materials over any watersheds along the haul routes.

Disposal of CCR would use an existing permitted landfill. As such, no impacts to aquatic ecosystems would occur in conjunction with disposal activities.

Because this alternative would avoid direct impacts to aquatic resources and incorporate appropriate designs to minimize indirect effects, impacts to aquatic resources associated with Alternative B are considered to be minor.

3.9.2.3 Alternative C – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and West Ash Pond; Disposal of CCR in a Beneficial Re-Use Process & Offsite Landfill Location

Under Alternative C, impacts associated with closure activities identified in the East Ash Pond Complex and West Ash Pond project areas would be similar to those identified under Alternative B and would be minor.

The construction and operation of the beneficial re-use processing facility may impact aquatic resources depending on the aquatic resources present on the site selected for the facility. However, based on the bounding characteristics identified in Table 2-10, it is expected that the site selected for construction of the beneficial re-use processing facility would not contain substantial aquatic resources, and overall disturbances to aquatic resources would be avoided or minimized. Any potential unavoidable impacts to aquatic resources are expected to be minimized to the extent that the action would qualify for appropriate permit requirements.

As such, although construction and operation of the beneficial re-use processing facility may potentially result in minor localized alteration of aquatic habitats, these effects are not expected to result in notable alteration or destabilization of populations of any aquatic species. Therefore, impacts to aquatic ecosystems resulting from the construction and operation of the proposed beneficial re-use processing facility would be minor.

3.9.3 Summary of Impacts to Aquatic Ecology

As summarized in Table 3-11, TVA has determined that aquatic ecology impacts related to the primary action and associated component actions for the proposed ash impoundment closures at ALF are minor. Any unavoidable direct impacts to aquatic resources would be mitigated as required by both state and federal agencies in accordance with Section 404 of the CWA.

Table 3-11. Summary of Impacts to Aquatic Ecology

Alternative	Action	Impact	Severity
		Impoundment Closures	
B, C	Impoundment closure	Potential indirect impacts to the McKellar Lake and Horn Lake Cutoff could include sedimentation from storm water during Closure-by-Removal process.	Minor and localized. BMPs would be implemented in accordance with site-specific BMPs and erosion control plans.
		Potential direct impacts to McKellar Lake from outfall removal activities.	Minor and localized. Mobile aquatic biota would be temporarily displaced but would quickly re-establish. Less mobile aquatic organisms would be directly impacted. Activities would be designed to minimize impacts to McKellar Lake and meet the terms and conditions of applicable USACE and TDEC permits.
		Transport of All CCR to an Offsite Landfill	
B	Truck transport to landfill	No impact.	No impact.
B	Rail transport to landfill	No impact.	No impact.
		Borrow Transport to ALF	
B, C	Truck transport to ALF	No impact.	No impact.
		Transport of CCR to a Beneficial Re-use Processing Facility	
C	Truck transport to beneficial re-use processing facility and to an offsite landfill	No impact.	No impact.
		Construction and Operation of Beneficial Re-use Processing Facility	
C	Construction and operation of a beneficial re-use processing facility	Potential aquatic resource impacts based on final site determination.	Minor. Site would be selected that does not contain substantial aquatic resources, and overall disturbances to aquatic resources would be minimized. Any unavoidable impacts would be permitted through the appropriate federal and state agencies.

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. 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 federally listed under the ESA. The listing of species is managed by TDEC, which considers listing recommendations from the TWRA. Additionally, the TDEC Natural Heritage Program and TVA both maintain databases of species that are considered threatened, endangered, special concern, or are otherwise tracked in Tennessee.

The TVA Natural Heritage database indicated records for three federally protected species (bald eagle, interior least tern, and piping plover) within a 3-mile radius of ALF, and two species designated as rare or listed by TDEC (striped whitelip snail and blue sucker) within a 10-mile radius (as indicated by asterisks in Table 3-12). Review of the USFWS IPaC website (USFWS 2019b) identified two additional federally listed species, the Indiana bat (*Myotis sodalis*) and the northern long-eared bat (*Myotis septentrionalis*), that have the potential to occur in the proposed project areas, though no records in Shelby County are known to date. TDEC lists a total of 26 species listed as rare in Tennessee that are known to occur in Shelby County (Table 3-12) (TDEC 2019c).

No state- or federally listed plant species or designated critical habitats have been documented within a 5-mile vicinity of ALF. Additionally, no federally listed plant species are known to occur in Shelby County, Tennessee.

Table 3-12. Species of Conservation Concern Documented to Occur in Shelby County, Tennessee and Federally-Listed Species with Potential to Occur in Shelby County, Tennessee

Common Name	Scientific Name	Status		Suitable Habitat Present[4]
		Federal[1]	State[2] (Rank[3])	
Birds				
Bald eagle*	*Haliaeetus leucocephalus*	DM	D (S3)	N
Bell's vireo	*Vireo bellii*	--	Rare (S1B)	N
Bewick's wren	*Thryomanes bewickii*	--	D (S1)	N
Cerulean warbler	*Dendroica cerulea*	--	D (S3B)	N
Interior least tern*	*Sterna antillarum athalassos*	LE	E (S2S3B)	Y
Piping plover*	*Charadrius melodus*	LT		Y
Swainson's warbler	*Limnothlypis swainsonii*	--	D (S3)	N
Mammals				
Eastern woodrat	*Neotoma floridana illinoensis*	--	D (S3)	N
Indiana bat[5]	*Myotis sodalis*	LE	E (S1)	P
Northern long-eared bat[5]	*Myotis septentrionalis*	LT	T (S1S2)	P
Reptiles				
Northern pinesnake	*Pituophis melanoleucus*	--	T (S3)	N
Insects				
Bronze copper	*Lycaena hyllus*	--	Rare (S3)	P (Limited)
Amphibians				
Southern cricket frog	*Acris gryllus*	--	Rare (S2S3)	P (Limited)
Mollusks				
Fatmucket	*Lampsilis siliquoidea*	--	Rare (S2)	N
Southern hickorynut	*Obovaria jacksoniana*	--	Rare (S1)	N
Striped whitelip*	*Webbhelix multilineata*	--	Rare (S2)	N
Fish				
Blue sucker*	*Cycleptus elongatus*	--	T (S2)	N
Naked sand darter	*Ammocrypta beani*	--	D (S2)	N
Piebald madtom	*Noturus gladiator*	--	D (S3)	N
Plants				
American ginseng	*Panax quinquefolius*	--	S-CE (S3S4)	N
Cedar elm	*Ulmus crassifolia*	--	S (S2)	N
Copper iris	*Iris fulva*	--	T (S2)	N
Featherfoil	*Hottonia inflate*	--	S (S2)	N
Harvey's beakrush	*Rhynchospora harveyi*	--	T (S1)	N
Multiflowered mud-plantain	*Heteranthera multiflora*	--	S (S1)	N
Ovate catchfly	*Silene ovata*	--	E (S2)	N
Red starvine	*Schisandra glabra*	--	T (S2)	N
Sweetbay magnolia	*Magnolia virginiana*	--	T (S2)	N
Willow aster	*Symphyotrichum praealtum*	--	E (S1)	N

Common Name	Scientific Name	Status		Suitable Habitat Present[4]
		Federal[1]	State[2] (Rank[3])	

Sources: TVA 2018b, TDEC 2019c, and USFWS IPaC 2019b

[1] Federal Status Codes:
DM = Delisted, Recovered, and Being Monitored
LE = Listed Endangered
LT = Listed Threatened;
-- = Not Listed by USFWS

[2] State Status Codes:
E = Listed Endangered
S = Species of special concern
T = Listed Threatened
Rare = Rare, but not state listed
D = Deemed in Need of Management
CE = Commercially Exploited

[3] State Rank:
S1 = Critically Imperiled
S2 = Imperiled
S3 = Vulnerable
S4 = Apparently Secure
S#S# = Denotes a range of ranks because the exact rarity of the element is uncertain (e.g., S1S2)
Migratory Species may have separate ranks for different population segments (e.g. S1B, S2N, S4M);
S#B = rank of breeding population
S#N = rank of non-breeding population

[4] Habitat Codes:
Y = Yes, species has been documented in existing habitats within proposed project areas, and suitable habitat is present
N = No, no records of species within proposed project areas and no suitable habitat is present
P = Potentially suitable habitat is present, but no records of species in proposed project areas

[5] Federally listed species whose range includes Shelby County, Tennessee, though no records are known from this county.

*Species documented within 3 miles (terrestrial species), 5 miles (plants) or 10 miles (aquatic species) of ALF by the TVA Natural Heritage Database.

3.10.1.1 Wildlife

3.10.1.1.1 Terrestrial Animals

Birds

Bald eagles are protected under the Bald and Golden Eagle Protection Act (USFWS 2019a) and are listed as in need of management (vulnerable) by the state of Tennessee. Bald eagles are typically found near large, open bodies of water such as rivers, lakes, and reservoirs. Bald eagles will nest on cliffs or large trees near water (NatureServe 2019). Suitable nesting and foraging habitats exist along the Mississippi River adjacent to ALF. One bald eagle nest was recorded in 2008, west of ALF on the east bank of the Mississippi River (TVA 2018b). TWRA observed adult eagles at this nest on March 1, 2019 indicating it is still active. The nest is approximately 0.5 mile from the proposed laydown area. Two additional nests near ALF were active from approximately 1999 to 2005 and 2001 to 2005, but they have both since been abandoned and have fallen from their respective trees. Because the trees in the proposed project 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 Mississippi River and McKellar Lake and the known nesting location.

The Bell's vireo is not state- or federally listed, but the breeding population of Bell's vireo is ranked as critically imperiled in Tennessee. Bell's vireo requires scrub-shrub, dense brush, willow thickets, or narrow early successional wooded areas with dense understories such as those often found along small stream corridors (NatureServe 2019). Bell's vireos tend to prefer the above-mentioned habitats if they are scattered within more open grassland or agricultural landscapes versus forest dominated areas. Small fragmented areas of grassland/shrub habitats surrounded by mature forests may be avoided by this species.

Due to the lack of dense vegetation, suitable habitat for this species is not present within the proposed project areas. In addition, no records of Bell's vireo are known to exist within 3 miles of ALF.

The Bewick's wren is state-listed as in need of management (critically imperiled). Bewick's wren occurs in farmyards, brushy areas, 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, fencerows, and pastures (NatureServe 2019). Based on the vegetation in the project areas, it unlikely that these areas would provide suitable habitat, and no occurrences are known within 3 miles of ALF.

The Cerulean warbler is state-listed as in need of management (breeding population is ranked as vulnerable). Cerulean warbler typically nests in forested areas with numerous large trees, although they have been known to use other types of nesting habitat opportunistically. These migratory birds are only found in Tennessee while nesting or as passing migrants. Their non-breeding habitat is in South America (NatureServe 2019). No known occurrences of cerulean warblers have been recorded in the TVA Natural Heritage database within 3 miles of ALF. Due to the presence of large tracts of mature, wooded areas surrounding ALF, it is unlikely that small to mid-sized trees within the proposed project areas would be utilized as nesting habitat.

The interior least tern is federally and state-listed as endangered. The interior least tern nests and forages on open shorelines, riverine sandbars and mudflats throughout the Mississippi and Missouri river drainages (USFWS 2013). Suitable nesting habitat consists of sparsely vegetated areas with sand or gravel substrate that are located near an adequate food supply. Fidelity exhibited by terns across years to a particular site is strongly influenced by the dynamic nature of river hydrology, which may change island size and vegetative cover annually. Least terns also have been documented using inland sites created by humans such as dredge spoil and stilling impoundments associated with coal plants, where site characteristics mimic (to some degree) natural habitat (TVA 2016c).

The interior least tern is a locally common summer resident in Tennessee along the Mississippi River and a rare migrant elsewhere in Tennessee. Individuals begin arriving in early May and are concentrated in the western half the state. Summer nesting colonies of least tern have been documented along the Mississippi River, and at ALF on the banks of the East Ash Pond Complex, including the Stilling Pond and the Coal Yard Runoff Pond, the West Ash Pond, and on roads surrounding the ash impoundments within the project areas at ALF. Predation at these sites was extremely high, such that over 90 percent of the nests failed during previous nesting years. Occurrence of nesting colonies at ALF ash ponds typically coincides with high water levels along the nearby Mississippi River, at which time the more suitable sandy islands, sand bars and river banks are rendered inaccessible due to the high water levels. In 2019, with high water levels in the Mississippi River, terns were observed nesting in the East Ash Pond Complex and the gravel lot surrounding the ACC pond. Nesting success in 2019 has also been extremely low. Despite previous use, the West Ash Pond is no longer suitable for nesting interior least terns due to significant vegetative growth.

The piping plover is federally listed as threatened. The piping plover is a small shorebird, and occurrence of this species is limited to fall and summer migration seasons within the Tennessee Valley Region, where the species is considered a rare fall migrant and

extremely rare spring migrant. Adult female piping plovers typically migrate from summer to winter grounds during July; adult males and juveniles migrate between late August and early September. The frequency of observance of this species within this region has been less than annual, with time spent averaging two days per stay at interior stopover sites. Piping plovers are routinely observed on islands in the Mississippi River near Memphis (TVA 2016c).

Studies of migration ecology suggest that piping plovers do not concentrate in large numbers during migration and that most sightings are of individual birds. Although the species uses a variety of habitats, most interior sites used by piping plovers included reservoir shorelines. Piping plovers were noted to move quickly through the southern states during spring, often overflying southern states. The species appears to select stopover sites opportunistically (USFWS 2003). One piping plover was observed foraging along the East Ash Impoundment Complex project area in 2010. Given the infrequency of occurrence of this species in this region, incidence of piping plover within the project areas is rare.

The Swainson's warbler is state-listed as in need of management (vulnerable). Swainson's warbler nests in areas with dense, shrub vegetation. It is a very secretive bird and is infrequently observed. It is most commonly seen nesting in cane breaks, low floodplain forests, and rhododendron and mountain laurel thickets. Tennessee is within the breeding range of the Swainson's warbler (NatureServe 2019). Due to the lack of dense vegetation within the proposed project areas, it is unlikely that the Swainson's warbler would be found in these areas, and the TVA Natural Heritage database indicated no records of this species within 3 miles of ALF.

Mammals

Bats

The Indiana bat is found throughout much of the eastern half of the United States and has been listed as a federally endangered species since March 11, 1967. It is also listed in Tennessee as endangered. Per the 2019 Range-Wide Indiana Bat Summer Survey Guidelines, "suitable summer habitat for Indiana bats consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags greater than 5 inches in diameter at breast height that have exfoliating bark, cracks, crevices, and/or hollows" (USFWS 2019c). Other summer habitat may include riparian zones, bottomlands, floodplains, wooded wetlands, and adjacent upland forests (USFWS 2007). Individual trees may be considered suitable habitat when they exhibit characteristics of suitable roost trees and are within 1,000 feet of other forested habitat (USFWS 2019c). Tree species that Indiana bats have been known to roost and establish maternity colonies in include hickory (Carya spp.), oak (*Quercus* spp.), elm (*Ulmus* spp.), ash (*Fraxinus* spp.), maple (*Acer* spp.), and poplar (*Populus* spp.) trees. Some tree species, primarily hickories and, to a lesser extent, oaks, provide adequate bark characteristics in living trees. Space between exfoliating bark and the trunk of the tree appear to be the primary characteristic needed for bats to use a particular tree (USFWS 2007). In winter, Indiana bats hibernate in caves or abandoned mines (USFWS 2007). There are no records of caves occurring within 5 miles of ALF (TVA 2018b).

The closest summer record of Indiana bat to the project site occurs in Benton County, Mississippi, within Holly Springs National Forest, which is located approximately 50 miles to the southeast of the proposed project areas. This record is of a roost tree identified by tracking a female Indiana bat during spring migration from a cave in White County, Tennessee, in 2013. The closest winter record of Indiana bat to the proposed project areas is a hibernaculum (suitable winter habitat) greater than 100 miles to the east in Tishomingo County, Mississippi. No Indiana bats have been observed at this location since 1939, and this hibernaculum is no longer thought to be active due to the collapse of the mine in which it occurred (TVA 2016c).

The northern long-eared bat occurs statewide in Tennessee but is now uncommon in the state after the introduction of the fungus causing the deadly disease known as white-nose syndrome has caused dramatic declines in populations of this species. They were federally listed as a threatened species in April of 2015 and are also listed as threatened by the state of Tennessee. In summer months, northern long-eared bats roost singly or in colonies within cavities, underneath bark, crevices, or hollows of both live and dead trees that typically have a diameter at breast height greater than or equal to 3 inches. Northern long-eared bats appear to be opportunistic, selecting trees based on the presence of cavities, crevices, or peeling bark. Northern long-eared bats emerge from their roosts at dusk to forage through the understory of forested hillsides and ridges feeding on insects (USFWS 2015).

Suitable summer habitat for the northern long-eared bat includes a wide variety of forested lands to roost, forage, and travel. This includes forests containing potential roosts such as woodlots, fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit characteristics of suitable roost trees and are within 1,000 feet of other forested habitat. Non-forested foraging habitats may include adjacent emergent wetlands and edges of agricultural fields, old fields, and pastures. Northern long-eared bats typically occupy their summer habitat from mid-May through mid-August (USFWS 2019c). In winter, the northern long-eared bat hibernates underground in caves or other manmade structures such as mines (USFWS 2015).

A December 2015 field review of the trees within the West Ash Pond determined that the trees do not represent suitable summer roosting habitat for the Indiana bat or northern long-eared bat (TVA 2016c). A June 2017 survey did not identify any large trees located within the footprint of the East Ash Pond Complex. Trees located between the East Ash Pond Complex and McKellar Lake and in the Horn Lake Cutoff wetland area did not have exfoliating bark, cracks, or hollows. However, large cottonwoods in these areas have deep crevices that could provide limited summer roosting trees (Amec Foster Wheeler 2017). No suitable winter roosting or hibernacula sites are present within the project areas. Low quality foraging habitats may be present within the project areas for the Indiana bat and northern long-eared bat over forested areas and inundated ash ponds. However, larger, higher quality foraging habitats are available in surrounding areas that would provide more suitable and adequate foraging areas for bats.

Other Mammals

The eastern woodrat is state-listed as in need of management (vulnerable). The eastern woodrat is generally found in forested areas, caves, and rocky outcrops (TWRA 2019a). The geographic range of this species includes Illinois, Missouri, Arkansas, Tennessee, Kentucky, Alabama, Mississippi, Florida, and Louisiana (IDNR 2010). No suitable habitat for this species is present within the proposed project areas.

Reptiles

The northern pinesnake is state-listed as threatened. Northern pinesnakes are egg laying snakes that breed in spring, with hatchlings emerging in late summer. The northern pinesnake's preferred habitat is characterized by xeric, pine or pine-oak dominated woodlands with open understory and sandy soils for burrowing (NatureServe 2019). As no pine or pine oak dominated woodlands are within the project boundaries, no suitable habitat for this species is present within the proposed project areas. No records of this species are known within 3 miles of the project area (TVA 2018b).

Insects

The bronze copper is not listed, but it is ranked as vulnerable in Tennessee. The bronze copper is a butterfly that is found in herbaceous wetlands, including marshes, sedge meadows, moist to wet grassy meadows, ditches, fens, and pondshore wetlands (NatureServe 2019). The areas surrounding the proposed project areas provide potential low quality habitat for this species; however there are no known records within the 3-mile vicinity of ALF.

Amphibians

The southern cricket frog is not listed, but it is ranked as vulnerable to imperiled in Tennessee. Southern cricket frogs inhabit grassy margins of swamps, ponds, ditches, and temporary pools. Reproduction occurs in shallow water (NatureServe 2019). Potential low-quality habitat for this species exists surrounding the East Ash Impoundment; however, there are no known records within 10 miles of the project area (TVA 2018b).

3.10.1.1.2 Aquatic Animals

Mollusks

The striped whitelip is not listed, but it is ranked as imperiled in Tennessee. Striped whitelip is a terrestrial snail that is associated with lowland forest, sedge meadows, and fens (NatureServe 2019). Records within Tennessee occur within coastal plain habitat near the Mississippi River. Suitable habitat is not expected to occur within the project areas.

The fatmucket is not listed, but it is ranked as critically imperiled in Tennessee. Fatmucket is a mussel usually found in quiet or slow-moving water with a mud bottom (NatureServe 2019). There is no habitat for this species within the project areas, and there are no known records for this species within a 10-mile radius of ALF.

The southern hickorynut is not listed, but it is ranked as imperiled in Tennessee. Southern hickorynut is a mussel that is found on gravel in small to large rivers with low to moderate currents (Cummings and Cordeiro 2012). There is no habitat for this species within the project areas, and no records of this species exist within a 10-mile radius of ALF.

Fish

The blue sucker is state-listed as threatened. 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 2019). One blue sucker was captured in 1976 and one was captured 1979 during gill netting sampling in the Mississippi River near the Memphis Bridge. There is no habitat for this species within the project areas.

The naked sand darter is state-listed as in need of management (imperiled). Naked sand darter is a small fish that can be found on sandy bottoms of clean, medium to large streams, creeks, and small to medium rivers (NatureServe 2019). There is no habitat for the naked sand darter within the project areas.

The piebald madtom is state-listed as in need of management (vulnerable). Piebald madtom is a small fish that inhabits small to medium mainstream rivers and lower parts of major tributaries with moderate depth and velocities. This species is usually found in areas with a clean, sandy or clay bottom and in areas associated with debris cover (NatureServe 2019). There is no habitat for the piebald madtom within the project areas.

3.10.1.2 Plants

The TVA Natural Heritage database indicated that no state- or federally listed plant species, or associated designated critical habitat, are known to occur on or within 5 miles of ALF (TVA 2018b). Ten species of plants listed by the TDEC as threatened, endangered, or species in need of management in Tennessee are known to occur within Shelby County (see Table 3-12). No federally-listed plant species are known to exist in Shelby County. Preferred habitat for each species and the possibility of habitat within the project areas are addressed in Table 3-13. Lands associated with the ALF East Ash Pond Complex, West Ash Pond and temporary laydown area have been extensively disturbed by current and/or previous land use. These areas are currently used for industrial purposes and do not contain intact, high-quality native plant communities (TVA 2016c; Amec Foster Wheeler 2017).

Table 3-13. Habitat Requirements for Plant Species of Conservation Concern within Shelby County

Common Name	Habitat Requirements	Habitat within Project Area*
American ginseng	Slopes of shaded, rich woodlands. Usually over limestone or marble[1]	N
Cedar elm	Bottomlands, along streams and rivers, usually in limestone soils[1]	N
Copper iris	Swamps, bottomlands, along edges of sloughs, ditches, and ponds[2]	N
Featherfoil	Roadside ditches, unprotected sloughs and swamps[1]	N
Harvey's beakrush	Damp to wet acidic sedge meadows, barrens, oak savannas, and flatwoods[3]	N
Multiflowered mud-plantain	Shallow water and mud flats[2]	N
Ovate catchfly	Open or forested with sandy or pebbly substrates, including floodplains[1]	N
Red starvine	Rich woods in bottomlands or bluffs along creeks and rivers[1]	N
Sweetbay magnolia	Acidic, forested wetlands[2]	N
Willow aster	Moist prairies and marshes[2]	N

Common Name	Habitat Requirements	Habitat within Project Area*

Source:
[1] NatureServe 2019
[2] TDEC 2019c
[3] Chester 2015
*Habitat Codes:
Y = Yes, species has been documented in existing habitats in proposed project areas and suitable habitat is present
N = No, no records of species within proposed project areas and no suitable habitat is present
P = Potentially suitable habitat is present, but no records of species in proposed project areas

3.10.2 Environmental Consequences

3.10.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not close any impoundments at ALF, and no work would be conducted that would result in loss or disturbance of habitat beyond existing conditions. Therefore, no project-related environmental impacts with respect to threatened or endangered species or species of conservation concern, or any suitable habitat, would occur.

3.10.2.2 Alternative B – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in an Offsite Landfill Location

A number of activities associated with the proposed ash pond closures, including construction activities such as grading, clearing, grubbing, vegetation removal, dewatering, and use of borrow material, were addressed in TVA's programmatic consultation with the USFWS on routine actions and federally listed bats in accordance with ESA Section 7(a)(2) and completed in April 2018. For those activities with potential to affect bats, TVA committed to implementing specific conservation measures. These activities and associated conservation measures are identified on page 5 of the TVA Bat Strategy Project Screening Form (Appendix B) and would be implemented as part of the proposed project.

While low quality foraging habitats may be present within the project areas for the Indiana bat and northern long-eared bat, there are no known records of them occurring in Shelby County (TVA 2018b) and larger, higher quality foraging habitats are available in surrounding areas. Limited clearing of trees would occur in conjunction with closure activities, including 45 to 50 scattered trees within the West Ash Pond and some small saplings within the East Ash Pond. These trees were not determined to be suitable summer roost habitat for these species. Although potential summer roosting trees for the Indiana and northern long-eared bats were identified in the forested areas between the East Ash Pond and McKellar Lake, as well as in the Horn Lake Cutoff wetland area, these trees would be avoided during the proposed construction activities. Therefore, impacts to Indiana or northern long-eared bats under this alternative are not expected to be significant.

A number of activities associated with the proposed project were addressed in TVA's programmatic consultation with the U.S. Fish and Wildlife Service on routine actions and federally listed bats in accordance with ESA Section 7(a)(2) and completed in April 2018. For those activities with potential to affect bats, TVA committed to implementing specific conservation measures. These activities and associated conservation measures are identified in the TVA Bat Strategy Project Screening Form (Appendix B) and need to be reviewed/implemented as part of the proposed project.

The interior least tern was documented at the West Ash Pond in 2010, however because the site has been substantially vegetated since that time the area is no longer considered suitable for nesting. The interior least tern has been known to occasionally nest at the East Ash Pond Complex and further south on a gravel lot adjacent to the ACC pond in recent years. Consultation with USFWS under Section 7 of the ESA is underway.

Although piping plovers routinely utilize islands in the Mississippi River near Memphis for migratory stopover sites, only one piping plover has been observed within ALF ash ponds within the past five years. Given the infrequency of occurrence for the piping plover and low potential for suitable habitat, no impacts to this species are anticipated.

Potential low quality habitat for the bronze copper and southern cricket frog is located adjacent to the open water within the East Ash Pond Complex. However, there are no known records of either of these species within the project limits. There are larger blocks of more suitable habitat located to the east of the project area that would not be impacted and would continue to provide habitat should these species occur in the vicinity. Therefore, no impacts to the bronze copper or southern cricket frog are anticipated under this alternative.

There is no suitable nesting habitat for the bald eagle within the East Ash Pond Complex or West Ash Pond project areas, or the laydown area. There is an active nest approximately 0.5 mile from the laydown area and 1.0 mile from the rest of the project areas. Actions are greater than 660 feet from the nest, therefore the proposed ash impoundment closure actions are in compliance with the National Bald Eagle Management Guidelines (USFWS 2007). No significant impacts to this species are anticipated.

Any construction activities would adhere to permit limit requirements and would utilize BMPs as described in TVA's guide for environmental and best management practices to minimize indirect effects on aquatic resources during the construction phase (TVA 2017). The proposed East Ash Pond Complex and West Ash Pond project areas and temporary laydown area at ALF are highly disturbed, industrial areas that do not contain intact, high-quality native plant and animal communities, and they do not provide suitable habitat for the remaining listed species in Table 3-12; therefore, the project would have no impacts on the remaining listed threatened and endangered species.

CCR excavated from the impoundments at ALF would be transported via truck or rail for disposal to an existing offsite permitted landfill and borrow material would be transported by truck to the project area from a previously permitted borrow site. Therefore, there would be no additional direct impacts to threatened or endangered species and their associated habitats as a result of offsite transport of CCR or onsite transport of borrow.

3.10.2.3 Alternative C – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and West Ash Pond; Disposal of CCR in a Beneficial Re-Use Process & Offsite Landfill Location

Under Alternative C, impacts associated with closure activities identified in the East Ash Pond Complex and West Ash Pond project areas would be the similar to those identified under Alternative B and would be minor.

According to the proposed facility characteristics listed in Table 2-10, the potential beneficial re-use processing facility would be constructed on previously disturbed industrial land and disturbance of rare/sensitive vegetation communities, listed species, and other species of concern would be avoided. Site selection for the potential beneficial re-use

processing facility would also avoid designated critical habitats. In addition, there would be no impacts to federally listed bats because tree clearing would be avoided. Therefore, based on the bounding attributes, construction and operation of the proposed beneficial re-use processing facility would not impact threatened or endangered species or their critical habitats.

3.10.3 Summary of Impacts to Threatened and Endangered Species

As summarized in Table 3-14, TVA has determined that impacts to threatened and endangered species and their associated habitats related to the primary action and associated component actions of the proposed ash impoundment closures at ALF are minor.

Table 3-14. Summary of Impacts to Threatened and Endangered Species

Alternative	Action	Impact	Severity
		Impoundment Closures	
B, C	Impoundment closure	Loss of potential low quality nesting habitat for interior least tern.	Consultation with USFWS under Section 7 of the ESA is underway regarding potential impacts to interior least tern. Project activities may affect, but are not likely to adversely affect, the interior least tern. Several proposed actions were addressed in TVA's programmatic consultation with the USFWS on routine actions and federally listed bats in accordance with ESA Section 7(a)(2) and completed in April 2018. For those activities with potential to affect Indiana bats and northern long-eared bat, TVA committed to implementing specific conservation measures. These activities and associated conservation measures would be implemented as part of the proposed project. No impact to other threatened and endangered species.
		Transport of All CCR to an Offsite Landfill	
B	Truck transport to landfill	No impact.	No impact.
B	Rail transport to landfill	No impact.	No impact.
		Borrow Transport to ALF	
B, C	Truck transport to ALF	No impact.	No impact.
		Transport of CCR to a Beneficial Re-use Processing Facility	
C	Truck transport to beneficial re-use processing facility and to an offsite landfill	No impact.	No impact.
		Construction and Operation of Beneficial Re-use Processing Facility	
C	Construction and operation of a beneficial re-use processing facility	No impact.	No impact due to the avoidance of threatened and endangered species and associated critical habitat for development.

3.11 Wetlands

3.11.1 Affected Environment

The USACE regulates the discharge of dredged or fill material into waters of the United States, including wetlands, under the CWA's Section 404 Permit [33 USC § 1344]. Additionally, Executive Order 11990--Protection of Wetlands requires federal agencies to avoid possible long and short-term impacts to wetlands and minimize their impact in order 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 a prevalence of vegetation typically adapted for life in saturated soil conditions. Types of 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 [33 CFR 328.39(b)].

ALF is located near McKellar Lake and the Mississippi River in the Northern Mississippi Alluvial Plain Level IV Ecoregion (73a), a subdivision of the Mississippi Alluvial Plain Level III Ecoregion (73) where the land use and land cover are dominated by agriculture. Bottomland deciduous forests were prominent in the region before they were cleared for agriculture use. Within the project area these forests are not extensive due to disturbance related to the construction of ALF (Griffith et al. 1998).

Wetlands within the proposed project areas were identified on the National Wetland Inventory (NWI) maps and included a total of 36.0 acres of emergent wetlands and 52.7 acres of open water (Figure 3-9, Table 3-15). In June 2017, a wetland delineation was performed within the East Ash Pond Complex project area. Potential jurisdictional wetlands were evaluated in accordance with the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0).

The only jurisdictional resource delineated within the project area is a small, 0.3-acre forested wetland within the Horn Lake Cutoff area (Table 3-15; Figure 3-9). This wetland lies outside the East Ash Pond Complex project area on the southeastern side of the east berm near the stilling pond. Most of the wetland is dominated by deciduous forest; however, a depression located near the center of the eastern boundary is dominated by herbaceous wetland vegetation. Common trees include box elder, sycamore, eastern cottonwood, and black willow, and common herbaceous vegetation includes sedges (*Carex sp., Cyperus sp.),* slender rush, swamp rose mallow (*Hibiscus moscheutos),* and broadleaf cattail (Amec Foster Wheeler 2017).

NWI wetland maps suggest the presence of emergent wetlands within the West Ash Pond and open water wetlands in the Metal Cleaning Pond. However, both of these areas are diked containment facilities and are not considered to be jurisdictional. Additionally, no wetlands were observed in the laydown area. As such there are no wetland resources identified within the West Ash Pond project area or laydown area.

In addition, 31.3 acres of non-jurisdictional open water was observed in the East Ash Pond Complex project area (Table 3-15; Figure 3-9). The majority of the open water resources are located on the eastern end of the East Ash Pond Complex with some herbaceous vegetation located along the open water's shoreline, including water lily (*Nymphaea sp*.), water primrose, common reed, and cattail. Since these open water areas are considered non-jurisdictional, they are not regulated under Section 404 of the CWA.

Table 3-15. Summary of Wetland Features Identified Within the Project Areas

Feature Type	Laydown Area	West Ash Pond Project Area	East Ash Pond Complex Project Area
NWI Mapped (acres)			
Emergent Wetlands	0	16.5	19.5
Open Water	0	2.7	50.0
Total	**0**	**19.2**	**69.5**
Field Delineated (acres)			
Forested Wetlands[1]	0	0	0.3
Open Water[2]	0	0	31.3
Total	**0**	**0**	**31.6**

Source: USFWS 2017; Amec Foster Wheeler 2017
[1]Forested wetland is jurisdictional
[2]Open water resources and emergent wetlands within project areas are non-jurisdictional

Figure 3-9. Wetlands Within the Project Areas

3.11.2 Environmental Consequences

3.11.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, no closure activities would occur. As a result, no new work would be conducted that would potentially alter project-related environmental conditions within the project areas. Therefore, there would be no impacts to wetland and open water resources.

3.11.2.2 Alternative B – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in an Offsite Landfill Location

Under the primary action considered as part of Alternative B, the open water resources within the surface impoundments at ALF would be drained and the CCR transported to an offsite landfill. However, since these impoundments are considered non-jurisdictional, direct impacts to open water areas would not need to 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. No wetland or open water resources were delineated within the laydown area.

The proposed closure of the East Ash Pond Complex would include the installation of two storm water outfalls that would drain into the Horn Lake Cutoff wetland. These outfalls would be placed above the limits of the wetland; therefore, no dredge or fill activities would occur within the wetland. In addition, the existing Outfall 001A would be abandoned, which would likely consist of a combination of excavation and demolition of the existing risers/ outfall pipes and/or placement of graded aggregate/rip-rap. These activities would be designed to minimize impacts to the wetland to the furthest extent possible and meet the terms and conditions of applicable USACE and TDEC permits.

