Document Type: EIS-Administrative Record
Index Field: **Environmental Impact Statement**
Project Name: **Ash Impoundment Closure EIS**
Project Number: 2015-31

FINAL
ASH IMPOUNDMENT CLOSURE PROGRAMMATIC EIS

PART II – SITE-SPECIFIC NEPA REVIEW: ALLEN FOSSIL PLANT

Prepared by:
TENNESSEE VALLEY AUTHORITY
Chattanooga, TN

June 2016

Ashley R. Farless, PE, AICP
NEPA Compliance
Tennessee Valley Authority
1101 Market Street
Chattanooga, TN 37402
Phone: 423-751-2361
Fax: 423.751.7011

This page intentionally left blank

Table of Contents

List of Appendices

List of Tables

List of Figures

Symbols, Acronyms, and Abbreviations

>	Greater Than
≥	Greater Than or Equal to
AADT	Average Annual Daily Traffic
ALF	Allen Fossil Plant
BMP	Best Management Practices
CCR	Coal Combustion Residual
COC	Constituents of Concern
CSX	CSX Transportation, Inc.
CC	Combined Cycle
dBA	A-Weighted Decibels
EJ	Environmental Justice
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
ESA	Endangered Species Act of 1973
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
HUD	U.S. Department of Housing and Urban Development
Ldn	Day-Night Sound Level
MGD	Million Gallons Per Day
MLGW	Memphis Light, Gas, and Water
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
RIF	Relative Impact Framework
TDEC	Tennessee Department of Environment and Conservation
TVA	Tennessee Valley Authority
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WWTP	Waste Water Treatment Plant
yd^3	Cubic Yards

This page intentionally left blank

CHAPTER 1 – PURPOSE AND NEED FOR ACTION

1.1 Introduction and Background

The Allen Fossil Plant (ALF) was constructed in the 1950s by the Memphis Light, Gas, and Water (MLGW) (Figure 1-1). Tennessee Valley Authority (TVA) purchased the plant and the underlying property in 1984. ALF's three coal-fired units are scheduled to be retired by June 2018. As part of this action, TVA plans to perform additional closure activities at the now-dry West Ash Impoundment.

Figure 1-2 identifies the West Ash Impoundment at ALF, and Table 1-1 summarizes its characteristics. Although this document refers to the area as an "impoundment," it no longer impounds water. The West Ash Impoundment was the original fly ash impoundment for ALF and received sluiced fly ash and boiler slag until 1978 (Dewberry 2013). In 1992-1993, approximately 173,000 cubic yards (yd^3) of ash were excavated and beneficially re-used as fill material in the U.S. Army Corps of Engineers (USACE) levee. Sluice lines from the East Ash Impoundment were then temporarily rerouted to the West Ash Impoundment while work was being done on the East Impoundment. Sluice lines were returned to the East Impoundment in October 1992, and the water in the West Ash Impoundment was pumped out (Dewberry 2013). The West Ash Impoundment intermittently received minimal amounts of coal combustion residuals (CCR) between 1992 and October 2015. All flow to the impoundment was rerouted by October 19, 2015. The West Ash Impoundment has not received any CCR since that time and does not impound water. For that reason, the area is already a "closed" impoundment as that term is described by the U.S. Environmental Protection Agency (EPA) in its new rule regulating the disposal CCR in landfills and impoundments. In particular, EPA states in the Preamble to the CCR Rule that "the final rule does not impose any requirements on any CCR surface impoundments that have in fact 'closed' before the rule's effective date—i.e., those that no longer contain water and can no longer impound liquids" (80 Federal Register 21343).

Although the West Ash Impoundment is not subject to the CCR Rule, TVA anticipates conducting additional closure activities at this site in accordance with TVA plan objectives. For this reason, the West Ash Impoundment is included in the closure analysis.

This site-specific National Environmental Policy Act (NEPA) review tiers off the programmatic level review provided in Part I.

View of West Ash Impoundment

1.2 Decision to be Made

TVA must decide how to continue to close the West Ash Impoundment at ALF. TVA's decision will consider factors such as potential environmental impacts, economic issues, availability of resources and TVA's long-term goals.

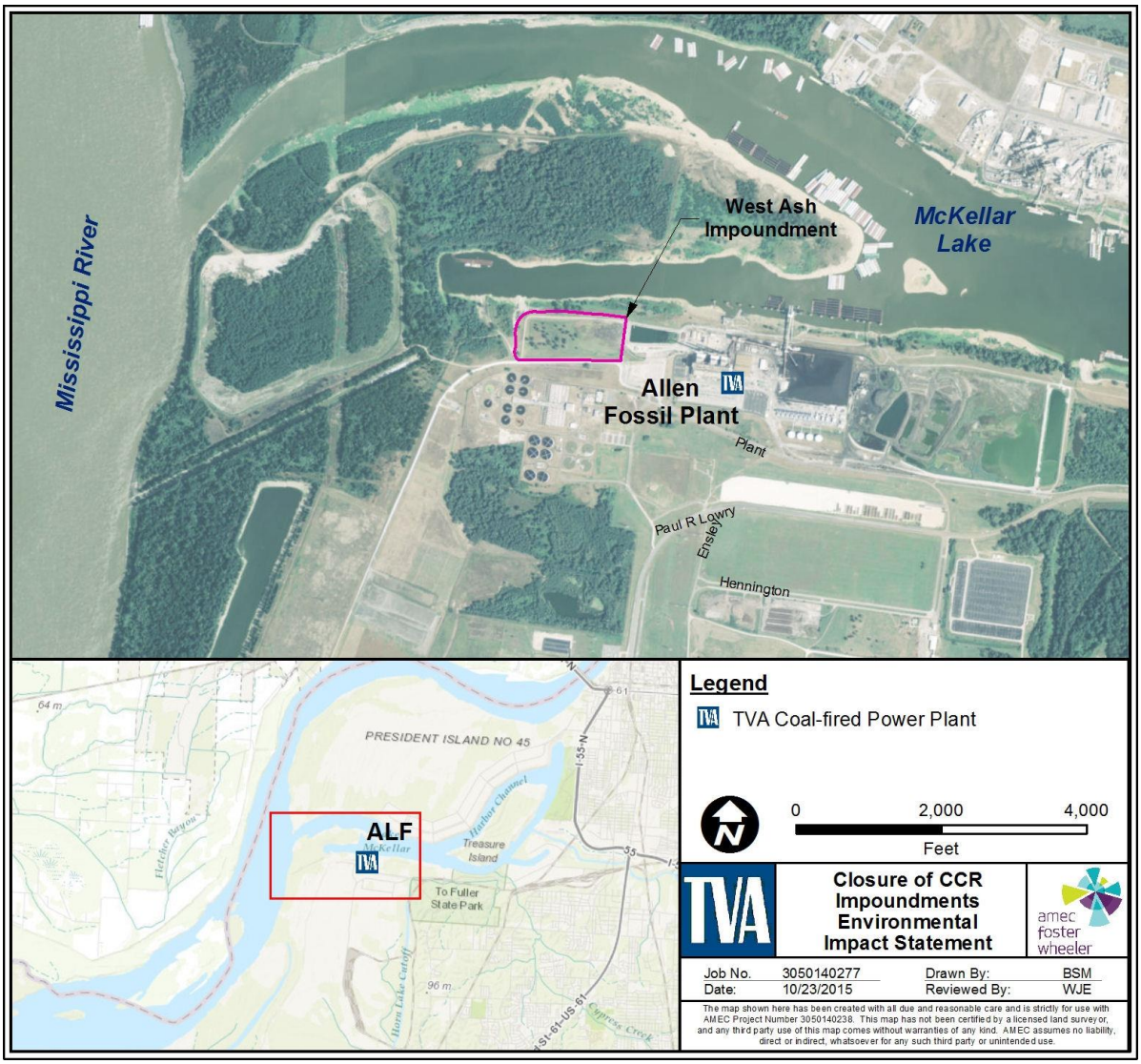


Figure 1-1. ALF Project Location

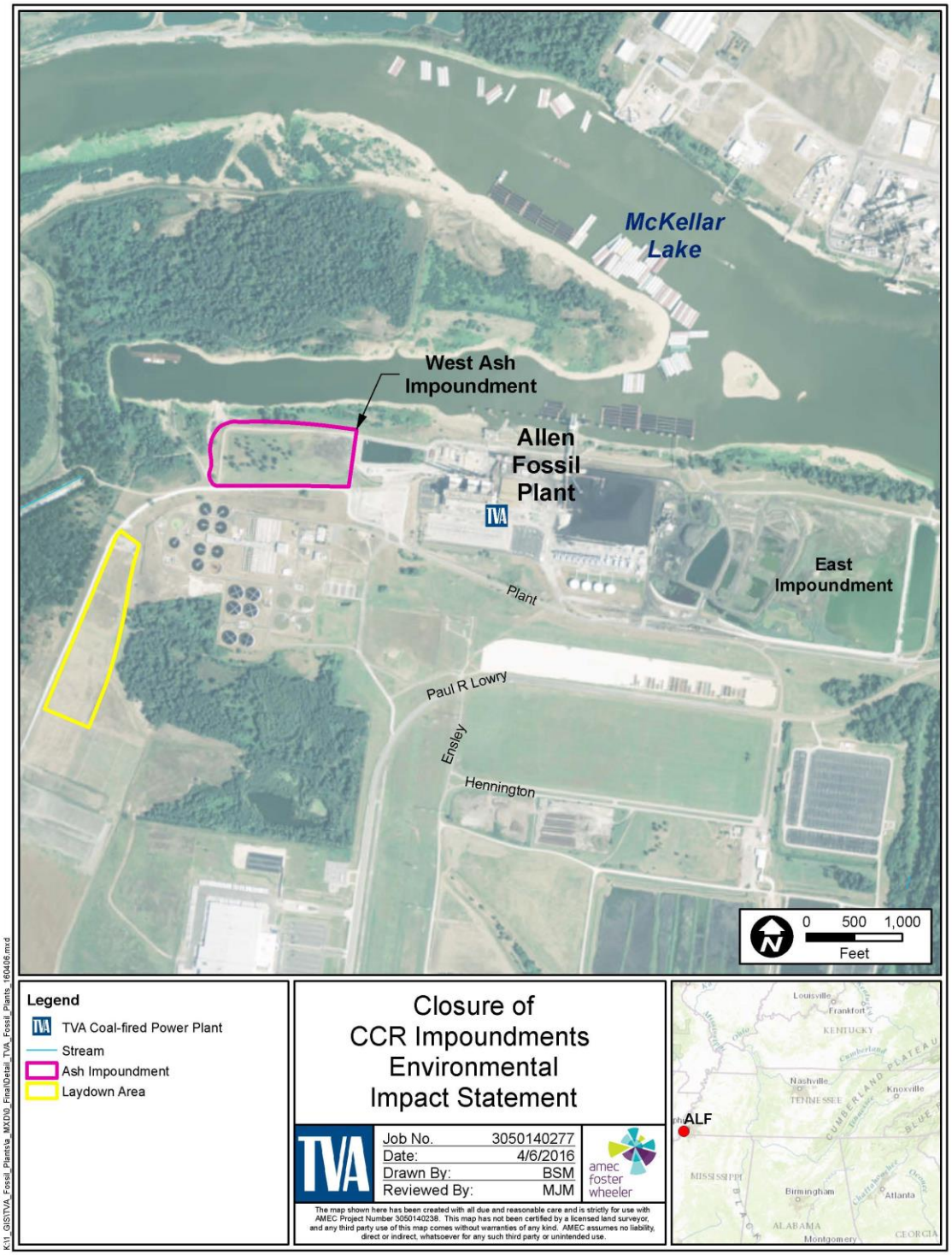


Figure 1-2. West Ash Impoundment Location and Utilization Areas

Table 1-1. Summary of West Ash Impoundment Characteristics

Attribute	Description
Location	Shelby County, TN
Impoundment Name	West Ash Impoundment
Impoundment Status	Closed
Size	22 ac
CCR Material	Fly Ash and Boiler Slag
CCR Volume	250,000 yd^3
Borrow Material Volume	15,000 yd^3
Temporary Laydown Areas	5 to 10 ac
Proposed Closure Completion Date	Within 5 years

1.3 Purpose and Need

The purpose of this site-specific action is to support the implementation of TVA's stated goal of eliminating all wet CCR storage at its coal plants by facilitating the continued closure of the West Ash Impoundment at ALF in a safe and effective manner.