Potential indirect impacts to the Horn Lake Cutoff wetland adjacent to the East Ash Pond Complex project area could include sedimentation from storm water runoff through the surface drainage features during the Closure-by-Removal process. To minimize these potential impacts, BMPs would be implemented in accordance with site-specific erosion control plans. Such BMPs could include site-specific designs that consist of the placement of riprap rock at the outfall location to function as energy dissipation to reduce scour and erosion within the adjacent wetland. Because this alternative would avoid direct impacts to wetlands and incorporate appropriate designs to minimize indirect effects, impacts to wetlands would be minor.

Transport of CCR would occur along existing roadways or rail lines. Similarly, the haul routes for borrow transport would utilize existing roads. Therefore, any resources along these routes are already subjected to vehicular or rail traffic, and no facilities would need to be constructed. Therefore, no direct impacts to wetlands and open water resources along the haul routes (rail or roadway) to the landfill and borrow site are anticipated.

In conjunction with the component actions under Alternative B, potential indirect impacts to the wetland and open water areas occurring near the CCR loading areas and along the haul routes could include the deposition of dust from the transportation of CCR material and borrow. To minimize these impacts, materials would be covered during transportation to reduce the release of dust particulate matter.

3.11.2.3 Alternative C – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and West Ash Pond; Disposal of CCR in a Beneficial Re-Use Process & Offsite Landfill Location

Impacts associated with Alternative C, including the transport of borrow material to ALF, would be the same as identified under Alternative B and would be minor and minimized with the use of appropriate BMPs.

Transport of CCR to the beneficial re-use processing facility, to the offsite landfill, and the transport of beneficiated product from the facility would utilize existing roads. Therefore, any resources along the haul routes are already subjected to vehicular traffic and no new roads would need to be constructed. Therefore, no direct impacts to wetlands and open water resources are anticipated.

The construction and operation of the beneficial re-use processing facility may impact wetland resources depending on the characteristics of the proposed site. However, as noted in Table 2-10, it is expected that the beneficial re-use processing facility developer would preferentially avoid sites containing substantial wetlands and minimize overall disturbances to wetlands. Any potential unavoidable impacts to wetlands are expected to be minimized to the extent that the action would qualify for permitting under the Section 404 nationwide permitting program and TDEC's ARAP permitting process.

Potential indirect impacts to the wetland and open water areas occurring near the haul routes could include the deposition of dust from the transportation of CCR material to the facility. To minimize these impacts, materials would be covered during transportation to reduce the release of dust particulate matter. Indirect impacts associated with offsite transport of beneficiated product is not anticipated given the nature of the product and the use of pneumatic trucks.

3.11.3 Summary of Impacts to Wetlands

As summarized in Table 3-16, TVA has determined that all wetland impacts related to the primary action and associated component actions proposed as part of the ash impoundment closures at ALF are minor. Any unavoidable direct impacts to wetlands would be mitigated as required by both state and federal agencies in accordance with Section 404 of the CWA.

Table 3-16. Summary of Impacts to Wetlands

Alternative	Action	Impact	Severity
		Impoundment Closures	
B, C	Impoundment closure	Potential indirect impacts to the Horn Lake Cutoff wetland adjacent to the East Ash Pond Complex could include sedimentation from storm water runoff through the surface drainage features during Closure-by-Removal process.	Minor. BMPs would be implemented in accordance with site-specific designs and erosion control plans.
		Transport of All CCR to an Offsite Landfill	
B	Truck transport to landfill	Deposition of dust particulate matter from transportation of material.	Negligible and localized, minimized with the use of BMPs including covered loads and dust suppression.
B	Rail transport to landfill	Same as truck transport.	Same as truck transport.
		Borrow Transport to ALF	
B, C	Truck transport to ALF	Deposition of dust particulate matter from transportation of material.	Negligible and localized. Materials would be covered during transportation to reduce the release of dust particulate matter.
		Transport of CCR to a Beneficial Re-use Processing Facility	
C	Truck transport to beneficial re-use processing facility and to an offsite landfill	Deposition of dust particulate matter from transportation of material.	Negligible and localized, minimized with the use of BMPs including covered loads and dust suppression.
		Construction and Operation of Beneficial Re-use Processing Facility	
C	Construction and operation of a beneficial re-use processing facility	Potential wetland impacts based on final site location.	Minor. Developer would avoid and minimize impacts to the furthest extent possible and any unavoidable impacts would be permitted through the appropriate federal and state agencies.

3.12 Solid and Hazardous Waste

3.12.1 Affected Environment

3.12.1.1 Solid Waste

In Tennessee, requirements for management of solid wastes are focused on solid waste processing and disposal under Rule 0400-11-.01. Solid wastes are defined in the rule as garbage, trash, refuse, abandoned material, spent material, byproducts, scrap, ash, sludge and all discarded material including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial and agricultural operations, and from community activities. Currently, the solid waste generated at ALF is managed in accordance with federal and state requirements.

The primary solid wastes that resulted from the operation of ALF are collectively known as CCR. When generating at full capacity, ALF consumed approximately 7,200 tons of coal a day and produced approximately 85,000 dry tons of CCR (boiler slag and fly ash) per year. TVA has historically managed storage of CCR materials generated at ALF in surface impoundments and as structural fill. Currently, there are approximately 3 million yd^3 of CCR remaining in the East Ash Pond Complex, approximately 300,000 yd^3 of CCR remaining in the West Ash Pond, and approximately 200,000 yd^3 of CCR located under the Metal Cleaning Pond. CCRs are regulated as special wastes that require special waste approval for the wastes to be disposed of at a landfill specifically permitted to receive those types of wastes. .

3.12.1.2 Hazardous Waste

Hazardous materials are regulated under a variety of federal laws including Occupational Safety and Health Administration (OSHA) standards, Emergency Planning and Community Right to Know Act (EPCRA), the RCRA, the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, and the Toxic Substances Control Act.

Regulations implementing the requirements of EPCRA are codified in 40 CFR 355, 40 CFR 370 and 40 CFR 372. Under 40 CFR 355, facilities that have any extremely hazardous substances present in quantities above the threshold planning quantity are required to provide reporting information to the State Emergency Response Commission, Local Emergency Planning Committees and local fire departments. Inventory reporting to emergency response parties is required for facilities with greater than the threshold planning quantity of any extremely hazardous substances or greater than 10,000 pounds of any OSHA regulated hazardous material. EPCRA also requires inventory reporting for all releases and discharges of certain toxic chemicals. TVA applies these requirements as a matter of policy.

RCRA regulations define what constitutes a hazardous waste and establishes a “cradle to grave” system for management and disposal of hazardous wastes. Subtitle C of RCRA includes separate, less stringent regulations for certain potentially hazardous wastes. Used oil, for example, is regulated as hazardous waste if it is disposed of, but it is separately regulated if it is recycled. Specific requirements are provided under RCRA for generators, transporters, processors and burners of used oil that are recycled. Universal wastes are a subset of hazardous wastes that are widely generated. Universal wastes include batteries, lamps and high intensity lights and mercury thermostats. Universal wastes may be managed in accordance with the RCRA requirements for hazardous wastes or by special, less stringent provisions.

Although ALF is closed, ACC and Allen Combustion Turbine (ACT) are considered small quantity generators of hazardous waste by TDEC, generating between 100 and 1,000 kilograms of hazardous waste per month. The proper management of hazardous materials/wastes at these facilities is performed in accordance with established procedures and applicable regulations.

3.12.2 Environmental Consequences

3.12.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, no closure activities would occur, and there would be no generation of solid or hazardous wastes related to proposed closure activities, offsite transport of CCR materials, or onsite transport of borrow materials. Therefore, no impacts to solid and hazardous waste generation are anticipated.

3.12.2.2 Alternative B – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in an Offsite Landfill Location

The primary solid and hazardous wastes generated under this alternative would be from closure activities. Table 3-17 identifies representative solid and hazardous wastes that could be generated as a result of closure activities under this alternative.

Table 3-17. Representative Hazardous and Solid Wastes Generated During Construction (Closure Activities)

Waste	Origin	Composition or Characteristic	Disposal Method
Solid Waste			
Scrap wood, steel, glass, plastic, paper	Construction activities	Normal refuse	Recycle and/or dispose of in a Class I landfill[1]
Land clearing wastes	Construction activities	Solids	Dispose of in a Class III[1] or IV[1] landfill
Waste oil filters	Construction equipment and vehicles	Solids	Recycle at a permitted treatment, storage and disposal facility (TSDF)
Oil fuel and solvent rags	Cleanup of small spills, cleaning and degreasing operations	Hydrocarbons	Dispose at a Class I[1] landfill as special wastes
Non-hazardous solvents, paint, adhesives	Construction activities, Equipment cleaning	Solvents paints, adhesives that are not characteristic or listed hazardous waste	Dispose at a Class [1]I landfill as special waste
Sanitary waste	Portable toilet holding tanks	Solids and liquids	Remove by contracted sanitary service or utilize existing sanitary sewer system
Hazardous Waste			
Used and waste lubricating and hydraulic oils	Construction vehicles and equipment	Hydrocarbons	Recycle at a permitted TSDF or used oil recycler
Oily rags, oily sorbent	Cleanup of small spills	Hydrocarbons	Dispose at a permitted TSDF
Fuels, absorbents and soils contaminated by gasoline or diesel	Construction equipment	Ignitable, benzene, other hydrocarbons	Dispose at a permitted TSDF or recycle
Solvents, paint, adhesives	Construction activities, equipment cleaning	Ignitable solvents; solvents paints, adhesives containing	Recycle or dispose at a permitted TSDF

Waste	Origin	Composition or Characteristic	Disposal Method
		constituents identified as characteristic hazardous waste (40 CFR 261 Subpart C); Solvents listed under 40 CFR 261 Subpart D	
Solvent and fuel contaminated rags	Construction activities, equipment cleaning	See above	Recycle or dispose at a permitted TSDF
Miscellaneous acids and alkalis	Construction activities	Corrosive hazardous wastes	Dispose at a permitted TSDF
Spent lead acid batteries	Construction machinery	Lead, sulfuric acid	Manage as universal wastes
Spent lithium and Ni/Cd batteries	Equipment construction machinery	Heavy metals	Manage as universal waste
Fluorescent, mercury vapor and high intensity (sodium vapor) lamps	Lighting equipment	Mercury and other metals	Recycle as universal waste
Contaminated environmental media	Site preparation	Varies	Dispose at permitted TSDF or Class I landfill

Source: TVA 2016b

[1]Disposal facilities

- Class I disposal facility - takes non-hazardous municipal solid wastes such as household wastes, approved special wastes, and commercial wastes
- Class II disposal facility - takes non-hazardous industrial wastes, commercial wastes and fill
- Class III disposal facility - takes Class IV wastes plus landscaping, land clearing and farming wastes
- Class IV disposal facility - takes construction/demolition wastes, shredded tires and waste with similar characteristics

As identified in the TVA Ash Impoundment Closure PEIS (TVA 2016b), the majority of waste streams resulting from closure activities would be solid nonhazardous waste. However, some nonhazardous liquid waste would also be generated. During construction, the primary solid nonhazardous wastes generated would be refuse from the contractor personnel, a small volume of construction debris (piping removed, rubble, packing materials, etc.) and soils, as briefly summarized below:

- Construction debris consisting primarily of piping removed, miscellaneous construction rubble, wastes from packing materials and empty nonhazardous chemical containers during project construction
- Land clearing wastes would result from grading operations
- Soils would result from land clearing, grading and excavation

In addition to these larger nonhazardous waste streams, limited quantities of nonhazardous solvents, paints and adhesives, spill absorbent, oil and solvent contaminated rags, and empty containers would be generated.

Various hazardous wastes, such as fuels, lubricating oils, solvents, paints, adhesives, compressed gases and other hazardous materials could also be produced during construction. Oily wastes generated during servicing of heavy equipment would generally not be stored on site but would be managed by off-site vendors who service on-site equipment using appropriate self-contained used oil reservoirs. Appropriate spill prevention, containment and disposal requirements for hazardous wastes would be implemented to protect construction and plant workers, the public and the environment.

TVA would manage all solid waste and hazardous wastes generated from closure and construction activities in accordance with standard procedures for spill prevention and cleanup and waste management protocols in accordance with pertinent federal, state and local requirements. OSHA requirements for workers engaged in these activities would be applied.

Under this closure alternative, TVA would excavate and relocate approximately 3.5 million yd^3 of CCR from the impoundments at ALF to an existing offsite landfill for disposal Given that the CCR would be disposed of in a permitted landfill that has the capacity to receive it, it is expected that disposal of CCR from ALF would have a negligible effect on the long term ability to meet disposal needs of the region. Transport of CCR would be managed under the requirements set forth under RCRA Subtitle D and in accordance with pertinent state and local requirements. If upon excavation and testing it is determined that the soils under the CCR in the impoundments contain constituents that could be classified as hazardous, TVA would manage this material in accordance with applicable federal, state and local requirements. As such impacts to solid waste and hazardous waste generation would be minor.

In addition to transport of CCR, this alternative is expected to require transport of borrow material to ALF. The amount of solid and hazardous wastes generated from maintenance of vehicles needed to transport CCR and borrow would increase under Alternative B over current conditions. Hazardous wastes generated by vehicle maintenance (EPA 1999) and railway car and engine cleaning and maintenance (EPA 2000) include: used lubricating oils, used hydraulic fluids, coolants, oily sorbents and rags, solvents, waste fuel, and batteries. Solid wastes generated from these activities include: packaging, empty containers, bulbs, tires, scraps generated from body work, and other debris. All waste generated from the transport of CCR and borrow material would be handled in accordance with standard procedures for spill prevention and cleanup and waste management protocols in accordance with pertinent federal, state and local requirements.

Overall, the impacts related to solid or hazardous wastes resulting from the primary action and component actions undertaken by TVA under Alternative B would be minor.

3.12.2.3 Alternative C – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and West Ash Pond; Disposal of CCR in a Beneficial Re-Use Process & Offsite Landfill Location

Similar to Alternative B, the proposed closure of the East Ash Pond Complex, West Ash Pond, and Metal Cleaning Pond would result in the generation of construction-related solid and hazardous wastes. With implementation of the standard procedures for spill prevention and cleanup and waste management protocols in accordance with pertinent federal, state and local requirements, only minimal direct or indirect adverse effects related to solid or hazardous wastes are anticipated from closure activities.

Under Alternative C, TVA would excavate and transport by truck the majority (up to 95 percent) of CCR from the ALF surface impoundments to a beneficial re-use processing facility, with the remaining CCR being transported to an existing offsite landfill. CCR materials removed from the impoundments would be transported to the facility at rates similar to that of transport to an offsite landfill (240 truck trips per day, approximate 8-year period). Though the location of the proposed beneficial re-use processing facility is unknown, solid and hazardous waste impacts associated with the transport of CCR to the facility would be similar to those described for Alternative B and would be minor.

All solid waste and hazardous wastes generated from construction activities associated with the beneficial re-use processing facility would be managed in accordance with standard procedures for spill prevention and cleanup and waste management protocols in accordance with pertinent federal, state and local requirements.

Solid wastes that would be generated from operation of the proposed facility include paper and plastics from packaging of maintenance-related materials, small quantities of oils and fuels from spills, small quantities of paints, adhesives, etc. from maintenance. Pumps, valves and controls associated with the processing facility would require replacement during operations. Generation of regulated hazardous wastes is not expected (see Table 2-10). However, any regulated hazardous waste would be managed in accordance with RCRA requirements. Solid wastes from production processes at the facility and delivery of beneficiated product are expected to be minor. Solid waste generated during outages/maintenance activities would vary in amounts and would be disposed of in an appropriate licensed landfill (see Table 2-10).

Impacts also would be associated with maintenance of vehicles that deliver beneficiated product to various markets. Average volume of trucking would be 100-120 truck trips per day for up to 250 days per year. Wastes from vehicle maintenance activities would be managed in accordance with standard procedures for spill prevention and cleanup and waste management protocols in accordance with pertinent federal, state and local requirements.

There would also be a long-term beneficial impact associated with solid wastes under Alternative C, as compared to Alternative B. Under Alternative C the majority of CCR at ALF would be beneficially re-used for use in concrete and other building materials, which would transform up to 2,850,000 cy of CCR wastes into re-usable, beneficiated products. As such, this same quantity of CCR would not be disposed of in an offsite landfill. In addition, beneficiated CCR could be used as a substitute for other materials which would indirectly limit generation of solid waste associated with obtaining such materials.

Therefore, adverse impacts associated with generation of solid and hazardous wastes during construction and operation of the beneficial re-use processing facility would be minor, but given the additional wastes associated with the short term construction and long term operation of the proposed beneficial re-use processing facility, impacts under Alternative C would be incrementally greater than Alternative B. However, there would be a long term moderate beneficial impact associated with solid wastes under Alternative C, as compared to Alternative B, as the majority of CCR at ALF would be beneficially re-used.

3.12.2.4 Summary of Impacts Associated with Solid and Hazardous Waste

Wastes generated by proposed project activities would be managed in accordance with standard procedures for spill prevention and cleanup and waste management protocols in accordance with pertinent federal, state and local requirements. Therefore, as summarized in Table 3-18, solid and hazardous waste impacts related to the primary action and associated component actions proposed as part of the ash impoundment closures at ALF would be minor.

Table 3-18. Summary of Impacts to Solid and Hazardous Waste

Alternative	Action	Impact	Severity
		Impoundment Closures	
B, C	Impoundment closures	Small volumes of solid and hazardous wastes generated from site preparation and construction activities.	Minor impact as hazardous wastes would be managed in accordance with all applicable state and federal regulations.
		No change in the generation of solid waste, however solid waste previously managed at ALF would be managed in an offsite landfill location.	
		Transport of All CCR to an Offsite Landfill	
B	Truck transport to landfill	Solid and hazardous wastes generated by maintenance of equipment used to transport CCR to the offsite landfill.	Minor impact as hazardous wastes would be managed in accordance with all applicable state and federal regulations.
B	Rail transport to landfill	Same as above.	Minor impact.
		Borrow Transport to ALF	
B, C	Truck transport to ALF	Solid and hazardous waste generated by maintenance of equipment used to transport borrow to ALF.	Minor impact as hazardous wastes would be managed in accordance with all applicable state and federal regulations.
		Transport of CCR to a Beneficial Re-use Processing Facility	
C	Truck transport to beneficial re-use processing facility and to an offsite landfill	Solid and hazardous waste generated by maintenance of equipment used to transport CCR to the beneficial re-use facility.	Minor impact as hazardous wastes would be managed in accordance with all applicable state and federal regulations.
		Construction and Operation of Beneficial Re-use Processing Facility	
C	Construction and operation of a beneficial re-use processing facility	Small volumes of solid and hazardous wastes generated from site preparation and construction activities.	Minor impact, though impacts of Alternative C would be incrementally greater than Alternative B due to additional wastes produced from the short term construction and long term operation of the proposed facility.
		Solid and hazardous waste generated by maintenance of equipment used to transport CCR to beneficial re-use facility and to transport beneficiated product.	Minor impact, though impacts of Alternative C would be incrementally greater than Alternative B due to additional wastes produced from maintenance of trucks that transport beneficiated product.
		The majority of CCR at ALF would be beneficially re-used.	Long term moderate beneficial impact.

3.13 Visual Resources

3.13.1 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 3.14.

The visual landscape of an area is formed by physical, biological, and man-made features that combine to influence both landscape identifiability and uniqueness. Scenic resources within a landscape are evaluated based on a number of factors that include scenic attractiveness, integrity, and visibility. Scenic attractiveness is a measure of scenic quality based on human perceptions of intrinsic beauty as expressed in the forms, colors, textures, and visual composition of each landscape. It can be scored into three categories: distinctive, common, or minimal. Scenic integrity is a measure of scenic importance based on the degree of visual unity and wholeness of the natural landscape character. The scenic integrity of a site can be scored as high, moderate, low, or very low. 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.

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

For this analysis, the affected environment includes the proposed West Ash Pond project area, East Ash Pond Complex project area, and laydown area, as well as the physical and natural features of the landscape. The plant is located in an industrial region on the south end of Memphis. The surrounding topography ranges from gently sloping near the banks of the Mississippi River and McKellar Lake to moderately sloping at T.O. Fuller State Park to the east. Industrial activities including the ACT, Nucor Steel, Electrolux, the Maxson WWTP, CN/CSX Intermodal facility, ACC, and the City of Memphis Earth Complex are visible to the south of the proposed project area at ALF, as part of the Frank C. Pidgeon Industrial Park. Forested areas within T.O. Fuller State Park are visible to the east and southeast. The view to the north, across McKellar Lake, is a mix of undeveloped land and industrial developments associated with the International Port of Memphis.

Most of the areas within the ALF property boundary are devoid of vegetation and have been heavily disturbed by previous industrial activities. The three existing ALF stacks, the powerhouse, and the existing transmission lines leaving the plant site are the dominant elements in the landscape that are visible to motorists on nearby roadways within the foreground and middleground. Within the immediate vicinity of the plant site, the landscape character is distinctly industrial. Based on the above characteristics, the scenic attractiveness of the affected environment is considered to be minimal to common, whereas the scenic integrity is considered to be low. The rating for scenic attractiveness is based on the ordinary or visual quality of the landscape. The scenic integrity has been lowered by the industrial nature of the surrounding area. However, in the 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 to be fair.

3.13.2 Environmental Consequences

3.13.2.1 Alternative A – No Action Alternative

Under this alternative, no closure activities would occur, resulting in no changes to the existing environment. The landscape character and integrity would remain in its current state; therefore, there would be no project-related impacts to aesthetics and visual resources.

3.13.2.2 Alternative B – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in an Offsite Landfill Location

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 general public, their viewing distances, and visibility of the proposed action are also considered during the analysis. There are no sensitive viewing receptors within the foreground of the project area. The nearest residential area is located approximately 1.0 mile southeast of the East Ash Pond Complex project area. Views of the project areas are generally restricted to the foreground (i.e., within 0.5 mile) and groups that have direct views of the project areas include authorized employees, contractors and visitors to the plant site. The proposed project areas could also potentially be viewed by recreational or industrial users on McKellar Lake.

Closure-by-Removal of the surface impoundments at ALF would include the addition of borrow material to achieve proposed finished grades and provide a suitable medium to support restoration of the former impoundment with approved, non-invasive seed mixes. This would convert areas of existing industrial use to a natural soil and vegetated state. During closure of the ash impoundments there would be a slight visual discord from existing conditions due to an increase in personnel and construction equipment in the area and construction-related traffic to the work site. Because of the screening effect of terrain associated with the forested bluff line, visibility of the proposed project area by residents southeast of ALF is expected to be very limited. However, watercraft users on McKellar Lake would most likely be able to observe the construction equipment operating at the impoundments. As potential visual disturbances would only be visible to a few people and due to the temporary nature of the activities, visual impacts during closure of the impoundments would be considered minor.

In the foreground, closed impoundments that are covered with natural vegetation may enhance the landscape character compared to the current condition. In more distant views, the closure of the impoundments would likely merge with the overall industrial components of the facility. Therefore, the closed impoundments would generally be absorbed by existing TVA plant components and would become visually subordinate to the overall landscape character associated with ALF.

Component actions to the ash impoundment closures include transport of excavated CCR to an offsite landfill for disposal via truck or rail and transport of borrow material onsite via truck, throughout the closure period. Specific landfill and borrow sites have not been selected; however, the impacts to visual resources are based upon the bounding scenarios which incorporate the largest extend of potential impacts as identified in Tables 2-4, 2-5, and 2-8. As stated in Section 2.4.1.4, trains carrying CCR from ALF would be integrated into the existing freight system and therefore they would not present a visual discord. However, visual receptors along the proposed trucking haul routes (to the offsite landfill or the onsite transport of borrow) would potentially be exposed to increased visual discord due to the increase in vehicular traffic. Impacts to visual resources are expected to be minor as the roads in the vicinity of ALF are already predominantly used for industrial activity, and the haul routes to the landfill and borrow site would utilize previously constructed roads that are already subjected to vehicular traffic. In addition, there would no project-related changes to the visual landscape within the proposed landfill or borrow site boundaries because these sites would be previously developed and/or permitted.

Overall, the proposed closure of the ash impoundments would not be discernible from the existing scenery nor would it contrast with the overall landscape. There may be some temporary, minor visual discord during closure activities due to an increase in personnel and equipment. In addition, there would be minor changes to the visual setting for visual receptors along the transportation routes that would last through the closure period (approximately 8 years). Following construction, however, based upon the improved visual characteristics of vegetated former impoundments under this alternative, the scenic attractiveness and scenic quality of the project areas would improve to some degree relative to the existing condition. Therefore, minor adverse impacts would result from implementation of Alternative B in the short term, but impacts would be minor and beneficial in the long term.

3.13.2.3 Alternative C – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and West Ash Pond; Disposal of CCR in a Beneficial Re-Use Process & Offsite Landfill Location

Impacts associated with the proposed ash impoundment closures and the component actions of CCR transport offsite by truck and transport of borrow onsite would be the same as identified under Alternative B.

However, under this alternative the majority of CCR excavated from the impoundments would be transported to a beneficial re-use processing facility. As noted in bounding characteristics of the facility (see Table 2-10), the beneficial re-use processing facility would be developed on a previously disturbed site in an area that is compatible with surrounding land uses. During construction of the facility there would be a slight visual discord from the existing conditions due to an increase in personnel and equipment in the area. However, this increase would be minor and temporary (up to 14 months). Additionally, as the facility would be constructed in an area with compatible land uses, the facility would blend in with

surrounding land uses and visual discord would be minor. The maximum height of the facility components would be 140 feet. At this height there may be some minor visual impacts to any sensitive receptors in the foreground, however they would not be perceptible in the middleground or background.

The operation of the beneficial re-use processing facility would include the transport of CCR to the site and delivery of beneficiated product to various markets within the region along existing roads. The additional vehicular traffic would not result in a visual discord along these roadways as, according to Table 2-9, the facility would have direct access to a collector road or major highway that can support truck traffic without noticeable effects to LOS. Therefore, only minor impacts to visual resources associated with the construction and operation of the beneficial re-use facility are anticipated.

3.13.3 Summary of Impacts to Visual Resources

As summarized in Table 3-19, TVA has determined that all visual resource impacts related to the proposed primary and component actions of the ash impoundment closures at ALF are minor.

Table 3-19. Summary of Impacts to Visual Resources

Alternative	Action	Impact	Severity
		Impoundment Closures	
B, C	Impoundment closures	Temporary visual discord during construction period.	Short term, minor adverse impacts
		Restoration of the former impoundments to natural soil and vegetated state.	Long term, minor beneficial impacts
		Transport of All CCR to an Offsite Landfill	
B	Truck transport to landfill	Temporary visual discord to visual receptors along the haul route from trucks transporting CCR.	Minor impact.
B	Rail transport to landfill	No impact.	No impact.
		Borrow Transport to ALF	
B, C	Truck transport to ALF	Temporary visual discord to visual receptors along the haul route from trucks transporting borrow to ALF.	Minor impact.
		Transport of CCR to a Beneficial Re-use Processing Facility	
C	Truck transport to beneficial re-use processing facility and to an offsite landfill	Temporary visual discord to visual receptors along the haul route.	Minor impact.
		Construction and Operation of Beneficial Re-use Processing Facility	
C	Construction and operation of a beneficial re-use processing facility	Potential impact to visual receptors within the foreground of the facility.	Minor impact.
		Potential localized impact to visual receptors along truck hauling routes	

3.14 Cultural and Historic Resources

3.14.1 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 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, that 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 NEPA by following the process outlined in the regulations implementing Section 106 of NHPA. Additional cultural resource laws that protect historic resources include the Archaeological and Historic Preservation Act (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 State Historic Preservation Officer (SHPO) and other interested consulting parties, including federally recognized Indian tribes.

Cultural resources are considered historic properties if they are listed or eligible for listing in the 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), that the undertaking's effect on a historic property within the area of potential effect (APE) would diminish any of the qualities that make the property eligible for the NRHP, the effect is said to be adverse. Examples of adverse effects would be ground disturbing activity in an archaeological site or erecting structures within the viewshed of a historic building in such a way as to diminish the structure's integrity of feeling or setting.

3.14.2 Area of Potential Effects

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.

TVA determined that the APE for direct effects on historic properties consists of the East Ash Impoundment Complex, the West Ash Impoundment, the site proposed for use as a beneficial re-use processing facility, and the proposed location of the borrow site to be used in connection with the project. Transport of CCR from ALF to an offsite landfill or to a beneficial re-use processing facility and the transport of borrow material onsite would utilize existing roadway corridors that had previously been disturbed during their construction and are, therefore, excluded from the APE.

The APE will be re-determined in future once the location of the beneficial re-use processing facility has been selected by its prospective owner, and specific borrow site or sites have been identified by the contractor. In each case, TVA will not own or operate either the beneficial re-use processing facility or borrow sites.

3.14.3 Previous Studies

In 2017, TVA completed consultation with the Tennessee SHPO and federally-recognized Indian tribes regarding the proposed closure of the East Ash Pond Complex. The APE identified for that project included the East Ash Pond Complex, West Ash Pond, and a small laydown/storage area located west of the WWTP at ALF.

TVA conducted a desktop review to evaluate the potential of the APE to contain archaeological sites that could be eligible for inclusion in the NRHP. The desktop review included a search for previous archaeological surveys in or near the APE, utilizing records obtained by TVA during recent Section 106 reviews for other projects at ALF. The review also included an examination of documents including geologic maps, soil maps, historic and current topographic maps, current satellite imagery, and TVA design drawings.

No archaeological sites have been previously identified within the APE. The laydown/storage area west of the WWTP was included in two previous archaeological surveys (de Gregory et al., 2014 and Starr 1994) and no archaeological sites were identified. Remaining portions of the APE have not been included in any archaeological surveys.

Based on a review of existing documentation (historic maps, geologic maps, and previous cultural resources survey reports) TVA found that the undertaking would not affect historic properties. SHPO agreed with TVA by letter dated July 7, 2017 (Appendix C).

The current project boundary differs in relatively minor ways from the area reviewed in 2017. The Metal Cleaning Pond was added to the APE, the area that would be affected by the closure of the East Ash Pond Complex was enlarged somewhat, an area near the West Ash Pond that was included as possible laydown areas (in parking lots) has been removed from consideration, and the location of a proposed laydown area was moved slightly. Therefore, TVA re-determined the undertaking’s APE based on these changes.

TVA's "no effect" finding for the undertaking as reviewed in 2017 was based on the following considerations:

- The proposed laydown area was included in two previous archaeological surveys (de Gregory 2014 et al., and Starr 1994) and no archaeological sites were identified in the laydown area
- The underlying geology of the project area consists of unconsolidated alluvial silts and sands that reflect a dynamic fluvial environment (Moore and Diehl 2004). These sediments were deposited during the late Holocene and are unlikely to contain intact pre-contact archaeological sites
- Much of the project area was subjected to major earth-moving operations during the construction of ALF in the 1950s

TVA reviewed additional documents that provided more detail regarding the geology of the project sites. Fisk (1944) reconstructed paleochannels of the Mississippi River from Cape Girardeau, Missouri to Donaldsonville, Louisiana. Plate 5 of this work shows that the ALF reservation was within the main channel of the Mississippi River between 1765 and at least 1880. During that time the river gradually migrated west, in stages, before settling into its current location sometime between 1880 and 1944. Based on this information, we now know that all surficial deposits and soils in the APE date after 1765. Some deposits in the western part of the APE may be as young as the early 20th century, and as such indicates a lack of potential for pre-contact archaeological sites.

Once the location for the beneficial re-use processing facility and offsite borrow areas have been identified, TVA would review those areas for potential effects on cultural resources as outlined by 36 CFR Part 800.4-800.8. TVA would study the locations for such purposes as identifying historic properties, assessing adverse effects, resolving adverse effects, solving a failure to resolve adverse effects, documenting TVA's decision, and coordinating the review and decisions with NEPA. Before authorizing the use of any soil borrow in connection with the undertaking, TVA would satisfy all requirements of Section 106 of the NHPA.

3.14.4 Environmental Consequences

3.14.4.1 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.

3.14.4.2 Alternative B – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in an Offsite Landfill Location

After considering the modifications in project design and review of the documents on which the original "no effect" finding was based, along with Fisk's geologic map, TVA finds that this change in APE and project design will not result in adverse effects on historic properties. TVA consulted with the SHPO and with federally-recognized Indian tribes with an interest in this area. In a letter dated March 7, 2019, the SHPO agreed with TVA's finding of no effect (Appendix C). None of the consulted tribes objected to the undertaking or identified resources of concern in the APE.

Transport of CCR offsite and the transport of borrow onsite would use existing roadways that have been previously disturbed. Additionally, CCR would be deposited into an existing landfill. Therefore, there would be no impact to historic resources associated with these component actions.

As no specific borrow site has been identified, TVA is unable to define an APE for this action at this time. TVA has added a commitment to this EIS requiring the project to inform the cultural compliance staff once the proposed borrow sites have been identified. TVA would perform all necessary due diligence and consultation as required under Section 106 of the NHPA related to any offsite work.

3.14.4.3 Alternative C – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and West Ash Pond; Disposal of CCR in a Beneficial Re-Use Process & Offsite Landfill Location

Cultural resource impacts under Alternative C would be the same as Alternative B. However, under Alternative C, CCR excavated from the impoundments would be transported to a beneficial re-use processing facility. Although the location of the beneficial re-use processing facility has not been determined, according to the identified bounding characteristics of this facility (Table 2-10), the preferred site would be previously disturbed and located in an area that is compatible with industrial land uses. The site would not be located in an area that contains previously identified NRHP listed or eligible sites. Therefore, development of a beneficial re-use processing facility on such as site would have no effect on cultural resources.

However, if the proposed site for the beneficial re-use processing facility is located in an area that does not conform to these bounding characteristics, TVA would perform all necessary due diligence and consultation as required under Section 106 of the NHPA.

3.14.5 Summary of Impacts to Cultural and Historic Resources

As summarized in Table 3-20, TVA has determined that closure of the CCR impoundments at ALF would have no effect on cultural resources.

Table 3-20. Summary of Impacts to Cultural and Historic Resources

Alternative	Action	Impact	Severity
		Impoundment Closures	
B, C	Impoundment closure	Impacts to archeological and historic resources related to construction and operation.	No effect.
		Borrow would be obtained from a permitted borrow site. However, no specific borrow site has been identified.	Onsite activities: No effect. Offsite borrow areas: TVA would perform all necessary due diligence and consultation as required under Section 106 of the NHPA related to any offsite work.
		Transport of All CCR to an Offsite Landfill	
B	Truck transport to landfill	Offsite transport of CCR along existing roadways.	No effect.
B	Rail transport to landfill	Offsite transport of CCR along existing railways.	No effect.
		Borrow Transport to ALF	
B, C	Truck transport to ALF	Onsite transport of borrow along existing roadways.	No effect.
		Transport of CCR to a Beneficial Re-use Processing Facility	
C	Truck transport to beneficial re-use processing facility and to an offsite landfill	Offsite transport of CCR along existing roadways.	No effect.
		Construction and Operation of Beneficial Re-use Processing Facility	
C	Construction and operation of a beneficial re-use processing facility	Potential impacts to cultural resources based on final site location.	No effect. Preferred site would be previously disturbed and avoid any previously identified NRHP listed or eligible sites.

3.15 Land Use

3.15.1 Affected Environment

ALF is located in the southwest portion of the city of Memphis in Shelby County, Tennessee. It is located within the Frank C. Pidgeon Industrial Park, which has been zoned for heavy industrial use by both the city of Memphis and Shelby County (Memphis City Council 1981; City of Memphis and Shelby County 2010). According to the Memphis and Shelby County zoning code, a heavy industrial district is intended to accommodate high-impact manufacturing, industrial or other uses, that by their nature create some nuisance, and which are not properly associated with or are compatible with nearby residential districts or other less intense mixed use or industrial districts (City of Memphis and Shelby County 2010). Current uses of the Frank C. Pidgeon Industrial Park include manufacturing,

sewage and wastewater treatment, and intermodal freight transportation. In addition, the International Port of Memphis is located on the opposite side of McKellar Lake at Presidents Island and consists of 37 waterfront terminal facilities moving products such as petroleum, tar, asphalt, cement, steel, coal, salt, fertilizers, rock, and grain (International Port of Memphis 2019a).

No residential or commercial land uses occur in the immediate vicinity of ALF. Single-family residential areas occur approximately 1.0 mile to the southeast of the East Ash Pond Complex project area at the closest point.

The area for this evaluation consists of approximately 179.6 total acres (the 137.4-acre East Ash Pond Complex project area, 39.5-acre West Ash Pond Project Area, and 2.7-acre temporary laydown area) on which ash impoundment closure activities may take place. As summarized in Table 3-8 and shown in Figure 3-8, the ash impoundment project areas are characterized by a mixture of land cover types. Nonetheless, all land uses within the project areas are considered industrial. Developed lands in the vicinity are associated with the industrial uses of the Frank C. Pidgeon Industrial Park and the International Port of Memphis, and the non-industrial, residential uses in the neighborhoods of southeast Memphis.

3.15.2 Environmental Consequences

3.15.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, no impoundment closure activities would occur. Therefore, no changes to existing land use.

3.15.2.2 Alternative B – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in an Offsite Landfill Location

Closure of the surface impoundments at ALF would include the addition of borrow material to achieve proposed finished grades and provide a suitable medium to support restoration of the former impoundment with approved, non-invasive seed mixes. This would convert project areas to more conditions more conducive to future industrial or other economically beneficial uses. While the extent of the potential future development is unknown, it is assumed that any future development would comply with uses allowed under the current zoning designation. While the impoundment closure would convert land cover types, the site would remain zoned for industrial use and would be available for potential redevelopment.

Impoundment closure activities would also result in short term land use impacts associated with the temporary conversion of land for the purposes of a laydown area to support various construction-related activities. These short term impacts would include the utilization of construction parking lots, laydown and stockpile areas, and temporary crew trailers and offices. Upon completion of impoundment closure activities, it is anticipated that this area would be restored to its previous state. Therefore, land use impacts in the laydown area are anticipated to be temporary and minor.

CCR transport via over-the road truck would utilize previously constructed roads which are already subjected to vehicular traffic, and no new roads would need to be constructed. Similarly transport via rail would utilize existing rail lines, and candidate landfills have existing infrastructure in place such that no additional rail spurs or unloading facilities would

need to be constructed. Therefore, there would be no impact to land use associated with transport of CCR.

Similarly, transport of borrow also would utilize previously constructed roads which are already subjected to vehicular traffic, and no new roads would need to be constructed. Therefore, there would be no impact to land use associated with borrow acquisition and transport.

3.15.2.3 Alternative C – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and West Ash Pond; Disposal of CCR in a Beneficial Re-Use Process & Offsite Landfill Location

Under Alternative C, impacts associated with the primary actions related to closure of the impoundments and the transport of borrow and CCR would be similar to those identified under Alternative B.

A specific site for the beneficial re-use processing facility has not been identified. However, according to the proposed facility attributes and bounding characteristics listed in in Tables 2-9 and 2-10, the facility would be located in an area zoned for compatible uses, such as industrial zoning. Additionally, it would be preferentially constructed on previously disturbed land and would require an area up to 15 acres. In the event the chosen site is located on land previously developed for industrial use, there would be no change in land use. However, if not, there is the potential for up to 15 acres of previously undeveloped land to be converted to industrial use in association with the construction of the beneficial re-use processing facility. Changes in land use due to the construction and operation of the beneficial re-use processing facility would be long term, but minor, due to the location of the facility in an area zoned for compatible uses and the small area of land required.

3.15.3 Summary of Impacts to Land Use

As summarized in Table 3-21, TVA has determined that all impacts to land use related to the primary action and associated component actions for the proposed ash impoundment closures at ALF are minor.

Table 3-21. Summary of Impacts to Land Use

Alternative	Action	Impact	Severity
		Impoundment Closures	
B, C	Impoundment closure	Conversion of industrial use and open water areas to herbaceous cover. Continued to be zoned for industrial use.	Minor; potential future redevelopment presumed consistent with current land use.
		Temporary use of laydown area for construction-related activities during impoundment closure.	Minor; small scale and would be restored to previous state following closure activities.
		Transport of All CCR to an Offsite Landfill	
B	Truck transport to landfill	No impact.	No impact.
B	Rail transport to landfill	No impact.	No impact.
		Borrow Transport to ALF	
B, C	Truck transport to ALF	No impact.	No impact.
		Transport of CCR to a Beneficial Re-use Processing Facility	
C	Truck transport to beneficial re-use processing facility and to an offsite landfill	No impact.	No impact.
		Construction and Operation of Beneficial Re-use Processing Facility	
C	Construction and operation of a beneficial re-use processing facility	Potential conversion of up to 15 acres of undeveloped land to industrial use associated with facility construction.	Minor due to small scale and location in area zoned for compatible uses.

3.16 Prime Farmland

3.16.1 Affected Environment

The 1981 Farmland Protection Policy Act (7 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 periods, and are protected from frequent flooding.

Prime farmland soils within the proposed project areas and within a 5-mile radius of ALF are summarized in Table 3-22. Of the 179.6 acres that make up the East Ash Pond Complex project area, the West Ash Pond project area, and the temporary laydown area, approximately 90.0 acres (50 percent of the total area) are mapped prime farmland soils. Prime farmland within these areas consists of Commerce silt loam and Robinsonville silt loam (USDA NRCS 2019b). However, the 65.8 acres of prime farmland soils located within the East Ash Pond Complex project area and the 24.1 acres located within the West Ash Pond project area have previously been impacted by the construction and operation of existing ALF facilities and, therefore, would no longer be considered prime farmland.

Table 3-22. Acres of Prime Farmland Soils Mapped Within the Project Areas

	Mapped Prime Farmland Soils (acres)	Non-Prime Farmland Soils (acres)	Total Acreage
East Ash Pond Complex Project Area	65.8[1]	71.6	137.4
West Ash Pond Project Area	24.1	2.7	39.5
Temporary Laydown Area	0.1	15.3	2.7
Total	90.0	89.6	179.6
Shelby County, within 5-Mile Radius of ALF	20,030.2	18,003.6	38,773.1[2]

Source: USDA NRCS 2019b

[1] Note: consists of lands previously disturbed by plant operations and no longer contain prime farmland soil characteristics

[2]Includes 739.3 acres that are not classified as either Prime Farmland or Non-Prime Farmland Soils, as no digital data was available

As is evident in Table 3-22, prime farmland is not a unique feature in the project vicinity, with over 51 percent of soils in a 5-mile radius of ALF being considered prime farmland. Overall, the prime farmland soils within the proposed project areas and laydown area comprise approximately 0.45 percent of the total prime farmland soils found within a 5-mile radius of the project area.

Although some of the soils within the proposed project areas and laydown area have the physical characteristics of prime farmland, the site has been zoned for industrial use, thereby removing it from the prime farmland category under the Farmland Protection Policy Act and its implementing regulations.

3.16.2 Environmental Consequences

3.16.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, no impoundment closure activities would occur. Therefore, there would be no impacts to prime farmland.

3.16.2.2 Alternative B – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in an Offsite Landfill Location

Based on NRCS soil mapping, there are a total of approximately 90.0 acres of soils considered prime farmland within the project area. However, less than an acre of this has not been previously impacted by construction and operation of ALF facilities. A portion of the temporary laydown area consists of a mowed field, approximately 0.1 acres of which

are considered prime farmland. Under Alternative B, impacts to the laydown area would be temporary and would not include substantial ground disturbance activities. Upon completion of the impoundment closure activities, the area would be restored to the original condition. Furthermore, the area is included in the Frank C. Pidgeon Industrial Park which has been zoned for industrial use, thereby removing it from the prime farmland category under the Farmland Protection Policy Act and its implementing regulations. Impacts to prime farmland within project boundaries would be insignificant due to the temporary use of the laydown area, the minimal acreage affected, and the zoning of the land for industrial use.

CCR removed from the impoundments would be transported to an existing offsite permitted landfill, and borrow material used in site restoration would be obtained from a previously permitted site. As these facilities would be dedicated to their specific uses, neither the offsite landfill nor the borrow sites would be considered prime farmland. Therefore, there would be no additional secondary impact to prime farmland soils in conjunction with component actions under Alternative B.

3.16.2.3 Alternative C – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and West Ash Pond; Disposal of CCR in a Beneficial Re-Use Process & Offsite Landfill Location

Under Alternative C, impacts to prime farmland associated with closure of the impoundments, transport and disposal of CCR, and procurement of borrow material would be the same as those identified under Alternative B.

In conjunction with TVA actions associated with this alternative, TVA is also assessing the potential impacts associated with a component action consisting of the construction and operation of a beneficial re-use processing facility. According to the proposed facility attributes and characteristics listed in Tables 2-9 and 2-10, the facility would be preferentially constructed on previously disturbed industrial land and would require an area up to 15 acres. Ideally, the chosen site would not contain soils with the physical characteristics of prime farmland, or soils would be previously disturbed or developed such that the land would no longer be considered prime farmland. However, under the bounding condition, there is the potential for up to 15 acres of prime farmland to be converted to industrial use in association with the construction of the beneficial re-use processing facility. Due to the small scale of the land requirements, the permanent loss of 15 acres of prime farmland would be minor and would not impact regional agriculture or crop production.

3.16.3 Summary of Impacts to Prime Farmland

As summarized in Table 3-23, TVA has determined that all impacts to prime farmland related to the primary action and associated component actions for the proposed ash impoundment closures at ALF are minor.

Table 3-23. Summary of Impacts to Prime Farmland

Alternative	Action	Impact	Severity
		Impoundment Closures	
B, C	Impoundment closures	Conversion of less than 1 acre	Negligible impact. .
		Transport of All CCR to an Offsite Landfill	
B	Truck transport to landfill	No impact.	No impact.
B	Rail transport to landfill	No impact.	No impact.
		Borrow Transport to ALF	
B, C	Truck transport to ALF	No impact.	No impact.
		Transport of CCR to a Beneficial Re-use Processing Facility	
C	Truck transport to beneficial re-use processing facility and to an offsite landfill	No impact.	No impact.
		Construction and Operation of Beneficial Re-use Processing Facility	
C	Construction and operation of a beneficial re-use processing facility	Potential conversion of up to 15 acres of prime farmland to industrial use associated with facility construction.	Minor due to small scale.

3.17 Transportation

3.17.1 Affected Environment

ALF is located in the Frank C. Pidgeon Industrial Park which is served by highway, railway and waterway modes of transportation. Figures 2-3 and 2-5 identify the primary roadway network in the immediate project area. Major traffic generators include Nucor Steel, Electrolux Corporation, TVA's ACC and ACT plants, and the CSX intermodal facility. Traffic generated by these facilities is generally composed of a mix of cars and light duty trucks (such as a Fedex truck), as well as medium duty (larger delivery trucks) to heavy duty trucks (semi-tractor trailers).

Two service interchanges provide access to ALF from Interstate 55 (I-55). One is at West Mallory Avenue (a single-point urban interchange), the other is a partial (half-diamond) interchange at Kansas Street. The access at Kansas Street is to/from the west only. From Kansas Street, Rivergate Drive provides access between Kansas Street and Riverport Road (also known as Paul R. Lowry Road, hereinafter referred to as Riverport Road). From Kansas Street, Rivergate Drive provides access between Kansas Street and Riverport Road. Table 3-24 presents the 2017 Average Annual Daily Traffic (AADT) measured in

vehicles per day (veh/day) counts for roadways in the vicinity of ALF. Primary routes to ALF are shown on Figure 2-5.

From West Mallory Avenue, Riverport Road provides direct truck and automobile access to ALF. Riverport Road varies from two to four lanes, whereas Rivergate Drive is a two lane facility. Table 3-24 presents the 2017 Average Annual Daily Traffic (AADT) measured in vehicles per day (veh/day) counts for roadways that serve the Frank C Pidgeon Industrial Park as well as those used for truck transport in conjunction with CCR and borrow transport actions.

Table 3-24. Average Annual Daily Traffic Counts of Affected Roadways

Roadway Segment	Proposed Project use	2017 Average Daily Vehicle Use (veh/day)[1]	Number of Lanes	Existing Level of Service[2]
Riverport Rd. between ALF and W. Mallory Ave.	Transport CCR	9,718	4	A
Rivergate Rd. between Riverport Rd. and Horn Lake Rd.	Transport Borrow and CCR	468	4	A
Horn Lake Rd. between Rivergate Dr. and US-61	Transport Borrow and CCR	11,615	4	A
W. Mallory Ave. between Riverport Rd. and I-55	Transport CCR	7,493	4	A
Weaver Rd. between W. Mitchell Rd. and W. Raines Rd.	Transport Borrow	6,274	4	A
W. Raines Rd. between Weaver Rd. and Sewanee Rd.	Transport Borrow	4,919	2	B
Sewanee Rd. between W. Raines Rd. and W. Shelby Dr.	Transport Borrow	744	2	A
W. Shelby Dr. just east of Sewanee Rd.	Transport Borrow	3,353	2	A
I-55 between W. Mallory Ave. and East Shelby Dr.	Transport CCR	79,972	6	C
I-240 between I-55 and SR-300	Transport CCR	100,133	6	C
SR-300 between I-55 and US-51	Transport CCR	22,096	4	A
E. Shelby Dr. between I-55 and Malone Rd.	Transport CCR	44,863	6	B
Malone Rd. from East Shelby Dr. to the South Shelby Landfill	Transport CCR	6,756	2	B
US-61 between Horn Lake Rd. and MS-3	Transport CCR	12,915	2	A

Roadway Segment	Proposed Project use	2017 Average Daily Vehicle Use (veh/day)[1]	Number of Lanes	Existing Level of Service[2]
MS-3 between US-61 and Hambick Rd.	Transport CCR	890	2	A
Hambick Rd. just west of MS-3	Transport CCR	190	2	A
Riverport Rd. between ALF and 3900 Paul Lowery Dr.	Transport Borrow	2,500	4	A
W. Holmes Rd. just east of Weaver Rd.	Transport Borrow	3,266	2	A

[1] Source: TDOT/MDOT 2017. Value shown is average of all available AADT data for impacted roadway segment.
[2] Source: TRB/FDOT 2013.

Levels of service (LOS) on the roadways in the vicinity of ALF calculated for 2017, ranged from LOS A to LOS C. 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
- LOS F designates traffic flow breakdown where the traffic demand exceeds the capacity of the roadway; traffic can be at a standstill

Railroads

ALF is served by a variety of rail lines that traverse the Memphis area. The Canadian Railroad operates rail line which directly serves ALF (CN 2019). This line runs east from ALF, parallel and to the north of Riverport Road for a distance of approximately 2 miles where it crosses to the south of the road. From there it continues eastward on the south side of the road for approximately 1.5 miles where it reaches the Canadian National Harrison Yard where there is access to several carriers which serve destinations throughout the country.

Barge

The ALF barge unloading area is located on McKellar Lake which has direct access to the Mississippi River. When in operation, ALF received coal deliveries by barge. Currently the ACT Plant receives fuel oil by barge.

3.17.2 Environmental Consequences

3.17.2.1 Alternative A – No Action Alternative

Under this alternative, no closure activities would occur and accordingly CCR would not be transported offsite. As a result, there would be no project-related impact to the existing transportation network.

3.17.2.2 Alternative B – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in an Offsite Landfill Location

As part of the primary action of ash impoundment closure, transportation effects are associated with workforce travel and the deliveries of materials and supplies in conjunction with construction activities. The peak construction workforce consists of 50 construction workers on site. Assuming vehicle occupancy of one person per vehicle, an average construction work force traffic volume would consist of 100 vehicles trips per day (50 vehicles inbound in the morning and 50 vehicles outbound in the afternoon). It is assumed that the construction workforce traffic would primarily access ALF from Plant Road via Riverport Drive. Vehicle movements more distant from ALF would utilize Riverport Drive and would disperse throughout the wider transportation network and resulting in negligible effects on the roadway system volume and LOS. CCR transport from ALF is a component action that entails the consideration of either transport by truck or rail. Similarly, the transport of borrow is a component action that would utilize some of the same roads as those used for CCR transport. Therefore, the assessment of impacts to transportation considers each of these actions in aggregate.

A specific landfill accessible by each of these modes of transportation has not been selected. Therefore, the impacts to transportation for truck is based upon the bounding or scenarios identified in Tables 2-4 and 2-8. As per the bounding analysis, CCR from ALF could be transported by truck up to 29 miles (58-miles roundtrip). There are three potential landfills within the 29-mile radius:

1. South Shelby Landfill – approximately 19 miles southeast of ALF
2. North Shelby Landfill – approximately 29 miles north of ALF
3. Tunica Landfill – approximately 27 miles south of ALF

The truck transport of CCR could have an effect on general traffic flow along the roadways and at intersections. CCR would be deposited in an existing landfill at a rate of 240 truck trips (120 truckloads) per day. Transport of all of the CCR from the impoundments would occur over an approximate 8-year timeframe (closure period).

Closure-by-Removal is also expected to require approximately 3.0 million cubic yards of suitable borrow material. Based on the bounding analysis presented in Table 2-8, TVA estimates that an average of 232 truck trips (116 truckloads) per day (using dump trucks with a capacity of 15 yd^3 per truck) would be needed to achieve the proposed finished grades over a period of approximately 8 years.

The overall aggregate effects of the additional traffic from workforce traffic (100 trips per day) and transport of CCR and borrow on the roadways in the project vicinity is summarized in Table 3-25 which illustrates the maximum increase in AADT for each roadway segment analyzed. In all cases, the aggregate effect would not change the predicted LOS on any

roadway segment and in most cases would not represent a substantial increase in the percent of traffic. However, two segments were noted as having a substantial increase in percentage of traffic relative to baseline conditions:

- Rivergate Road between Riverport Road. and Horn Lake Road
- Hambick Road just west of MS-3

Table 3-25. Projected Average Annual Daily Traffic Counts of Roadways in the Vicinity of ALF from Transport of CCR and Borrow

Impacted Roadway Segment	Primary Project Use	Max. Projected Average Daily Vehicle Use (veh/day)[1]	Percent Increase in Traffic	Projected Level of Service[2]
Riverport Rd. between ALF and W. Mallory Ave.	Workforce Commute, Transport Borrow and CCR	10,290	5.9	A
Rivergate Rd. between Riverport Rd. and Horn Lake Rd.	Workforce Commute, Transport Borrow and CCR	1,040	122.2	A
Horn Lake Rd. between Rivergate Dr. and US-61	Workforce Commute, Transport Borrow and CCR	11,907	5.0	A
W. Mallory Ave. between Riverport Rd. and I-55	Transport CCR	7,733	3.2	A
Weaver Rd. between W. Mitchell Rd. and W. Raines Rd.	Transport Borrow	6,506	3.7	A
W. Raines Rd. between Weaver Rd. and Sewanee Rd.	Transport Borrow	5,151	4.7	B
Sewanee Rd. between W. Raines Rd. and W. Shelby Dr.	Transport Borrow	976	31.2	A
W. Shelby Dr. just east of Sewanee Rd.	Transport Borrow	3,585	6.9	A
I-55 between W. Mallory Ave. and East Shelby Dr.	Transport CCR	80,212	0.3	C
I-240 between I-55 and SR-300	Transport CCR	100,133	0.2	C
SR-300 between I-55 and US-51	Transport CCR	22,336	1.1	A
E. Shelby Dr. between I-55 and Malone Rd.	Transport CCR	45,103	0.5	B

Impacted Roadway Segment	Primary Project Use	Max. Projected Average Daily Vehicle Use (veh/day)[1]	Percent Increase in Traffic	Projected Level of Service[2]
Malone Rd. from East Shelby Dr. to the South Shelby Landfill	Transport CCR	6,996	3.6	B
US-61 between Horn Lake Rd. and MS-3	Transport CCR	13,155	1.9	A
MS-3 between US-61 and Hambick Rd.	Transport CCR	1,130	27.0	A
Hambick Rd. just west of MS-3	Transport CCR	430	126.3	A
Riverport Rd. between ALF and 3900 Paul Lowery Dr.	Transport Borrow	2,732	9.3	A
W. Holmes Rd. just east of Weaver Rd.	Transport Borrow	3,458	7.2	A

[1] Source: TDOT/MDOT 2017. Value shown is average of all available AADT data for impacted roadway segment.
[2] Source: TRB/FDOT 2013.

Localized traffic impacts may also occur at intersections in the vicinity of ALF and along the routes to landfill and borrow locations. The intersection of Plant Road and Riverport Road is currently stop controlled only on Plant Road and traffic on Riverport Road does not stop. This affects the number of trucks that can turn onto Riverport Road and, as a result, trucks could back up on Plant Road causing delays. Additionally, vehicles leaving ALF are required to make a left turn across on-coming traffic. Potential effects would be even greater when CCR and borrow truck movements occur simultaneously as there would potentially be a combined total of 472 vehicle trips (236 vehicles) on the roadways per day. The AADT on both Plant Road and Rivergate Road more than double under this combined scenario. A temporary signal could be used at this intersection to help mitigate this, but some minor delays for existing traffic on Riverport Road would occur. A signal would allow the traffic to leave ALF via Plant Road efficiently while also creating gaps in the trucking traffic. Similar intersection delays and impacts may also be evident at Rivergate Road and Riverport Road, at Rivergate Drive and New Horn Lake Road, and potentially at landfill and borrow locations. Notably, it is expected that some delays in trucks turning right onto Rivergate Road may occur during times when a train is crossing the at-grade roadway. Localized effects may also be evident just from borrow transport on roadways within residential communities (e.g., Crossfield Rd near Borrow Site G). In order to minimize potential traffic effects, TVA will develop a traffic management plan that considers alternate access locations to/from ALF (i.e., Plant Road vs. Riverport Road to the west), staging and management of truck ingress/egress, borrow site selection to optimize use of borrow sites that do not require use of local, low volume roadway segments, potential alternate routing during train operations on Rivergate Road, and installation of temporary signals at key intersections.

The transport of both CCR and borrow material over public roadways would result in an increase in the number of vehicle miles traveled on those roadways. This increase in

vehicle miles is a factor in injury and fatal traffic crash rates. Therefore, there would be a minor impact related to increased traffic and driver safety. Due to the greater distance travelled, the risk is greater if transported by rail. The offsite transport of CCR by rail results in increased risks related to crashes and train derailments. Any uncontrolled at-grade crossings would pose an even greater risk.

Increased heavy vehicle traffic has the potential to deteriorate the roadways and impact driver safety. This is especially a risk on less improved local roads. The pavement design of local neighborhood roads used for transport of borrow may not have factored in a high percentage of heavy loads. Therefore, the truck traffic could potentially result in wear and tear of the pavement, pavement rutting, formation of potholes and destruction of soft (grass or loose gravel) shoulders.

Overall, the aggregate potential impacts from vehicle/truck operations on the regional transportation network are considered minor. However, localized effects on roadway segments that are used jointly by trucks transporting CCR and borrow are notable and moderate in many areas and moderate in localized intersections and low volume roadways (e.g. Rivergate Road, Crossfield Road and Hambick Road). However, these effects may be minimized substantially in conjunction with the benefits of a comprehensive traffic management plan.

TVA is also considering rail transport of CCR. Under this option impacts associated to the local and regional roadway system would be less than that described above as it would only entail workforce movement and the transport of borrow. Rail transport of CCR would be regionally distributed over a distance of up 1,047 miles (Table 2-5). TVA estimates that it could load 11 rail cars of CCR per day (approximately 1,000 yd^3 of CCR). Transport of CCR to an offsite landfill for disposal by rail would take approximately 15 years. Because trains carrying CCR from ALF are expected to be integrated within the existing rail freight system the addition of 11 rail cars per day would not result in increased rail congestion, delays or idling time and the impact of offsite transport of CCR by rail would be minor.

3.17.2.3 Alternative C – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and West Ash Pond; Disposal of CCR in a Beneficial Re-Use Process & Offsite Landfill Location

Activities conducted under primary actions associated with Alternative C would result in the similar magnitude and intensity of the impact to transportation as described for Alternative B. Additionally, impacts to transportation associated with the component actions of transport of CCR to the beneficial re-use processing facility, offsite landfill by truck (for materials unsuitable for beneficial re-use processing) and borrow transport would be similar to those described for Alternative B.

In conjunction with TVA actions associated with this alternative, TVA is also assessing the potential impacts associated with a component action consisting of the construction and operation of a beneficial re-use processing facility. Based on the bounding attributes in Table 2-10, the construction phase would employ a workforce of up to 150, and an operational workforce of up to 36. Accordingly, this would generate up to 300 vehicle trips per day and 62 vehicle trips per day, respectively. Based on the bounding analysis presented in Table 2-9, TVA estimates that an average of 120 truck trips (60 truckloads) of CCR per day would be needed to supply operations of the re-use processing facility. Additionally, on average up to 60 truckloads per day (120 truck trips) would leave the facility with beneficiated product that is transported to market. While the site of a prospective

beneficial re-use processing facility has not been determined it is expected to be located with direct access to a collector or other higher functioning roadway. Table 3-26 summarizes the relative effect of the combined traffic of workforce commuting, CCR transport, and beneficiated product deliveries associated with typical locations for the beneficial re-use processing facility.

Table 3-26. Projected Traffic Increase Associated with Beneficial Re-use Operations

Impacted Roadway Segment	Primary Project Use	Baseline Average Daily Vehicle Use (veh/day) [1]	Max. Projected Average Daily Vehicle Use (veh/day)	Percent Increase in Traffic
Typical Collector Roadway (High Volume)	Workforce Commute, Transport CCR, Product Delivery	6,300	6,612	5.0
Typical Collector Roadway (Low Volume)	Workforce Commute, Transport CCR, Product Delivery	2,500	2,812	12.5

[1] Source: FHWA, 2019

The increase in AADT does not adversely affect the LOS. As a result, there would be only minor traffic impacts associated with the construction and operation of the facility. The localized effects on roadway segments that are used jointly by the commuting operational workforce, trucks transporting CCR, and delivery of beneficiated product are therefore considered to be minor.

3.17.3 Summary of Impacts to Transportation

As summarized in Table 3-27, TVA has determined that impacts to transportation related to the proposed ash impoundment closures and related component actions are minor.

Table 3-27. Summary of Impacts to Transportation

Alternative	Action	Impact	Severity
		Impoundment Closures	
B, C	Impoundment closure	Temporary construction impacts related to construction activities and construction-related traffic.	Minor impact.
Transport of All CCR to an Offsite Landfill			
B	Truck transport to landfill	Increased traffic and safety risk related to offsite transportation of CCR (crashes, road damage, and other transportation-related effects). Aggregate potential effects with borrow transport.	Overall, the aggregate potential impacts on the regional transportation network are minor. However, localized effects on roadway segments that are used jointly by trucks transporting CCR and borrow are moderate in localized intersections and low volume roadways. Effects may be minimized substantially in conjunction with the benefits of a comprehensive traffic management plan.
B	Rail transport to landfill	Increased traffic and safety risk on roadways related to offsite transportation of CCR (crashes, derailments, and other transportation-related effects).	Minor impact to railway system.
Borrow Transport to ALF			
B, C	Truck transport to ALF	Impacts to traffic related to transport of borrow material on public roadways. Impacts minimized due to shorter hauling distance and intermittent activity. Aggregate potential effects with CCR transport.	See “Truck Transport of All CCR to an Offsite Landfill” above for severity of aggregate effects.

Alternative	Action	Impact	Severity
	Transport of CCR to a Beneficial Re-use Processing Facility		
C	Truck transport to beneficial re-use processing facility and to an offsite landfill	Increased traffic and safety risk related to additional vehicle miles travelled.	Minor impact to LOS of roadway system. See "Truck Transport of All CCR to an Offsite Landfill" above for severity of aggregate effects.
	Construction and Operation of Beneficial Re-use Processing Facility		
C	Construction and operation of a beneficial re-use processing facility	Temporary traffic impacts related to construction activities. Long-term transport of beneficiated product to various markets results in increased traffic and safety risk related to offsite transport (crashes, road damage and other transportation-related effects).	Minor impact to LOS of the roadway system, though impacts of Alternative C would be incrementally greater than Alternative B due to the number of additional trucks associated with the short-term construction and long-term operation of the proposed facility on roadways.

3.18 Noise

3.18.1 Affected Environment

Noise is unwanted or unwelcome sound usually caused by human activity and added to the natural acoustic setting of a locale. It is further defined as sound that disrupts normal activities or 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 include developed sites where frequent human use occurs, such as churches and schools.

Sound is measured in logarithmic units called decibels (dB). Given that the human ear cannot perceive all pitches or frequencies of sound, noise measurements are typically weighted to correspond to the limits of human hearing. This adjusted unit of measure is known as the A-weighted decibel (dBA) which filters out sound in frequencies above and below human hearing. 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. The noise level associated with a 10 dBA change is perceived as being twice as loud; whereas the noise level associated with a 20 dBA change is considered to be four times as loud and would therefore represent a "dramatic change" in loudness.

To account for sound fluctuations, environmental noise is commonly described in terms of the equivalent sound level. The equivalent sound level is the constant noise level that conveys the same noise energy as the actual varying instantaneous sounds over a given period. Fluctuating levels of continuous, background, and/or intermittent noise heard over a specific period are averaged as if they had been a steady sound. The day-night sound level (L_{dn}), expressed in dBA, is the 24-hour average noise level with a 10-dBA correction penalty

for the hours between 10 p.m. and 7 a.m. to account for the increased sensitivity of people to noises that occur at night. Typical background day-night noise levels for rural areas are anticipated to range between an L_{dn} of 35 and 50 dB, whereas higher-density residential and urban areas background noise levels range from 43 dB to 72 dB (EPA 1974). Common indoor and outdoor noise levels are listed in Table 3-28.

There are no federal, state, or locally established quantitative noise-level regulations specifying environmental noise limits in Shelby County, Tennessee. However, the EPA noise guideline recommends outdoor noise levels do not exceed L_{dn} of 55 dBA, which is sufficient to protect the public from the effect of broadband environmental noise in typical outdoor and residential areas. These levels are not regulatory goals but are "intentionally conservative to protect the most sensitive portion of the American population" with "an additional margin of safety" (EPA 1974). The U.S. Department of Housing and Urban Development (HUD) considers an L_{dn} of 65 dBA or less to be compatible with residential areas (HUD 1985).

Table 3-28. Common Indoor and Outdoor Noise Levels

Common Outdoor Noises	Sound Pressure Levels (dB)	Common Indoor Noises
	110	Rock Band at 5 m (16.4 ft)
Jet Flyover at 300 m (984.3 ft)		
	100	Inside Subway Train (New York)
Gas Lawn Mower at 1 m (3.3 ft)		
	90	Food Blender at 1 m (3.3 ft)
Diesel Truck at 15 m (49.2 ft)		Garbage Disposal at 1 m (3.3 ft)
	80	Shouting at 1 m (3.3 ft)
Gas Lawn Mower at 30 m (98.4 ft)	70	Vacuum Cleaner at 3 m (9.8 ft)
Commercial Area		Normal Speech at 1 m (3.3 ft)
	60	Large Business Office
	50	Dishwasher Next Room
Quiet Urban Daytime		
	40	Small Theater, Large Conference Room
Quiet Urban Nighttime		Library
Quiet Suburban Nighttime		
	30	Bedroom at Night
Quiet Rural Nighttime		Concert Hall (Background)
	20	Broadcast and Recording Studio
	10	
		Threshold of Hearing
	0	

Source: Arizona DOT 2008

3.18.1.1 Sources of Noise

ALF is located south of McKellar Lake in an area used for industrial purposes. ALF's three coal-fired units and associated coal facilities were retired on March 31, 2018 and do not generate any noise. However, ambient noise in the area is characterized by operations at ACT and ACC, including the existing combustion turbine units, and other industrial operations in the Frank C. Pidgeon Industrial Park.

Noise sources common to activities evaluated in this EIS include noise from construction activities and transportation noise. 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 will 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.

Transportation noise would primarily be comprised of noise associated the transport of CCR and borrow material via truck; however, transport of CCR by rail is also being considered, which would result in noise impacts related to rail 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 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 an approximately 3 dBA increase in noise level, which would not normally be a perceptible noise increase (FHWA 2011). Railway noise depends primarily on the speed of the train, but variations are present depending upon the type and condition of engines, wagons, and rails (Berglund and Lindvall 1995).

3.18.1.2 Noise Receptors

Sensitive noise receptors include residences or other developed sites where frequent human use occurs, such as churches, parks, and schools. Sensitive noise receptors would include recreationists using T.O. Fuller State Park, which is located approximately 75 feet southeast of the East Ash Pond Complex project area, on the opposite side of Riverport Road. The northwest corner of the park, closest to the project area, is primarily undeveloped woodland separated from the main body of the park by a railroad spur. This isolated portion of the park contains Plant Road, which provides access to the park, but does not provide any park amenities. The next closest receptor is a residential property located approximately 1.0 mile southeast of ALF, separated from the proposed project area by densely forested areas of T.O. Fuller State Park.