1.4 Summary of Proposed Action

As previously stated, the West Ash Impoundment is considered closed and not subject to the CCR Rule. In addition, the National Pollutant Discharge Elimination System (NPDES) Permit which covers water discharges at ALF defines the West Ash Impoundment as inactive, but still part of the NPDES infrastructure. TVA proposes to conduct additional closure activities at the West Ash Impoundment at ALF. The proposed action is described in detail in Chapter 2.

The West Ash Impoundment is not considered a stability risk as it does not contain water (Dewberry 2013). No measures are needed to stabilize the West Ash Impoundment berms. Routine maintenance and inspection of berms would continue regardless of closure alternative selected.

CHAPTER 2 – ALTERNATIVES

This section tiers off the programmatic level alternatives narrative in Part I.

2.1 Existing West Ash Impoundment Operations

The NPDES Permit number TN0005355 (Tennessee Department of Environment and Conservation [TDEC] 2011) covers water discharges at ALF. Drainage from the ALF site discharges to McKellar Lake and the Mississippi River. Process wastewater discharges from the facility are permitted under NPDES permit and include outfalls that are sampled, monitored, and reported on monthly discharge monitoring reports. These include Outfall 001–East Ash Impoundment, Outfall 002–Inactive West Ash Impoundment, and Outfall 003–Condenser Cooling Water.

McKellar Lake is the source water body used to draw ALF's once-through cooling water. Plant area storm water and excess water from the East Ash Impoundment discharges to McKellar Lake, and non-contact cooling water is discharged into the Mississippi River through an approximately 4,400-ft long canal located west of the plant. At full operating capacity, cooling water flows through the condensers at a rate of 356 million gallons per day (MGD). No water associated with condenser cooling is discharged to the West Ash Impoundment.

Between 1992 and October 2015 the West Ash Impoundment intermittently received minor sources of CCR and some non-CCR inflow. Sources of non-CCR flows to the West Ash Impoundment were extremely limited and included powerhouse roof and yard drainage, car wash wastewater and area runoff, precipitator pad sump drainage, switchyard and transformer yard drainage and direct precipitation. These sources were rerouted prior to October 19, 2015, and rainwater is the only source of flow to the West Ash Impoundment. Two storm water outfalls were added at ALF to reroute and ensure no water is collected in the West Ash Impoundment, one is for the rerouted flows, and one is for the direct water falling in the West Ash Impoundment footprint.

2.2 Project Alternatives

TVA evaluated the three alternatives for closing ALF's West Ash Impoundment: Alternative A – No Action, Alternative B – Closure-in-Place, and Alternative C – Closure-by-Removal. Screening analysis to determine the reasonability of the "action" alternatives was undertaken by evaluating a range of key issues and factors related to the West Ash Impoundment at ALF and the feasibility of undertaking closure activities (Figure 2-1). Key factors that TVA considered included the following:

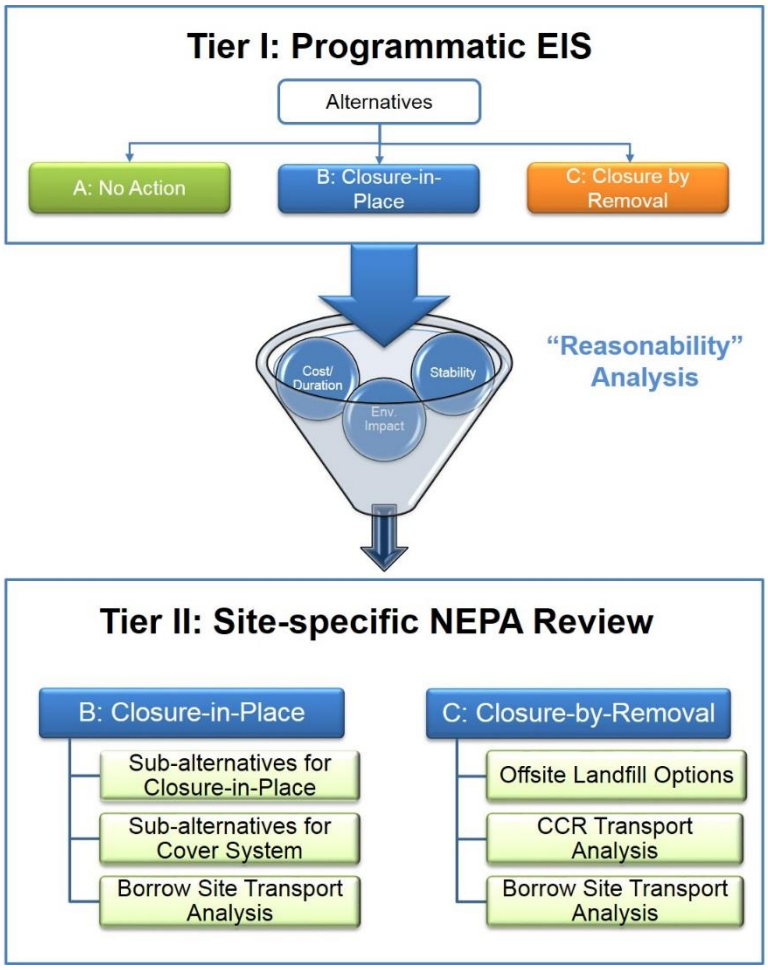


Figure 2-1. Reasonable Alternatives Analysis for ALF West Ash Impoundment

- *Volume of CCR materials*. The size of an ash impoundment and volume of CCR may affect closure activities and appropriateness of an alternative. The West Ash Impoundment at ALF is estimated to contain 250,000 yd^3 of CCR materials.

- *Schedule/Duration of Closure Activities*. Time necessary to complete closure activities at an ash impoundment may affect the reasonability of closure alternatives. TVA has determined that closure activities at the West Ash Impoundment would be completed within a reasonable construction period and has included this impoundment in this analysis as TVA believes that final closure of this facility within a reasonable construction schedule, rather than under a prolonged schedule, is preferable from an environmental standpoint.

- *Stability*. Stability of the CCR facilities were evaluated by Dewberry Consultants (2013). Safety ratings under static conditions were determined to be adequate for the West Ash Impoundment. TVA is currently evaluating the seismic stability of the West Ash Impoundment and will make appropriate modifications as needed to ensure that the berm stability is at a level that meets or exceeds industry acceptable factors of safety using conservative assumptions. The proposed closure grades of the facilities will be evaluated prior to construction and any needed improvements to the berms will be made as part of the closure system

construction. The West Ash Impoundment has not received CCR materials since 1992, and all additional sources of flow have been rerouted.

- *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 work force and the public. Worker safety is a particular concern as heavy equipment and difficult working conditions would occur for any closure activities. As discussed in Challenges of Closing Large Fly Ash Ponds, accidents, near misses and fatalities have been reported at impoundments during operations and closure activities (Seymour et al. 2013, Johnson 2014, Mitchell 2006). Equipment, such as bulldozers and trucks, can become bogged down, disabled and engulfed. For example, while removing fly ash from an impoundment in Kentucky, an excavator was operating approximately 200 ft from the edge of the impoundment when the exposed surface of the fly ash slid over an underlying soft, apparently saturated area. As a result, the fly ash and water engulfed the excavator resulting in the death of the operator.

  Closure-by-Removal also would require a substantially greater number of truck movements into and out of the site which would increase the risk of injuries and fatalities associated with truck crashes (see Part I, Chapter 2). As the number of truck movement miles increase, both for Alternatives B and C, the risk of traffic crashes, including personal injuries and fatalities, increases.

- *Mode and Duration of Transport Activities.* As described in Part I, Section 2.2, the activities related to transport of borrow (Alternative B) and CCR removal and transport (Alternative C) by truck or rail require the use of large numbers of vehicles and operators. For those sites with CCR volumes exceeding 600,000 yd^3, TVA determined that insufficient time is available to effectively remove the CCR materials by truck and achieve closure of inactive impoundments within a reasonable construction period. The West Ash Impoundment contains approximately 250,000 yd^3 of CCR. Given, the existing volume of CCR in the West Ash Impoundment, it is estimated that Closure-by-Removal by truck could be completed within a reasonable time frame.

  Transport of CCR materials by rail must consider the volume of CCR materials to be removed (cost-effectiveness and duration of removal operations), logistics related to supporting infrastructure (constructing and permitting loading and unloading facilities), the availability of rail service at receiving landfills and transport of suitable borrow material to the closure site. The duration of CCR removal by rail is generally expected to be similar to that of truck transport because rail loading operations are highly dependent on the rate at which CCR can be safely excavated, dried and moved to rail loading facilities. Given, the existing volume of CCR in the West Ash Impoundment, it is estimated that Closure-by-Removal by train could be completed within a reasonable time frame.

- *Potential Effects to Water Resources*. Potential human health risk was also considered by reviewing the results of groundwater monitoring and the incidence of surface water releases from the West Ash Impoundment to receiving waterbodies. No records of releases or issues of concern are known that represent a risk to off-site human health from CCR constituents associated with the existing impoundment.

- *Potential Effects to Wetlands*. Under the Clean Water Act, wetlands are considered 'special aquatic sites' deserving of special protection because of their ecologic significance. Wetlands are important, fragile ecosystems that must be protected, and EPA has long identified wetland protection as a high priority. Initial screening analysis by TVA determined that for both Alternatives B and C, proposed actions would not cause or contribute to significant degradation of wetlands; and that appropriate measures could be taken to avoid and minimize impacts to wetlands and ensure no net loss of wetlands.

- *Risk to Adjacent Environmental Resources*. Risk of potential release and degradation of sensitive environmental resources (groundwater, surface water, ecological receptors, and factors related to the human environment) with a defined nexus to the CCR impoundment is an important consideration for alternative development. Initial screening analysis by TVA determined that for both Alternatives B and C, proposed actions 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.

- *Excessive Cost.* Excessive closure costs may affect the reasonableness of an alternative.

  Other factors affecting cost-effectiveness of transport of CCR, and not related to engineering and infrastructure, include availability of materials for construction, availability of labor, availability of permitted landfills, fuel costs, and other economic factors.

2.2.1 Alternative Eliminated from Further Consideration

2.2.1.1 No Action Alternative

The No Action Alternative was fully evaluated in Part I and was determined to not meet the purpose and need of achieving the TVA goal of closing ash impoundments. Therefore, this alternative is not included in the site-specific analysis.

2.2.2 Reasonable Alternatives Retained for Further Analysis

As illustrated in Figure 2-1, two alternatives have been evaluated by TVA and are considered reasonable alternatives subject to site-specific evaluation.

2.2.2.1 Alternative B – Closure-in-Place

TVA has identified a closure cover system for ALF that is designed to have a permeability performance standard of 1 x 10^{-7} – 100 times lower (better) than that prescribed by EPA in the Final Rule.

Construction activities associated with the closure of the West Ash Impoundment will entail direct disturbance of the ash impoundment and disturbance of supporting laydown areas (see Figure 1-2). TVA anticipates temporarily using approximately 5 to 10 ac of the laydown area for vehicle and equipment parking, materials storage, and construction administration. Under this alternative, approximately 15,000 yd^3 of borrow material would be hauled using tandem dump trucks from one of two identified sites (Figure 2-2).

Conceptual designs for the in-place closure of the West Ash Impoundment are provided in Appendix A. Activities associated with this action would include the following:

1. No dewatering activities as there is no ponded water.
2. Breach the berm on northern and western side of impoundment to improve site drainage.
3. Maintain storm water routing so as to prevent conveyance to the West Ash Impoundment.
4. Decommission and remove existing NPDES outfall.
5. Grade and reconfigure CCR (Category C) to consolidate CCR, reduce footprint, and promote site drainage.
6. Acquire and transport borrow material to help grade and cover site.
7. Install geosynthetic liner cover system (Sub-alternative B-2).
8. Install protective soil cover and establish vegetation.
9. Install and operate groundwater monitoring system per state requirements.
10. Complete and submit closure documentation.

Because the West Ash Impoundment was not considered to have a stability risk, no measures to improve stability are anticipated during the closure process (Dewberry Consultants 2013). The West Ash Impoundment is not subject to CCR Rule location requirements.