In addition to those sensitive noise receptors located in the vicinity of the project areas, receptors located within 500 feet of the potential haul routes determined in the bounding analyses for the truck transport of CCR to candidate landfills and the transport of borrow for onsite restoration were identified (see Sections 2.4 and 2.5). Based upon the bounding

scenario for CCR transport to an offsite landfill, up to 1,350 sensitive noise receptors would be located within 500 feet of the potential haul route utilized for CCR transport to a candidate landfill by truck. In addition, assuming utilization of all potential borrow sites, approximately 725 receptors would be located within 500 feet of a potential borrow haul route.

3.18.2 Environmental Consequences

3.18.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, no closure activities would occur. Therefore, there would be no project-related impacts to noise receptors.

3.18.2.2 Alternative B – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in an Offsite Landfill Location

Potential sources of noise associated with Alternative B include construction noise from impoundment closures and associated earth-moving activities (dozing, grading, and fill placement), and roadway noise from construction workforce traffic, transport of CCR to an offsite landfill, and the transport of borrow onsite to support site restoration. As both the offsite landfill and all borrow sites would be previously developed and/or permitted facilities, it is expected that noise associated with CCR disposal or borrow procurement at these locations would be consistent with their permitted usage.

Noise from closure activities at the ash impoundments would be the result of construction equipment, which would typically consist of loaders, dozers, excavators, telescopic handlers, compactors, and dump/haul trucks. Typical noise levels from construction equipment are expected to be 85 dBA or less at a distance of 50 feet from the construction equipment (FHWA 2016a). Based on straight line noise attenuation, it is estimated that noise levels from these sources, when utilized at the boundary of the East Ash Pond Complex project area, would attenuate to 81.5 dBA at the northwest corner of T.O. Fuller State Park. However, as previously noted, there are no amenities in this isolated portion of the park and park users would only be in this area when entering or exiting the park via Plant Road. The closest park amenity, a hiking trail, is located approximately 1,380 feet from the project area boundary and is also on a bluff, at a significantly higher elevation than the project area. Construction noise would be expected to attenuate to 56.2 dBA at the trail, slightly higher than the EPA's L_{dn} guideline of 55 dBA but lower than the HUD's L_{dn} guideline of 65 dBA. Furthermore, the actual noise level would likely be lower in the field, where vegetation and topography would cause further noise attenuation. The nearest residence is located approximately 1.0 mile southeast of the project areas, where construction noise would attenuate to 44.5 dBA, below both the EPA and HUD recommended guidelines. Therefore, due to distance, impacts from onsite construction noise at all residential properties would be negligible. Although construction noise levels at the northwestern boundary of T.O. Fuller State Park would be relatively high, this area of the park is only accessed by vehicular traffic entering and exiting the park via Plant Road. Given the temporary and intermittent nature of construction noise, and that noise levels at all park amenities would attenuate to levels near or below the EPA's L_{dn} guideline, the impact of noise generated from construction activities at the ash impoundments is expected to be minor.

There is also a potential for indirect noise impacts associated with a temporary increase in traffic related to construction workforce vehicle traffic. TVA estimates that the workforce

needed for impoundment closure would consist of an average of 50 personnel per day, over an approximately 8-year period. Assuming one person per commuting vehicle, there would be a daily morning inbound traffic volume of approximately 50 vehicles and a daily outbound traffic volume of approximately 50 vehicles, five days per week. As workforce traffic noise would only occur twice per day as workers are entering and leaving the project site and would result from a relatively small number of vehicles dispersed among the surrounding roadways, noise impacts from construction workforce traffic would be minor.

CCR excavated from the ALF surface impoundments would be transported to an offsite landfill for disposal via truck or rail. A specific landfill accessible by each of these modes of transportation has not been selected. Therefore, the noise impacts for each of the proposed modes of transportation are based upon the bounding scenario identified in Tables 2-4 and 2-5.

In the bounding analysis, TVA identified sensitive noise receptors along the potential haul routes to the candidate landfills accessible by over-the-road truck and determined that up to 1,350 sensitive noise receptors could be located along the haul route to an offsite landfill that could receive CCR from ALF. These receptors would be potentially exposed to increased roadway noise during the approximately 8-year closure period. As noted in Section 3.17 (Transportation), the roadways utilized by the haul routes to the landfills are almost entirely comprised of major collector, arterial, and interstate roads with daily traffic volumes ranging from 6,700 to over 100,000 vehicles per day. CCR transport, which would generally only occur on weekdays during normal working hours, would increase traffic volumes by 240 truck trips per day, resulting in, at most, a 3.6 percent traffic increase on these major roadways. This minor increase in traffic volume would have negligible effects on noise levels at sensitive noise receptors along these roads. However, per the bounding analysis, shorter portions of the potential haul routes may utilize private, collector, or rural arterial roads with lower traffic volumes. While the addition of 240 truck trips is not expected to double the traffic volume along any of these roads with lower traffic volumes, CCR truck transport may periodically result in perceptible noise increases (above 3 dBA) at receptors located along these roads due the use of over-the-road trucks and noise associated with increased noise at intersections when trucks stop and start (FHWA 2011). Portions of the potential haul routes along roads with lower traffic volumes are either located around ALF or near the entrances of candidate landfills. These roadways serve industrial or agricultural development and have few to no sensitive noise receptors within 500 feet of the roadway. Therefore, increased transportation noise associated with CCR transport via over-the-road trucking is anticipated to have a minor impact on sensitive receptors located along the haul route.

As stated in Chapter 2.4, TVA could load one unit train every 9 days and as such trains carrying CCR from ALF are expected to be integrated within the existing rail freight system and would not result in increased rail congestion, delays or idling time. As such, sensitive noise receptors located along these existing rail lines would not experience notably greater noise impacts due to the transport of CCR by rail than those they already experience under current rail operating conditions. Therefore, noise impacts from CCR transport via rail would be minor.

Closure-by-Removal of the impoundments at ALF is expected to require approximately 3.0 million cubic yards of suitable borrow material. Similar to the transport of CCR, noise generated as a result of the truck transport of borrow material from an offsite location to ALF could impact sensitive receptors that are located adjacent to the haul routes. TVA

estimates that an average of 232 truck trips (116 truckloads) of borrow material per day would be needed to achieve the proposed finished grades. The overall duration of borrow trucking activities would occur intermittently throughout the approximately 8-year closure period. Per the bounding analysis, up to 725 sensitive noise receptors could be located along the haul routes to the potential borrow sites and would be exposed to increased roadway noise associated with borrow transport during the closure period. As noted in Section 3.17 (Transportation), the roadways utilized by the proposed borrow haul routes are primarily collector roads with existing traffic volumes ranging from approximately 2,500 to 11,000 vehicles per day. Borrow transport, which would generally only occur on weekdays during normal working hours, would increase traffic volumes by 232 truck trips per day (or approximately 2 to 10 percent) on these roadways. Less frequently traveled roads utilized by the borrow routes, such as Sewanee Road and Rivergate Drive, would experience increased traffic volumes of approximately 32 and 50 percent, respectively. While none of these roadways would come close to doubling in traffic volume, borrow transport may periodically result in perceptible noise increases (above 3 dBA) at sensitive receptors along these roads due to use of over-the-road trucks and increased noise at intersections, which are more common on local and collector roads. However, borrow transport would be intermittent throughout the closure period, and haul routes would vary depending on which borrow site(s) were currently in use. As noise impacts from borrow transport would be intermittent and occur during a normal workday, general noise impacts at sensitive receptors along these roadways be notable but still minor relative to existing baseline traffic-related noise.

It should be noted that, under the bounding condition, small portions of the borrow haul routes may be required to utilize low-volume neighborhood streets, such as Crossfield Road (near Borrow Site G), to access a potential borrow site. Traffic volumes are typically not available for these roads but given that Crossfield Road is an unmarked local road used to access a small neighborhood, traffic volumes were estimated at approximately 100 vehicles per day. Therefore, an increase of 232 truck trips and associated increased noise levels along this road would result in relatively large noise impacts for the residences located along the roadway. As borrow transport is intermittent, and a single borrow site may contain only a portion of the material necessary over the closure period, noise impacts along a particular road may be short term relative to the closure period. In addition, efforts would be made to minimize the use of borrow sites that require access using low-volume neighborhood streets.

The transport of CCR to an offsite landfill and transport of borrow onsite could utilize the same portions of some roadways in the vicinity of ALF. These roads, including Riverport Road, Rivergate Drive, and Horn Lake Road, could experience up to 472 additional truck trips if CCR and borrow hauling occur simultaneously. However, Riverport Road and Horn Lake Road have existing traffic volumes (9,718 and 11,615 vehicles per day, respectively) such that an increase of 472 truck trips would result in a less than 5 percent increase in traffic volume. This minor increase in traffic volume would have negligible effects on noise levels at sensitive noise receptors along these roads. Traffic volumes on Rivergate Drive (468 vehicles per day) have the potential to double if both CCR and borrow transport utilize the road simultaneously. However, the road is immediately adjacent to a rail yard and has no sensitive noise receptors within 500 feet. Therefore, combined noise impacts of CCR and borrow transport would remain minor.

In summary, direct noise impacts from closure activities at ALF would be limited to impacts to sensitive receptors using T.O. Fuller State Park. While construction noise levels at the

undeveloped northwestern boundary of the park would be relatively high, noise levels at all park amenities would attenuate to levels near or below the EPA's L_{dn} guideline. Indirect impacts associated with increased transportation noise under this alternative are typically minor due to the existing traffic volumes along the haul routes and transport during normal working hours. However, noise impacts of borrow transport have the potential to be large if low-volume neighborhood streets are utilized for an extended period of time. Efforts would be made to minimize the use of borrow sites that require access using low-volume neighborhood streets. For haul routes that are used by both the transport of CCR offsite and the transport of CCR onsite, the aggregate effect of this increased traffic could result in a doubling of traffic volumes. However, no sensitive noise receptors are located within 500 feet of the roadways that could be utilized to haul CCR offsite and borrow onsite. Therefore, the noise impact would be minor.

3.18.2.3 Alternative C – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in a Beneficial Re-Use Process & Offsite Landfill Location

Impacts associated with the primary actions related to closure of the impoundments and the component actions of CCR transport offsite by truck and transport of borrow would be similar to those identified under Alternative B and would be minor to large depending on the borrow site chosen.

Under Alternative C, TVA would excavate and transport via truck the majority (up to 95 percent) of CCR to a beneficial re-use processing facility, with the remaining CCR being transported to an existing offsite landfill. CCR materials removed from the impoundments would be transported to the facility at rates similar to that of transport of all CCR to an offsite landfill (240 truck trips per day, 210 working days per year), as described under Alternative B. Per the facility attributes listed in Table 2-9, CCR transported to the facility could be trucked up to 10 miles from ALF to the nearest interstate system. Given the location of ALF, the primary route to the interstate would be Riverport Road to I-55 via an interchange at West Mallory Avenue. Riverport Road and West Mallory Avenue have existing traffic volumes such that an increase of 240 truck trips would result in a 2 to 4 percent increase in traffic volume. This minor increase in traffic volume would have negligible effects on noise levels at sensitive noise receptors along these roads. Once on I-55, project-related traffic is anticipated to fit in with familiar traffic patterns. As the beneficial re-use processing facility would have direct access from a collector road or major highway, the remainder of the haul route would be comprised of high-capacity roadways where additional truck traffic would assimilate into the existing traffic patterns and therefore would result in imperceptible changes in noise level at sensitive receptors located along the haul route. Additionally, CCR transport would typically be limited to weekdays during normal working hours. Therefore, noise impacts associated with CCR transport to the beneficial re-use processing facility would be minor.

While a specific location for the beneficial re-use processing facility has not been chosen, based on the facility attributes and bounding characteristics, including the location of the facility in an area zoned for compatible uses, the facility would not be sited in immediate proximity to sensitive noise receptors such as residences, schools, or churches. Additionally, according to the bounding characteristics, the noise generated at the facility during operation would attenuate to a maximum of 65 dBA at the property boundaries, consistent with the HUD L_{dn} guidelines and within generally acceptable noise levels for commercial, industrial, and other compatible uses. Noise associated with the construction

of the facility may temporarily exceed 65 dBA at the property boundaries; however, construction noise would be limited to a period of 14 months. Additionally, as the facility would have direct access from a collector road or major highway that can support truck traffic without noticeable effects to LOS, increased traffic associated with the construction and operation of the beneficial re-use processing facility, including construction traffic, operational workforce traffic, and trucking of beneficiated product, would have a notable, but relatively minor impact on existing traffic volumes and consequently, traffic noise. Therefore, due to the location of the facility within an area zoned for compatible use, and its direct access from a collector road or major highway, noise impacts associated with the construction and operation of the beneficial re-use processing facility would be notable but minor.

3.18.3 Summary of Noise Impacts

As summarized in Table 3-29, TVA has determined that the majority of noise impacts associated with the primary action and associated component actions related to the proposed ash impoundment closures at ALF are minor. However, noise impacts of borrow transport have the potential to be large if low-volume neighborhood streets are utilized for an extended period of time. Efforts would be made to minimize the use of borrow sites that require access using low-volume neighborhood streets.

Table 3-29. Summary of Noise Impacts

Alternative	Action	Impact	Severity
		Impoundment Closures	
B, C	Impoundment closures	Localized noise at T.O. Fuller State Park during closure activities. Indirect noise impacts from construction workforce vehicle traffic.	Minor due to significant attenuation at all park amenities. Minor due to small workforce numbers and dispersion on surrounding roadways.
		Transport of All CCR to an Offsite Landfill	
B	Truck transport to landfill	Increased traffic noise for sensitive receptors along the haul route from trucks transporting CCR.	Minor due to small percent increase in total traffic volume.
B	Rail transport to landfill	Noise associated with rail transport of CCR for sensitive noise receptors located along rail lines.	Minor. Consistent with current operating conditions.
		Borrow Transport to ALF	
B, C	Truck transport to ALF	Increased traffic noise for sensitive receptors along the haul routes from trucks transporting borrow to ALF.	Minor along roadways with traffic volumes able to support additional trucks, but large for low-volume neighborhood streets. Efforts would be made to minimize the use of borrow sites that require access using low-volume neighborhood streets.

Alternative	Action	Impact	Severity
	Transport of CCR to a Beneficial Re-use Processing Facility		
C	Truck transport to beneficial re-use processing facility and to an offsite landfill	Increased traffic noise for sensitive receptors along the haul route from trucks transporting CCR.	Minor due to small percent increases in total traffic volume.
	Construction and Operation of Beneficial Re-use Processing Facility		
C	Construction and operation of a beneficial re-use processing facility	Localized short-term increase in noise during construction and continuing long-term during operation.	Minor due to location within an area zoned for compatible use and maximum operational noise of 65 dBA at property boundaries.
		Long-term increase in traffic noise for sensitive receptors in the vicinity of the facility due to workforce traffic and delivery of beneficiated product.	Minor. Direct access to major highway or collector road results in notable, but minor changes in existing traffic and associated noise conditions.

3.19 Natural Areas, Parks and Recreation

3.19.1 Affected Environment

Natural areas include ecologically significant sites, national or state forests, wilderness areas, scenic areas, WMAs, recreational areas, greenways, trails, Nationwide Rivers Inventory (NRI) streams, and wild and scenic rivers. Managed areas include lands held in public ownership that are managed by an entity (e.g., TVA, U.S. Department of Agriculture, United States Forest Service, State of Tennessee) to protect and maintain certain ecological and/or recreational features. Ecologically significant sites are either tracts of privately-owned land that are recognized by resource biologists as having significant environmental resources or identified tracts on TVA lands that are ecologically significant but not specifically managed by TVA's Natural Areas program. NRI streams are free-flowing segments of rivers recognized by the National Park Service (NPS) as possessing remarkable natural or cultural values. Parks and developed recreation facilities include open areas, boat ramps, community centers, swimming pools, and other public recreation areas owned or managed by federal, state, county, local municipality, or other public entities.

This section addresses natural areas, parks and recreation facilities that are on, immediately adjacent to (within a 0.5-mile radius), or within the region (within a 5-mile radius and within Shelby County) of ALF. Due to distance and separation by the Mississippi River, natural areas, parks and recreation facilities to the west of ALF in Crittenden County, Arkansas would not be directly impacted by the proposed primary actions. Therefore, the study area is appropriately limited to Shelby County, as these areas are local to the project and have the potential for impacts related to noise, fugitive dust, traffic, and air emissions. Natural areas, parks and recreation facilities within 5 miles of the project areas, within Shelby County, are noted in Table 3-30 and illustrated on Figure 3-10.

Table 3-30. Natural Areas, Parks and Recreation Facilities in 5-mile Study Area within Shelby County

Park Name	Managing Agency
Bison Park	City of Memphis
Boxtown Park	City of Memphis
Chickasaw Park	City of Memphis
Chucalissa Village State Archaeological Area	University of Memphis
Dalstrom Park	City of Memphis
Ensley Bottoms Complex	Tennessee Wildlife Resources Agency
Falcon Park	City of Memphis
Ford Park	City of Memphis
Kansas-Riverview Park, Community Center and Swimming Pool	City of Memphis
Martin L King Riverside Park and Marina	City of Memphis
O.L. Cash Park	City of Memphis
Otis Redding Park	City of Memphis
Presidents Island WMA	Tennessee Wildlife Resources Agency
Redbud Park	City of Memphis
Roosevelt Park	City of Memphis
T.O. Fuller State Park and Chucalissa Tree Trail Arboretum	State of Tennessee
Walker Park	City of Memphis
Walter Chandler Park	City of Memphis
Weaver Park	City of Memphis
Western Park	City of Memphis
Westwood Park, Community Center and Swimming Pool	City of Memphis
Wetlands Reserve Program Conservation Easement (939.2 acres)	Private Ownership with easement held by Natural Resources Conservation Service (NRCS)
Wetlands Reserve Program Conservation Easement (1,313.8 acres)	Private Ownership with easement held by NRCS

Sources: City of Memphis 2019 and TVA 2018b

Figure 3-10. Natural Areas, Parks, and Recreation Facilities in 5-mile Study Area within Shelby County

T.O. Fuller State Park, which contains the Chucalissa Archaeological Site and Chucalissa Tree Trail Arboretum, is located approximately 90 feet southeast of the East Ash Pond Complex project area at its closest point. Established in 1938, the 1,138-acre park was the first state park east of the Mississippi River that was open for use by African Americans and is the only state park located within the city limits of Memphis. The park features hiking, camping, an arboretum trail, and a nature center. Recreation facilities at the park include a picnic area, campground, swimming pool, and tennis courts. The Chucalissa Village State Archaeological Area is comprised of 866.5 acres within T.O. Fuller State Park, 0.4 miles southeast of the East Ash Pond Complex project area. This site was set aside in 1994 to preserve one of the major prehistoric settlements in the southeast (Tennessee State Parks 2019).

Presidents Island WMA is located 0.75-miles north of the ALF plant site. This 6,300-acre site is a notable birding site and provides habitat for many wildlife species. Portions of the site are actively managed for hunting (TWRA 2019c).

Approximately 1.8 miles southwest of ALF and located along the eastern bank of the Mississippi River, there are two privately owned properties that have conservation easements held by the NRCS through enrollment in the Wetlands Reserve Program. These parcels have been placed in a voluntary program to protect, enhance, and restore wetlands (USDA NRCS 2019a).

The Ensley Bottoms Complex is an important area for shorebirds and other waterfowl that includes the ALF surface impoundments, McKellar Lake, Presidents Island Wildlife Management Area, T. O. Fuller State Park, the T.E. Maxson WWTP, and other public and private lands in the vicinity of ALF (TWRA 2019b). Designated as an important bird area by TWRA, this 1,058.8-site acre site contains a mix of habitat types, including agricultural fields, grasslands, sludge treatment ponds, and bottomland forest. Although the ALF facilities are not open to the public, TVA allows bird watchers to view the East Ash Pond Complex from surrounding roadways.

There are 17 City of Memphis parks located 0.5 to 5.0 miles from the proposed project areas. These parks range in size from approximately 3 acres to over 150 acres, and they provide varying amenities including playgrounds, swimming pools, walking trails, sports fields and courts, community centers, pavilions, and picnic areas (City of Memphis 2019).

In addition to the developed recreational facilities located within a 5-mile radius of the project areas, parks and recreational facilities located along potential haul routes identified for the bounding analysis for the transport of borrow and the truck transport of CCR to the candidate landfills were identified (see Sections 2.4 and 2.5). One additional facility, Gardenview Park, is located adjacent to a potential CCR haul route identified in the bounding analyses. Gardenview Park is a City of Memphis-owned park located approximately 8.5 miles southeast of ALF adjacent to I-55. Park amenities include ball fields and a playground (City of Memphis 2019).

Apart from developed recreational facilities, there are also opportunities for dispersed recreation in the region around ALF. Dispersed recreation occurs in an undeveloped setting and includes informal activities such as hiking, nature observation, primitive camping, backpacking, horseback riding, cycling, boating, canoeing, fishing, rock climbing, off-road all-terrain vehicle use, and driving for pleasure. McKellar Lake is located immediately north of ALF and is occasionally utilized for recreational boating and fishing. However, it is part of

the International Port of Memphis and is primarily characterized by industrial rather than recreational use (International Port of Memphis 2019a).

3.19.2 Environmental Consequences

3.19.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, no closure activities would occur. Therefore, there would be no impacts to natural areas, parks or recreational resources.

3.19.2.2 Alternative B – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in an Offsite Landfill Location

Under Alternative B, there would be a direct impact to the Ensley Bottoms Complex important bird area, as closure of the ash ponds would result in decreased attraction to shorebirds and other waterfowl. This would result in a long-term impact to recreational bird watchers who frequent the area around the impoundments to view shorebirds, waterfowl and other wildlife. Closure of the East Ash Pond Complex would make the resulting landscape unsuitable for use by the interior tern. Therefore, those recreators specifically attracted to ALF because of the opportunity to view this rare species would be expected to pursue other bird viewing opportunities elsewhere. However, the Ensley Bottoms Complex covers a large area, most of which would remain unaffected by project activities. Due to the location of the site near both the Mississippi River and McKellar Lake, there is an abundance of higher quality waterfowl and wading bird habitat in the vicinity. Furthermore, there are multiple locations nearby that provide additional bird watching opportunities, including T.O Fuller State Park, Presidents Island WMA, and the sewage ponds just southeast of the plant. Therefore, Alternative B is anticipated to have a minor impact on the Ensley Bottoms Complex and recreational bird watching.

Due to the proximity of the project areas to T.O. Fuller State Park, there is a potential for indirect impacts associated with the closure of the impoundments. These impacts involve disruption of traffic patterns, potential delays in accessing the park, and an increase in noise and dust emissions. However, the northwest corner of the park that is closest to the East Ash Pond Complex project area is undeveloped woodland with the exception of Plant Road, which provides access into to the park. The closest park amenity, a hiking trail, is located approximately 0.25 miles from the project area boundary and is also on a bluff, at a significantly higher elevation than the project area. Except when entering or exiting the park via Plant Road, impacts to park users would be minimized by the buffer provided by the undeveloped forested area, as well as by distance and topography. Therefore, impacts to users of T.O. Fuller State Park as a result of construction-related traffic are anticipated to be minor. For all remaining natural areas, parks, and recreation facilities, there would be no direct or indirect impacts from onsite activities given the existing industrial setting of the project location and the distance between these resources and the proposed project areas.

Increased traffic, fugitive dust emissions and noise associated with the offsite transport of CCR to an existing landfill could potentially impact users of natural areas, parks and recreational facilities adjacent to haul routes used to transport CCR. Based on the bounding analysis presented in Table 2-4, the maximum length of a trucking haul route through or adjacent to parks or recreational facilities is 1.2 miles. The largest single component of this distance (approximately 0.9 miles) is the portion of Riverport Road passing along the northern edge of T.O. Fuller State Park. While all routes that leave the industrial park must utilize this roadway, the areas of the park directly adjacent to the road are undeveloped

woodlands and wetlands that are not typically accessed by park users. The closest hiking trails and park amenities are over 700 feet from the roadway. BMPs designed to minimize fugitive dust emissions (such as covered loads) would be utilized to minimize the effects of fugitive dust, and CCR transport would typically only occur on weekdays during normal working hours when these facilities are less frequently utilized. Furthermore, roadways that are designed to support through traffic and as such natural areas, parks and recreational facilities would have undeveloped buffer areas between the roadway and park amenities. As such, impacts from increases in traffic and noise or dust emissions would be minimized and would not impair use or enjoyment of these resources.

However, city parks that may be located adjacent roadways with lower traffic volumes are typically smaller with facilities such a ball fields and playgrounds located closer to the road. Users at these facilities would be impacted by noise and fugitive dust and increased traffic associated with transport of CCR and or borrow material. As described above, BMPs designed to minimize fugitive dust emissions would be employed and transport of CCR and borrow material would generally occur during normal working hours which would minimize the impacts on city parks or similar recreational facilities located adjacent to the haul route during the closure period. For these reasons, and because of the temporary nature of the actions, impacts of CCR transport via truck on parks and recreation would be moderate but limited to the relatively short term.

As stated in Chapter 2.4, trains carrying CCR from ALF are expected to be integrated within the existing rail freight system and would not result in increased rail congestion, delays or idling time. As such, natural areas, parks and recreation facilities located along these existing rail lines would not experience notably greater impacts due to the transport of CCR by rail than those they already experienced under current rail operating conditions. Therefore, impacts of CCR transport via rail would be minor.

Closure-by-Removal of the impoundments at ALF is expected to require approximately 3.0 million yd^3 of suitable borrow material. All borrow material would be obtained from a previously developed and/or permitted site and therefore the procurement of borrow would not impact natural areas, parks or recreational facilities. Similar to the transport of CCR, fugitive dust, noise and traffic generated as a result of transport of borrow material from an offsite location to ALF could indirectly impact users of these areas that are located adjacent to the transport routes. Based on the bounding analysis presented in Table 2-8, approximately 1.8 miles of the borrow haul route would pass through or adjacent to natural areas, parks or developed recreation facilities. As described above for the transport of CCR from ALF, the largest single component of this distance (approximately 0.9 miles) is a portion of Riverport Road passing through and along the northern edge of T.O. Fuller State Park, and the areas of the park directly adjacent to the road are undeveloped woodlands and wetlands that are not typically accessed by park users. Therefore, the aggregate effect of transport of borrow and CCR along this roadway would have a minor effect on users of the park.

Overall, impacts to natural areas, parks, and recreation resulting from the primary action and component actions undertaken by TVA under Alternative B are anticipated to be minor to moderate. Indirect impacts from offsite transport would be minimized through the use of BMPs to minimize dust emissions. In addition, transport of CCR and borrow would generally be restricted to weekdays during normal working hours and would only occur for the duration of closure activities. While the impoundment closure would result in long-term impacts to recreational bird watchers, there is an abundance of shorebird and waterfowl

habitat, as well as other bird watching locations, in the vicinity of ALF. As such, overall impacts to recreational bird watchers is expected to be minor.

3.19.2.3 Alternative C – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and West Ash Pond; Disposal of CCR in a Beneficial Re-Use Process & Offsite Landfill Location

Impacts to natural areas, parks, and recreation resulting from the primary actions associated with closure of the impoundments and the component actions of CCR transport of borrow onsite would be similar to those identified under Alternative B and would be minor to moderate.

Under this alternative, the majority of CCR materials removed from the impoundments would be transported to a beneficial re-use processing facility via over-the-road trucking at rates similar to that of transport to an offsite landfill as described for Alternative B. While a specific location of the beneficial re-use processing facility has not been chosen, transport of CCR from ALF would utilize existing arterial and interstate roadways as much as possible to enhance safety and efficiency of transport. As described under Alternative B, trucks transporting CCR from ALF would utilize Riverport Road to reach the closest highway (I-55), thereby passing through and adjacent to T.O. Fuller State Park. However, as described above, increased traffic along this roadway is not expected to impair the use or enjoyment of this park. Once on the interstate, additional truck traffic would assimilate into the existing traffic patterns and therefore would have minimal impacts on any parks and recreation facilities along the haul route. Impacts to parks and recreation associated with transport of CCR to the beneficial re-use processing facility would be temporary and minor.

Although the specific location of a beneficial re-use processing facility has not been determined, based on the attributes presented in Tables 2-9 and 2-10, existing natural areas, parks or developed recreation areas would not be considered an acceptable land use for the facility and, therefore, would not be directly impacted by construction. In the event that there are natural areas, parks or recreation facilities in the vicinity of the proposed beneficial re-use facility, these areas may experience indirect impacts such as fugitive dust, construction noise, and increased traffic during construction. However, construction impacts would be temporary (up to 14 months) and would be minimized through use of BMPs (e.g., dust control measures) as required to reduce offsite emissions.

In addition, if there are natural areas, parks or recreation areas in the vicinity, indirect impacts from operation of the beneficial re-use facility may occur. Primary impacts would be associated with disruption of traffic patterns from workforce commuting and delivery of beneficiated product to various markets, which may result in potential delays in accessing parks, and increase in noise levels. The facility is anticipated to operate up to 350 days per year, with a commuting workforce of up to 36 employees, while trucking of product (up to 90 truckloads or 180 truck trips per day) would occur 250 days per year, primarily on weekdays. However, because facility attributes include direct access to the site from a collector road or major highway that can support truck traffic without noticeable effects to LOS, this increase in traffic would not have a notable, but minor impact on existing traffic patterns and, consequently, on traffic noise. Therefore, impacts associated with the construction and operation of the beneficial re-use processing facility on parks and recreation are anticipated to be minor.

3.19.3 Summary of Impacts to Managed and Natural Areas

As summarized in Table 3-31, TVA has determined that all impacts to parks and recreation related to the primary action and associated component actions related to the proposed ash impoundment closures at ALF are minor to moderate.

Table 3-31. Summary of Impacts to Managed and Natural Areas

Alternative	Action	Impact	Severity
		Impoundment Closures	
B, C	Impoundment closures	Long-term impacts to Ensley Bottoms Complex and recreational birders due to dewatering of the impoundments.	Minor. High quality waterfowl and wading bird habitat and bird watching opportunities are present in other areas of the Ensley Bottoms Complex.
		Transport of All CCR to an Offsite Landfill	
B	Truck transport to landfill	Temporary increase in fugitive dust, noise, and traffic for natural areas and parks along the haul route from trucks transporting CCR.	Minor impact to parks and recreational facilities located on roadways which support higher traffic volumes. Moderate impact to smaller parks located adjacent to the haul routes. Transport would be limited to weekdays during normal working hours and minimized with the use of BMPs including dust control measures.
B	Rail transport to landfill	Temporary increase in fugitive dust and noise for natural areas and parks located along rail lines.	Minor. Would not experience notably greater impacts due to transport of CCR by rail than those already experienced under current rail operating conditions.
		Borrow Transport to ALF	
B, C	Truck transport to ALF	Increase in fugitive dust, noise, and traffic for natural areas and parks along the haul routes from trucks transporting borrow to ALF.	Minor impact to parks and recreational facilities located on roadways which support higher traffic volumes. Moderate impact to smaller parks located adjacent to the haul routes. Transport would be limited to weekdays during normal working hours and minimized with the use of BMPs including dust control measures.

Alternative	Action	Impact	Severity
	Transport of CCR to a Beneficial Re-use Processing Facility		
C	Truck transport to beneficial re-use processing facility and to an offsite landfill	Temporary increase in fugitive dust, noise, and traffic for natural areas and parks along the haul route from trucks transporting CCR.	Minor impact due to use of. roadways which support higher traffic volumes where facilities are generally buffered from traffic impacts. Minimized with the use of BMPs, including dust control measures.
	Construction and Operation of Beneficial Re-use Processing Facility		
C	Construction and operation of a beneficial re-use processing facility	Temporary increase in fugitive dust, noise, and traffic for natural areas and parks in proximity to facility during construction.	Minor. Relatively short-term and minimized with the use of BMPs, including dust control measures.
		Long-term increase in traffic and associated noise for any natural areas or parks near the facility due to increased workforce and delivery of beneficiated product.	Minor. Location on major highway or collector road results in minimal changes in existing traffic conditions.

3.20 Socioeconomics and Environmental Justice

3.20.1 Affected Environment

For the socioeconomic and environmental justice analysis, multiple geographic references were used to characterize the affected environment. For lands in the immediate vicinity of ALF, the study area was defined as any census block group that falls within a 5-mile radius of ALF, within the boundaries of Shelby County. Due to distance and separation by the Mississippi River, communities to the west of ALF in Crittenden County, Arkansas would not be directly impacted by the proposed primary actions. Therefore, the study area is appropriately limited to Shelby County, as these populations are local to the project and have the potential for exposure to human health or environmental hazards related to noise, fugitive dust, traffic, and air emissions. The City of Memphis, Shelby County, and the state of Tennessee are included as secondary geographic areas of reference. In addition, to further define the effects of offsite transport of CCR and onsite transport of borrow on environmental justice, block groups meeting the specified criteria as minority or low-income populations along the potential haul routes determined in the bounding analyses (see Sections 2.4 and 2.5) were identified. Comparisons at multiple spatial scales provide a more detailed characterization of populations that may be affected by the proposed actions, including any environmental justice populations (e.g., minority and low-income). Demographic and economic characteristics of populations within the study area were assessed using the 2013-2017 American Community Survey (ACS) 5-year estimates provided by the U.S. Census Bureau (USCB) (USCB 2019a).

3.20.1.1 Demographics

Memphis is a densely populated metropolitan area with a total population of 654,723. The population of Memphis accounts for approximately 70 percent of the total population of Shelby County and 10 percent for all of Tennessee (Table 3-32). Collectively, the block groups that make up the 5-mile study area have a total population of 35,804. This population represents approximately 5.5 percent of the total population of Memphis and 3.8 percent of Shelby County. It should be noted that the block group that contains the project areas and temporary laydown area is comprised primarily of industrial properties and has no resident population.

Table 3-32. Demographic Characteristics of the ALF Study Area and Secondary Reference Geographies

	Study Area (5-mile Radius in Shelby County)	City of Memphis	Shelby County	State of TN
Population[1,2]				
Population, 2017 estimate	35,804	654,723	937,847	6,597,381
Population, 2010	38,166	646,889	927,644	6,346,105
Percent Change 2010-2017	-6.2%	1.2%	1.1%	4.0%
Persons under 18 years, 2017	23.8%	25.2%	25.3%	22.7%
Persons 65 years and over, 2017	17.2%	11.8%	12.2%	15.4%
Racial Characteristics[1]				
Not Hispanic or Latino				
White alone, 2017 (a)	2.4%	26.1%	36.5%	74.3%
Black or African American, 2017 (a)	92.8%	63.7%	53.2%	16.7%
American Indian and Alaska Native, 2017 (a)	0.0%	0.1%	0.1%	0.2%
Asian, 2017 (a)	0.1%	1.6%	2.5%	1.7%
Native Hawaiian and Other Pacific Islander, 2017 (a)	0.0%	0.0%	0.0%	0.1%
Some Other Race alone, 2017 (a)	0.3%	0.2%	0.2%	0.1%
Two or More Races, 2017	0.5%	1.4%	1.5%	1.9%
Hispanic or Latino, 2017	4.0%	7.0%	6.1%	5.2%
Housing and Income[1]				
Housing units, 2017	16,490	298,310	403,206	2,903,199
Median household income, 2013-2017	$31,252	$38,230	$48,415	$48,708
Persons below poverty level, 2013-2017	28.5%	26.9%	20.8%	16.7%
Persons below low-income threshold, 2013-2017 (b)	56.7%	51.0%	40.8%	37.3%

(a) Includes persons reporting only one race.