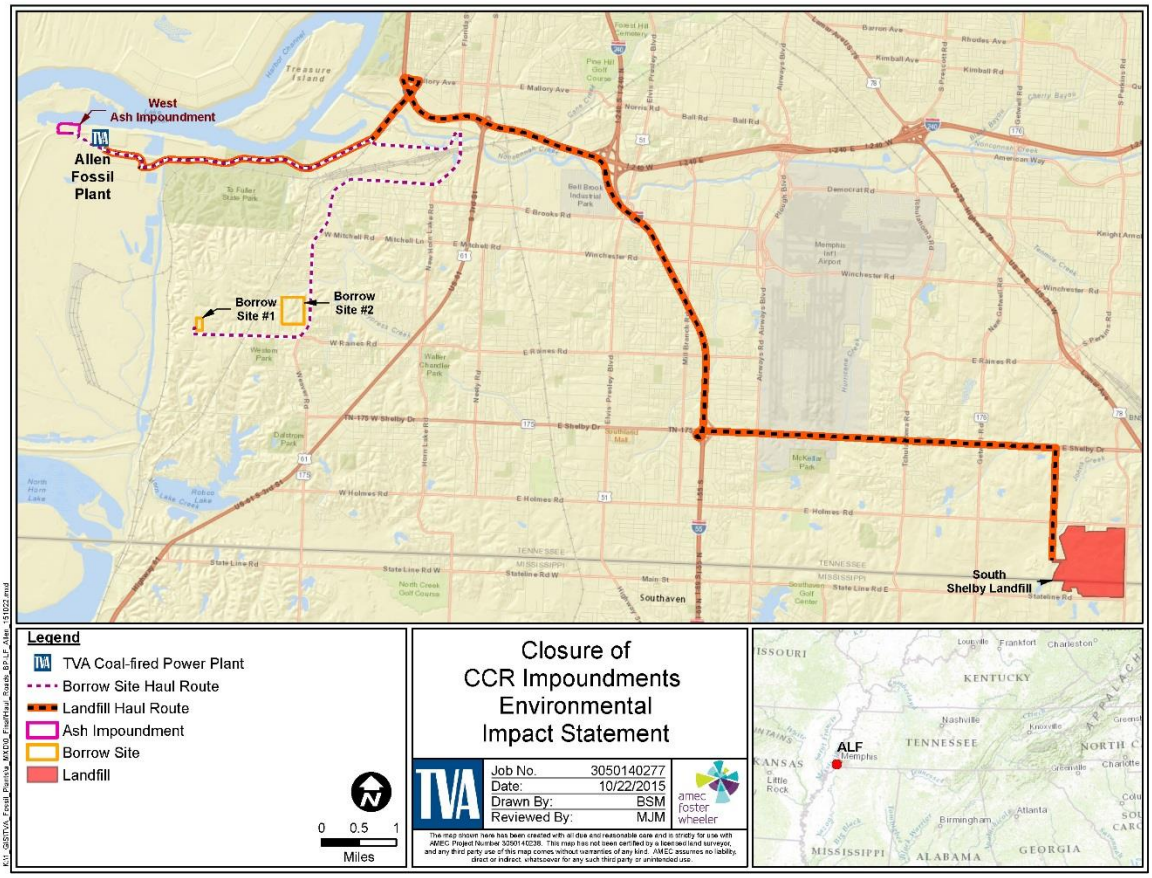


Figure 2-2. Proposed Borrow Site Locations and Haul Routes

TVA can complete Closure-in-Place of the West Ash Impoundment within a reasonable time frame (i.e. within 5 years). However, considering the expected scope and sequencing of the project, closure may be completed within approximately 1.7 years. Alternative B is estimated to cost $3.5 million. Cost and duration information is summarized in Table 2-1.

This closure alternative is evaluated in the Environmental Consequences section as it is an alternative that could meet the purpose and need of the project and could be accomplished within a reasonable construction schedule.

2.2.2.2 Alternative C – Closure-by-Removal

Alternative C – Closure-by-Removal activities at West Ash Impoundment would include the following:

1. No dewatering activities as there is no ponded water.
2. Breach the berm on northern and western side of impoundment to improve site drainage.
3. Maintain storm water routing so as to prevent conveyance to the West Ash Impoundment.
4. Decommission and remove existing NPDES outfall.
5. Remove CCR and transport to a permitted landfill.
6. Acquire and transport borrow material to help grade and cover site.
7. Fill, grade, and establish vegetation.
8. Complete and submit closure documentation.

The South Shelby Landfill is the nearest Resource Conservation and Recovery Act Subtitle D landfill to ALF (see Figure 2-2). While CCR removed from ALF could be transported greater distances to other landfills, the South Shelby landfill was used for this analysis.

Alternative C is estimated to cost $20 million to excavate and transport the CCR from the West Ash Impoundment and grade/cover the site. Removal within the 5 year closure period would result in 25,000 truckloads of CCR to a Subtitle D landfill. It is anticipated that up-front permitting and planning will take six months and post-closure site restoration and permit close-out will take six months. TVA expects that the rate of removal would result in the transport of an average of up to 100 truckloads of CCR per day (Figure 2-3). This would equate to a daily traffic count of 200 trucks passing by a given location each work day (22 per hour).

TVA can complete closure-through-removal of the West Ash Impoundment within a reasonable time frame (i.e., within 5 years). However, considering the expected scope and sequencing of the project, closure may be completed within approximately 2.7 years. Alternative C is estimated to cost $20 million.

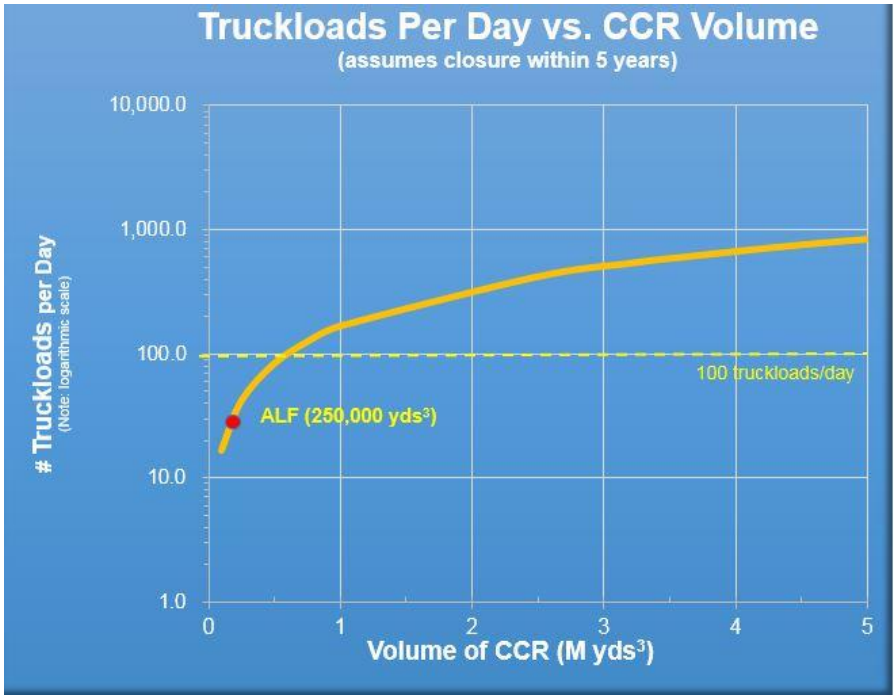


Figure 2-3. Number of Truckloads vs. CCR Removal Volume

Removal of CCR by rail was also considered by TVA for Closure-by-Removal of the West Ash Impoundment. In Part I, Chapter 2, TVA identified factors to determine whether transport of CCR by rail would be reasonable. Those factors include volume of material; distance from the impoundment to a permitted landfill; availability of the infrastructure to manage the transfer of material; cost effectiveness; and schedule. Applying these factors to the removal of CCR from the West Ash Impoundment at ALF, transport by rail is unreasonable due to the cost (Table 2-1). Rail transport would require the installation of loading infrastructure, and a rail transportation service in the form of a rail carrier. Additional rail infrastructure may need to be constructed at or very near a Subtitle D landfill. The components of a rail unloading infrastructure may include: clamshell buckets to move the CCR off the train to a stockpile area prior to being placed on trucks and conveyors or loaders to load the CCR onto trucks; and infrastructure to support trucking to the landfill site. The necessary environmental and construction permits to construct these facilities could easily take 18 to 24 months to acquire. Rail cars may need to be lined to prevent spills or releases as was the case for the removal of CCR at KIF. Given the relatively low volume of CCR to be removed from the West Impoundment (250,000 yd^3), the environmental impacts associated with development and permitting of the required loading and unloading infrastructure, and the excessive cost, use of rail to transport CCR from this site would not be feasible.

Therefore, the off-site transport of CCR by trucks will be evaluated under this alternative in the Environmental Consequences sections as it is an alternative that could meet the purpose and need of the project and be accomplished within a reasonable construction schedule.

Table 2-1. Cost and Duration for Closure of the West Ash Impoundment at ALF

Closure-in-Place		Closure-by-Removal (Truck)			Closure-by-Removal (Rail)		
Cost (millions)	Duration (years)	Cost (millions)	Increase in Cost from Closure-in-Place (percent)	Duration (years)	Cost (millions)	Increase in Cost from Closure-in-Place (percent)	Duration (years)
$3.5	1.7	$20	457%	2.7	$23	557%	2.7

2.3 EPRI Relative Impact Framework

As described in Part I, Section 2.3, the Electric Power Research Institute (EPRI) has developed a comprehensive analytical tool, the "Relative Impact Framework" (RIF) to assess and compare the potential health and environmental impacts of the two CCR impoundment closure alternatives, Closure-in-Place and Closure-by-Removal (EPRI, 2016c). The RIF provides a systematic approach to quantify potential relative impacts to environmental media associated with each closure scenario, including constituents in groundwater, surface water, and ambient air. In addition to environmental media, the RIF also provides an approach to quantify potential relative impacts to safety of workers and nearby residents from construction activities, including the transportation of materials to and from the site, in addition to the potential relative impacts to the sustainability of natural resources (e.g., energy, water and materials) associated with each closure alternative.

Part I provides an independent assessment of the health and environmental impacts for each impoundment closure alternative, which the EPRI analysis substantiates. At the programmatic level (Part I), TVA concluded that in most situations, Closure-in-Place likely will be more environmentally beneficial and less costly than Closure-by-Removal, especially when the amount of borrow and CCR material that must be moved to and from a site is substantial.

2.4 Comparison of Alternatives

The environmental impacts of Alternative B and Alternative C were analyzed in detail in this section and are summarized in Table 2-2. These summaries are derived from the information and analyses provided in the Affected Environment and Environmental Consequences sections of each resource in Chapter 3.