(b) Low-income threshold is defined as two times the poverty level

Sources: [1]USCB 2019a; [2]USCB 2011

Minority populations represent the primary component of the population of the 5-mile study area. Specifically, Blacks or African Americans represent 92.8 percent of the population within the 5-mile study area (see Table 3-32), 63.7 percent of the population of Memphis, and 53.2 percent of the population of Shelby County. These percentages are notably greater than the state-wide value for Tennessee (16.7 percent). In contrast, whites account for just 2.4 percent of the population within the study area, even though they represent 36.5 percent and 74.3 percent of Shelby County and Tennessee populations, respectively. Other minority racial and ethnic groups are present in the study area but are at or below comparative rates for Shelby County and Tennessee.

The average median household income of the block groups that comprise the study area is $31,252. In comparison, the median household incomes for Memphis, Shelby County and Tennessee are $38,230, $48,415, and $48,708, respectively (see Table 3-31). Approximately 28.5 percent of the population within the 5-mile study area have an annual household income below the nationwide poverty level, compared to 26.9 percent for the City of Memphis, 20.8 percent for Shelby County, and 16.7 percent for Tennessee.

3.20.1.2 Economic Conditions

Shelby County contains a total employed labor force of 430,218 workers (Table 3-33). Business sectors providing the greatest employment include Education, Health Care and Social Assistance (22.8 percent); Transportation, Warehousing and Utilities (12.0 percent); Retail Trade (11.4 percent); and Professional, Scientific, Management, and Administrative Services (10.3 percent).

Table 3-33. Largest Employers by Sector within Shelby County, Tennessee

Sector	Number of Employees	Percent
Education, Health Care and Social Assistance	97,957	22.8%
Transportation, Warehousing and Utilities	51,826	12.0%
Retail Trade	48,879	11.4%
Professional, Scientific, Management, and Administrative Services	44,113	10.3%
Arts, Entertainment, Recreation, Accommodation and Food Services	40,288	9.4%
Manufacturing	38,817	9.0%
Finance, Insurance, Real Estate, Rental and Leasing	23,364	5.4%
Public Administration	20,446	4.8%
Construction	20,099	4.7%
Wholesale Trade	14,412	3.3%
Subtotal	**400,201**	**93.0%**
Total Employed Population	**430,218**	**100%**

Source USCB 2019a

The total employed civilian population within the block groups that make up the study area is 12,673, with the unemployment rate at 2,602 people, or 17.0 percent of the civilian labor force. This unemployment rate is noted to be higher relative to the unemployment rates of the city of Memphis (10.4 percent), Shelby County (8.6 percent) and the State of Tennessee (6.6 percent) (Table 3-34).

Table 3-34. Employment Characteristics of the Resident Labor Force

	Population			
Employment Status	Study Area (5-mile Radius in Shelby County)	City of Memphis	Shelby County	State of TN
Population >16 years	28,280	506,705	726,932	5,270,257
Civilian Labor Force	15,275	321,611	470,615	3,207,366
Employed	12,673	288,253	430,218	2,996,610
Unemployed	2,602	33,358	40,397	210,756
Unemployment				
% of Total Population > 16 years	9.2%	6.6%	5.6%	4.0%
% of Civilian Labor Force	17.0%	10.4%	8.6%	6.6%

Source: USCB 2019a

3.20.1.3 Community Facilities and Services

Community facilities and services are public or publicly funded facilities such as police protection, fire protection, schools, hospitals and other health care facilities, libraries, daycare centers, churches and community centers. When applicable, the study area for the evaluation of impacts to community services is the service area of various providers; otherwise a secondary study area defined for the purposes of a socioeconomic analysis may be defined. In this case, the study area for community impacts is the same as for the socioeconomic analyses described above (within a 5-mile radius of ALF and within the boundaries of Shelby County).

Community facilities and services available to the communities within the 5-mile study area include over 100 churches, 15 schools and daycare centers, five fire stations, two community centers, and a post office (USGS 2019). There are no police stations or hospitals within the study area. Additionally, there are no community facilities located in the immediate vicinity (within 0.5 mile) of ALF; the closest facilities are the Macedonia Missionary Baptist Church and the Apple and Cookies Enrichment Center daycare facility, both located near the intersection of Boxtown Road and Fields Road, approximately 1.4 miles southeast of ALF.

In addition, five schools, two day care centers, the Mitchell Community Center, the Memphis Fire Station #37 and 10 churches are located along the portions of the haul routes that would be used to transport CCR offsite or borrow onsite included within the 5-mile study area. Community facilities outside of the 5-mile study area located along portions of the haul routes to the existing landfills that primarily utilize interstates were not identified as these facilities would not be impacted by additional traffic on these roadways.

3.20.1.4 Environmental Justice

On February 11, 1994, President Clinton signed EO 12898 Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. Under EO 12898 some federal-executive agencies are mandated to consider environmental justice as part of the NEPA process. Environmental justice has been defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income (EPA 2018a) and ensures that minority and low-income populations do not bear disproportionately high and adverse human health or environmental effects from federal

programs, policies, and activities. Although TVA is not one of the agencies subject to this order, TVA routinely considers environmental justice impacts as part of the project decision-making process.

Guidance for addressing environmental justice is provided by the CEQ's environmental justice guidance under the National Environmental Policy Act (CEQ 1997). The CEQ defines minority as any race and ethnicity, as classified by the USCB, as: Black or African American; American Indian or Alaska Native; Asian; Native Hawaiian and Other Pacific Islander; some other race (not mentioned above); two or more races; or a race whose ethnicity is Hispanic or Latino (CEQ 1997).

Identification of minority populations requires analysis of individual race and ethnicity classifications as well as comparisons of all minority populations in the region. Minority populations exist if either of the following conditions is met:

- The minority population of the impacted area exceeds 50 percent of the total population.
- The ratio of minority population is meaningfully greater (i.e., greater than or equal to 20 percent) than the minority population percentage in the general population or other appropriate unit of geographic analysis (CEQ 1997).

The nationwide poverty level is determined annually by the USCB and varies by the size of family and number of related children under 18 years of age. The 2018 USCB Poverty Threshold for an individual is an annual income of $13,064, and for a family of four, is an annual household income of $25,900 (USCB 2019b). For the purposes of this assessment, low-income individuals are those whose annual household income is less than two times the poverty level. More encompassing than the base poverty level, this low-income threshold, also used by the EPA in their delineation of low-income populations, is an appropriate measure for environmental justice consideration because current poverty thresholds are often too low to adequately capture the populations adversely affected by low income levels, especially in high-cost areas (EPA 2017). According to EPA, the effects of income on baseline health and other aspects of susceptibility are not limited to those below the poverty thresholds. Populations having an income level from one to two times the poverty level also have worse health overall than those with higher incomes (Centers for Disease Control and Prevention 2011). A low-income environmental justice population exists if either of the following two conditions is met:

- The low-income population exceeds 50 percent of the total number of households.
- The ratio of low-income population significantly exceeds (i.e., greater than or equal to 20 percent) the appropriate geographic area of analysis.

Based on a preliminary review of the EPA's EJSCREEN tool, the majority of communities in the vicinity of ALF meet the criteria for consideration as minority and/or low-income populations. A more detailed evaluation was completed using the 2013-2017 ACS data to identify specific block groups within the study area that exceed environmental justice thresholds. Figure 3-11 identifies the block groups that meet the specified criteria as environmental justice minority populations or low-income populations.

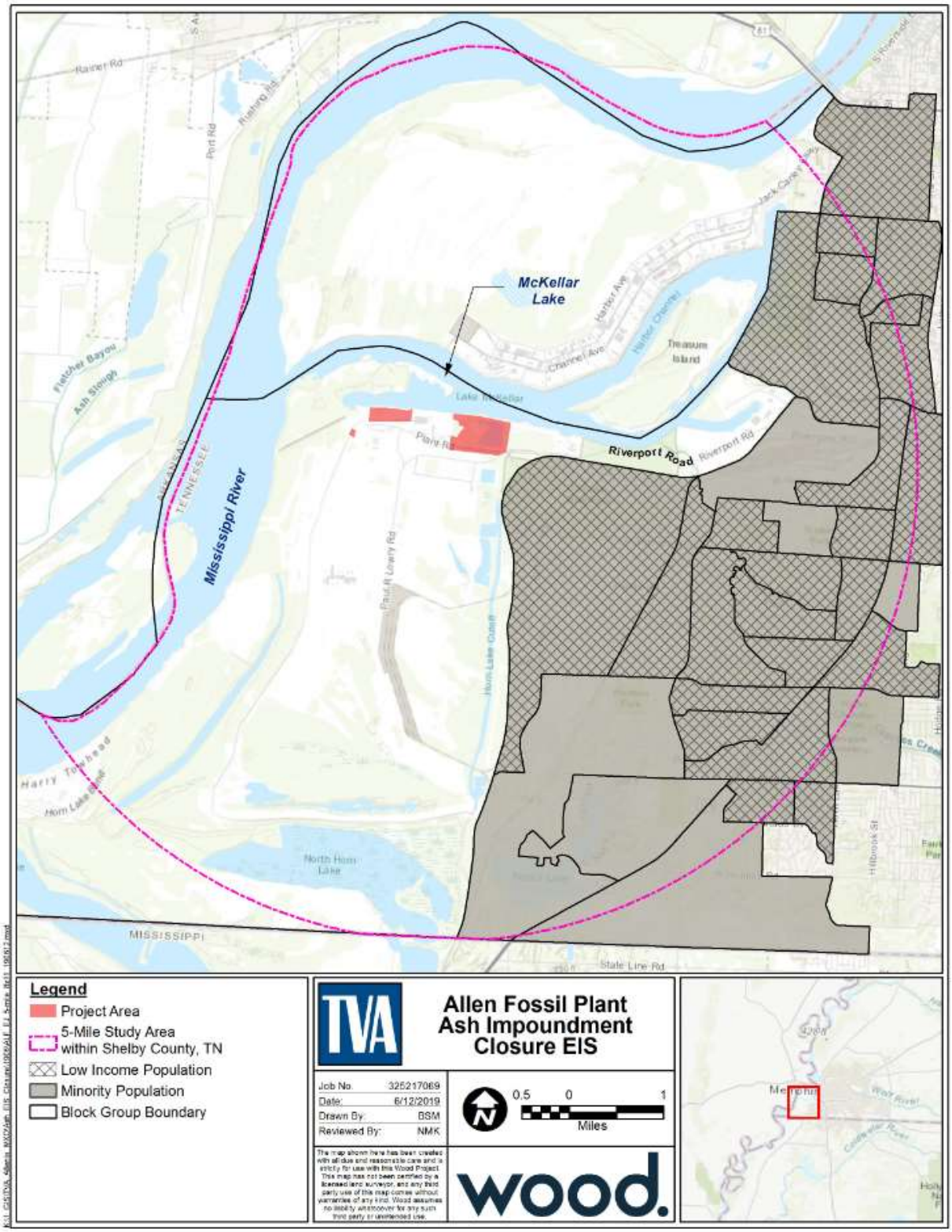


Figure 3-11. Environmental Justice Populations Within the ALF Study Area

Minority populations make up 97.6 percent of the total population within the study area. Comparatively, minorities comprise 73.9 percent of the population of the city of Memphis, 63.5 percent of Shelby County, and 25.7 percent of Tennessee (see Table 3-32). African American populations, which frequently represent more that 75 percent of the total population within each block group.

As shown in Table 3-32, the percentage of the population living below the low-income threshold within the study area is 56.7 percent. This percentage is slightly greater than that of the city of Memphis (51.0 percent) and notably greater than that of Shelby County (40.8 percent) and the state of Tennessee (37.3 percent). Figure 3-11 identifies individual block groups determined to meet the criterion for consideration as low-income population groups subject to environmental justice considerations.

In addition to the environmental justice communities located within the 5-mile study area, block groups meeting the specified criteria as environmental justice minority or low-income populations along the potential haul routes determined in the bounding analyses for the truck transport of CCR to candidate landfills and the transport of borrow for onsite restoration were identified (see Sections 2.4 and 2.5). Based upon the bounding scenario for CCR transport to an offsite landfill, up to 85 percent of the approximately 29-mile haul route would pass through or be immediately adjacent to block groups with minority environmental justice populations and up to 65 percent of the haul route would pass through or be immediately adjacent to block groups with low-income environmental justice populations. In addition, assuming utilization of all potential borrow sites, 63 percent of the roadways utilized by the haul routes would pass through or immediately adjacent to minority environmental justice populations and 48 percent of the of the roadways utilized by the haul routes would pass through or immediately adjacent to low-income environmental justice populations.

3.20.2 Environmental Consequences

3.20.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, no closure activities would occur. Consequently, employment at ALF would remain at existing levels and would not substantially change the local demographics or economy. Additionally, no actions would be undertaken that would have a disproportionate effect on environmental justice populations.

3.20.2.2 Alternative B – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in an Offsite Landfill Location

3.20.2.2.1 Demographic and Employment Impacts

Closure-by-Removal of the surface impoundments at ALF would require an onsite workforce ranging in size from 30 to 150 personnel, with an average workforce size of 50 personnel over the approximately 8-year closure period. In addition, if CCR is transported to an offsite landfill via truck, an additional workforce would be required to operate the trucks. Based on transportation analyses completed for the PEIS, trucks could complete four trips per day to a landfill located within 30 miles of ALF (TVA 2016b); therefore, approximately 30 drivers would be needed to complete the 120 truck trips per day. Workers could be drawn from the labor force that currently resides in the Shelby County area and specialty workers and laborers not available within the area would be expected to temporarily relocate or commute to the project area to support impoundment closure activities for the

duration of the closure period. However, given that the maximum average number of workers needed during closure activities (80) would equate to just 0.24 percent of the unemployed civilian workforce in Shelby County (33,358), it is likely that most of the workers would be drawn from the existing labor force and that impacts to local demographics and employment would be beneficial and minor.

3.20.2.2.2 Economic Impacts

Impoundment closure activities would entail a temporary increase in employment and associated payrolls, the purchases of materials and supplies, and procurement of additional services. Capital costs associated with the proposed action would, therefore, have direct economic benefits to the local area and surrounding community during the 8-year closure period. Revenue generated by sales tax collected from purchases by construction workers would benefit the local economy. Additionally, temporary beneficial secondary impacts would result from expenditure of the wages earned by the workforce involved in impoundment closure activities. For example, the hospitality and service industries would benefit from the demands brought by the influx of the construction workforce.

In addition, Closure-by-Removal of the surface impoundments would allow the project areas to be redeveloped in the future for industrial or commercial use. While a specific future use has not been determined at this time, economic redevelopment of the site would be in line with the growth and improvements envisioned for the Frank C. Pidgeon Industrial Park, which could ultimately contribute to the region's economic health. Overall, economic impacts from Alternative B are anticipated to be beneficial, although minor relative to the total economy of the region.

3.20.2.2.3 Community Facilities and Services Impacts

Direct impacts to community facilities occur when a community facility is displaced or access to the facility is altered. Indirect impacts occur when a proposed action or project results in a population increase that would generate greater demands for services and/or affect the delivery of such services. Proposed actions under Alternative B, including Closure-by-Removal of the surface impoundments, transport and disposal of CCR to an existing offsite permitted landfill, and procurement and transport of borrow from a permitted borrow site, would not result in the displacement of any community facilities. Although access to community facilities located proximate to the proposed CCR and/or borrow haul routes would be maintained, there may be some impact to ease of movement to these facilities during closure activities due to increased truck traffic. For most facilities along the haul routes, such as the 10 churches, the Mitchell Community Center and the fire station, this potential impact would be minor as public use of these facilities is limited or generally does not occur during normal working hours associated with borrow transport. However, localized effects on traffic flow and safety from the additional truck traffic combined with the cars and buses used to transport students to and from school and day care facilities may be evident. This impact could be minimized with implementation of a traffic management plan as described in Section 3.17.

As the construction workforce would not have significant impacts on local demographics, increased demands for services such as schools, churches, and emergency services are not anticipated.

3.20.2.2.4 Environmental Justice Impacts

As indicated in Figure 3-11, the majority of block groups that make up the study area meet the criteria for consideration as minority and/or low-income populations under Executive Order 12898. However, the proposed project areas and temporary laydown area are located in an area reserved for heavy industry, in a block group that has no residential population. Additionally, for the closest block group with a residential population, just east of ALF, T.O. Fuller State Park serves as a buffer between the residential neighborhoods and the project areas. The nearest residences are located approximately 1.0 mile to the southeast, and therefore, will not experience any direct impacts from onsite impoundment closure activities. Therefore, there would be no direct impacts to the surrounding communities or environmental justice populations as the result of the primary action of impoundment closure.

Transportation activities are component actions associated with impoundment closure that have the potential to result in temporary indirect impacts to those communities located along the transportation routes. Such effects may include increases in traffic and the associated disruption to community cohesion, transportation related noise, exposure to fugitive dust, and exhaust emissions. As previously indicated, the proposed ash impoundment closures would create additional workforce traffic as well as truck traffic to transport CCR offsite and borrow onsite. Additional traffic from workforce traffic (100 trips per day) would contribute to the regional transportation network. These motorists would disperse throughout the transportation network and would use interstate highways or major arterial roadways as much as possible. Therefore, impacts to environmental justice populations from construction workforce traffic would be minor.

As indicated in bounding attributes presented in Table 2-4, the maximum length of a trucking haul route to a candidate landfill through or adjacent to block groups with environmental justice populations is 24.4 miles for minority populations and 18.6 miles for low-income populations. Potential haul routes to the landfills identified in the bounding analysis would primarily use arterial or interstate roadways whenever possible, where the additional truck traffic would assimilate into the existing traffic patterns. Additionally, communities located along the interstate and other arterial routes are typically set back from the roadway, minimizing impacts from noise and dust emissions. Given the location of ALF, the primary route to the interstate would be Riverport Road to I-55 via an interchange at West Mallory Avenue. The segment of Riverport Road is bounded by industrial and commercial development and uninhabited areas like those associated with T.O. Fuller State Park. Therefore, in cases where the transport of CCR to a landfill the use of high-volume roadways that are designed to support through traffic would only result in minor impacts to transportation.

However, depending on the landfill chosen by TVA, it may be necessary for portions of some haul routes to utilize roadways through residential areas in the vicinity of ALF which have been identified as communities subject to environmental justice considerations. In addition, portions of some of these roadways may also be used for transport of borrow which may, at times, be concurrent with transport of CCR to an offsite landfill. Although the impacts of the additional CCR haul traffic would not impact the LOS on these roads (see Section 3.17), residences along these lower capacity roads would be impacted by the increase in air and noise emissions and localized effects on traffic flow. However, BMPs designed to minimize fugitive dust emissions (such as covered loads) would be utilized to minimize the effects of fugitive dust. Furthermore, CCR transport would typically only occur

on weekdays during normal working hours and would be limited to the duration of closure activities. For these reasons, CCR transport via truck along these lower capacity roads could have a moderate impact on environmental justice populations that would be limited to the duration of the closure period.

As stated in Section 2.4, rail transport of CCR to an offsite landfill was also considered. Trains carrying CCR from ALF are expected to be integrated within the existing rail freight system and would not result in increased rail congestion, delays or idling time. As such, environmental justice populations located along these existing rail lines would not experience notably greater impacts due to the transport of CCR by rail than those already experienced under current rail operating conditions. Therefore, impacts of CCR transport via rail on environmental justice populations would be minor, and not disproportionate, as they would be consistent across all communities along the existing rail system.

As indicated in Tables 2-4 and 2-5, under the bounding or scenario, the candidate landfills accessed by both truck and rail are located in environmental justice communities meeting the criteria for both minority and low-income populations. The impacts to the environmental justice communities adjacent to the landfills would consist primarily of the transportation-related impacts described above. Because the candidate landfills are all existing, landfills with the capacity to accept the CCR within existing permitted limits, the operations associated with disposal of CCR within the landfill boundaries would be consistent with current, permitted use. In the landfill screening analysis TVA limited its consideration to landfills owned and operated by commercial carriers that offer established management systems, reliability, and as such, are assumed to comply with environmental practices consistent with TVA standards. These large commercial landfill operators are expected to have robust environmental control plans, effective project designs and a history of compliance that ensures that offsite impacts to surrounding receptors within environmental justice populations is low.

Closure-by-Removal of the impoundments at ALF is also expected to require approximately 3.0 million cubic yards of suitable borrow material. Based on the bounding analysis of this component action presented in Table 2-8, TVA estimates that an average of 232 truck trips (116 truckloads) per day would be needed to achieve the proposed finished grades over the approximate 8-year closure period. Under the bounding conditions and assuming utilization of all potential borrow sites, up to 11.0 miles of the proposed borrow haul routes would pass through or immediately adjacent to block groups with minority populations and up to 8.4 miles would pass through or immediately adjacent to block groups with low-income populations. Under the bounding conditions, the majority of the borrow haul routes would be comprised of roads with moderate traffic volumes that serve communities subject to environmental justice considerations. Residences along these roadways would be impacted as a result of additional noise, truck emissions, congestion and the associated disruptions to community cohesion resulting from the increased truck traffic. However, these effects may be minimized substantially in conjunction with the benefits of a comprehensive traffic management plan and implementation of BMPs designed to minimize fugitive dust emissions (such as covered loads). Furthermore, noise associated with additional truck traffic would typically only occur on weekdays during normal working hours and would be limited to the duration of closure activities. For these reasons, impacts of borrow transport via truck could have a moderate impact on environmental justice populations that would be limited to the duration of the closure period.

However, under the bounding condition, small portions of the borrow haul routes may be required to utilize low-volume neighborhood streets within environmental justice communities, such as Crossfield Road, to access a borrow site. As Crossfield Road is an unmarked local road used to access a small neighborhood, an increase of 232 truck trips per day along this road would result in greater noise, fugitive dust, and exhaust emissions for the residences located along it and would be disruptive to neighborhood traffic patterns and community cohesion. As borrow transport is intermittent, and a single borrow site may contain just a small fraction of the material necessary over the closure period, these impacts have the potential to be short-term relative to the closure period. Nonetheless, a large number of truck trips on a daily basis concentrated on such low volume residential roadways has the potential to result in large but overall, short term impacts on environmental justice populations. In order to mitigate this potential, TVA will review the contractor's borrow plan to ensure it conforms to the terms and conditions outlined in the traffic management plan (described in Section 3.17) to avoid concentrated use of borrow sites that utilize low volume roadways to minimize effects to local communities.

Additionally, it should be noted that employment opportunities may be provided to residents of the study area during the closure period, which would could potentially provide positive impacts to area minority and low-income populations.

In summary, no direct impacts to environmental justice communities associated with ash impoundment closure are anticipated. Indirect impacts associated with transportation activities under this alternative are disproportionate to local minority and low-income communities but are limited to the construction period and range from minor to large depending on the degree of concentrated truck traffic on low-volume local roads that serve the environmental justice communities. However, moderate or large impacts could be mitigated through the utilization of alternate borrow sites. In addition, BMPs designed to minimize fugitive dust emissions would be employed, and CCR and borrow transport would generally be restricted to weekdays during normal working hours. Lastly, minor beneficial impacts to area environmental justice populations could result from additional employment opportunities during the closure period.

3.20.2.3 Alternative C – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and West Ash Pond; Disposal of CCR in a Beneficial Re-Use Process & Offsite Landfill Location

Under Alternative C, impacts associated with the primary actions related to closure of the impoundments and the component actions of CCR transport offsite and truck transport of borrow onsite would be similar to those identified under Alternative B. In addition, under Alternative C, TVA is assessing the potential impacts associated with component actions related to transport of CCR to a beneficial re-use processing facility and the construction and operation of the facility. The following impacts are in addition to those noted for Alternative B, unless otherwise stated below.

3.20.2.3.1 Demographic and Employment Impacts

As indicated in Tables 2-9 and 2-10, construction of the beneficial re-use processing facility would require a workforce of up to 150 personnel over the construction period which would last for up to 14 months. Following the construction period, the facility would require a long-term operational workforce of up to 36 personnel. While a specific location for the beneficial re-use processing facility has not been chosen, it is estimated that approximately 90 percent of the workforce would be drawn from the labor force residing in the region where

the facility is sited. However, specialty workers and laborers not available within the region would be expected to relocate to the area, either temporarily to support construction, or long-term to support operational activities. Therefore, demographic characteristics of the region selected for construction of the beneficial re-use processing facility would be expected to experience both temporary and long-term changes in response to the in-migration of construction and operational workforces, respectively. However, given the small number of long-term operational personnel required, and that the majority of the workers would be drawn from the existing labor force in the area, the impact on local demographics would be beneficial and minor.

3.20.2.3.2 Economic Impacts

Similar to impoundment closure activities, the construction of a beneficial re-use processing facility would entail a temporary increase in employment and associated construction payrolls, the purchases of materials and supplies, and procurement of additional services. Beneficial economic impacts would result from capital costs associated with the construction, expenditure of wages earned by the workforce, and sales tax revenue from workforce purchases. Following construction, there would be a long-term increase in employment and associated payrolls for the operational workforce, resulting in beneficial economic impacts similar to but less than those associated with the construction period.

3.20.2.3.3 Community Facilities and Services Impacts

While a specific location for the beneficial re-use processing facility has not been chosen, according to the proposed facility attributes and bounding characteristics listed in in Tables 2-9 and 2-10, the facility would be located in an area zoned for compatible uses and direct access to the site would be provided by a collector road or major highway that can support truck traffic without noticeable effects to LOS. Based on these bounding characteristics, the construction of the beneficial re-use processing facility would not result in the displacement of any community facilities, nor would nearby community facilities be notably impacted by increased operational traffic. Additionally, as neither the construction workforce nor the long-term operational workforce would result in notable impacts on local demographics, increased demands for services such as schools, churches, and emergency services are not anticipated.

3.20.2.3.4 Environmental Justice Impacts

Under Alternative C, instead of disposing all excavated CCR in an existing offsite landfill, TVA would excavate and transport via truck the majority (up to 95%) of CCR to a beneficial re-use processing facility, with the remaining CCR being transported to an existing offsite landfill. CCR materials removed from the impoundments would be transported to the facility at rates similar to that of transport of all CCR to an off-site landfill (240 truck trips per day, 210 working days per year), as described under Alternative B. Per the bounding attributes listed in Table 2-9, CCR transported to the facility could be trucked up to 10 miles from ALF to the nearest interstate system. Once on the interstate, project-related traffic would assimilate within the existing traffic. As identified for Alternative B, the primary route to the interstate from ALF would be Riverport Road to I-55 via an interchange at West Mallory Avenue. The segment of Riverport Road between ALF and I-55 is bounded by industrial and commercial development and uninhabited areas like T.O. Fuller State Park, and therefore there would be no impact on environmental justice populations along this route. As the beneficial re-use processing facility would have direct access from a collector road or major highway, the remainder of the haul route would be comprised of high-capacity

roadways where additional truck traffic would assimilate into the existing traffic patterns. Additionally, operations would typically be limited to weekdays during normal working hours and BMPs designed to minimize fugitive dust emissions would be utilized. Therefore, impacts of CCR transport to the beneficial re-use processing facility on environmental justice populations along the haul route would be minor, and under the bounding condition, would be disproportionate.

While a specific location for the beneficial re-use processing facility has not been chosen, based on the bounding characteristics, including the location of the facility in an area zoned for compatible uses, the facility would not be constructed in the immediate vicinity of residential properties. Therefore, construction and operation of the facility would not have any direct impacts on environmental justice populations.

However, in the event environmental justice communities are located proximate to routes used to access the facility, these communities could experience transportation-related impacts, first from construction workforce commuting, followed by operational workforce commuting and the delivery of beneficiated product to various markets. During the construction period, lasting up to 14 months, a workforce of up to 150 personnel would be required. Once operational, the facility is anticipated to operate up to 350 days per year, with a commuting workforce of up to 36 employees, while trucking of product (up to 90 truckloads or 180 truck trips per day) would occur 250 days per year, primarily on weekdays. However, because facility attributes include direct access to the site from a collector road or other high functioning roadway that can support truck traffic without noticeable effects to LOS, this increase in traffic would not have a notable impact on existing traffic patterns or traffic noise. Therefore, impacts associated with the construction and operation of the beneficial re-use processing facility on environmental justice populations are anticipated to be minor.

Additionally, employment opportunities may be provided to residents of the region where the facility is sited during both the construction and operational phases, potentially providing positive impacts to area minority and low-income populations.

3.20.3 Summary of Impacts to Socioeconomics and Environmental Justice

As summarized in Table 3-35, TVA has determined that the majority of impacts to socioeconomics and environmental justice related to the primary action and associated component actions related to the proposed ash impoundment closures at ALF range from minor to large depending on the degree of concentrated truck traffic on low volume streets designed to serve environmental justice communities. However, moderate or large impacts could be mitigated through the utilization of alternate borrow sites and implementation of a traffic management plan.

Table 3-35. Summary of Impacts to Socioeconomics and Environmental Justice

Alternative	Action	Impact	Severity
		Impoundment Closures	
B, C	Impoundment closure	Temporary changes in demographic and employment characteristics in response to the in-migration of transient construction workforce.	Minor beneficial impact.
		Temporary benefits to local economy associated with capital costs, sales tax revenue, and expenditure of construction worker wages. Allows for future redevelopment, which could also benefit local economy.	Minor beneficial impact.
		Transport of All CCR to an Offsite Landfill	
B	Truck transport to landfill	Disruption in ease of access to community facilities such as schools and day care centers along the haul route.	Moderate impact. Minimized with use of a traffic management plan designed to address congestion at these facilities.
		Temporary increase in fugitive dust, noise, and traffic for environmental justice populations along the haul route from trucks transporting CCR.	Moderate impact to communities located adjacent haul routes that do not utilize I-55.
B	Rail transport to landfill	Temporary increase in fugitive dust and noise for environmental justice populations located along rail lines.	Minor.
		Borrow Transport to ALF	
B, C	Truck transport to ALF	Disruption in ease of access to community facilities such as schools and day care centers along the haul route	Moderate impact. Minimized with use of a traffic management plan designed to address congestion at these facilities.
B, C	Truck transport to ALF (cont.)	Temporary increase in fugitive dust, noise, and traffic for environmental justice populations along the haul route from trucks transporting borrow.	Moderate to large, disproportionate impact to communities located adjacent to the haul routes. Potential for significant impacts if low-volume neighborhood streets must be utilized for an extended period of time. Minimized by avoiding the use of borrow sites accessed by low volume roadways serving residential areas.

Alternative	Action	Impact	Severity
		Transport of CCR to a Beneficial Re-use Processing Facility	
C	Truck transport to beneficial re-use processing facility and to an offsite landfill	Temporary increase in fugitive dust, noise, and traffic for environmental justice populations along the haul route from trucks transporting CCR.	Minor impact to communities located adjacent to the haul routes. Transport would utilize interstate and other high-capacity roads where truck traffic would blend in with current traffic patterns.
		Construction and Operation of Beneficial Re-use Processing Facility	
C	Construction and operation of a beneficial re-use processing facility	Temporary and long-term changes in demographic and employment characteristics in response to the in-migration of construction and operational workforces.	Minor beneficial impact.
		Long-term increase in traffic and associated noise for any environmental justice populations near the facility due to increased workforce and delivery CCR to the site and beneficiated product from the site.	Minor. Location on major highway or collector road results in minimal changes in existing traffic conditions.

3.21 Public Health and Safety

3.21.1 Affected Environment

Workplace health and safety regulations are designed to eliminate personal injuries and illnesses from occurring in the workplace. The OSHA is the main statute protecting the health and safety of workers in the workplaces. TVA has a robust safety conscious culture that is focused on awareness and understanding of workplace hazards, prevention, intervention, and active integration of BMPs to avoid and minimize hazards. Personnel at ALF are conscientious about health and safety having addressed and managed operations to reduce or eliminate occupational hazards through implementation of safety practices, training, and control measures.

General guidelines for work place safety that are communicated to work crews include the following:

- *Pre-Job Brief* – allows the worker to think through a job and use that knowledge to make the job as safe as possible.
- *Two-Minute Rule* (situational awareness) – take time before starting a job to familiarize yourself with the work environment and to identify conditions that were not identified during the pre-job brief.
- *Stop When Unsure* – when confronted with a situation that creates a question and what to do is uncertain, stop and get help.

- *Self-Check* – use of "STAR" acronym to promote self-check awareness: **S**top and focus, **T**hink what will happen with right or wrong action, **A**ct correctly, **R**eview that the results are as expected.
- *Procedure Use and Adherence* – allows for proper application of procedures and work packages based on expected activities.
- *Flagging and Operational Barriers* – key to ensure control of the work zones and avoidance of exposure to work hazards by public.
- *Three-Way Communication* – essential for all job tasks to ensure they are completed safely and productively.

TVA's Safety Standard Programs and Processes would be strictly adhered to during the proposed actions. 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 OSHA and state requirements.

The potential offsite consequences and emergency response plan are discussed with local emergency management agencies. These programs are audited by TVA no less than once every three years and by EPA periodically.

Mitigative measures are used to ensure protection of human health which includes the workplace, public and the environment. Applicable regulations and attending administrative codes that prescribe monitoring requirements may include those associated with emergency management, environmental health, drinking water, water and sewage, pollution discharge, air pollution, hazardous waste management and remedial action.

ALF's three-coal fired units and associated coal facilities were retired on March 31, 2018, and TVA currently restricts access to ALF, performs periodic inspections and critical maintenance as needed, and conducts environmental monitoring and reporting as required. The routine inspections and maintenance activities remaining at the closed plant reflect a safety-conscious culture and activities are performed consistent with OSHA and state standards and requirements and specific TVA guidance.

3.21.2 Environmental Consequences

3.21.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not close the ash impoundments at ALF. The remaining inspection and maintenance activities at the closed ALF facility would continue within the safety conscious culture, and activities and monitoring currently performed would be in accordance with applicable standards or specific TVA guidance. TVA's safety conscious efforts will continue such that no changes to current public and health and safety are anticipated under this alternative. Therefore, Alternative A would not have an impact on public health and safety.