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

Issue Area	Alternative B – Closure-in-Place	Alternative C – Closure-by-Removal
Closure Cost	$3.5 million	$20 million
Air Quality	Temporary minor impacts during construction from fugitive dust and emissions from equipment and vehicles	Temporary minor impacts during construction from fugitive dust and emissions from equipment and vehicles. However, given the increased number of truck trips needed for closure activities, this impact would be greater than the impact identified for Alternative B
Climate Change	Construction and trucking operations of borrow material contributes to emissions of Green House Gas.	Construction and trucking operations of CCR removal and borrow material contributes to emissions of Green House Gas.
Land Use	No impact as no change in industrial land use.	No impact as no change in industrial land use.
Prime Farmland	No impact	No impact
Geology and Seismology	Stable under static conditions. Seismic stability under evaluation and mitigable.	No impacts or risks of failure
Groundwater	Reduction of hydraulic input reduces risk of migration of constituents to groundwater.	Reduces risk to groundwater by removing CCR from the impoundment.
Surface Water	Risk to surface water would be reduced. Construction-related impacts would be negligible.	Risks to surface water would be reduced. Construction-related impacts would be negligible.
Floodplains	Increases 100-year floodplain area by approximately 14 to 16 ac; minor beneficial impact.	Increases floodplain area by approximately 20 ac; minor beneficial impact.
Vegetation	Minor and adverse impact in the short term, but minor and positive in the long term.	Minor and adverse impact in the short term, but minor and positive in the long term.
Wildlife	Minor impact to previously disturbed low quality habitat. Potential beneficial impacts in the long term.	Minor impact to previously disturbed low quality habitat. Potential beneficial impacts in the long term.
Aquatic Ecology	No impact	No impact
Threatened and Endangered Species	No effect on threatened or endangered species	No effect on threatened or endangered species
Wetlands	No impact	No impact
Socioeconomic Resources	Short-term beneficial increases in employment, payroll, and tax payments during construction.	Short-term beneficial increases in employment, payroll, and tax payments during construction.
Environmental Justice (EJ)	No direct impacts; indirect impacts associated with the transport of borrow material (i.e., noise, dust) are disproportionate to local EJ communities but are short-term and	No direct impacts; indirect impacts associated with the transport of borrow and CCR material (i.e., noise, dust) are disproportionate to local EJ communities, short term and minor to

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

Issue Area	Alternative B – Closure-in-Place	Alternative C – Closure-by-Removal
	minor in nature.	moderate in nature.
Natural Areas, Parks and Recreation	No impacts	No impacts
Transportation	Temporary minor impacts from transport of borrow material	Temporary minor impacts from transport of borrow and CCR material
Visual Resources	Minor impacts during construction. Beneficial in the long term.	Minor impacts during construction. Beneficial in the long term.
Cultural Resources	No impacts due to use of previously disturbed lands.	No impacts due to use of previously disturbed lands.
Noise	Temporary minor noise impacts associated with the transport of borrow material due to increased frequency of truck traffic.	Temporary moderate construction noise impacts associated with the transport of borrow material and the off-site transport of CCR due to increased frequency of truck traffic.
Solid and Hazardous Waste	Minimal amounts generated during construction activities and managed in permitted facilities	Minimal amounts generated during construction activities and managed in permitted facilities
Public Health and Safety	Potential for temporary minor impacts during construction activities and transportation of borrow material.	Increased potential of accidents associated with deep excavations into ash impoundments. Potential for temporary minor impacts during construction activities and transportation of borrow material and CCR
Cumulative Effects	Minor short-term effects to air, noise and EJ communities associated with borrow site trucking operations	Greater effects relative to Alternative B to air, noise and EJ communities associated with borrow site and CCR trucking operations.

2.5 Identification of Mitigation Measures

Mitigation measures identified in Chapter 3 to avoid, minimize, or reduce adverse impacts to the environment are summarized below. TVA's analyses of preferred alternatives include mitigation, as required, to reduce or avoid adverse effects. Project-specific best management practices (BMPs) are also identified.

- Fugitive dust emissions from site preparation and construction will be controlled by wet suppression and BMPs (Clean Air Act Title V operating permit incorporates fugitive dust management conditions).
- Erosion and sedimentation control BMPs (e.g., silt fences and a truck wash) will ensure that surface waters are protected from construction impacts.
- Consistent with Executive Order (EO) 13112, disturbed areas will be revegetated with native or non-native, non-invasive plant species to avoid the introduction or spread of invasive species.

- BMPs will be used during construction activities to minimize and restore areas disturbed during construction.

- TVA will implement supplemental groundwater mitigative measures that could include monitoring, assessment, or corrective action programs as mandated by state requirements. State requirements provide an additional layer of groundwater protection to minimize risk.

2.6 Preferred Closure Alternative

TVA has identified Alternative B – Closure-in-Place as the preferred alternative. Alternative B would achieve the purpose and need of the project and close the West Ash Impoundment within a reasonable construction period. Alternative B requires substantially less cost, fewer overall environmental impacts, and avoids off-site transfer of CCR resulting in relatively lower impacts to environmental justice communities as a result of noise and emissions associated with transport of CCR to an off-site permitted landfill.

2.7 Necessary Permits or Licenses

TVA holds the permits necessary for the operation of ALF. Depending on the decisions made respecting the proposed actions, however, TVA may have to obtain or seek amendments to the following permits:

- NPDES Construction Storm Water Permit for storm water runoff from construction activities.

- Modification of ALF's existing NPDES permit to reflect the decommissioning of Outfall 002.

- Modification to the Tennessee Multi-Sector Permit for Industrial Storm Water discharges would be made for the addition of new storm water outfalls.

- Section 408 (Rivers and Harbors Act) by the USACE for work near the Ensley Levee.

- ALF's Storm Water Pollution Prevention Plan would be revised to include the closed West Ash Impoundment.

This page intentionally left blank

CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section describes the baseline environmental conditions potentially affected by the proposed closure of the West Ash Impoundment and an assessment of impacts of the project on the environmental resources identified. This assessment tiers off the impact analysis presented in Part I, Chapter 3 and, based on the specific activities proposed for closure of the impoundment, TVA was able to focus its environmental review on specific resources and eliminate others from further evaluation.

The analysis presented here does not contain detailed discussions on resources not found in the planning area, or where site-specific conditions would not change the impact analysis presented in Chapter 3 of the Programmatic EIS. These include:

- Air Quality and Climate Change. No impacts to air quality and climate change were identified in Part I, Section 3.1 except for the nonattainment status for ozone at ALF. The State of Tennessee has filed a petition to have the area re-designated as attainment. Air quality in the vicinity of ALF is expected to be consistent with the approved Tennessee Air Pollution State Implementation Plan.
- Land Use
- Prime Farmland
- Geology and Seismology
- Socioeconomics (excluding Environmental Justice)
- Visual Resources
- Solid and Hazardous Waste
- Public Health and Safety

A discussion of resources retained for detailed analysis is provided in the following sections.

3.1 Groundwater

3.1.1 Affected Environment

3.1.1.1 Site Location/Background

ALF resides within the Mississippi Alluvial Plain Subdivision of the Coastal Plain Physiographic Province, an area characterized by flat to gently rolling floodplain terrain bordered on the eastern side by steep loess bluffs. Structurally, the area lies near the center of the upper portion of the Mississippi Embayment, a broad southward-plunging rock trough or syncline with its axis approximately aligned with the course of the Mississippi River. The syncline consists of several thousand feet of relatively unconsolidated cretaceous, tertiary, and quaternary age deposits of clay, silt, sand, gravel, chalk, and lignite. The principal aquifers of this sedimentary sequence include (in descending order), recent alluvium, the Memphis sand, and the Fort Pillow sand.

Exploratory drilling at ALF and the Pidgeon Industrial Park, located south of the plant, indicates the alluvial aquifer ranges from 100 to 136 ft in thickness (Beard 1989; Hall, Blake, and Associates 1991). The upper portion of the alluvial deposits generally consist of fine sand, silt, and clay; whereas, the basal portion is composed of coarser sand and gravel. Alluvial sediments typically occur in discontinuous lenses and layers and exhibit a high degree of heterogeneity. Recharge occurs primarily by surface infiltration of rainfall. Well monitoring, conducted in this area intermittently since 1988, indicates groundwater movement in the alluvial aquifer beneath the plant site is generally northward to McKellar Lake, with 10 to 15 ft overall seasonal variations in water level. Depth to groundwater is generally 10 to 30 ft below ground surface. Groundwater flow direction at the West Ash Impoundment is assumed to be generally similar with a flow direction towards McKellar Lake.

The alluvial aquifer typically provides water for domestic, irrigation, and industrial supplies in the Memphis area. However, there are no known water supply wells completed in the alluvial aquifer within at least 1 mi of ALF (TVA 2006).

The alluvial aquifer is separated from the deeper Memphis sand aquifer by a clay aquitard associated with the Jackson and Upper Claiborne formations. Overall thickness of the Jackson clay varies from 0 to 360 ft regionally. Several deep borings completed at ALF encountered Jackson aquitard at depths ranging from 114 to 144 ft, although none fully penetrated the unit. Aquitard penetrations ranged from 4 to 40 ft and generally indicated the formation consists of silty clay with occasional thin lenses of silt, sand, lignite, and gravel.

The Memphis sand is a major regional aquifer and is the source of municipal water for the City of Memphis. The aquifer primarily consists of fine-to-coarse sand with isolated lenses of clay and silt. Thickness ranges from 500 to 900 ft regionally. Recharge occurs at the aquifer outcrop area in western Tennessee and, to a lesser extent, from influx of groundwater from overlying formations. Regional groundwater movement is generally westward toward the axis of the Mississippi Embayment. However, a large cone of depression has formed around the city due to withdrawals from numerous water supply wells completed in this aquifer in Memphis and neighboring areas of Shelby County. The Memphis sand is separated from the underlying Fort Pillow aquifer by 0 to 310 ft of clay, silt, and sand sediments of the Flour Island aquitard. The Fort Pillow aquifer is not widely used in the Memphis region because of the availability of shallower groundwater resources.

As discussed in Part I, Section 2.2, no federal post-closure care measures are required for the West Ash Impoundment as it is not subject to the CCR Rule requirements based on its date of ceased operations (EPA 2015). However, TVA is in the process of further studying groundwater characteristics near ALF for the purposes of developing a groundwater monitoring system that meets state requirements.

3.1.1.2 Groundwater Quality

No representative monitoring records specific to the West Ash Impoundment regarding ground water quality are available. TVA has conducted groundwater monitoring at the East Ash Impoundment and has analyzed samples for antimony, arsenic, barium, beryllium, cadmium, chromium, fluoride, lead, mercury, nickel, nitrate+nitrite, selenium, silver, thallium, turbidity and total suspended solids. Although these results cannot be directly interpreted to be representative of the expected conditions at the West Ash Impoundment, they may be a general indicator of groundwater quality. With the exception of an anomalous result for arsenic as compared to other wells onsite, the samples and

parameters exhibit trends that appear stable or non-detectable and do not exceed their applicable Groundwater Protection Standards. Arsenic has been determined to be naturally occurring at elevated levels in this area and not related to plant activities, including, but not limited to, the operation of the inactive west ash pond and the active east ash pond. (Koop 2001 and Key Environmental 2013).

3.1.2 Environmental Consequences

3.1.2.1 Alternative B – Closure-in-Place

The West Ash Impoundment only intermittently received minor sources of CCR between 1992 and October 2015 and has not received any CCR since October 19, 2015, Alternative B would still improve groundwater by capping the impoundment using an approved closure cover system (see Part I, Chapter 2). Grading to promote drainage of the West Ash Impoundment as described in Chapter 2 would result in a reduction of mounding of the surficial aquifer, reduced vertical leaching of CCR constituents and general improvement in groundwater. Additionally, the installation of an approved closure system, would further reduce infiltration and subsurface flow to the groundwater.

As discussed in Part I, Section 2.2, no federal post-closure care measures are required for the ALF West Ash Impoundment since it is not subject to the CCR Rule requirements. TVA will implement any supplemental mitigation measures required pursuant to a unilateral administrative order that TDEC issued in August 2015, which could include additional monitoring, assessment, or corrective action programs.

The beneficial effects of the Closure-in-Place Alternative indicate that the impacts of this alternative are beneficial to groundwater, as compared to the No Action Alternative. Removal of potential additional hydraulic inputs from precipitation, surface water run off or other water additions to the impoundment through the capping process would effectively reduce potential subsurface flows of leachate to groundwater which were directly related to the migration of the surface water from the impoundment passing through the vadose zone into the groundwater below.

With respect to groundwater, EPRI's analysis indicated that this alternative was similar to its analysis of the hypothetical site. Compared to the Closure-by-Removal Alternative, Closure-in-Place had a less beneficial impact for only high mobility constituents under both the intersecting and non-intersecting groundwater condition (high mobility and low mobility constituents are defined in Part I, Section 2.3). EPRI also found that there was a negligible difference from Alternative C with respect to low mobility constituents under both groundwater scenarios. The activities associated with the Closure-in-Place Alternative would reduce groundwater risk related to this impoundment.

Considering the beneficial effects of removal of the Closure-in-Place Alternative, the reduction of subsurface flows, and the commitment to supplemental mitigative measures, as appropriate, the impacts of this alternative on groundwater are beneficial and considerable, as compared to the No Action Alternative.

3.1.2.2 Alternative C – Closure-by Removal

The site-specific impacts for Alternative C – Closure-by-Removal for the West Ash Impoundment are similar to the beneficial impacts of this alternative described in Part I. Groundwater risk near ALF would be reduced by the implementation of this alternative. As identified by EPA in the CCR Rule, removal of the CCR materials would reduce groundwater risk in the impoundment area by removing potential source materials. The

permitted South Selby Landfill identified to receive the CCR is lined and has groundwater monitoring systems in place to help minimize potential impacts to groundwater.