3.21.2.2 Alternative B – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in an Offsite Landfill Location

Closure-by-Removal of the ash impoundments would include the excavation of CCR from the impoundments and the transport of the excavated material to an offsite permitted landfill. The equipment required for impoundment closure includes dozers, compactors,

dump trucks, scrapers/pans, track hoes and diesel pumps. As identified in the PEIS (TVA 2016b) deep excavations of CCR can result in increased risks to workforce health and safety. Customary industrial safety standards including OSHA requirements for workers engaged in excavation activities would help reduce these risks. Also, the establishment of appropriate BMPs and job site safety plans would describe how job safety would be maintained during the project. These BMPs and site safety plans address the implementation of procedures to ensure that equipment guards, housekeeping, and personal protective equipment are in place; the establishment of programs and procedures for lockout, right-to-know, hearing conservation, heavy equipment operations, excavations, and other activities; the performance of employee safety orientations and regular safety inspections; and the development of a plan of action for the correction of any identified hazards. All these measures would help ensure that job site safety risks are reduced.

Additionally, offsite transport of CCR and onsite transport of borrow on public roadways results in increased risks related to crashes, derailments, road damage and other transportation-related effects. Closure activities, including materials transport, would last approximately 8 to 15 years depending on the chosen mode of transportation of CCR. Impacts to public health and safety for onsite transport of borrow material would be less than those for offsite transport of CCR, because borrow transport would be intermittent throughout the closure period and the hauling distance from the borrow site(s) would be shorter (up to 12.6 miles one-way) than the distance to a landfill (up to 29.1 miles one-way by truck or up to 1,047 miles one-way by rail).

The combined hauling activities in combination with increased construction-related traffic to the work site could cause an increase in truck traffic to and from the facility. Increased truck traffic could lead to a slightly higher risk of accidents in the ALF vicinity during the closure period due to the increase in the number of vehicle miles traveled on those roadways, especially at high-risk areas such as the I-55 interchange at West Mallory Avenue and the public at-grade railroad crossing at Riverport Road. This increase in vehicle miles is a factor in injury and fatal traffic crash rates. According to the bounding attributes for transport of CCR by truck shown in Table 2-4, the estimated number of transport-related injuries for transport of 3.5 million yd^3 of CCR over the closure period would be 3.6, and the estimated number of transport-related fatalities would be 0.2 (FHWA 2016b).

If CCR is transported by rail, it could cause increased rail traffic along the Canadian Railroad rail line. Increased rail traffic is also a factor in injury and fatal traffic crash and derailment rates. According to the bounding attributes for transport of CCR by rail shown in Table 2-5, the estimated number of transport-related injuries would be 8.6, and the estimated number of transport-related fatalities would be 1.1 (FHWA 2016b). Therefore, impacts to public health and safety would likely be greater if CCR is transported offsite by rail because of the greater distance traveled.

The establishment of appropriate BMPs and job site safety plans would address transportation in describing how job safety would be maintained during the project. In addition, the at-grade railroad crossing on Riverport Road has safety measures installed including an automatic warning system with flashing lights and gates, and additional traffic control measures would be installed in other high-risk areas as needed to minimize congestion. Therefore, transportation-related impacts to public health and safety would be temporary and minor.

TVA may decide to contract with outside vendors for construction and/or transportation services under Alternative B. It is TVA policy that all contractors have in place a site-specific health and safety plan prior to operation on TVA properties. With the high level of safety awareness and preparation during impoundment closure activities, safety and security plans and safety awareness would reduce potentially large safety risks (deep excavations into the CCR impoundments) down to a minor and temporary impact.

In addition, maintenance of the closed impoundments (e.g., maintaining vegetation, monitoring, and reporting as necessary) would adhere to established health and safety practices. These practices would address and provide management procedures for the reduction or elimination of occupational and public health hazards.

Use of BMPs, safety procedures, and security measures would minimize possible safety effects. Therefore, impacts to public health and safety under Alternative B would be minor.

3.21.2.3 Alternative C – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and West Ash Pond; Disposal of CCR in a Beneficial Re-Use Process & Offsite Landfill Location

Alternative C would have similar impacts to worker and public health and safety as Alternative B regarding the ash impoundment closure activities, transport of CCR offsite, and transport of borrow material onsite. However, under this alternative, a portion (up to 95 percent) of the CCR removed from the impoundments would be transported to a beneficial re-use processing facility. CCR not suitable for beneficial re-use would be disposed of in an existing offsite commercial landfill.

As shown in Table 2-9, construction of the proposed beneficial re-use processing facility would occur over an approximately 14-month period. Excavation activities would include deep pier foundations (approximately 40 feet deep) for the processing island and minor trenching for establishment of pipelines. No basement or deep foundations would be required for the occupied buildings.

It is expected that construction activities in support of the proposed facility would be performed consistent with standards as established by OSHA and state requirements, and the establishment of applicable BMPs and job site safety plans would describe how job safety would be maintained. Construction debris and wastes would be managed in accordance with federal, state, and local requirements. Worker and public health and safety during construction including material transportation would be maintained and impacts to public health and safety would be minor.

Activities associated with operation of the beneficial re-use processing facility would adhere to established health and safety practices. These practices would address and provide management procedures for the reduction or elimination of occupational and public health hazards. Operation of the beneficial re-use facility would include transport of CCR to the facility and transport of beneficiated product to various markets, which would be associated with increased risks related to offsite transportation (crashes, road damage and other transportation-related effects). The development and implementation of appropriate safety plans, training and a comprehensive overall safety culture is assumed to be part of any vendor selected by TVA.

With the preparation and execution of safety plans and training, overall impacts to safety under Alternative C would be minor. However, given the additional risks associated with the

short term construction and long term operation of the proposed beneficial re-use processing facility, including the number of additional trucks estimated to be on the roadways for transport of beneficiated product, impacts under Alternative C would be minor, yet incrementally greater than Alternative B.

3.21.3 Summary of Impacts to Public Health and Safety

As summarized in Table 3-36, TVA has determined that impacts to public health and safety related to the proposed ash impoundment closures and related component actions are minor.

Table 3-36. Summary of Impacts to Public Health and Safety

Alternative	Action	Impact	Severity
		Impoundment Closures	
B, C	Impoundment closure	Temporary impacts related to construction activities and construction-related traffic.	Minor impact.
		Increased risk associated with excavation of CCR impoundments.	Minor impact.
		Transport of All CCR to an Offsite Landfill	
B	Truck transport to landfill	Increased risk related to offsite transportation of CCR (crashes, road damage, and other transportation-related effects).	Minor impact, minimized with the installation of traffic control measures as needed to minimize congestion. Lower risk for injuries and fatalities than transport by rail.
B	Rail transport to landfill	Increased risk related to offsite transportation of CCR (crashes, derailments, and other transportation-related effects).	Minor impact, higher risk for injuries and fatalities than transport by truck.
		Borrow Transport to ALF	
B, C	Truck transport to ALF	Impacts to public health and safety related to transport of borrow material on public roadways. Impacts minimized due to shorter hauling distance and intermittent activity.	Minor impact.
		Transport of CCR to a Beneficial Re-use Processing Facility	
C	Truck transport to beneficial re-use processing facility and to an offsite landfill	Increased risk of crashes, road damage and other transportation-related effects related to additional vehicle miles traveled.	Minor impact, minimized with the installation of traffic control measures as needed to minimize congestion.

Alternative	Action	Impact	Severity
	Construction and Operation of Beneficial Re-use Processing Facility		
C	Construction and operation of a beneficial re-use processing facility	Temporary impacts related to construction activities, including excavation, and construction-related traffic.	Minor impact, though impacts of Alternative C would be incrementally greater than Alternative B due to additional risks associated with the short term construction and long term operation of the proposed facility.
		Long term transport of beneficiated product to various markets results in increased risk related to offsite transportation (crashes, road damage and other transportation-related effects).	Minor impact, though impacts of Alternative C would be incrementally greater than Alternative B due to the number of additional trucks on roadways for transport of beneficiated product.

3.22 Cumulative Effects

The CEQ regulations (40 CFR 1500-1508) implementing the procedural provisions of the NEPA of 1969, as amended (42 USC 4321 et seq.) define cumulative impact as:

> "…the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR § 1508.7)."

TVA evaluated a full range of environmental resource issues for inclusion in the cumulative effects analysis. The proposed actions and their connected actions identified under Alternatives B and C would occur mostly on land that was previously disturbed and is used for industrial purposes. The surrounding landscape is already subject to environmental stressors associated with continuing industrial operations. Consequently, as has been described in prior subsections of this EIS, the existing quality of environmental resources with the potential to be directly or indirectly affected by project activities is generally low. The proposed transportation of CCR from the facility to an offsite landfill or beneficial re-use processing facility would utilize existing roadways and this material would be managed on land developed as a landfill or operated as an industrial facility. Additionally, borrow would be obtained from a previously permitted site. As such, impacts associated with these actions are confined to those associated with the transportation of materials from ALF for disposal or the transport of borrow to ALF to be used for site restoration.

3.22.1 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. The cumulative impact analysis is based on the resources of potential concern and the geographic area in which potential adverse effects from site-specific activities have the potential to alter (degrade) the quality of the regional environmental resources. The appropriate geographic area of analysis for ALF is therefore limited to the immediate project

area and vicinity (2-mile radius) surrounding ALF. For air quality, the geographic area is the county.

3.22.2 Identification of "Other Actions"

3.22.2.1 Past Actions Undertaken by TVA

TVA constructed and is operating the ACC Plant fueled by natural gas, located just south of ALF on a site that TVA currently leases. The ACC Plant became operational in April 2018 and is comprised of three individual combustion turbine units, two of which operate on natural gas with a generating capacity of 330 MW each. The remaining unit is a combustion steam turbine with a capacity to produce 420 MWs. Construction of this facility also included construction of a new gas pipeline lateral connecting the plant to an existing gas interstate pipeline that has adequate transportation capacity to supply the plant. The new gas pipeline lateral was constructed and is operated by MLGW.

3.22.2.1.1 Retirement of ALF

The three ALF coal units were retired in March 2018. Virtually all coal unit operational measures were discontinued, and the coal plant is currently subject to basic care and maintenance measures. Primary operational measures that were discontinued include daily coal barge operations, coal pile management, pumping and use of water from McKellar Lake for condenser cooling, and thermal discharges to the Mississippi River. The plant has discontinued the discharge of fly ash and bottom ash to the East Ash Pond Complex, but ash ponds are being maintained until closure plans are proposed and implemented. Routine plant deliveries have also been discontinued. The existing switchyard is being maintained for use in operations associated with the ACC Plant. Employment at the plant has been reduced.

Past, present, and reasonably foreseeable future actions that were identified for consideration in this cumulative analysis are listed in Table 3-37. These actions were identified within the geographic area of analysis as having, in the aggregate, the potential to result in larger and potentially significant adverse impacts to the resources of concern.

Actions that have a timing that is "past" or "present" inherently have environmental impacts that are integrated into the base condition for each of the resources analyzed in this chapter. However, these actions are included in this discussion to provide for a more complete description of their characteristics. Actions that are not reasonably foreseeable are those that are based on mere speculation or conjecture, or those that have only been discussed on a conceptual basis.

Table 3-37. Summary of Other Reasonably Foreseeable Future Actions in the Vicinity of the Proposed Project

Actions Description	Description	Timing and Reasonable Foreseeability
Continuing Operations of the ACT and Adjacent Industrial Facilities	Operations at ACT Plant, ACC Plant, Harsco Minerals facility, industries within Frank C. Pidgeon Industrial Park, Port of Memphis, and operation of the T.E. Maxson WWTP	Past, Present, Reasonably Foreseeable Future
Upgrade to the T.E. Maxson WWTP	Ongoing expansion of the T.E. Maxson WWTP	Present
Deconstruction of ALF	Demolition and deconstruction of the ALF fossil plant and restoration of the site to support future economic development	Reasonably Foreseeable Future
Development of the Port of Memphis and the Frank C. Pidgeon Industrial Park	Rail upgrades to Presidents Island and expansion of the southern end of Riverport Road at Pidgeon Industrial Park	Reasonably Foreseeable Future
Future Redevelopment of the ALF Site	Industrial development of the ALF Site	Reasonably Foreseeable Future
CCR Management Projects at ALF	TVA plans to close the following surface impoundments at ALF: East Ash Pond Complex, West Ash Pond, and the Metal Cleaning Pond	Reasonably Foreseeable Future

3.22.2.1.2 Continuing Operations at ALF and at Adjacent Industrial Facilities

The ACT Plant and the Harsco Minerals plant, both adjacent to the proposed East Ash Pond Complex project area, would continue operations at ALF. The ACT has 20 combustion turbine units that are designed to start quickly and typically are operated only during peak demand periods. The turbines run on diesel oil and natural gas to supply power during times of peak demand across the TVA power system. Harsco Minerals is a provider of recycling solutions for industrial byproducts.

ALF is located within the Frank C. Pidgeon Industrial Park. This area is a zoned industrial park bounded on the north by McKellar Lake, on the west by the Mississippi River, on the east by the Canadian National Railroad, and the Mississippi State line on the south. The industrial park contains a number of developed uses including the existing ALF plant, the T.E. Maxson WWTP, the ACC Plant, Nucor Steel, Electrolux, the City of Memphis Earth Complex, the CN/CSX intermodal facility, the ACT Plant at ALF, and other zoned industrial sites (Moon E.W. Inc. 2008).

The City of Memphis owns and operates the T.E. Maxson WWTP, located on lands immediately west of ALF. The WWTP currently treats an average of 70 MGD of wastewater, serving the City since its commissioning in 1975. Treated wastewater is discharged into the Mississippi River while the primary and waste activated sludge is sent to a covered lagoon system for anaerobic digestion. The City is currently developing upgrades to final treatment processes to facilitate effective long term operation of a disinfection system, address plant odor concerns, and provide additional treatment capacity

(T.E. Maxson WWTF Process Upgrade Project 2019). Construction of these upgrades is expected to be completed by late summer 2019.

The commercial Port of Memphis is located across McKellar Lake immediately north of ALF. Past and present port operations impose a variety of continuing stressors on the ecosystem of McKellar Lake and the adjoining Mississippi River ecosystem associated with barge movement and activities. These stressors typically include physical forces (i.e., shear, pressure), wave induced shoreline erosion, drawdowns, entrainment mortality of planktonic life forms, and sediment re-suspension (TVA 2016b).

3.22.2.2 Infrastructure Improvements at the Port of Memphis and the Frank C. Pidgeon Industrial Park

The Port of Memphis was recently awarded a Competitive Rail Connectivity Grant to expand rail service on Presidents Island at the 58-acre public terminal facility. The project would include the construction of approximately 4,900 feet of new rail track in the terminal, plus four new switches. This would create capacity for approximately 70 additional 100-ton rail cars at the facility. The project would help companies that transfer bulk products from rail to barge. The public terminal is an intermodal facility that provides access to waterborne, rail, truck, and pipeline operations, and provides general cargo handling services to more than 150 industries on Presidents Island and serves more than 300 metropolitan markets that can be reached overnight by truck (Economic Development Growth Engine for Memphis and Shelby County, 2019).

In addition, the City of Memphis is in the process of designing a 6,800-foot expansion of the southern end of Riverport Road at Frank C. Pidgeon Industrial Park. The expansion of the road would create a southern access point to the proposed CN Riverport Logistics Center on 730 acres of property immediately east of the Intermodal Gateway Memphis facility in the industrial park. The CN and CSX railroads are in the final planning phases of an expansion of the Intermodal Gateway Memphis facility south of ALF in the Frank C. Pidgeon Industrial Park. The expansion would double the size of the current facility and more than triple the current annual intermodal container throughput (International Port of Memphis 2019b).

3.22.2.3 Future Deconstruction and Redevelopment of the ALF Site

TVA is currently evaluating the deconstruction and demolition of ALF and restoring the site to support future economic development. The purpose of the deconstruction and demolition project is to appropriately manage the disposition of the buildings and physical structures at ALF that are no longer needed for their original purpose of power generation. TVA proposes to manage the disposition of the ALF site to provide necessary structures and facilities for ongoing site activities while considering capital cost, long term operations and maintenance costs, environmental risks, safety and security at the plant site, and making the land available for future economic development.

A new master plan for the Port of Memphis has been completed that identifies short-, middle- and long-range goals for future development on Presidents Island and within the Frank C. Pidgeon Industrial Park. Ninety-five percent of the industrial land on Presidents Island is occupied and supports approximately 200 companies with 4,000 employees, while the Frank C. Pidgeon Industrial Park supports 2,300 acres of under-developed industrial land, including the ALF site. The plan identifies constraints and opportunities for growth and offers recommendations for facility expansions and property redevelopment that include the

ALF site. In addition, the plan identifies potential target industries for both Presidents Island and the Frank C. Pidgeon Industrial Park (International Port of Memphis 2018; International Port of Memphis 2019c).

While the plan is conceptual, and no particular development has been presented, TVA has had numerous discussions with the City of Memphis and MLGW as to their interest in potential economic redevelopment of the ALF property. The proposed action will make the ALF closure area land available for future economic development projects in the greater Memphis area. Redevelopment is of particular interest at this site due to its location within the Frank C. Pidgeon Industrial Park as well as its access to the Port of Memphis via McKellar Lake. Therefore, it is reasonably foreseeable that this site would be developed for another use that conforms to the current surrounding land uses and zoning.

3.22.3 Analysis of Cumulative Effects

To address cumulative impacts, the existing affected environment surrounding the proposed project area was considered in conjunction with the environmental impacts presented in Chapter 3. These combined impacts are defined by the Council on Environmental Quality 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 to each of the identified environmental resources of concern are analyzed below.

This analysis is limited only to those resource issues potentially adversely affected by preferred alternative project activities or connected actions. Accordingly, climate change, geology, soils, vegetation, wildlife, floodplains, wetlands, cultural and historic resources, managed and natural areas, parks and recreation, socioeconomics, and public health and safety are not included in this analysis as these resources are either not adversely affected, or the effects are considered to be minimal or beneficial.

Primary adverse cumulative effects of the proposed actions as described in the preceding sections of Chapter 3 are related to the potential additive and overlapping effects on air quality, groundwater, surface waters and aquatic ecology, threatened and endangered species, land use, transportation, noise, hazardous materials and solid and hazardous waste, and environmental justice.

3.22.3.1 Air Quality

Air quality within the Memphis region is influenced by emissions from permitted industrial and commercial facilities and routine emissions from mobile sources. As such, the Memphis air quality region (Shelby County) was selected as the geographic reference area for this resource.

It is expected that emissions would continue from ongoing operations in the area, including emissions from local vehicles, TVA’s ACT and ACC, Harsco Minerals, and other adjacent industrial facilities, including the Frank C. Pidgeon Industrial Park and the International Port of Memphis. By comparison, the recent shutdown of ALF has resulted in significant reductions in air emissions that represents a benefit to regional air quality conditions. In addition to ongoing emissions from vehicles and industrial operations, local emissions and fugitive dust are expected to occur in conjunction with activities associated with the deconstruction and demolition of ALF.

Air emissions associated with closure activities under the proposed action would also result in an increase in local emissions and fugitive dust. As described in Section 3.1 emissions from equipment and vehicle use are expected to be minor and short term. In addition, fugitive dust emissions associated with closure activities would be mitigated through the use of BMPs, such as water suppression for dust control and regular inspections and maintenance of construction vehicles. The cumulative effect of the project activity emissions, when combined with the ongoing emissions from local vehicles and adjacent industrial facilities, would incrementally increase emissions local to ALF under the proposed action, but such increases would not be notable on a regional scale. If the reasonably foreseeable future actions (such as emissions from the deconstruction and demolition of ALF) occur at the same time as the proposed project, there would be potential for minor and short term impacts to air quality. However, exceedances of applicable ambient air quality standards are not expected. Therefore, the cumulative effects of the proposed action on air quality would not adversely affect regional air quality.

3.22.3.2 Groundwater

As described in Section 3.4, groundwater within the vicinity of ALF is generally of good quality with selected areas of localized exceedances of MCLs. Activities associated with the reasonably foreseeable future actions listed in Table 3-37 have the potential to affect groundwater. However, for many of these potential actions, implementation of the proper BMPs would minimize the impacts to groundwater. Additionally, in conjunction with the ongoing remedial investigation at the ALF East Ash Pond Complex coupled with the commitment to implement appropriate corrective measures as required by TDEC, groundwater characteristics are expected to improve.

Construction activities associated with ash impoundment closure at ALF have the potential to release constituents that may impact groundwater. However, demolition of ALF and environmental abatement would be conducted in accordance with any applicable environmental and safety regulations, minimizing the potential for a release of contaminants. In the long term, all potential environmental contamination sources would be removed from the project area, which would limit the potential for contamination of groundwater from these sources and would have a positive impact on groundwater quality relative to the No Action Alternative. Therefore, the cumulative effects of the proposed action on groundwater would not adversely affect groundwater.

3.22.3.3 Surface Water and Aquatic Ecology

The potential for cumulative effects to surface waters and water quality are largely driven by the variety of uses of and inputs into McKellar Lake. As described in Section 3.19, McKellar Lake is occasionally utilized for recreational boating and fishing. However, it is primarily characterized by industrial rather than recreational use, and there are a number of industrial facilities that discharge into the reservoir, contributing to the existing surface water quality.

Surface water under Alternatives B and C could be potentially impacted on a localized basis due to runoff during soil disturbing activities. Similar impacts could be anticipated from the nearby construction projects and industrial and port expansions listed in Table 3-37. BMPs would be used for all construction activities to minimize and reduce indirect impacts on receiving streams, and discharges into surface waters would comply with all NPDES permit limits and local, state, and federal regulations. Any construction activities in McKellar Lake would adhere to NPDES permit limit requirements and would utilize mitigation to minimize impacts to aquatic life. Therefore, given the local abundance of similar aquatic resources

within the region, the relatively low quality of the resources potentially affected, and the implementation of BMPs during construction for all identified projects, cumulative impacts to aquatic and surface water resources at a watershed level are not anticipated.

3.22.3.4 Threatened and Endangered Species

As described in Section 3.10.2.2 the interior least tern has been documented as occurring in the vicinity of ALF and ACC under conditions of high stage on the Mississippi River. Least tern has also been observed to nest on gravel roads and other areas with similar gravely substrate. Because there is the potential for Alternatives B and C to affect the least tern by disturbance to nests and birds in the project area, TVA has engaged in consultation with the USFWS. Recognizing the potential for cumulative effects in conjunction with the reasonably foreseeable actions associated with deconstruction and demolition of ALF, TVA has developed the avoidance and mitigation measures described in Section 3.10 that account for the potential effects of the proposed action and other reasonably foreseeable future actions. In consideration of TVA's commitment to these measures, it is concluded that the cumulative effect of all actions is to affect, but not likely to adversely affect the interior least tern.

3.22.3.5 Visual Resources

The closure of the ash impoundments at ALF is expected to result in a short term alteration of the visual landscape in conjunction with the presence and operation of construction equipment. Concurrent and overlapping activities associated with the deconstruction and demolition activities would also add to the visual discord associated with construction equipment. However, as most of ALF is not visible from the surrounding area, these increases in site activity would only be visible to those participating in recreation or industrial activities on McKellar Lake and to plant employees and contractors.

Over the long term, the visual disturbance of the stacks and the powerhouse visible from McKellar Lake would be removed. In combination with the closure of the ash impoundments, including final vegetative cover, the visual aspects of ALF and the vicinity would be improved, and made available for future economic development. However, the nature and characteristics of such future development are not known at this time. As the stacks, powerhouse, ash impoundments and potential structures associated with future development are generally not visible but from a few vantage points, any cumulative impacts to visual resources would be considered beneficial but insignificant.

3.22.3.6 Land Use

Under the proposed action, the project area would become available for potential redevelopment, allowing for future industrial or other economically beneficial use. Lands within the project area would remain as zoned industrial lands. While the extent of the potential future development is unknown, redevelopment of the site is foreseeable and any future development would comply with uses allowed under the current zoning designation. Therefore, the cumulative effects of the proposed action on land use would not adversely affect local land use and zoning.

3.22.3.7 Transportation

The other identified actions within the geographic area, including ongoing operations at the ACT, ACC, and the Harsco Minerals operation at ALF and within the adjacent industrial facilities at the Frank C. Pidgeon Industrial Park and the International Port of Memphis, do

not have the potential to contribute to additional impacts to transportation. Ongoing operations of these facilities and the traffic they generate are considered part of the existing environmental setting and are not expected to increase in the foreseeable future.

The reasonably foreseeable future projects that are planned to occur on ALF such as the deconstruction and demolition activities could contribute to cumulative impacts on the local transportation network if these activities overlap with the proposed ash impoundment closure project. The number of trucks associated with the transport of debris from ALF deconstruction, added to the number of trucks required to remove CCR from impoundments at ALF and transport of borrow material for restoration activities could result in a very large number of trucks entering and exiting the facility on a daily basis. This could lead to congestion along adjacent arterial roadways and possibly on I-55. TVA would mitigate congestion in the vicinity of ALF with a traffic plan, as needed. Possibilities include staging of trucks, temporary signals, spacing logistics, or timing truck traffic to occur during lighter traffic hours (such as not in the morning or afternoon commute hours). With implementation of these mitigation measures, cumulative impacts to transportation would be moderate. However, once construction is completed traffic associated with the foreseeable future projects would be negligible and would only occur during the construction phases of these activities.

3.22.3.8 Noise

The other identified actions within the geographic area, including on-going operations at the ACT, ACC and Harsco Minerals operation at ALF and within the adjacent industrial facilities at the Frank C. Pidgeon Industrial Park and the International Port of Memphis, do not have the potential to contribute to additional impacts to noise. Ongoing operations of these facilities and the related impacts to noise are considered part of the existing environmental setting and are not expected to increase in the foreseeable future.

Implementation of the foreseeable future projects have the potential to contribute to additional noise impacts associated with construction activities. Due to the temporary nature of construction activities and distance to the nearest sensitive noise receptors, noise from construction associated with these activities at ALF would not result in a cumulative impact to noise.

Offsite noise emissions associated with transport of CCR and borrow material under Alternatives B and C would result in moderate to large effects to receptors located along the haul routes. As described above, reasonably foreseeable deconstruction and demolition actions at ALF may result in roadway transport of debris or borrow material. However, transport of these materials would utilize interstate highways or major arterial roadways as much as possible. While such additional traffic would contribute incrementally to greater noise levels, the expected overall cumulative effects from all reasonably foreseeable future actions is moderate in the short term within most areas and large but overall, short term impacts where a large number of truck trips are used on a daily basis on low volume residential roadways. Following deconstruction and ash impoundment closure activities, noise levels would return to baseline levels and as such there would only be minor long term cumulative impacts associated with future economic development of the site.

3.22.3.9 Hazardous Materials and Solid and Hazardous Waste

Under Alternatives B and C, CCR would be hauled either by truck or by rail to a licensed landfill. Due to the temporary nature of the operations and the use of previously permitted

disposal facilities, along with trained and experienced contractors and personnel, environmental impacts from CCR handling and disposal are not anticipated. Reasonably foreseeable future construction activities in the immediate vicinity, including demolition and deconstruction activities, would also have the potential to contribute waste to permitted disposal facilities in the region. Due to the available capacity for large volumes of solid waste at permitted landfills in the vicinity of ALF, the cumulative impact from these planned activities is anticipated to be negligible.

3.22.3.10 Environmental Justice

Most of the communities within the vicinity of ALF meet the criteria for environmental justice consideration. Given the distance of these communities from ALF, there is a potential that these communities would be indirectly impacted due to an increase in traffic, noise, exposure to fugitive dust, and exhaust emissions from the trucks used to transport the CCR and borrow material. It is also likely that some of these communities would be along routes taken during disposal of wastes and debris associated with the deconstruction and demolition of ALF, or other planned construction projects within the vicinity of ALF. Because these short term actions are potentially concurrent, potential cumulative effects may be expected to occur on a local basis. Therefore, the cumulative effects of the proposed action on noise has the potential to result in large but overall, short term impacts in environmental justice populations where a large number of truck trips are used on a daily basis on low volume residential roadways, if these activities occur concurrently with other construction activities in the geographic area. Such physical impacts associated with the transport of borrow material or demolition debris (i.e., noise, fugitive dust, exhaust emissions) would be mitigated through BMPs identified in Section 2.9 or by the selection of borrow sites that are not within identified environmental justice communities. Following deconstruction and ash impoundment closure activities, noise levels, exhaust emissions and fugitive dust would return to baseline levels and as such there would only be minor long term cumulative impacts associated with future economic development of the site.

3.23 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 primary action and related component actions have the potential to cause unavoidable adverse effects to several natural and human environmental resources.

The closure of CCR impoundments at ALF has the potential to cause unavoidable adverse effects to existing open water habitats located within the ash impoundments, as well as to recreational bird watchers that frequent these areas. However, this impact is considered minor as these areas are elements of a man-made permitted treatment system which do not provide high quality habitat. In addition, temporary impacts to water quality from runoff at the site could impact nearby receiving water bodies and wetlands during closure activities. BMPs to minimize runoff would be implemented, and water released by closure activities would meet established TDEC permit limits.

Other impacts associated with Alternatives B and C primarily would be related to impacts that occur during onsite closure activities. Activities associated with the use of construction equipment may result in varying amounts of dust, air emissions, and noise that may

potentially impact both onsite workers and recreationists using T.O. Fuller State Park. Workers would use appropriate protection and adhere to safety standards designed to minimize worker-related injuries. Noise emissions from onsite construction activities and equipment are minimized through implementation of BMPs including proper maintenance of construction equipment and vehicles.

The commuting of the construction workforce and construction-related equipment, transport of CCR to offsite landfills (Alternatives B and C) or a beneficial re-use processing facility (Alternative C), and the transport of borrow onsite (Alternatives B and C) would increase traffic on public roads, which could compromise public safety. This additional traffic would also increase noise and fugitive dust in areas proximate to these roads, adversely impacting parks and recreational facilities, environmental justice populations, and sensitive noise receptors along the routes. Emissions from construction equipment are minimized through implementation of BMPs including proper maintenance of construction equipment and vehicles and dust suppression measures.

Under Alternative C, the construction of proposed beneficial re-use processing facility could adversely impact natural resources such as vegetation, wildlife, surface waters, and wetlands located where the facility is sited. However, based on the facility attributes and bounding characteristics listed in Tables 2-9 and 2-10, impacts to these environmental features would be minimized to the extent possible. Unavoidable impacts would be permitted through the appropriate federal and state agencies.

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

Given the proximity of the environmental justice communities to ALF, impacts cannot be avoided; however, impact to these communities would be mitigated through BMPs identified in Section 2.9 or by the selection of borrow sites that are not within identified environmental justice communities. Following ash impoundment closure activities, noise levels, exhaust emissions, and fugitive dust would return to baseline levels.

3.24 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 EIS focuses on the analyses of environmental impacts associated with the various primary and component actions proposed to support disposal of CCR from the impoundments at ALF. For the purposes of this section, these activities are considered short term uses of the environment and the long term is considered to be initiated upon the closure of the impoundments at ALF. This section includes an evaluation of the extent that the short term uses preclude any options for future long term use of the project site.

Impoundment closure activities would have a negative effect on a limited amount of short term uses of the environment, such as air, noise, and transportation resources as described above. In addition, construction activities such as site preparation and noise may displace some wildlife during the construction period. 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 and support jobs and revenue.

Transport of CCR to offsite landfills (Alternatives B and C) or a beneficial re-use processing facility (Alternative C), as well as transport of borrow material to the project site, would have little to no effect on existing natural and physical resources because no new roadways or landfill facilities would be required. Although impacts to roadways along the haul routes may occur, they would be addressed through regular road maintenance activities and the long term productivity would not be affected.

Long term effects of impoundment closure would include the permanent loss of habitat for waterfowl, wading birds, and other wildlife as ash impoundments are closed, and the potential permanent loss of recreational use for bird watchers. However, other higher quality habitat for species that use these impoundments is generally located elsewhere in the vicinity of ALF. In the long term, the site could become very productive if redeveloped for industrial or commercial use, thereby producing employment opportunities and tax revenue and enhancing long term productivity of the site.

During impoundment closure activities, the purchase of borrow material would have a short term impact on the availability of this resource for other uses. However, there are multiple borrow sites in the region and the necessary quantities for closure are not expected to have a long term impact on the availability of borrow material in the area.

Landfills that meet the criteria outlined in the bounding analysis and described in Section 2.4.1 would be utilized for disposal of CCR excavated from the impoundments at ALF. Disposal of CCR in these landfills would impact capacity. However, due to the available capacity for large volumes of solid waste at permitted landfills in the vicinity of ALF, there would not be a long term impact to the availability of landfill capacity in the region. Any effects would be minimized under Alternative C because of the smaller amount of material that would be transported to existing landfills.

Overall, limited effects to local resources may affect use of those resources during construction activities associated with impoundment closures. However, the long term use of these resources would not be affected, and redevelopment of the land may result in increased productivity as compared to the No Action Alternative. Additionally, ash impoundment closure would have a beneficial effect on long-term productivity through the reduction or elimination of potential subsurface discharges to groundwater that would occur as a result of closure of the ash impoundments.

Under Alternative C, the proposed beneficial re-use processing facility would likely be constructed in an area that has been previously disturbed and supports industrial uses. Any short term adverse impacts, such as localized increases in noise, fugitive dust, and air emissions, and beneficial economic impacts associated with construction would be similar to those anticipated for construction activities as described above for impoundment closure, but at a much smaller scale. Use of this land for the beneficial re-use processing facility would be consistent with land use in the area and is not expected to affect the region’s long term productivity.

3.25 Irreversible and Irretrievable Commitments of Resources

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. Irreversible commitments generally occur to nonrenewable resources such as minerals or cultural resources and to those resources that are renewable only over long time-spans, such as soil productivity. A resource commitment is considered irretrievable when the use or consumption is neither renewable nor recoverable for use until reclamation is successfully applied. Irretrievable commitments generally apply to the loss of production, harvest, or other natural resources and are not necessarily irreversible. For example, the construction of a road through a forest would be an irretrievable commitment of the productivity of timber within the road right-of-way as long as the road remains. Mining of ore is an irreversible commitment of a resource; once the ore is removed and used, it cannot be restored.

The land within the project areas is not irreversibly committed because upon completion of impoundment closure activities, the land supporting the facilities could be returned to other industrial or nonindustrial uses. Because the project area is zoned for heavy industrial use, it is likely future land use would be industrial in nature.

Resources required by impoundment closure activities, including labor and fossil fuels, would be irretrievably lost. Nonrenewable fossil fuels would be irretrievably lost through the use of gasoline and diesel-powered equipment during removal of CCR, placement of fill, grading, and transport of CCR and borrow material. However, it is unlikely that their limited use in this effort would adversely affect the overall future availability of these resources.