Groundwater benefits associated with this alternative include substantially reducing the groundwater risk from groundwater constituents of concern (COC) migrating off-site. No federal post-closure care measures are required under this alternative. State requirements for post-closure certification would be implemented as needed.

The impacts of this alternative on groundwater are beneficial as it substantially reduces subsurface flows and substantially reduces COCs from the former ash impoundment.

3.2 Surface Water

3.2.1 Affected Environment

ALF is on the Mississippi River 5 mi southwest of downtown Memphis. The plant was built in the 1950s by the MLGW, leased to TVA in 1965, and purchased outright by TVA in 1984. TVA has easements to use both the West and East ash impoundments and does not own these facilities

The project area is located entirely within the McKellar Lake surface water system. 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 6.6 mi long, 1,550 ac water body (excluding Treasure Island) (TVA 2014).

The hydrology and hydrodynamics of McKellar Lake are topics of interest because the ALF cooling water system influences flow within McKellar Lake. 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, river stage changes, and cooling water withdrawal. River stage changes, and therefore McKellar Lake stages, span a range of greater than 50 ft from low stage to flood stage.

The West Ash Impoundment intermittently received minor sources of CCR between 1992 and October 2015, but has not received any CCR since October 19, 2015. Sources of flows to the West Ash Impoundment are limited to direct precipitation. However, evaporation and infiltration off-set any inputs such that average discharge from the West Ash Impoundment Outfall 003 is zero.

3.2.1.1 Surface Water Quality

There are water quality concerns in many of the stream segments in the Horn Lake-Nonconnah watershed. McKellar Lake is part of this watershed. Fish consumption advisories have been issued for the first 1.8 mi of Nonconnah Creek upstream from McKellar Lake with chlordane and other organics listed as the pollutants, or cause (Denton et al. 2012). Nonconnah Creek Basin (HUC 08010211) includes 22 separate water body segments and is on the TDEC 303(d) list of impaired waters (January 2012). McKellar Lake is listed by TDEC for PCBs, dioxins, and chlordane from contaminated sediments. It is also listed for *Escherichia coli*, low dissolved oxygen, Nitrate + Nitrite, and sedimentation/siltation from sanitary sewer overflows and discharges from municipal

separate storm sewer systems (MS4). Recently, there was a major sewage spill into McKellar Lake. The nearby Mississippi River and the Horn Lake cutoff (Figure 3-1) are generally listed for similar pollutants from similar sources (TDEC 2014).

For the Horn Lake cutoff drainage, TDEC identified the following causes for non-support and the total maximum daily loads priority (in parentheses) associated with each cause (TDEC 2014):

- low dissolved oxygen (low)
- total phosphorus (medium)
- loss of biological integrity due to siltation (low)
- arsenic (high)
- Escherichia coli (NA)

A draft total maximum daily loads for arsenic in the Nonconnah Creek watershed has been released by TDEC (January 2014).

3.2.2 Environmental Consequences

3.2.2.1 Alternative B – Closure-in-Place

Under this alternative no alteration or modification of surface water resources would occur within the immediate project site or associated laydown areas.

Under this alternative CCR material in the ALF West Ash Impoundment would be consolidated and compacted. An approved cover system consisting of either a typical Subtitle D soil cover or a geosynthetic liner coupled with cover soil would be installed as described in Part I, Section 2.2). The existing berm would be breached (north and west) and the site would be graded to drain any surface runoff directly to McKellar Lake (Appendix A). The existing NPDES permitted outfall structure would be decommissioned in consultation with TDEC and removed.

Wastewaters generated during the proposed project may include construction storm water runoff, drainage from work areas, domestic sewage, non-detergent equipment washings, dust control, and hydrostatic test discharges. Potential impacts and BMPs to minimize effects of these wastewater streams are provided in Part I, Section 3.7.

Lateral movement of water from the impoundment berms (seepage) at ALF West Ash Impoundment is not known to occur. Nonetheless, this alternative would reduce the potential for any future lateral movement from berms and groundwater subsurface flow to receiving surface waters. Consequently, any pathways for transport of COCs as a result of the lateral movement of water from the berm or groundwater subsurface flow to adjacent surface waters would be minimized.

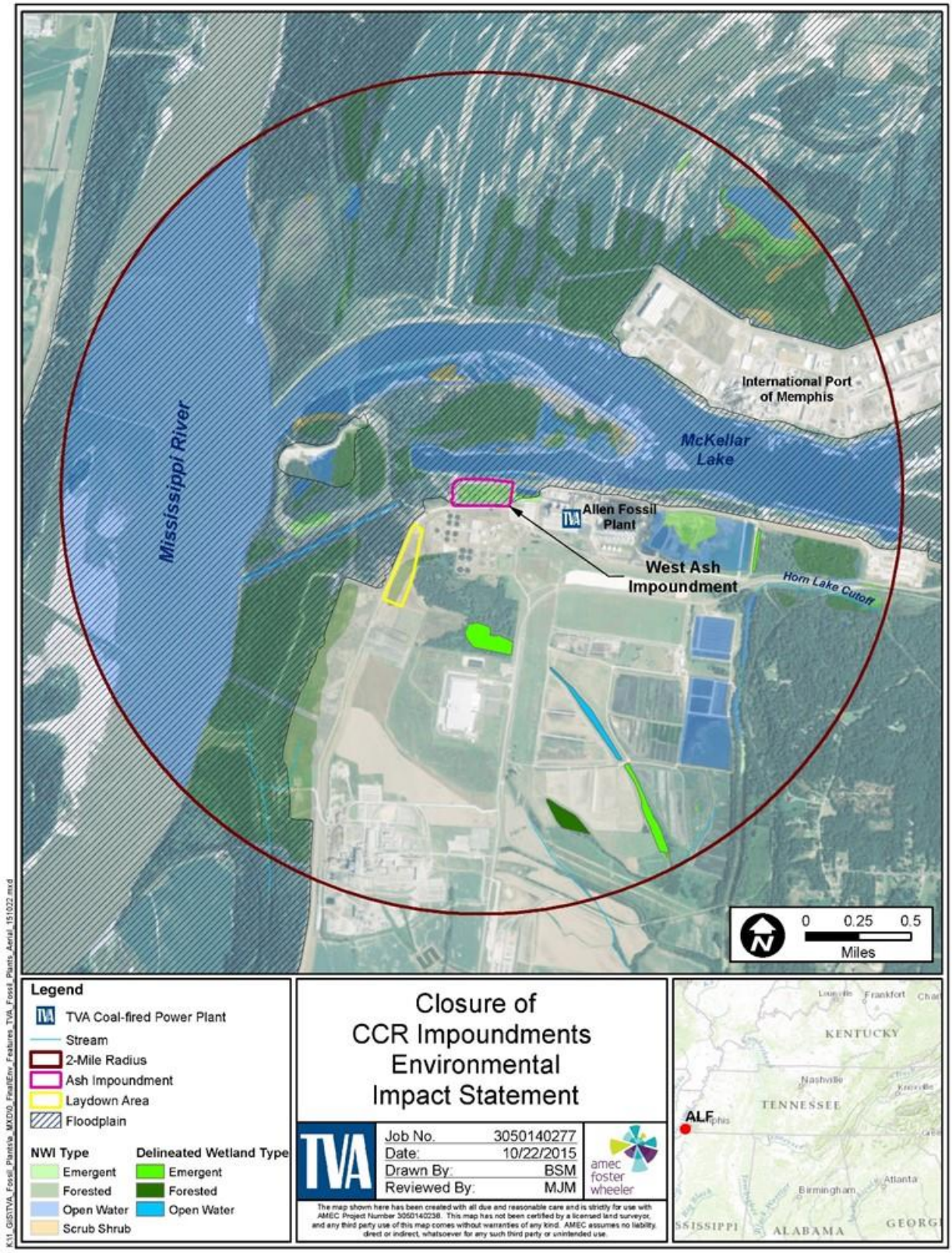


Figure 3-1. Environmental Features in the Vicinity of ALF

As described in Part I, Section 3.7, a recent study conducted by EPRI has evaluated the impact of impoundment closure on surface water for a hypothetical CCR impoundment in Tennessee (EPRI 2016b). Under a closure scenario similar to Alternative B, EPRI analyzed the potential for COC releases from groundwater and the resultant effect on receiving surface waters. EPRI analyzed two scenarios: one in which all CCR materials were located above the water table, and a second in which the groundwater intersected the CCR materials. Under both closure scenarios, EPRI found that the in-place closure scenario provided a positive impact compared to baseline (i.e., concentrations of all COCs, with the exception of Arsenic(V), are less than 100 percent of baseline), ranging from a 2.5 to 7-fold increase in positive impact. Arsenic(V) migrates very slowly, thus, surface water concentrations are the same for all scenarios including baseline (EPRI 2016b).

This alternative would reduce the potential for any future lateral movement (seepage) from berms and possible release to surface waters. Consequently, any pathways for transport of COCs as a result of lateral movement through the berms and groundwater flow to adjacent surface waters would be minimized.

Because surface water flow and potential lateral movement and groundwater releases to surface waters would be minimized, 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 negligible.

3.2.2.2 Alternative C – Closure-by-Removal

No alteration or modification of surface water resources would occur within the immediate project site or associated laydown areas. Water withdrawals and discharges impacts would be essentially the same as those described for Alternative B.

In contrast to Alternative B, which includes consolidating and compacting the CCRs, this alternative would entail the removal and transport of approximately 250,000 yd^3 of CCR material from the project site to an existing permitted landfill. As a result, any pathways for transport of COCs as a result of lateral flow of water from the berm or groundwater subsurface flow to adjacent surface waters would be substantially reduced. Material placed within the receiving landfill is assumed to be fully contained by an approved liner system such that no lateral movement or flow of COCs to receiving waters would occur.

Impacts associated with the closure of the West Ash Impoundment impacts would be similar to those described above in Alternative B. Excavation of the CCR material would require working with steeper slopes adjacent to the metal cleaning impoundment and other existing structures than Alternative B. The duration of the construction process has the potential to be longer and to require soil to be brought on-site and require protective BMPs. The soil would be obtained from a previously permitted/developed site, such as those shown in Figure 2-2. However, as long as all BMPs and mitigation measures are implemented, as needed, no negative or adverse impacts during the construction phase would be expected.

The operational activities associated with the closure of the impoundment impacts would be similar to those described above in Alternative B. As long as mitigation measures are utilized as needed, such as water treatment, proper drainage, and BMPs. No negative surface water quality impacts are anticipated.

Because surface water flows, potential lateral movements and groundwater subsurface flow to surface waters would be substantially reduced, and because all work would be done in compliance with applicable regulations, permits, and best management practices, potential direct and indirect impacts to surface waters would be negligible.

3.3 Floodplains

3.3.1 Affected Environment

The ALF West Ash Impoundment is depicted on Map Number 47157C0385F of the 2007 Shelby County, Tennessee, Flood Insurance Rate Map (FIRM) as being located within the 100-year floodplain of McKellar Lake and outside the boundary of the Ensley Levee. Floodplains within the project area are shown on Figure 3-1.

The West Ash Impoundment at ALF is located at McKellar Lake Mile 2.1, left descending bank, in Shelby County, Tennessee. According to Profile 75P in Volume 2 of the 2013 Shelby County Flood Insurance Study (FIS), the 100-year flood elevation at this location would be 225 ft above mean sea level. The 500-year flood elevation is not provided in the FIS; however, it is reported in the Allen Fossil Plant Emission Control Project Final Environmental Assessment as 230.5 ft (TVA 2014).

The lowest crest elevation of the West Ash Impoundment berm is 226.9 ft. Although the West Ash Impoundment 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.

3.3.2 Environmental Consequences

3.3.2.1 Alternative B – Closure-in-Place

The current closure plan includes installation of an approved closure cover system over the surface and excavation of an opening in the perimeter berm to allow drainage from or into the interior of the currently continuous perimeter dike. This plan is expected to result in approximately 65 to 75 percent (14 to 16 ac) of the impoundment interior to function as floodplain area during the 100-year flood. The area inundated at a flood elevation of 225.0 ft would depend on the final closure grading plan and cap thickness. This alternative would increase flood storage along McKellar Lake by a negligible amount. The impacts to floodplains and floodplain resources due to construction of the final closure system would be insignificant but beneficial.