For Alternative C, the land used for the proposed beneficial re-use processing facility would be irretrievably lost from construction of the structures and associated features. Nonrenewable fossil fuels would be irretrievably lost through the construction and operation of the facility. In addition, the materials used for the construction of the facility would be committed for the life of the facility. While some of these building materials may be irreversibly committed, some metal components and structures could be recycled. The limited use of building materials for use in this project would not adversely affect the future availability of these resources.

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CHAPTER 4 – LIST OF PREPARERS

4.1 NEPA Project Management

Name:	**W. Douglas White (TVA)**
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Name:	**Bill Elzinga**
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Project Role:	Wood Project Manager, NEPA Coordinator
Experience:	35 years of experience managing and performing NEPA analyses for electric utility industry, and state/federal agencies; ESA compliance; CWA evaluations.

4.2 Other Contributors

TENNESSEE VALLEY AUTHORITY

Name:	**Steve Cole**
Education:	PhD, Anthropology; MA, Anthropology; and BA, Anthropology
Project Role:	Cultural Resources
Experience:	31 years in Archaeology and Cultural Resources Management

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WOOD

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Name:	**Joel Budnik**
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Name:	**Karen Boulware**
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Name:	**Natalie Kleikamp**
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Name:	**Michael Lehmann**
Education:	MS Marine Biology
Project Role:	Wetlands
Experience:	12 Years wetland research
Name:	**Angela Love**
Education:	MS Biological Sciences
Project Role:	Quality Review
Experience:	20 Years NEPA Compliance
Name:	**Chris Mausert-Mooney**
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Project Role:	Vegetation Review
Experience:	9 years of experience in ecological and botanical investigations
Name:	**Rebecca Porath**
Education:	M.S. and B.S., Wildlife and Fisheries Sciences
Project Role:	Threatened and Endangered Species, Wildlife, Aquatic Ecology, Vegetation, Visual Resources, Hazardous Materials and Solid and Hazardous Waste, Cumulative Effects
Experience:	21 years of experience in environmental planning, NEPA analysis and documentation, ecological studies, and preparation of technical documents
Name:	**Konrad Quast**
Education:	B.S. and Ph.D., Hydrology and Water Resources
Project Role:	Groundwater

Experience:	20 years of experience in hydrogeologic and environmental geochemical data analysis, interpretation, and preparation of technical reports. Assessments and technical reports include basin wide groundwater flow, groundwater surface water interaction, coal combustion residual alternate source demonstrations, and geochemical forensics.

Name:	**Kim Pesenko**
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Project Role:	Air Quality and Climate Change
Experience:	10 years of experience in Air Quality Monitoring.

CHAPTER 5 – EIS RECIPIENTS

Following is a list of the agencies, organizations, and persons who have received copies of the EIS or notices of its availability with instructions on how to access the EIS on the project web page.

5.1 Federal Agencies

U.S. Environmental Protection Agency
U.S. Department of the Interior
U.S. Fish and Wildlife Service
U.S. Army Corp of Engineers

5.2 Federally Recognized Tribes

Absentee Shawnee Tribe of Oklahoma
Cherokee Nation
The Chickasaw Nation
Eastern Band of Cherokee Indians
Eastern Shawnee Tribe of Oklahoma
Kialegee Tribal Town
Shawnee Tribe
Thlopthlocco Tribal Town
United Keetoowah Band of Cherokee Indians in Oklahoma

5.3 State Agencies

Tennessee Department of Environment and Conservation
Tennessee Department of Transportation
Tennessee Wildlife Resources Agency
Tennessee Department of Agriculture
Tennessee Department of Economic and Community Development
Tennessee Historical Commission

5.4 Individuals and Organizations

Memphis Area Associations of Governments
EDGE/Port Authority
Protect our Aquifer

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Appendix A – Landfill Analysis

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ALLEN FOSSIL PLANT IMPOUNDMENT CLOSURE EIS LANDFILL SCREENING AND TRANSPORTATION BOUNDING ATTRIBUTE ANALYSIS

Shelby County, Tennessee

Prepared by:
Wood
Ballwin, Missouri

Prepared for:
TENNESSEE VALLEY AUTHORITY
Chattanooga, Tennessee

May 2019

PRE-DECISIONAL AND DELIBERATIVE COMMUNICATION

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List of Acronyms and Abbreviations

ALF	Allen Fossil Plant
CCR	coal combustion residuals
EIS	Environmental Impact Statement
EJ	Environmental Justice
EPA	U.S. Environmental Protection Agency
GHG	greenhouse gas
mi	miles
NEPA	National Environmental Policy Act
PEIS	Programmatic Environmental Impact Statement
RCRA	Resource Conservation and Recovery Act
TVA	Tennessee Valley Authority
yd^3	cubic yards

1.0 INTRODUCTION

1.1 Project Background

The Allen Fossil Plant (ALF) is located in Shelby County, southwest of Memphis, Tennessee. The plant was constructed in the 1950s by the Memphis, Light, Gas, and Water Division and is located on the south bank of McKellar Lake and east of the Mississippi River, on land protected from flooding by an existing US Army Corps of Engineers levee system. The Tennessee Valley Authority (TVA) purchased the plant and the underlying property in 1984. ALF's three coal-fired units were retired on March 31, 2018.

There are two surface impoundments at ALF that contain coal combustion residuals (CCR): the East Ash Pond Complex and the West Ash Pond. The East Ash Pond Complex is located east of the powerhouse, and east of the Coal Yard. It encompasses approximately 85 acres and includes dredge cells on the western end, a main ash pond in the central part, and a stilling pond on the eastern end. Collectively, there is approximately 3 million cubic yards (yd^3) of CCR that remains in the East Ash Pond Complex. The West Ash Pond was the original fly ash surface impoundment for ALF and received sluiced fly ash and boiler slag until 1978. In 1992-1993, approximately 173,000 yd^3 of CCR were excavated and beneficially re-used, The West Ash Pond intermittently received minimal amounts of CCR between 1992 and October 2015 and all flow to this surface impoundment was rerouted by October 19, 2015. The West Ash Pond has not received any CCR or wastewater since that time and does not impound water. Approximately 300,000 yd^3 of CCR material remains in the West Ash Pond. The Metal Cleaning Pond is a lined pond that contains plant process flows. It is not a CCR surface impoundment and was not designed to accumulate CCR. However, as it was constructed within the footprint of the West Ash Pond, there is approximately 200,000 yd^3 of CCR below the Metal Cleaning Pond. These impoundments are shown on Figure 1-1.

To support the implementation of TVA's goal to eliminate all wet CCR storage at its coal plants by closing CCR surface impoundments across the TVA system, and to assist TVA in complying with the U.S. Environmental Protection Agency's (EPA) CCR Rule, TVA is evaluating four alternatives to address the closure of these facilities.

- Alternative A- No Action
- Alternative B – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in an Offsite Landfill Location
- Alternative C – Closure of the Metal Cleaning Pond, Closure-by-Removal of the East Ash Pond Complex and the West Ash Pond; Disposal of CCR in a Beneficial Re-Use Process and Offsite Landfill Location
- Alternative D – Closure of the Metal Cleaning Pond and Closure-in-Place of the East Ash Pond Complex and the West Ash Pond

In accordance with TVA policy and the provisions of the National Environmental Policy Act of 1969 (NEPA), TVA intends to prepare an environmental impact statement (EIS) to address the closure of the surface impoundments and Metal Cleaning Pond at ALF. The purpose of this memo is to identify suitable off-site landfills that TVA could use for the disposal of CCR from ALF that could be accessed via truck, rail or barge. Findings from this report are intended to assist TVA with the decision-making process regarding closure of the CCR impoundments at ALF.

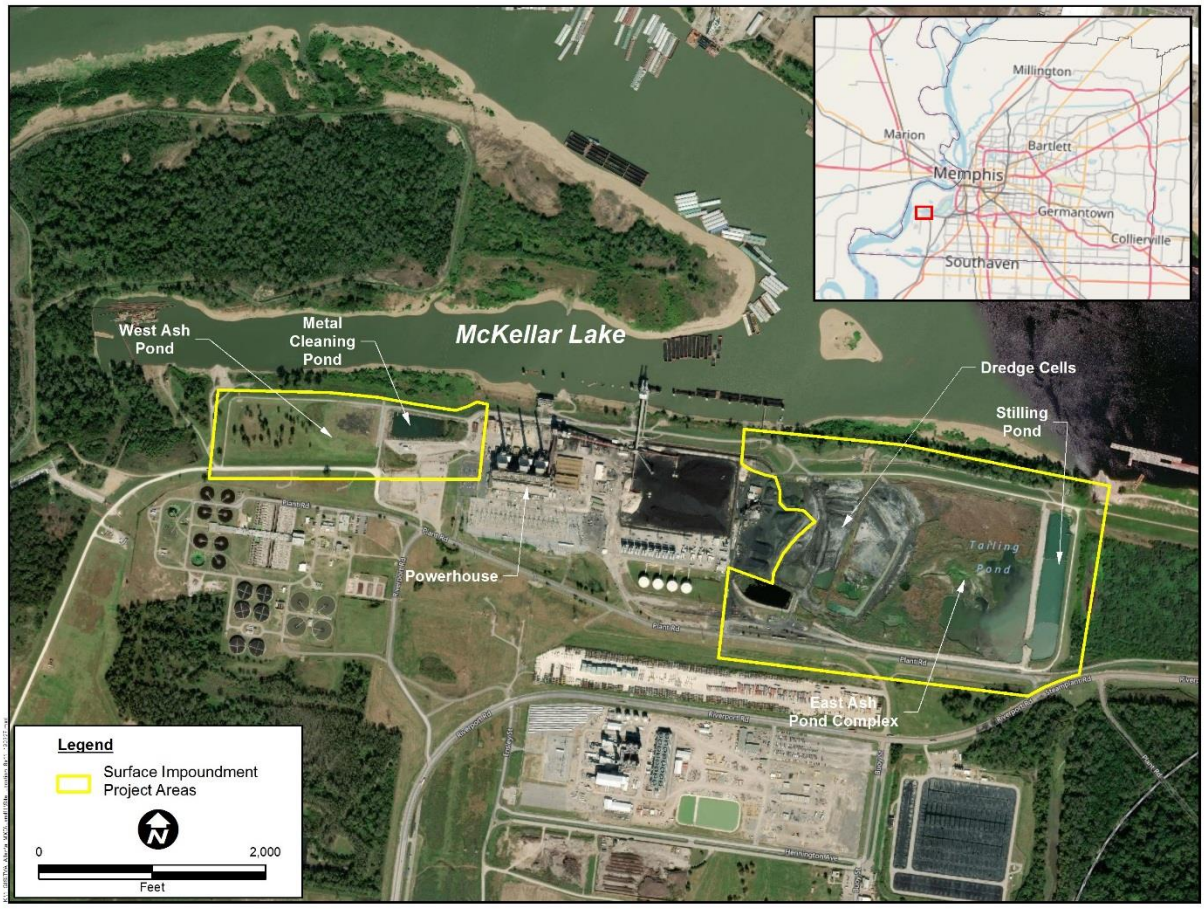

Figure 1-1. Surface Impoundments at ALF

On July 28, 2016, TVA issued a Record of Decision for a programmatic NEPA review entitled Ash Impoundment Closure Environmental Impact Statement (CCR Programmatic Environmental Impact Statement [CCR PEIS]) (TVA 2016). The purpose of the programmatic NEPA review was to support TVA's goal to eliminate all wet CCR storage at its coal plants by closing CCR surface impoundments across TVA's system and to assist TVA in complying with the EPA's CCR Rule issued on April 17, 2015 (80 Federal Register 21302). The EIS for surface impoundment closures at ALF will tier from TVA's 2016 CCR PEIS.

In Part I of the CCR PEIS, TVA considered several modes of transport of bulk materials that may be required for impoundment closure. TVA concluded the use of rail and barge to transport borrow material would not be suitable given the short-duration, the relatively small volume of borrow material required, and that borrow material is likely to come either from on-site or from previously developed and/or permitted off-site borrow sites. Advantages and disadvantages of each mode of transport of CCR material identified in the 2016 PEIS are summarized in Table 1-1.

Table 1-1. Advantages and Disadvantages of Transport Methods

Haul Method	Advantages	Disadvantages
Truck	• Sites (ash impoundments and landfills) are readily served by roads • Does not require special loading/unloading infrastructure • Can accommodate earlier closure for lower volume materials	• Lower volume per load • Requires the use of more vehicles and longer duration to move larger quantities of CCR due to smaller vehicle capacities • Potential for increased impacts (air quality, noise, vibration, road deterioration) to road system and to adjacent land uses • Increased risk of crashes on roadways
Barge	• Good for shipments of large quantities • Good for shipments over longer distances • Relatively less impact to roadside land uses • Relatively safer than shipping by truck or rail from a crash/accident standpoint	• Requires loading/unloading infrastructure (chutes, conveyors, etc.), increasing cost and extending the duration of closure • Landfills not typically served by barge (may require some trucking from barge unloading location) • Potential for spills to water bodies • Transport hindered if water levels are low or during flood events
Rail	• Good for shipments of large quantities • Good for shipments over longer distances • Relatively less impact to roadside land uses • Relatively safer than shipping by truck from a crash standpoint	• Requires more extensive loading/unloading infrastructure (chutes, conveyors, etc.), increasing costs and extending the duration of closure • Landfills not typically served by rail (may require some trucking from rail unloading location)

Source: TVA 2016

Considering the analysis presented in the CCR PEIS, and considering reasonable durations of closure, TVA determined that landfills within a 600-mile radius of ALF could be utilized for long-term storage of CCR excavated from the ash ponds at ALF if CCR were transported by barge or

rail. TVA also determined that landfills within a 30-mile radius of ALF could be utilized for long-term storage of CCR excavated from the ash ponds at ALF if CCR were transported by truck.

2.0 PURPOSE

TVA has not selected a landfill for disposal of CCR from the surface impoundments at ALF. The analysis of potential environmental impacts associated with the disposal of CCR to an off-site, previously developed and/or permitted landfill would be limited to those associated with the effects of transport of CCR to the facility. Therefore, the purpose of this analysis is to develop a set of bounding attributes related to the transport of CCR from ALF to an offsite landfill via truck, rail and barge. The first step in this analysis is to identify suitable landfills. The most impactful or "bounding" characteristics of CCR transport to these suitable landfills will be incorporated into a set of bounding attributes for each potential mode of transportation. The results of the analysis will be used to support the evaluation of impacts developed for the EIS for the closure of the surface impoundments at ALF. Should a receiving landfill be selected following completion of this EIS that does not meet the listed threshold conditions, a supplemental NEPA document would be required.

3.0 IDENTIFICATION OF SUITABLE LANDFILLS

3.1 Methodology

The following stepwise process was used to identify landfills that could be considered for disposal of CCR from ALF.

3.1.1 Step 1 – Initial Landfill Identification

3.1.1.1 *Landfills Within a 600-Mile Radius of ALF*

An internet search was conducted to identify all landfills regulated under the Resource Conservation and Recovery Act (RCRA) Subtitle D (solid waste) permitting requirements that may be located within a 600-mile radius of ALF. This search focused on the identification of landfills that may be considered for receiving landfills by transportation via either barge or rail. Landfills that are regulated under RCRA Subtitle D include Municipal Solid Waste Landfills and Non-hazardous Industrial Waste Landfills. These landfills must meet the minimum federal criteria for operation including design criteria, location restrictions, financial assurance, corrective action (cleanup), and closure requirements (EPA 2019). The 23 states included within this radius are identified in Table 3-1.

Table 3-1. States within a 600-Mile Radius of Allen Fossil Plant

Alabama	Indiana	Michigan	Ohio	Virginia
Arkansas	Iowa	Mississippi	Oklahoma	West Virginia
Florida	Kansas	Missouri	South Carolina	Wisconsin
Georgia	Kentucky	Nebraska	Tennessee	
Illinois	Louisiana	North Carolina	Texas	

This search identified 1,158 landfills of which 784 were located within the 600-mile radius of ALF (Figure 3-1).

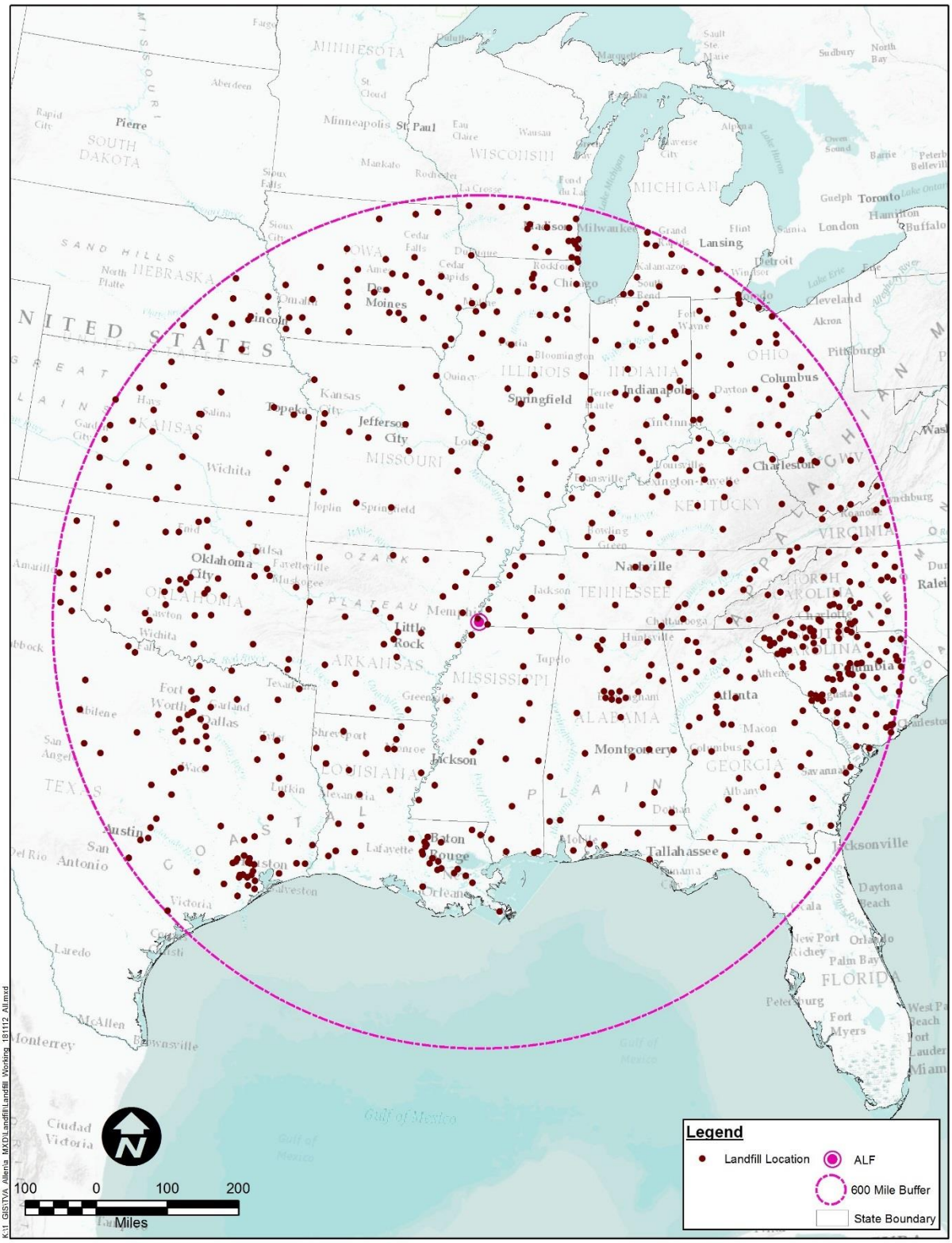

Figure 3-1. RCRA Subtitle D Landfills Within a 600-mile Radius of ALF

3.1.1.2 *Landfills Accessible by Truck*

TVA determined that all RCRA Subtitle D landfills within a 30-mile radius of ALF should be considered as options for disposal of CCR from ALF by truck. A total of four RCRA Subtitle D landfills were identified within a 30-mile radius of ALF. These landfills are:

- Crittenden County Landfill, Memphis, Arkansas
- South Shelby Landfill, Memphis Tennessee
- Tunica Landfill, Robinsonville, MS
- North Shelby Landfill, Memphis, Tennessee

The location of these landfills are identified on Figure 3-2.

3.1.2 Step 2 – Landfills Accessed by Barge or Rail

ALF has existing barge and rail facilities that, with modification, may be used to support transport by these transportation modes. While development of loading systems and associated infrastructure would be required to utilize these facilities, the transport of CCR removed from the surface impoundments to a separate barge or rail facility would not be necessary. Further screening was conducted to identify those landfills within 30 miles of a major waterway or rail line to accommodate potential transport from rail or barge terminal to the receiving landfill. This distance was chosen as it is consistent with the travel distance that TVA would truck material from ALF to a receiving landfill. Accordingly, each of the 784 landfills located within a 600-mile radius of ALF were screened for proximity to a navigable waterway or a rail line. The results of this screening analysis indicated that all 784 landfills are within 30 miles of a rail line and 204 of the 784 landfills are also within 30 miles of a navigable waterway (Figure 3-3).

3.1.3 Step 3 – Large Commercial Carriers

Additional screening was conducted to eliminate those landfills that were not operated by large commercial carriers. Commercial carriers offer established management systems, reliability, and are assumed to comply with environmental practices consistent with TVA standards. Landfills operated by the following commercial carriers were retained for additional analysis:

- Advance Disposal
- Tunnel Hill
- Waste Industries
- Republic Services
- Waste Connections
- Waste Management
- Green Group Holdings

A total of 226 of the 784 landfills originally identified are operated by large commercial carriers.

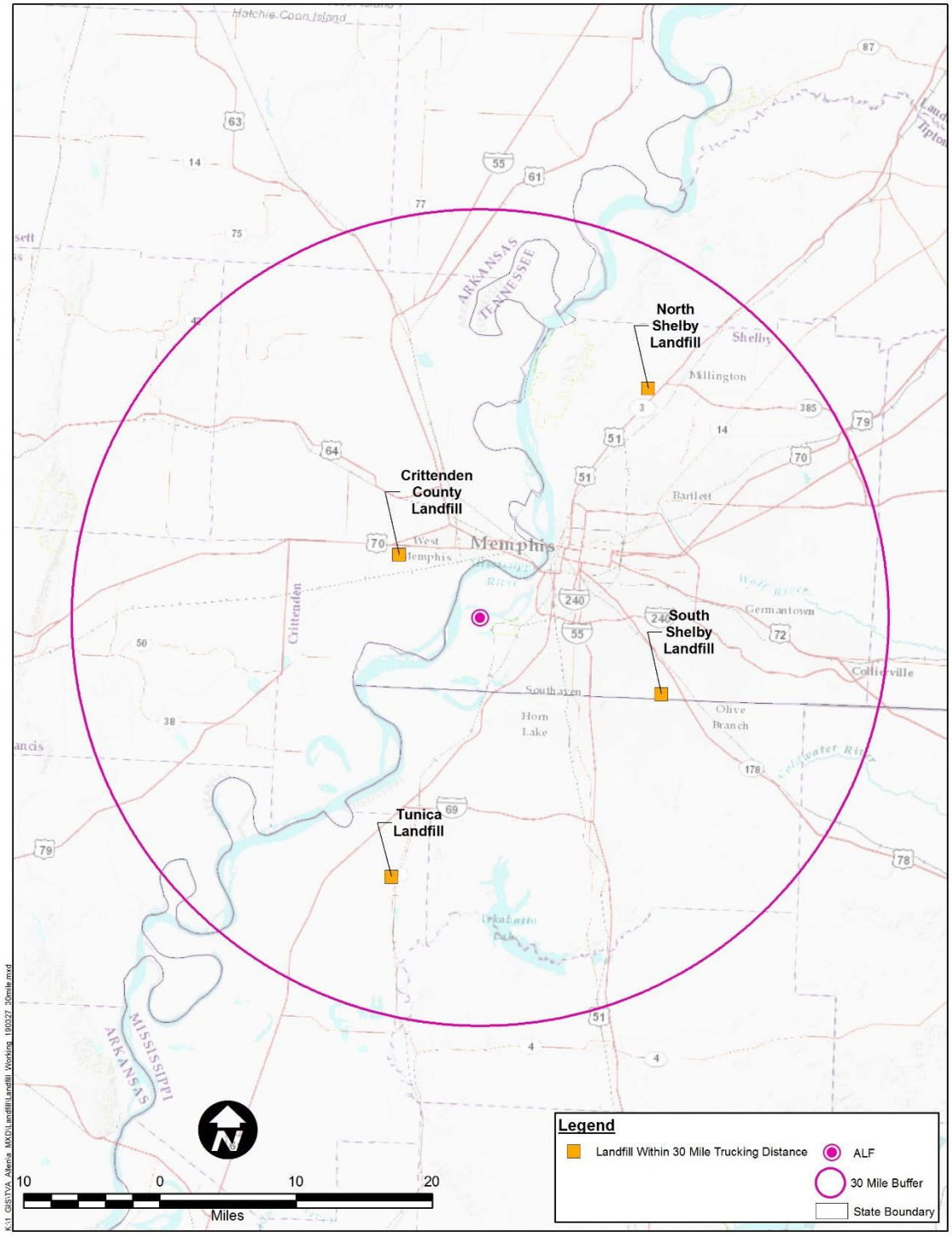

Figure 3-2. RCRA Subtitle D Landfills Within 30 Miles of ALF

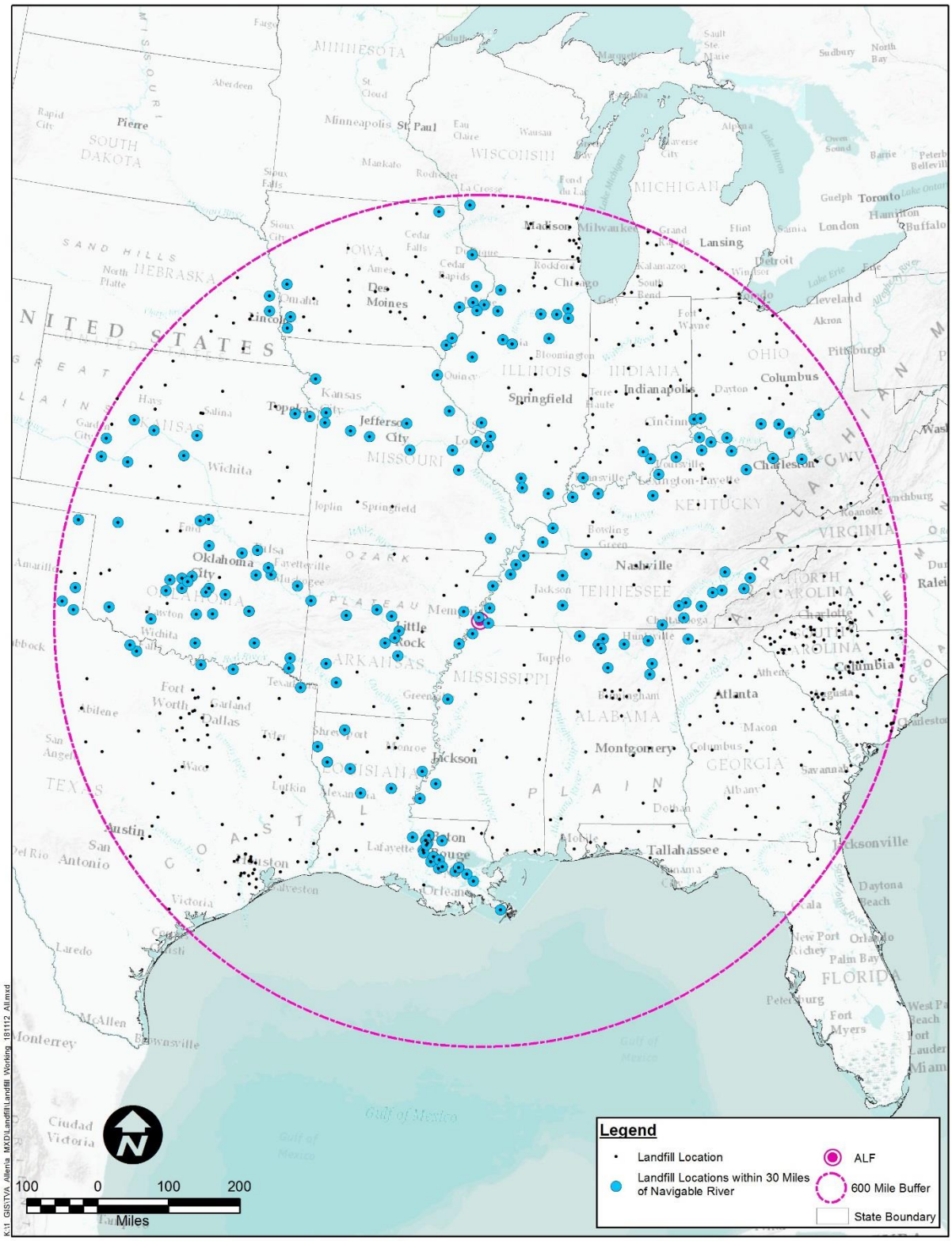

Figure 3-3. Landfills Within a 600-Mile Radius of ALF Accessible by Barge or Rail

3.1.4 Step 4 - Serviced by a Rail Spur or Port

Next, to avoid impacts associated with construction of unloading infrastructure and over-the-road trucking, the 226 landfills remaining were reviewed using available aerial imagery for the presence of rail or port access either at or near the landfill site. Available aerial imagery indicated that 13 landfills were potentially serviced by rail and two landfills could be serviced by an existing port with minimal to no over-the-road trucking required.

The results of the Steps 1-4 screening identified 22 candidate landfills that would meet the requirements established for disposal of CCR from ALF via truck, rail or barge. These landfills are within the established radius for rail or barge transport (600 miles) or truck transport (30 miles), are operated by large commercial carriers, and are serviced by a rail spur or established port if outside the 30-mile trucking radius. These candidate landfills are shown on Figure 3-4.

3.1.5 Step 5 - Internet Characterization of Landfill Attributes

The 22 remaining candidate landfills were screened for specific attributes using readily available information obtained from an internet search of commercial carrier websites, state and county waste management reports, and EPA data. Each landfill was characterized using the following attributes:

- Modes of Transport Available
- Remaining Capacity
- Types of Waste Accepted
- Geographic Restrictions on Waste Origin
- Presence within a community supporting communities subject to Environmental Justice (EJ) Consideration

Landfills that only accept waste from within a specific geographic area (of which ALF is not included), do not accept CCR or special waste, or that reported insufficient capacity were eliminated from further consideration. It should be noted that not all attribute information was readily ascertainable for each landfill, and as such, a lack of information alone did not result in the elimination of a landfill. Four landfills were eliminated using the internet characterization data as unsuitable. As a result, 18 candidate landfills were retained for further consideration in the development of the transportation bounding analysis.

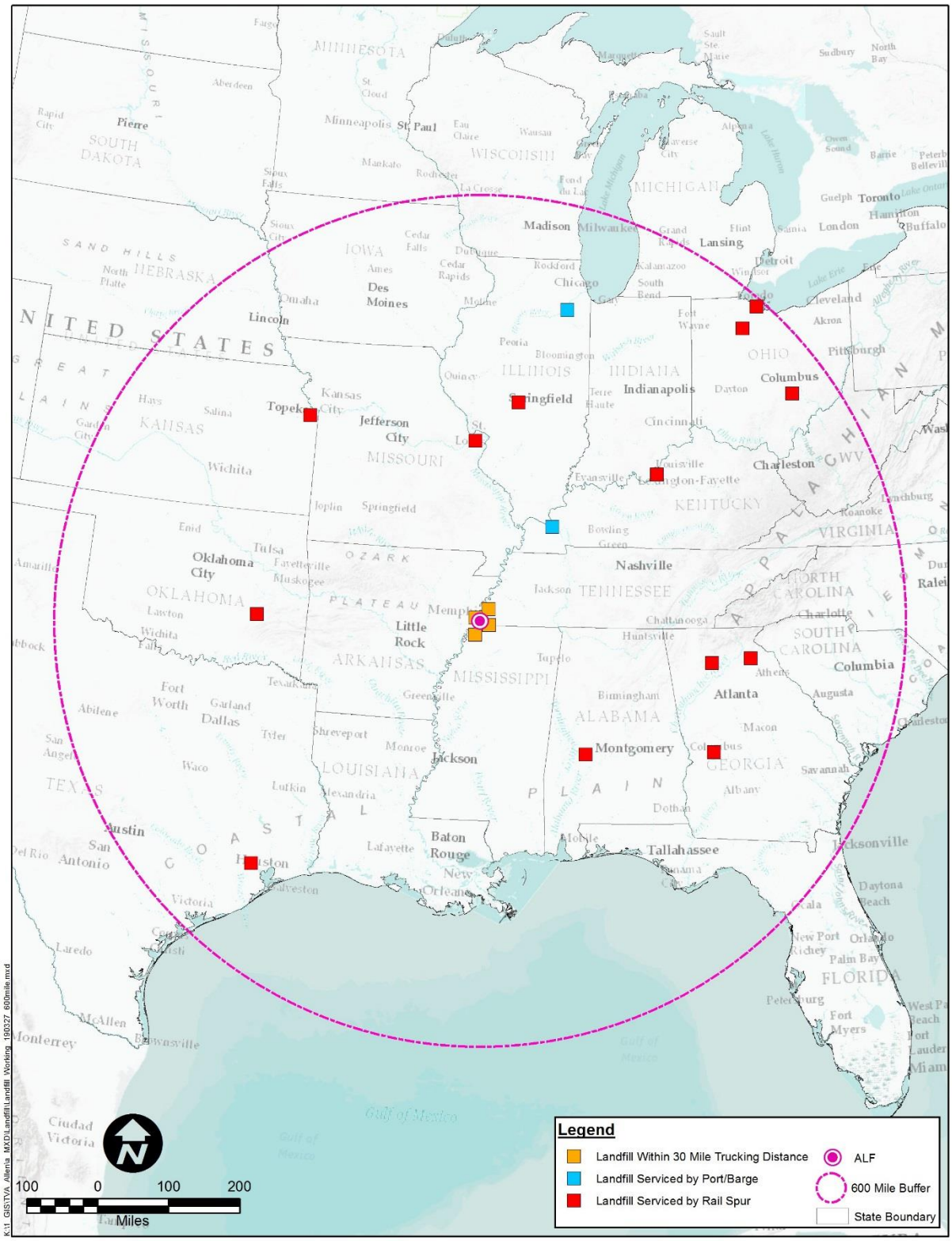

Figure 3-4. Landfills Carried Over for Further Evaluation

3.1.6 Step 6 – Additional Data Collection

Additional data was collected to validate the information obtained during the internet characterization screen. It was determined that there are three landfills that have operational rail spurs on-site that also meet all of the remaining criteria. None of the identified landfills within 600 miles are currently directly serviced by barge. Of the two landfills located near ports, one was eliminated due to insufficient capacity. The other, Laraway Recycling and Disposal Facility, while not directly served by barge, is located within 1 mile of an active port. The direct route between the port and landfill currently serves industrial facilities and would require use of a public roadway for a relatively short distance. Because this was the only viable landfill potentially served by barge (with the exception of the short roadway haul from the barge terminal to the receiving landfill), this landfill was provisionally retained as a potentially viable option for barge transport.