Portions of the proposed laydown area would be within 100-year floodplains. The proposed laydown area would be used only during construction of the final closure system. Potential flooding of the laydown area could occur from either McKellar Lake or the Mississippi River. Portions of the laydown area would be located on the interior side of the Ensley Levee. Based on topographic maps, the elevation of the laydown area is about 210 ft mean sea level. Therefore, the laydown area could be above the “within levee” 100-year flood elevation 204 ft, if located within the levee, and this would be consistent with EO 11988 (TVA 2014).

A review of the project by the USACE pursuant to Section 408 of the Rivers and Harbors Act may be required for work near the Ensley Levee.

3.3.2.2 Alternative C – Closure-by-Removal

Under the proposed closure plan, the berms would be breached and CCR would be removed. This plan is expected to result in the impoundment interior (approximately 20 ac) to function as floodplain area during the 100-year flood. The area inundated at a flood elevation of 225.0 ft would depend on the final closure grading plan. This alternative would increase flood storage along McKellar Lake by a negligible amount.

Portions of the proposed laydown area would be within 100-year floodplains. The proposed laydown area would be used only during the construction period. Potential flooding of the laydown area could occur from either McKellar Lake or the Mississippi River. Portions of the laydown area would be located on the interior side of the Ensley Levee. Based on topographic maps, the elevation of the laydown area is about 210 ft mean sea level. Therefore, the laydown area could be above the "within levee" 100-year flood elevation 204 ft, if located within the levee, and this would be consistent with EO 11988 (TVA 2014).

A review of the project by the USACE pursuant to Section 408 of the Rivers and Harbors Act may be required for work near the Ensley Levee. The impacts to floodplains or floodplain resources due to construction of the final closure system of the West Ash Impoundment and the laydown area would be temporary and minor.

3.4 Vegetation

3.4.1 Affected Environment

ALF is located in Shelby County, Tennessee, within the Lower Mississippi Riverine Forest Province (Bailey 1995) of the Mississippi Alluvial Plain (Griffith et al. 2001). The province consists of flat to gently sloping broad floodplains and low terraces made up of alluvium and loess. Prior to conversion of these lands to agriculture, this area was dominated by bottomland deciduous forest with an abundance of green ash, elm, cottonwood, sugarberry, sweetgum, and water tupelo, as well as oak and bald cypress. Pecan was also present, associated with eastern sycamore and roughleaf dogwood (TVA 2006).

Within a 2-mi radius of ALF, cultivated crops (2,693.3 ac) and open water (2,272.9 ac) are the dominant land cover types (Table 3-1). Plant communities within the West Ash Impoundment and proposed laydown areas consist primarily of mowed turf grasses, sporadic trees (cottonwoods), and ruderal/early successional habitat consisting of non-native weedy species. Land use/land cover analysis (see Table 3-1, Figure 3-2) indicates that cultivated crops (17.6 ac) is the dominant land cover feature in the permanent and temporary use areas. Based on a desktop review and site reconnaissance, no unique plant communities are present within the proposed project footprint at ALF.

Table 3-1. Land Use/Land Cover within the Vicinity of ALF

Land Cover Type	Permanent[1] and Temporary[2] Use Areas (ac)	2-mi Radius (ac)
Barren Land	0	88.3
Cultivated Crops	17.6	2,693.3
Deciduous Forest	0	302.5
Developed, High Intensity	0	268.3
Developed, Low Intensity	1.6	191.0
Developed, Medium Intensity	0	386.2
Developed, Open Space	5.4	211.7
Emergent Herbaceous Wetlands	0	87.0
Evergreen Forest	0	0
Hay/Pasture	0	17.3
Herbaceous	15.9	21.8
Mixed Forest	0	12.0
Open Water	0	2,272.9
Shrub/Scrub	0	10.8
Woody Wetlands	0 [3]	1,479.0
Total	**40.6**	**8,042.1**

Source: USGS 2011.

[1] Existing CCR Impoundment
[2] Laydown area
[3] Field assessment confirmed that woody wetlands are not present in laydown area

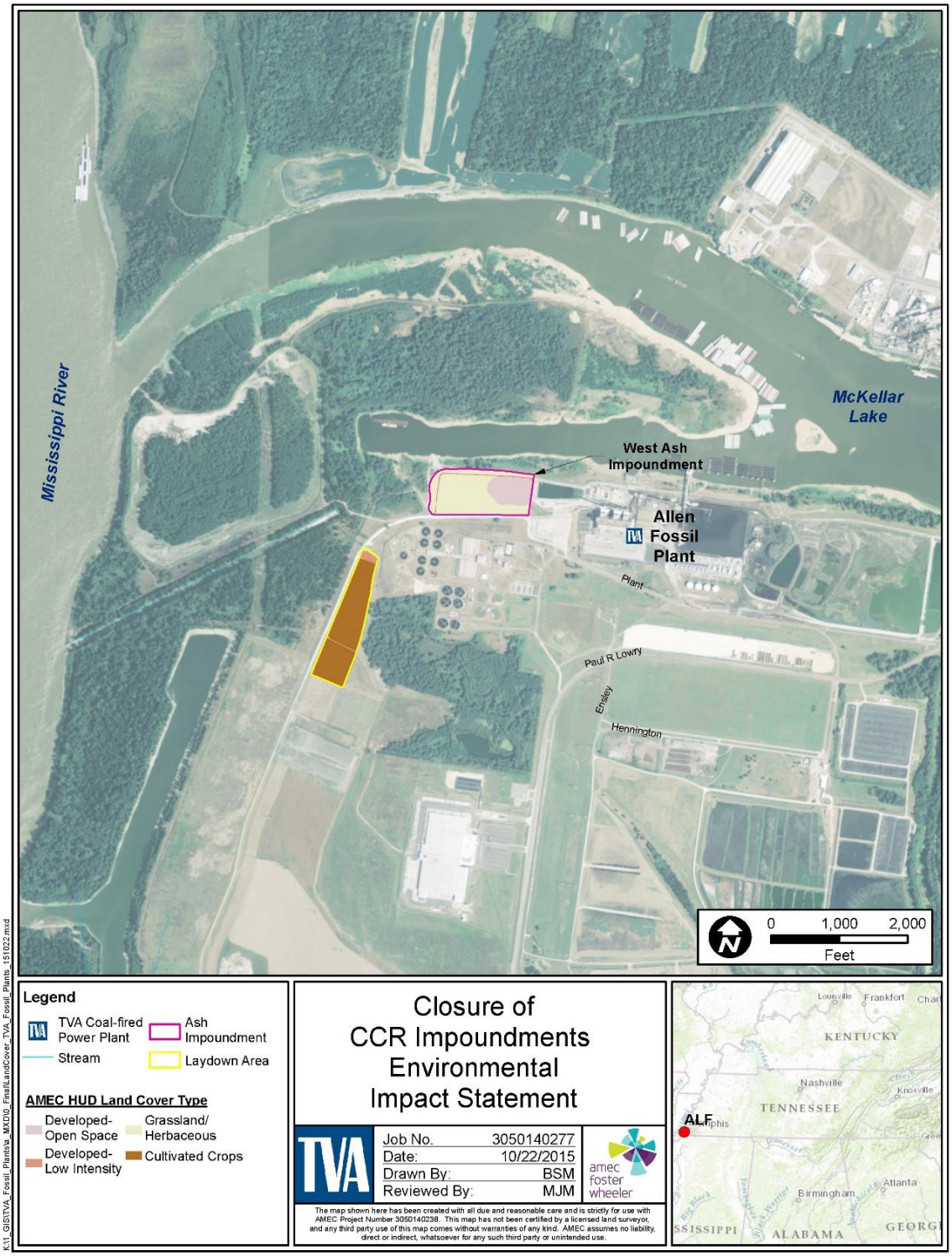


Figure 3-2. Land Cover Types Associated with Ash Impoundment Closure at ALF

3.4.2 Environmental Consequences

3.4.2.1 Alternative B – Closure-in-Place

As discussed in Part I, Section 3.9, impacts to vegetation would result from earthmoving activities related to shaping the CCR within the impoundments, reconfiguration of berms, and grubbing of laydown areas. Between 45 and 50 trees (primarily young cottonwoods) within the impoundment at ALF would be removed to support closure activities. Because plant communities within the impoundments and most laydown areas are poorly represented at ALF (primarily limited to early successional herbaceous land cover types), and potential impacts are very small relative to the abundance of similar cover types within the vicinity, direct impacts from site construction activities would be minor.

Under Alternative B, the West Ash Impoundment will be covered with material from a previously permitted borrow site located southeast of ALF. Potential indirect impacts of the transport of borrow material are associated with the deposition of fugitive dust on adjacent vegetation. However, this potential impact would be minimized by use of BMPs that include covering loads during transport.

Lands within the CCR impoundment will also be restored with a cover system that includes the establishment of an herbaceous cover. Temporary use areas will be revegetated to their current land cover type or replanted with herbaceous vegetation. Although transportation of borrow material has the potential to introduce invasive plants, BMPs consisting of erosion control measures and use of approved, non-invasive seed mixes designed to establish desirable vegetation would mitigate that risk. Therefore, impacts to vegetation under the Closure-in-Place Alternative would be minor and adverse in the short term, but would have a long term minor beneficial impact.

3.4.2.2 Alternative C – Closure-by-Removal

Impacts to vegetation under this alternative would be associated with ash removal and transport to an off-site permitted landfill (South Shelby Landfill). As with Alternative B, any existing vegetation would be entirely removed from the impoundment and from associated laydown areas needed to support construction. Deposition of fugitive dust may occur along haul routes as part of off-site transport.

Construction activities associated with the Closure-by-Removal Alternative may also result in the introduction and/or spread of invasive plant species heavy equipment use, off-site transport of CCR materials, and abandonment of the former ash impoundment. However BMPs consisting of erosion control measures and use of approved, non-invasive seed mixes designed to quickly establish desirable vegetation would minimize invasive plant impacts.

Impacts to vegetation under this alternative are limited to construction-phase disturbance of the same previously disturbed lands described under Alternative B. Ash impoundment re-use would be determined on a site-specific basis, but much of the former ash impoundment may be expected to revert to naturalized landscapes. Following removal and backfilling the former West Ash Impoundment, naturalized plant communities similar to those of surrounding floodplain cover types may be expected to reestablish within the former impoundment. Consequently, this alternative is expected to result in short term impacts to existing disturbed land cover types but would result in potential long term establishment of natural plant communities. Impacts of this alternative are therefore, minor and adverse in the short term, but would have a long term minor beneficial impact.

3.5 Wildlife

3.5.1 Affected Environment

The area evaluated for wildlife impacts incudes the existing West Ash Impoundment and its immediate surroundings, which include roads and maintained grassed berms. Terrestrial habitat within the project area includes some scattered trees within the ash impoundment and forested area along the north side of the maintained berm adjacent to the McKellar Lake. Painted buntings are known to frequent the forested lands west of ALF plant (TVA 2006). The area is the only known breeding population of painted buntings in Tennessee and, as of September 2015, was listed as a popular destination for local and regional birding organizations on the Tennessee Birding Trails website due to the presence of the buntings. This area is located outside of the project area.

The maintained areas of the West Ash Impoundment offer little suitable habitat for wildlife species, but can be used by many common species especially when the landscape still retains a few trees.

The West Ash Impoundment is not currently inundated, and does not provide habitat for wading birds. Limited areas with standing water from rainfall within the ash impoundment could provide seasonal habitat for a variety of amphibians and reptiles. Bullfrogs, cricket frogs, and American toads were encountered during previous field investigations at the facility. Cottonmouths and many species of water snakes may occur in riparian zones within bottomland forests. Bobcats, raccoons, coyotes, and deer also use these areas.

One wading bird colony has been documented within 5 mi of the project site (Tennessee Natural Heritage Program 1977). Based on review of aerial photography, no suitable habitat for heron colonies are available within the project footprint. Work activities would not affect heron rookeries or other aggregations of migratory birds.

3.5.2 Environmental Consequences

3.5.2.1 Alternative B – Closure-in-Place

The West Ash Impoundment occurs within a highly fragmented, industrial landscape that offers minimal habitat for wildlife. Under this alternative, resident wildlife found in the project area would continue to opportunistically use available habitats within the project vicinity. Limited clearing of trees would occur (45 to 50 trees within the West Ash Impoundment) in conjunction with closure activities and would not adversely affect the abundance of forested habitat available (see Table 3-1 and Figure 3-2). Additionally, tree removal would be conducted 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 very limited. During construction, most wildlife present within the project site would likely disperse to adjacent and/or similar habitat.

Following the construction period, some limited wildlife use of the closed impoundment may be expected. The West Ash Impoundment is proposed to be closed by using the geosynthetic-protective soil cover system and therefore, would be expected to provide limited foraging and nesting habitat for grassland species.

In consideration of the highly disturbed habitats present within the project area and associated temporary laydown areas, the availability of higher quality wildlife habitat in the proximity, and the potential functional value of the installed vegetated cover system,

potential direct and indirect impacts to associated wildlife are expected to be minor and potentially slightly beneficial in the long term.

3.5.2.2 Alternative C – Closure-by-Removal

As discussed for Alternative B, the area of permanent and temporary impact is primarily comprised of developed/disturbed land that is generally low quality habitat for wildlife. Construction-related activities and associated impacts with Alternative C are similar to those described above and effects of tree clearing and habitat alteration on wildlife would be similar. However, under Alternative C the former impoundment would be filled with material from a previously permitted borrow site located southeast of ALF. Lands within the former ash impoundment will also be restored using an approved, non-invasive seed mixes designed to establish desirable vegetation that would support periodic use by wildlife.

In consideration of the highly disturbed habitats present within the project area and associated temporary laydown areas, the availability of higher quality wildlife habitat in the proximity, and the potential restoration of the former impoundment, potential direct and indirect impacts to associated wildlife are expected to be minor and potentially beneficial in the long term.

3.6 Aquatic Ecology

3.6.1 Affected Environment

ALF lies approximately 1.8 mi east of the Mississippi River at Mississippi River Mile 725, and is located approximately 7.7 mi from downtown Memphis on a floodplain along the southern shore of 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 ac.

The area considered for ash impoundment closure activities at ALF is the West Ash Impoundment located on the shore of an embayment of McKellar Lake. The West Ash Impoundment currently does not impound water and supports terrestrial vegetation within its entire extent. Aside from McKellar Lake, there are no other waters directly adjacent to or in the immediate vicinity of the ash impoundment.

TVA evaluated the fish community in McKellar Lake using electrofishing sampling in 1974, and cove rotenone sampling in 1979 and 1980 (TVA 1995).

During the 1979-1980 study, 45 species were collected across four samples; this includes 15 commercially valuable and 21 recreationally valuable species:

- Common centrarchid species present at ALF included black crappie, white crappie, bluegill, green sunfish, longear sunfish, orangespotted sunfish and warmouth.
- Benthic invertivore species were dominated by freshwater drum, while gizzard shad was the dominant species by number and biomass.
- 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).

3.6.2 Environmental Consequences

3.6.2.1 Alternative B – Closure-in-Place

Under the Alternative B, no direct impacts to aquatic ecosystems are expected from the in-place closure of the West Ash Impoundment at ALF. Temporary laydown areas supporting closure activities are located within previously disturbed upland areas. Consequently, no direct impacts to aquatic ecosystems would occur in conjunction with planned closure activities.

Additionally, construction activities would adhere to permit limit requirements and would utilize standard operating procedures and BMPs to minimize indirect effects on aquatic resources in McKellar Lake. Therefore, no adverse effects to aquatic resources are expected from the Closure-in-Place of ash impoundments at ALF.

3.6.2.2 Alternative C – Closure-by-Removal

Under Alternative C, no direct impacts to aquatic ecosystems are expected from the proposed closure of the West Ash Impoundment at ALF. No direct impacts to aquatic ecosystems would occur in conjunction with planned closure activities.

Additionally, any construction activities would adhere to permit limit requirements and would utilize standard operating procedures and BMPs to minimize indirect effects on aquatic resources in McKellar Lake. Therefore, no adverse impacts to aquatic resources are expected under Alternative C.

3.7 Threatened and Endangered Species

3.7.1 Affected Environment

The Endangered Species Act of 1973 (ESA) provides broad protection for species of fish, wildlife and plants that are listed as threatened or endangered in the United States. The ESA outlines procedures for federal agencies to follow when taking actions that may jeopardize federally listed species or their designated critical habitat. The State of Tennessee provides protection for species considered threatened, endangered or deemed in need of management within the State other than those already federally listed under the ESA. The listing of species is managed by the TDEC; additionally, the Tennessee Natural Heritage Program and TVA both maintain databases of aquatic and terrestrial animal species that are considered threatened, endangered, special concern, or are otherwise tracked in Tennessee because the species is rare and/or vulnerable within the state.

A review of the TVA Natural Heritage Database in September 2015 revealed the occurrence of several federal- and state-listed species within a 2-mi radius of ALF as summarized in Table 3-2. Two federally listed species, the endangered Indiana bat and threatened northern long-eared bat, are known throughout the region and have the potential to occur near ALF. Within the 2-mi vicinity around the ALF, occurrence records exist for two additional federally listed species (interior least tern and piping plover), two state listed species (lark sparrow and Mississippi kite), and one species tracked by the Tennessee Natural Heritage Program (striped whitelip). The bald eagle, subject to protection under the Bald and Golden Eagle Protection Act, has been recorded from the area near ALF.

One yellow-crowned night heron rookery is historically recorded within 2-mi of ALF near Riverside Park in Memphis. This rookery was last observed in 1979 and birds have since dispersed into scattered smaller nesting groups.

No federal- or state-listed aquatic species and no federal- or state-listed plant species (or designated critical habitats) have been documented within a 2-mi vicinity of ALF. Additionally, no federally listed plant species are known to occur in Shelby County, Tennessee.

Table 3-2. Species of Conservation Concern within the Vicinity of ALF

Common Name	Scientific Name	Status	
		Federal[1]	State[2] (Rank[3])
Birds			
Bald eagle	*Haliaeetus leucocephalus*	DM	NMGT(S3)
Interior least tern	*Sterna antillarum athalassos*	LE	END(S2S3)
Lark sparrow	*Chondestes grammacus*	--	THR(S1)
Mississippi kite	*Ictinia mississippiensis*	--	NMGT(S2S3)
Piping plover	*Charadrius melodus*	LT	TRKD(S2)
Mammals			
Indiana bat[4]	*Myotis sodalis*	LE	END(S1)
Northern long-eared bat[4]	*Myotis septentrionalis*	LT	(S1S2)

TVA Natural Heritage Database, accessed 09/18/2015; Species documented within 2 mi of ALF

[1] Federal Status Codes: DM = Delisted, Recovered, and Being Monitored; LE = Listed Endangered; LT = Listed Threatened; PE = Proposed Endangered.

[2] State Status Codes: END = Endangered; THR = Threatened; NMGT = In Need of Management; TRKD = Tracked by the Tennessee Natural Heritage Program.

[3] State Rank: S1 = Extremely rare and critically imperiled; S2 = Very rare and imperiled; S3 = Vulnerable; S4 =Apparently secure, but with cause for long-term concern; SH = Historic in Tennessee; S#S# = Denotes a range of ranks because the exact rarity of the element is uncertain (e.g., S1S2).

[4] Known throughout the region but no occurrence records within 2-mi of the project site.

The interior least tern nests on open shorelines, riverine sandbars and mudflats throughout the Mississippi and Missouri river drainages. Suitable nesting habitat is sparsely vegetated with sand or gravel substrate and located near an adequate food supply. Fidelity exhibited by terns across years to a particular site is strongly influenced by the dynamic nature of river hydrology, which may change island size and vegetative cover annually (U.S. Fish and Wildlife Service [USFWS] 2013). 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 (Spear et al. 2007; Jenniges and Plettner 2008).

The interior least tern was listed as an endangered species by the USFWS in 1985 (USFWS 1985b). It 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 (Nicholson 1997).

Nesting colonies of least tern have been documented near ALF. Summer colonies have been documented along the Mississippi River (Jones 2009), and along the banks of the East Ash Impoundment. Occurrence of nesting colonies at ALF typically coincides with

high water levels along the nearby, Mississippi River, where the more suitable sandy islands, sand bars and river banks are rendered inaccessible due to the high water levels. Adult individuals were observed perched along exposed ash and foraging in along the shoreline of the East Ash Impoundment during the May 29, 2014, field survey (TVA 2014). No use of the West Ash Impoundment by this species has been recorded or is expected to occur as this facility is completely vegetated and lacks open water and shoreline habitats.

The piping plover is a small shorebird that was federally listed under the ESA in 1985 (USFWS 1985a). Occurrence of piping plover 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 (Henry 2012). Adult female piping plovers typically migrate from summer to winter grounds during July; adult males and juveniles migrate between late August and early September (USFWS 2003; Pompei 2004). 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.

Studies of migration ecology suggest that piping plover does not concentrate in large numbers during migration and that most sightings were 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 (Pompei 2004). One piping plover was observed foraging on an ash flat along the East Ash Impoundment in 2010. Given the infrequency of occurrence by this species in this region, occurrence of piping plover within the project area is rare. Ash impoundments are considered poor habitat for shorebirds as the water levels change frequently, preventing the development of suitable forage habitat (Henry 2012). No use of the West Ash Impoundment by this species has been recorded or is expected to occur as this facility is completely vegetated and lacks open water and shoreline habitats.

The Indiana bat is listed as federally endangered by the USFWS (2007). The species overwinters in large numbers in caves and forms small colonies under loose bark of trees and snags in summer months (Barbour and Davis 1974). Although females typically form small summer roosting colonies, males and juveniles may roost individually. Indiana bats disperse from wintering caves to areas throughout the eastern U.S. This species range extends from New York and New Hampshire in the north to Alabama, Georgia, and Mississippi in the south and as far west as eastern Kansas and Oklahoma. The species favors mature forests interspersed with openings. The presence of snags with sufficient exfoliating bark represent suitable summer roosting habitat. Use of living trees with suitable roost characteristics in close proximity to suitable snags has also been documented. Multiple roost sites are generally selected. The availability of trees of a sufficient bark condition, size, and sun exposure is another important limiting factor in how large a population an area can sustain (Tuttle and Kennedy 2002; Harvey 2002; Kurta et al. 2002). There are no records of caves occurring within 2-mi of ALF. A December 2015 field review of the trees within the West Ash Impoundment determined that the trees on site do not represent suitable summer roosting habitat for Indiana bat.

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 mi to the southeast of the project area. 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 project site is of a hibernaculum (suitable winter habitat) greater than 100 mi to the east in Tishomingo County, Mississippi. This hibernacula is no longer thought to be active, however, due to the collapse of the mine in which it occurred. No Indiana bats have been observed at this location, however, since 1939 (TVA 2014).

The northern long-eared bat is found in the U.S. from Maine to North Carolina on the Atlantic Coast, westward to eastern Oklahoma and north through the Dakotas, reaching into eastern Montana and Wyoming, and extending southward to parts of southern states from Georgia to Louisiana. Hibernacula includes underground caves and cave-like structures (e.g., abandoned or active mines, railroad tunnels). These hibernacula typically have large passages with significant cracks and crevices for roosting; relatively constant, cool temperatures (32 to 48°F) and with high humidity and minimal air currents. During summer this species roosts singly or in colonies in cavities, underneath bark, crevices, or hollows of both live and dead trees (typical diameter ≥3 in). Males and non-reproductive females may also roost in cooler places, like caves and mines. Northern long-eared bats forage in upland and lowland woodlots, tree-lined corridors, and water surfaces, feeding on insects. In general, habitat use by northern long-eared bats is thought to be similar to that used by Indiana bats, although northern long-eared bats appear to be more opportunistic in selection of summer habitat (USFWS 2014). A December 2015 field review of the trees within the West Ash Impoundment determined that the trees on-site do not represent suitable summer roosting habitat for northern long-eared bat.

The lark sparrow is listed as threatened by the state of Tennessee and is a species occupying open habitats such as grasslands, roadsides, farmland, pasture, and forest edge, including disturbed sites with exposed soils, grazing, or recent fire (Martin and Parish 2000). One occurrence record from 1993 exists within a 2-mi radius of ALF but recent occurrences on-site or in the vicinity of the plant are not known.