3.2 Results

Table 3-2 provides a list of landfills that were confirmed to accept CCR; have the ability to construct dedicated cells to accommodate a monofill for CCR from a single generator; have sufficient capacity to accept all CCR from ALF; and do not have geographic restrictions or service areas that exclude ALF. Additionally, they are either located within a 30-mile radius of ALF, are directly served by an operational rail spur, or are within one mile of a port.

Table 3-2. Landfills Suitable for Accepting CCR from ALF

Facility	Commercial Carrier	City, State	Distance to ALF (point to point)	Transport Method
South Shelby Landfill	Republic Services	Memphis, Tennessee	14 miles	Truck
Tunica Landfill	Waste Management	Robinsonville, Mississippi	20 miles	Truck
North Shelby Landfill	Republic Services	Millington, Tennessee	21 miles	Truck
Arrowhead Landfill	Green Group Holdings	Uniontown, Alabama	240 miles	Rail
Taylor County Disposal Landfill	Waste Industries	Mauk, Georgia	380 miles	Rail
Lee County Landfill	Republic Services	Bishopville, South Carolina	565 miles	Rail
Laraway Recycling and Disposal Facility	Waste Management	Joliet, Illinois	455 miles	Barge

4.0 TRANSPORTATION BOUNDING ANALYSIS

Each of the candidate landfill sites are existing permitted landfills with the ability to accept CCR and have the existing infrastructure in place such that construction of additional roads, rail lines, or unloading facilities outside of the existing landfill footprint would not be required. As such, impacts to the natural environment from disposal of CCR at these landfills are not anticipated. All landfills that met the screening criteria for transport by truck, rail and barge are located in geographic areas with air quality that meet or exceed national clean air standards (i.e. designated by the EPA as “attainment” areas) and all landfills are located in areas which contain communities that meet the requirements for EJ considerations. The analysis of potential environmental impacts associated with the disposal of CCR to an off-site landfill is limited to those associated with the effects of transport of CCR to the facility and the location of the landfill.

Resources having the potential to be impacted by the transport of CCR between ALF and the candidate landfills and that are considered in this analysis are limited to the following:

- Air Quality—Potential impact from fugitive dust and emissions from loading/unloading equipment and vehicles during transport of CCR to landfill
- Climate change and Greenhouse Gas (GHG)—Transport operations of CCR contribute to emissions of GHG

- Noise—Potential impact from noise emissions from loading/unloading equipment and vehicles during transport of CCR to landfill
- Transportation—Offsite transport has potential to result in additional impacts to local traffic and increased maintenance needs associated with transportation infrastructure (roadways, rail lines and/or waterways)
- Public health and safety—Impacts from loading/unloading activities and high-volume transport on roadways, rail lines, and/or waterways result in increased risk of accidents, injuries and deaths
- Natural Areas, Parks, and Recreation—Potential disruptions to the use and enjoyment of natural areas and recreational activities associated with transport of CCR through or adjacent to natural areas, parks or other recreational areas
- Environmental Justice— Potential impacts associated with the transport of and disposal of CCR (transportation-related noise, exposure to fugitive dust, and exhaust emissions) within identified EJ communities

TVA examined the proposed transport routes and the environmental attributes of the existing conditions along each route to determine the most potentially impactful or "bounding" characteristics of CCR transport to existing landfills via each potential mode of transportation. As part of this analysis, TVA used such factors as haul route distance, length through established EJ communities and other factors to develop a set of bounding attributes that may be used in conjunction with impact analyses for each potentially affected resource considered by NEPA, as appropriate. Results of analyses as presented in the following subsections will be used to support relevant resource impact analyses in the ALF Ash Impoundment Closure EIS.

4.1 Transport to Landfill Via Truck

Bounding attributes selected for use in impact analyses for transport of CCR to a landfill via truck are summarized in Table 4-1.

Table 4-1. Summary of Bounding Attributes Associated with the Transport of CCR to Offsite Landfill Via Truck

Attribute	Bounding Value
Distance by Road to ALF (mile)	29.1
Estimated Transport-Related Injuries[1]	3.6
Estimated Transport-Related Fatalities[2]	0.2
Length Through Low Income EJ Population (mile)	18.6
Length Through Minority EJ Population (mile)	24.4
Is Landfill Located in Low Income EJ Population?	Yes
Is Landfill Located in Minority EJ Population?	Yes
No. Potential Sensitive Air Receptors (within 200 feet)[3]	223

Table 4-1. Summary of Bounding Attributes Associated with the Transport of CCR to Offsite Landfill Via Truck

Attribute	Bounding Value
No. Potential Sensitive Noise Receptors (within 500 feet)[4]	1,350
Length Through or Adjacent to Natural Areas or Parks (mi)	1.2
Air Quality Attainment Status of Landfill Location and Haul Route[3]	In Attainment for All Criteria Pollutants

[1]Based on a rate of 32.953 per billion ton-miles for freight transport by truck (FHWA 2016)
[2]Based on a rate of 1.375 per billion ton-miles for freight transport by truck (FHWA 2016)
[3]Potential sensitive air receptors are homes, churches and recreational areas located within 200 feet of the proposed haul road
[4] Potential sensitive noise receptors are homes, churches, recreational areas within 500 feet of the proposed haul road

4.2 Transport to Landfill Via Rail

Transport of CCR to an offsite landfill via rail would utilize existing rail lines. While trains are more energy efficient than automobiles, they also result in emissions of nitrogen dioxide, carbon dioxide, and particulate matter that can contribute to air pollution and adverse health effects (Environmental Literacy Council 2019). Based upon the evaluation in the CCR PEIS (TVA 2016) and TVA's analysis at Gallatin Fossil Plant (AECOM 2018), TVA assumed an average rate of rail loading of approximately 11 rail cars per day and shipment of up to two trains per week. Because transport by rail would be relatively intermittent, trains carrying CCR from ALF are expected to be integrated within the existing rail freight system and would not result in increased rail congestion, delays or idling time. As such potential localized effects to air and noise receptors, EJ populations, and parks located along these existing rail lines would not experience notably greater impacts due to the transport of CCR by rail than those they already experienced under current rail operating conditions. Therefore, specific features along the rail haul routes were not identified for landfills accessed by rail. The primary bounding attributes considered for these landfills was determined to be distance traveled, as impacts associated with regional air and GHG emissions and health and safety risks typically increase proportionally with distance, and location in a community with environmental justice considerations.

Due to the varying ownership of rail lines, the exact haul routes between ALF and the rail-accessed landfills have not been determined. Rail distances to the candidate landfills accessible by rail were estimated based on the determination of the average increase in actual rail distance as identified in other studies conducted by TVA, relative to a straight measure of the point to point distance between the landfill and the subject fossil plant. Therefore, in order to estimate the bounding distance between ALF and the rail-accessed landfill, the point to point distance between ALF and the landfills accessible by rail was increased by approximately 85 percent. Bounding attributes selected for use in impact analyses for transport of CCR to a landfill via rail are summarized in in Table 4-2.

Table 4-2. Summary of Bounding Attributes Associated with the Transport of CCR to Offsite Landfill Via Rail

Attribute	Bounding Value
Estimated Distance by Rail to ALF (mi)	1,047
Estimated Transport-Related Injuries[1]	8.6
Estimated Transport-Related Fatalities[2]	1.1
Is Landfill Located in Low Income EJ Population?	Yes
Is Landfill Located in Minority EJ Population?	Yes

[1]Based on a rate of 2.172 per billion ton-miles for freight transport by rail (FHWA 2016)
[2]Based on a rate of 0.278 per billion ton-miles for freight transport by rail (FHWA 2016)

4.3 Transport to Landfill Via Barge

Transport of CCR to an off-site landfill via barge would utilize an existing transportation network of navigable waterways. Similar to rail transport, given the expected capacity of a river barge [average of 1,500 tons (USDOT 1994)], sensitive air and noise receptors, EJ populations, and parks located along existing waterways would not experience significantly greater impacts due to the transport of CCR by barge than those already experienced under current conditions. In addition, as identified above, based on the characteristics of the screening analysis, the impact associated with the transport of CCR from the port to the receiving landfill would be minimal. Therefore, specific features along the barge transport routes were not identified for landfills accessed by barge. Accordingly, the primary bounding attributes considered for landfills accessible by barge was distance traveled by waterway, as impacts associated with air and GHG emissions and health and safety risks typically increase proportionally with distance, and the location of the landfill within a community with environmental justice considerations. Bounding attributes selected for use in impact analyses for transport of CCR to a landfill via barge are summarized in Table 4-3.

Table 4-3. Summary of Bounding Attributes Associated with the Transport of CCR to Offsite Landfill Via Barge

Attribute	Bounding Value
Distance by River to ALF (mi)	732.5
Estimated Transport-Related Injuries[1]	0.55
Estimated Transport-Related Fatalities[2]	0.14
Is Landfill Located in Low Income EJ Population?	Yes
Is Landfill Located in Minority EJ Population?	Yes

[1]Based on a rate of 0.199 per billion ton-miles for waterborne freight transport (FHWA 2016)
[2]Based on a rate of 0.050 per billion ton-miles for waterborne freight transport (FHWA 2016)

While the aforementioned analysis has produced certain “bounding” values that may be used to support an assessment of potential environmental impacts, the sole candidate landfill identified

by this analysis has challenges that make transport and delivery of CCR from ALF problematic. These include the following:

- *Absence of direct port service to the receiving landfill*. As described in Section 3.1.6, Laraway Recycling and Disposal Facility is located within 1 mile of an active port (Port of Will County) and is not directly served by barge. As such, CCR transported from ALF via barge would have to be offloaded within the port onto trucks, transported via public roadways, and then disposed of within the landfill. These issues represent potential challenges that complicate CCR transport and increase risk.
- *Limited landfill capacity in Chicago region.* Discussions with the representative of the Laraway facility indicated landfill capacity within the Chicago region is very limited. While not definitive, it is believed this issue may limit TVA's ability to actually execute a contract with the receiving landfill as this could limit landfill capacity for local communities.
- *Excessively high disposal costs.* Because of the limited availability of landfill capacity in the Chicago region (as stated above), any contract for receipt of CCR from outside the region may be vulnerable to excessively high tipping fees. As such total transportation costs for this transportation option may be cost prohibitive.

Based on these challenges, the candidate landfill previously retained for screening analysis as a landfill potentially served by barge transport is eliminated from further consideration as impractical. Because no other candidate landfills have been identified that may potentially be served by barge transport, this mode of CCR transport is therefore, eliminated from detailed consideration in the EIS.

5.0 REFERENCES

Environmental Literacy Council. 2019. https://enviroliteracy.org/environment-society/transportation/rail-transportation (Accessed March 2019)

Federal Highway Administration. 2016. 2016 Freight Quick Facts Report. FHWA-HOP-16-083. September 2016. Retrieved from https://ops.fhwa.dot.gov/publications/fhwahop16083/index.htm (Accessed March 2019)

Tennessee Valley Authority (TVA). 2016. Final Ash Impoundment Closure Environmental Impact Statement, Part I—Programmatic NEPA Review, June 2016. Chattanooga, TN

U.S. Department of Transportation. 1994. Environmental Advantages of Inland Barge Transportation. August 1994. http://www.uppermon.org/visions/DOT_environ_barge.htm (Accessed March 2019)

US EPA. 2019. Resource Conservation and Recovery Act (RCRA) Overview. https://www.epa.gov/rcra/resource-conservation-and-recovery-act-rcra-overview. (Accessed March 2019)

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Appendix B – Bat Strategy Project Assessment

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From:	Hamrick, Elizabeth Burton
To:	robbie_sykes@fws.gov; ross_shaw@fws.gov
Subject:	Notification in accordance with TVA Programmatic Consultation for Routine Actions and Federally listed bats
Date:	Tuesday, June 04, 2019 4:10:00 PM
Attachments:	Completed_ALF-EIS_TVA-Bat-Strategy_6.4.19.pdf

Good afternoon,

TVA's programmatic ESA consultation on routine actions and bats was completed in April 2018. For projects with NLAA or LAA determinations, TVA is providing project-specific notification to relevant Ecological Service Field Offices. This notification also will be stored in the project administrative record. For projects that utilize Take issued through the Biological Opinion, that Take will be tracked and reported in TVA's annual report to the USFWS by March of the following year.

The attached form is serving at TVA's mechanism to determine if project-specific activities are within the scope of TVA's bat programmatic consultation and if there is project-specific potential for impact to covered bat species, necessitating conservation measures, which are identified for the project on page 5. The form also is serving as the primary means of notification to the USFWS and others as needed.

***Project**: Allen Fossil Plant (ALF) Ash Impoundment Closure Environmental Impact Statement, Shelby County, TN – TVA is assessing the environmental impacts of the proposed closures by removal of the East Ash Pond Complex, the West Ash Pond and the Metal Cleaning Pond at ALF, or leaving the plant as is and taking no actions. TVA is investigating disposal of CCR at an offsite landfill or at a beneficial re-use facility and an offsite landfill. No potentially suitable summer bat roosting trees would be removed. Best Management Practices would be used.*

Thank you.

Liz Hamrick
Terrestrial Zoologist
Biological Compliance

400 W Summit Hill Dr. WT 11C-K
Knoxville, TN 37902

865-632-4011 (w)
ecburton@tva.gov

Project Review Form - TVA Bat Strategy *(12/2018)*

*This form should **only** be completed if project includes activities in Tables 2 or 3 (STEP 2 below). This form is not required if project activities are limited to Table 1 (STEP 2) or otherwise determined to have no effect on federally listed bats. If so, include the following statement in your environmental compliance document (e.g., add as a comment in the project CEC): "Project activities limited to Bat Strategy Table 1 or otherwise determined to have no effect on federally listed bats. Bat Strategy Project Review Form NOT required." This form is to assist in determining required conservation measures per TVA's ESA Section 7 programmatic consultation for routine actions and federally listed bats.*[1]

Project Name: Allen Fossil Plant (ALF) Ash Impoundment Closure Env. Impact Statement **Date:** 5/7/2019

Contact(s): Doug White, Env; Ashley Farless, Env **CEC#:** **Project ID:** 33714

Project Location (City, County, State): Allen Fossil Plant, Memphis, Shelby County, Tennessee

Project Description:

TVA is assessing the environmental impacts of the proposed closures by removal of the East Ash Pond Complex, the West Ash Pond and the Metal Cleaning Pond at ALF, or leaving the plant as is and taking no actions. TVA is investigating disposal of CCR at an offsite landfill or at a beneficial re-use facility and an offsite landfill. No potentially suitable summer bat roosting trees would be removed.

SECTION 1: PROJECT INFORMATION - ACTION AND ACTIVITIES

STEP 1) Select TVA Action. If none are applicable, contact environmental staff or Terrestrial Zoologist to discuss whether form (i.e., application of Bat Programmatic Consultation) is appropriate for project:

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

STEP 2) Select all activities from Tables 1, 2, and 3 below that are included in the proposed project.

TABLE 1. Activities with no effect to bats. Conservation measures & completion of bat strategy project review form NOT required.

☐ 1. Loans and/or grant awards	☐ 8. Sale of TVA property	☐ 19. Site-specific enhancements in streams and reservoirs for aquatic animals
☐ 2. Purchase of property	☐ 9. Lease of TVA property	☐ 20. Nesting platforms
☐ 3. Purchase of equipment for industrial facilities	☐ 10. Deed modification associated with TVA rights or TVA property	☐ 41. Minor water-based structures (this does not include boat docks, boat slips or piers)
☐ 4. Environmental education	☐ 11. Abandonment of TVA retained rights	☐ 42. Internal renovation or internal expansion of an existing facility
☐ 5. Transfer of ROW easement and/or ROW equipment	☐ 12. Sufferance agreement	☐ 43. Replacement or removal of TL poles
☐ 6. Property and/or equipment transfer	■ 13. Engineering or environmental planning or studies	☐ 44. Conductor and overhead ground wire installation and replacement
☐ 7. Easement on TVA property	☐ 14. Harbor limits	☐ 49. Non-navigable houseboats

TABLE 2. Activities not likely to adversely affect bats with implementation of conservation measures. Conservation measures and completion of bat strategy project review form REQUIRED; review of bat records in proximity to project NOT required.

■ 18. Erosion control, minor	☐ 57. Water intake - non-industrial	☐ 79. Swimming pools/associated equipment
☐ 24. Tree planting	☐ 58. Wastewater outfalls	☐ 81. Water intakes – industrial
☐ 30. Dredging and excavation; recessed harbor areas	☐ 59. Marine fueling facilities	■ 84. On-site/off-site public utility relocation or construction or extension
☐ 39. Berm development	☐ 60. Commercial water-use facilities (e.g., marinas)	☐ 85. Playground equipment - land-based
☐ 40. Closed loop heat exchangers (heat pumps)	☐ 61. Septic fields	☐ 87. Aboveground storage tanks
☐ 45. Stream monitoring equipment - placement and use	☐ 66. Private, residential docks, piers, boathouses	☐ 88. Underground storage tanks
☐ 46. Floating boat slips within approved harbor limits	☐ 67. Siting of temporary office trailers	■ 90. Pond closure
■ 48. Laydown areas	☐ 68. Financing for speculative building construction	☐ 93. Standard License
☐ 50. Minor land based structures	☐ 72. Ferry landings/service operations	☐ 94. Special Use License
☐ 51. Signage installation	☐ 74. Recreational vehicle campsites	☐ 95. Recreation License
☐ 53. Mooring buoys or posts	☐ 75. Utility lines/light poles	☐ 96. Land Use Permit
☐ 56. Culverts	☐ 76. Concrete sidewalks	

Table 3: Activities that may adversely affect federally listed bats. Conservation measures AND completion of bat strategy project review form REQUIRED; review of bat records in proximity of project REQUIRED by OSAR/Heritage eMap reviewer or Terrestrial Zoologist.

☐ 15. Windshield and ground surveys for archaeological resources	■ 34. Mechanical vegetation removal, includes trees or tree branches > 3 inches in diameter	☐ 69. Renovation of existing structures
☐ 16. Drilling	■ 35. Stabilization (major erosion control)	☐ 70. Lock maintenance/ construction
■ 17. Mechanical vegetation removal, does not include trees or branches > 3" in diameter (in Table 3 due to potential for woody burn piles)	■ 36. Grading	☐ 71. Concrete dam modification
☐ 21. Herbicide use	■ 37. Installation of soil improvements	☐ 73. Boat launching ramps
■ 22. Grubbing	■ 38. Drain installations for ponds	☐ 77. Construction or expansion of land-based buildings
☐ 23. Prescribed burns	☐ 47. Conduit installation	☐ 78. Wastewater treatment plants
☐ 25. Maintenance, improvement or construction of pedestrian or vehicular access corridors	☐ 52. Floating buildings	☐ 80. Barge fleeting areas
☐ 26. Maintenance/construction of access control measures	■ 54. Maintenance of water control structures (dewatering units, spillways, levees)	☐ 82. Construction of dam/weirs/ levees
■ 27. Restoration of sites following human use and abuse	☐ 55. Solar panels	☐ 83. Submarine pipeline, directional boring operations
☐ 28. Removal of debris (e.g., dump sites, hazardous material, unauthorized structures)	☐ 62. Blasting	☐ 86. Landfill construction
■ 29. Acquisition and use of fill/borrow material	☐ 63. Foundation installation for transmission support	☐ 89. Structure demolition
☐ 31. Stream/wetland crossings	☐ 64. Installation of steel structure, overhead bus, equipment, etc.	☐ 91. Bridge replacement
☐ 32. Clean-up following storm damage	☐ 65. Pole and/or tower installation and/or extension	☐ 92. Return of archaeological remains to former burial sites
☐ 33. Removal of hazardous trees/tree branches		

STEP 3) Project includes one or more activities in Table 3? ◉ **YES (Go to Step 4)** ○ **NO (Go to Step 13)**

STEP 4) Answer questions a through e below (applies to projects with activities from Table 3 ONLY)

a) Will project project involve continuous noise (i.e., ≥ 24 hrs) that is greater than 75 decibels measured on the A scale (e.g., loud machinery)?

- (●) **NO** (NV2 does not apply)
- ( ) **YES** (NV2 applies, subject to records review)

b) Will project involve entry into/survey of cave, bridge, other structure (potential bat roost)?

- (●) **NO** (HP1/HP2 do not apply)
- ( ) **YES** (HP1/HP2 applies, subject to review of bat records)

c) If conducting **prescribed burning** (**activity 23)**, estimated acreage**:** [ ] and timeframe(s) below; [■] **N/A**

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

d) Will the project involve vegetation piling/burning?

- ( ) **NO** (SSPC4/ SHF7/SHF8 do not apply)
- (●) **YES** (SSPC4/SHF7/SHF8 applies, subject to review of bat records)

e) If **tree removal (activity 33 or 34)**, estimated amount: [50] ( ) **ac** (●) **trees** ( ) **N/A**

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

If warranted, does project have flexibility for bat surveys (May 15-Aug 15): ( ) **MAYBE** (●) **YES** ( ) **NO**

SECTION 2: REVIEW OF BAT RECORDS (applies to projects with activities from Table 3 ONLY)

STEP 5) Review of bat/cave records conducted by Heritage/OSAR reviewer?

(●) **YES** ( ) **NO** (If NO and includes Table 3 activities, submit project / relevant information [e.g., maps] for review by Terrestrial Zoologist.)

Info below completed by:

☐ **Heritage Reviewer**	(name)		Date	
☐ **OSAR Reviewer**	(name)		Date	
■ **Terrestrial Zoologist**	(name)	Elizabeth Hamrick	Date	Jun 4, 2019

Gray bat records: ☒ None ☐ Within 3 miles* ☐ Within a cave* ☐ Within the County

Indiana bat records: ☒ None ☐ Within 10 miles* ☐ Within a cave* ☐ Capture/roost tree* ☐ Within the County

Northern long-eared bat records: ☒ None ☐ Within 5 miles* ☐ Within a cave* ☐ Capture/roost tree* ☐ Within the County

Virginia big-eared bat records: ☒ None ☐ Within 10 miles* ☐ Within the County

Caves: ☒ None within 3 mi ☐ Within 3 miles but > 0.5 mi ☐ Within 0.5 mi but > 0.25 mi* ☐ Within 0.25 mi but > 200 feet* ☐ Within 200 feet*

Bat Habitat Inspection Sheet completed? ( ) **NO** (●) **YES**

Amount of SUITABLE habitat to be removed/burned (may differ from STEP 4e): [ ] **(**( ) **ac** ( ) **trees)*** (●) **N/A**

STEP 6) If reviewed by Heritage/OSAR reviewer, does records review trigger need for additional review by Terrestrial Zoologist (noted by * in Step 5)?

○ **NO (Go to Step 13)** ◉ **YES (Submit for Terrestrial Zoology review)** ○ **YES, however, based on Heritage Data review guidelines (or discussion with Terrestrial Zoology), project does not need to be submitted to Terrestrial Zoology for review. (Go to Step 13)**

Notes (additional information from field review or explanation of no impact):

Suitable trees north of the E Ash pond would be avoided.

STEPS 7-12 To be Completed by Terrestrial Zoologist (if warranted):

STEP 7) Project will involve:

☐ Removal of suitable trees within 0.5 mile of P1-P2 Indiana bat hibernacula or 0.25 mile of P3-P4 Indiana bat hibernacula or any NLEB hibernacula.

☐ Removal of suitable trees within 10 miles of documented Indiana bat (or within 5 miles of NLEB) hibernacula.

☐ Removal of suitable trees > 10 miles from documented Indiana bat (> 5 miles from NLEB) hibernacula.

☐ Removal of trees within 150 feet of a documented Indiana bat or northern long-eared bat maternity roost tree.

☐ Removal of suitable trees within 2.5 miles of Indiana bat roost trees or within 5 miles of Indiana bat capture sites.

☐ Removal of suitable trees > 2.5 miles from Indiana bat roost trees or > 5 miles from Indiana bat capture sites.

☐ Removal of documented Indiana bat or NLEB roost tree, if still suitable.

☒ N/A

STEP 8) Presence/absence surveys were/will be conducted: ○ **YES** ◉ **NO** ○ **TBD**

STEP 9) Presence/absence survey results, on _____ ○ **NEGATIVE** ○ **POSITIVE** ◉ **N/A**

STEP 10) Project ○ **WILL** ◉ **WILL NOT** require use of Incidental Take in the amount of _____ ○ **acres or** ○ **trees** proposed to be used during the ○ **WINTER** ○ **VOLANT SEASON** ○ **NON-VOLANT SEASON** ◉ **N/A**

STEP 11) Available Incidental Take (prior to accounting for this project) as of _____

TVA Action	Total 20-year	Winter	Volant Season	Non-Volant Season
5 Operate, Maintain, Retire, Expand, Construct Power Plants				

STEP 12) Amount contributed to TVA's Bat Conservation Fund upon activity completion: $ _____ OR ◉ **N/A**

SECTION 3: REQUIRED CONSERVATION MEASURES

STEP 13a) If answer to STEP 3 is NO, (*Project Lead* or *OSAR/Heritage Reviewer*) is to review Conservation Measures in Table 4 and ensure these selected Conservation Measures are relevant to project. If not manually override and uncheck. **Go to Step 14**

STEP 13b) If answer to STEP 3 is YES, and answer to STEP 6 is NO, *OSAR/Heritage Reviewer* is to review Conservation Measures in Table 4 that and ensure these selected Conservation Measures are relevant to project. If not manually override and uncheck. **Go to Step 14**

STEP 13c) If answer to STEP 3 is YES, and answer to STEP 6 is YES, *Terrestrial Zoologist* is to review Conservation Measures in Table 4 and ensure these selected Conservation Measures are relevant to project. If not manually override and uncheck. **Go to Step 15**

Table 4. TVA's ESA Section 7 Programmatic Bat Consultation Required Conservation Measures

The Conservation Measures in Table 4 are automatically selected based on your choices in Tables 2 and 3 but can be manually overridden, if necessary. To Manually override, press the button and enter your name.

Manual Override

Name: Elizabeth Hamrick

Check if applies to Project	Activities Subject to Conservation Measure	Conservation Measure Description
■	15, 16, 17, 18, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 45, 47, 48, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 90, 91, 92, 93, 94, 95, 96	**NV1** - Noise will be short-term, transient, and not significantly different from urban interface or natural events (i.e., thunderstorms) that bats are frequently exposed to when present on the landscape.
■	16, 17, 18, 21, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 48, 50, 51, 52, 53, 54, 55, 58, 59, 60, 61, 62, 63, 64, 65, 67, 70, 71, 73, 76, 77, 78, 80, 81, 82, 83, 86, 87, 88, 89, 90	**SSPC2** - Operations involving chemical/fuel storage or resupply and vehicle servicing will be handled outside of riparian zones (streamside management zones) in a manner to prevent these items from reaching a watercourse. Earthen berms or other effective means are installed to protect stream channel from direct surface runoff. Servicing will be done with care to avoid leakage, spillage, and subsequent stream, wetland, or ground water contamination. Oil waste, filters, other litter will be collected and disposed of properly. Equipment servicing and chemical/fuel storage will be limited to locations greater than 300-ft from sinkholes, fissures, or areas draining into known sinkholes, fissures, or other karst features.

Check if applies to Project	Activities Subject to Conservation Measure	Conservation Measure Description
☐	16, 17, 18, 21, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 48, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 61, 62, 63, 64, 65, 67, 69, 70, 71, 73, 76, 77, 80, 81, 82, 83, 84, 86, 87, 88, 89, 90, 91	**SSPC3** (**Power Plants only**) - Power Plant actions and activities will continue to implement standard environmental practices. These include: o Best Management Practices (BMPs) in accordance with regulations: • Ensure proper disposal of waste, ex: used rags, used oil, empty containers, general trash, dependent on plant policy • Maintain every site with well-equipped spill response kits, included in some heavy equipment • Conduct Quarterly Internal Environmental Field Assessments at each sight • Every project must have an approved work package that contains an environmental checklist that is approved by sight Environmental Health & Safety consultant. • When refueling, vehicle is positioned as close to pump as possible to prevent drips, and overfilling of tank. Hose and nozzle are held in a vertical position to prevent spillage o Construction Site Protection Methods • Sediment basin for runoff - used to trap sediments and temporarily detain runoff on larger construction sites • Storm drain protection device • Check dam to help slow down silt flow • Silt fencing to reduce sediment movement o Storm Water Pollution Prevention (SWPP) Pollution Control Strategies • Minimize storm water contact with disturbed soils at construction site • Protect disturbed soil areas from erosion • Minimize sediment in storm water before discharge • Prevent storm water contact with other pollutants • Construction sites also may be required to have a storm water permit, depending on size of land disturbance (>1ac) o Every site has a Spill Prevention and Control Countermeasures (SPCC) Plan and requires training. Several hundred pieces of equipment often managed at the same time on power generation properties. Goal is to • Minimize fuel and chemical use Ensure proper disposal of waste, ex: used rags, used oil, empty containers, general trash, dependent on plant policy • Maintain every site with well-equipped spill response kits, included in some heavy equipment • Conduct Quarterly Internal Environmental Field Assessments at each sight • Every project must have an approved work package that contains an environmental checklist that is approved by sight Environmental Health & Safety consultant. • When refueling, vehicle is positioned as close to pump as possible to prevent drips, and overfilling of tank. Hose and nozzle are held in a vertical position to prevent spillage o Construction Site Protection Methods • Sediment basin for runoff - used to trap sediments and temporarily detain runoff on larger construction sites • Storm drain protection device • Check dam to help slow down silt flow • Silt fencing to reduce sediment movement o Storm Water Pollution Prevention (SWPP) Pollution Control Strategies • Minimize storm water contact with disturbed soils at construction site • Protect disturbed soil areas from erosion • Minimize sediment in storm water before discharge • Prevent storm water contact with other pollutants • Construction sites also may be required to have a storm water permit, depending on size of land disturbance (>1ac) o Every site has a Spill Prevention and Control Countermeasures (SPCC) Plan and requires training. Several hundred pieces of equipment often managed at the same time on power generation properties. Goal is to minimize fuel and chemical use
☐	16, 26, 36, 37, 38, 39, 48, 50, 52, 59, 60, 62, 66, 67, 69, 72, 75, 77, 78, 79, 86	**L1** - Direct temporary lighting away from suitable habitat during the active season.
☐	16, 26, 36, 37, 38, 39, 48, 50, 52, 59, 60, 62, 66, 67, 69, 72, 75, 77, 78, 79, 86	**L2** - Evaluate the use of outdoor lighting during the active season and seek to minimize light pollution when installing new or replacing existing permanent lights by angling lights downward or via other light minimization measures (e.g., dimming, directed lighting, motion-sensitive lighting).

[1]Bats addressed in consultation (02/2018), which includes gray bat (listed in 1976), Indiana bat (listed in 1967), northern long-eared bat (listed in 2015), and Virginia big-eared bat (listed in 1979).

Hide All Unchecked Conservation Measures

- (•) HIDE
- ( ) UNHIDE

STEP 14) Save completed form in project environmental documentation (e.g., CEC, Appendix to EA) AND send a copy of form to **batstrategy@tva.gov.** Submission of this form indicates that Project Lead/Applicant:

Karen Boulware, Wood (name) is (or will be made) aware of the requirements below.

- Implementation of conservation measures identified in Table 4 is required to comply with TVA's Endangered Species Act programmatic bat consultation.
- TVA may conduct post-project monitoring to determine if conservation measures were effective in minimizing or avoiding impacts to federally listed bats.

STEP 15) ***For Use by Terrestrial Zoologist if Project and Form are Submitted for Review***

☒ Terrestrial Zoologist acknowledges that Project Lead/Contact (name) Doug White has been informed on Jun 4, 2019 (date) of any relevant conservation measures and/or provided a copy of this form.

☐ For projects that require use of Take and/or contribution to TVA's Bat Conservation Fund, Terrestrial Zoologist acknowledges that Project Lead/Contact has been informed that project will result in use of Incidental Take ○ ac ○ trees and that use of Take will require contribution to TVA's Conservation Fund upon completion of activity (amount entered should be $0 if cleared in winter).

Finalize and Print to Noneditable PDF. Changes to form cannot be made after this button is selected.

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Appendix C – Coordination

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

July 7, 2017

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

RE: TVA / Tennessee Valley Authority, Allen Fossil Plant, East Ash Impoundment Closure, Shelby County, TN

Dear Mr. Jones:

In response to your request, 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 (Federal Register, December 12, 2000, 77698-77739).

After considering the documentation submitted, we concur that there are no National Register of Historic Places listed or eligible properties affected by this undertaking. We have made this determination because either: no National Register listed or eligible Historic Properties exist within the undertaking's area of potential effects, the specific location, size, scope and/or nature of the undertaking and its area of potential effects precluded affects to Historic Properties, the undertaking will not alter any characteristics of an identified eligible or listed Historic Property that qualify the property for listing in the National Register, or it will not alter an eligible Historic Property's location, setting or use. We have no objections to your proceeding with your undertaking.

If your agency proposes any modifications in current project plans or discovers any archaeological remains during the ground disturbance or construction phase, 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. You may direct questions or comments to Jennifer M. Barnett (615) 687-4780. This office appreciates your cooperation.

Sincerely,

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

March 7, 2019

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

RE: TVA / Tennessee Valley Authority, Allen Fossil Plant, East Ash Impoundment and Chemical Pond Closures, Shelby County, TN

Dear Mr. Jones:

In response to your request, 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 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).

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If your agency proposes any modifications in current project plans or discovers any archaeological remains during the ground disturbance or construction phase, 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. If you are applying for federal funds, license or permit, you should submit this letter as evidence of consultation under Section 106 to the appropriate federal agency, which, in turn, should contact us as required by 36 CFR 800. If you represent a federal agency, you should submit a formal determination of eligibility and effect to us for comment. You may direct questions or comments to Casey Lee (615) 253-3163.

Sincerely,

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

EPM/cjl