The Mississippi kite has a state rank of S2 (very rare and imperiled) and S3 (vulnerable) in Tennessee as indicated in Table 3-2. Although abundant in the Great Plains, it is less common along the Mississippi River and areas further east. This kite may utilize a variety of habitat types but nests primarily in old-growth forests (Parker 1999). Two occurrence records exist within a 2-mi radius of ALF with the most recent being in 1993. More recent occurrences on-site or in the vicinity of the plant are not known.

3.7.2 Environmental Consequences

3.7.2.1 Alternative B – Closure-in-Place

The area of permanent and temporary impact subject to project activities under this alternative is primarily comprised of developed/disturbed land that is generally unsuitable for the listed species in Table 3-2. The interior least tern has been known to occasionally utilize the East Ash Impoundment, but has not been observed in the West Ash Impoundment that would be further closed under the proposed action. 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 impoundments within the last five years and TVA may be able to limit construction activities during the peak migratory seasons to minimize potential impacts on the piping plover.

Regarding the Indiana bat and northern long-eared bat, approximately 50 small to mid-sized trees (primarily young cottonwoods) in the impoundment would be removed under the proposed alternative. These trees were determined to not be suitable summer roost habitat

for these species. Ash impoundments and temporary laydown areas at ALF site do not provide suitable habitat for the remaining listed species in Table 3-2. For these reasons, there should be no effect on listed threatened and endangered species.

3.7.2.2 Alternative C – Closure-by-Removal

As discussed for Alternative B, the area of permanent and temporary impact is primarily comprised of developed/disturbed land that is generally unsuitable for the listed species in Table 3-2. Construction related activities and associated impacts with Alternative C are similar to those described above. For these reasons, there should be no effect on listed threatened and endangered species.

3.8 Wetlands

3.8.1 Affected Environment

The ALF facility is located within the Mississippi Alluvial Plain Ecoregion (Griffith, et al. 2001). Compared to middle and eastern Tennessee, wetlands in the project area are more common. Oak-hickory and southern floodplain forests are the natural vegetation types, although much of the forest cover has been removed for cropland. Some less-disturbed bottomland forest and cypress-gum swamp habitats still remain.

The proposed construction footprint includes the West Ash Impoundment and a temporary laydown area depicted in Figure 3-1.

The West Ash Impoundment at the ALF lacks open water and wet soil areas such that volunteer trees have become established in the former impoundment as depicted in Figure 3-1. Although 12.5 ac of emergent wetland were mapped by the National Wetlands Inventory (NWI) within the West Ash Impoundment, based on current site conditions, wetland features are not present.

An 8.9-ac forested wetland was also mapped by the NWI within the temporary laydown area. However, as depicted in Figure 3-2, there are no forested resources within this NWI feature and there are no obvious indicators of wetland features on aerial imagery. Additionally, TVA conducted a field review of this area in 2014 and confirmed that no jurisdictional wetlands were present within the previously mapped NWI wetlands within the laydown area (TVA 2014).

3.8.2 Environmental Consequences

3.8.2.1 Alternative B – Closure-in-Place

Closure-in-Place of the West Ash Impoundment would include grading the impoundment with earthen material and installation of a cover system which includes a layer of herbaceous vegetation. The temporary laydown area would be used to store equipment and materials during the construction phase and would be restored to existing contours and planted with native herbaceous cover upon completion.

No wetlands were identified within the footprint of the former the West Ash Impoundment and there should be no wetland impacts. Similarly, use of temporary laydown areas would not result in impacts to wetlands.

Indirect impacts to nearby jurisdictional or non-jurisdictional wetlands could potentially result from the alteration of hydrologic inputs to the wetland system resulting from closure of the impoundments. Jurisdictional wetlands adjacent to the ash impoundment have a hydrology

that is dominated by water levels within the adjacent McKellar Lake. Therefore, any modification of hydrologic inputs from the ash impoundment is expected to have a negligible effect on these wetlands. This cannot be avoided if this facility is closed under either closure method. In terms of EO 11990, there is no practicable alternative that would avoid impacting such wetlands.

Potential indirect impacts resulting from construction activities could include erosion and sedimentation from storm water runoff during construction into off-site or nearby jurisdictional and non-jurisdictional wetlands. BMPs in accordance with site-specific erosion control plans would be implemented to minimize this potential. Indirect impacts to wetland areas due to construction activities would be short-term and minor.

3.8.2.2 Alternative C – Closure-by-Removal

There are no wetlands in the footprint of the former West Ash Impoundment and there should be no impacts on wetlands. Similarly, use of temporary laydown areas would not result in impacts to wetlands.

Potential indirect impacts resulting from construction activities would be the same as those identified for Alternative B.

3.9 Environmental Justice

3.9.1 Affected Environment

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations formally requires federal agencies to incorporate environmental justice (EJ) as part of the NEPA. Specifically, it directs them to address, as appropriate, any disproportionately high and adverse human health or environmental effects of their actions, programs, or policies on minority and low-income populations. Although TVA is not one of the agencies subject to this order, TVA routinely considers EJ impacts as part of the project decision-making process.

Ash impoundment closure activities would occur on previously developed industrial sites; borrow material would be obtained from a previously permitted site and CCR would be disposed in an existing, permitted landfill. These activities would temporarily result in construction related noise, potential exposure to fugitive dust, and exhaust emissions to those persons proximate to the construction site and haul routes. Therefore, potentially affected communities were defined as any census block group that included the ash impoundment to be closed and any block group adjacent to the proposed haul route to the borrow sites or the identified route to the landfill considered for this analysis, the South Shelby Landfill.

Figure 3-3 identifies the block groups that meet the specified criteria as minority or low-income populations subject to EJ considerations in the vicinity of ALF. Total minority populations comprise greater than 50 percent of the population of all of the block groups studied and, therefore, meet the criteria to be considered a minority population subject to EJ considerations. The percentages of persons within each block group living below the poverty threshold range from 8 to 80 percent. Those block groups where the percentage of persons living below the poverty level exceed 50 percent or where the poverty rate is greater than 20 percent than the corresponding rate for Shelby County (20.8 percent), meet the specified criteria to be considered a low-income population subject to EJ consideration.

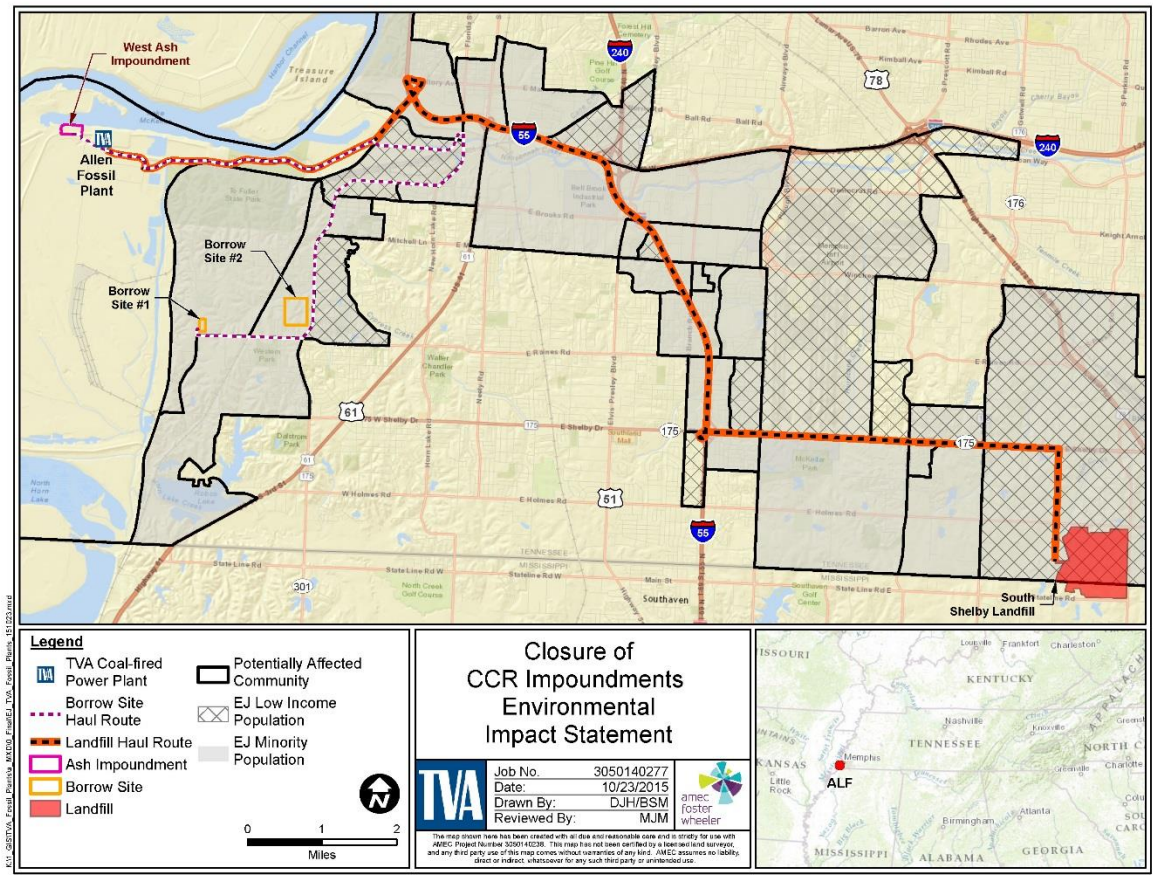


Figure 3-3. Environmental Justice Populations near ALF

3.9.2 Environmental Consequences

3.9.2.1 Alternative B – Closure-in-Place

As identified on Figure 3-3 all of the block groups in the vicinity of the West Ash Impoundment and the haul routes meet the criteria for consideration as a minority population and many of these block groups also meet the criteria for consideration as low-income populations under Executive Order 12898. The West Ash Impoundment is located in an area reserved for heavy industry, and the nearest residence is located approximately 2 mi to the southeast. Therefore, the proposed on-site closure action would not have a direct impact on the surrounding population.

All of the block groups along the designated haul route used to transport borrow material to the construction site meet the criteria for EJ consideration. It is estimated that approximately 10 truckloads per day would be required to haul borrow material to the West Impoundment during the closure period. This results in a traffic count of 20 dump trucks passing by a given location each day (two trucks per hour) during a portion of the overall construction period (not expected to exceed 12 months as noted in Section 3.11). Primary impacts to these communities would be associated with the concentrated truck movements along the haul route used to transport borrow material to ALF (see Figure 3-3). The communities along the haul route 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 borrow material. Dust control measures would be implemented to minimize emissions of fugitive dust; the haul of borrow material would generally occur during normal working hours and only during intermittent times throughout the site closure period.

Impacts associated with the transport of borrow material (i.e., noise, dust) are disproportionate to local EJ communities located along the haul route. However, these impacts are short term and relatively minor in nature. Conversely, employment opportunities would be provided to local residents to support the construction phase which would result in positive impacts to area low-income and minority populations.

3.9.2.2 Alternative C – Closure-by-Removal

As identified for Alternative B, due to the distance between the closest residence and the West Ash Impoundment, there would be no direct impact to the surrounding EJ communities as a result of on-site closure activities.

Indirect impacts associated with the transport of borrow material on-site would be similar as those described for Alternative B.

The landfill being considered for the disposal of CCR from ALF is the South Shelby Landfill located approximately 19 mi to the southeast. As noted in the Section 3.11, the proposed route to the landfill includes Interstate 55 (I-55) and other roadways designed to handle relatively high volumes of traffic. This route goes through a highly commercial and industrial area as well as through pockets of densely populated residential areas. All of the block groups along the haul route meet the criteria for EJ consideration (Figure 3-3). The average number of daily truckloads needed to haul CCR from the West Ash Impoundment to the South Shelby Landfill is estimated to be approximately 100. This trucking volume would result in a traffic count of 200 dump trucks passing by a given location each day (22 trucks per hour) during a portion of the overall construction period (see Section 3.11). Primary impacts to these communities would be associated with the concentrated truck movements along the route used to transport CCR to the receiving landfill (see Figure 3-3). 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 CCR off-site.

The transport of CCR would only occur during selected times during the construction period, and hauling trips would be dispersed throughout the day and would fit in with familiar traffic patterns along these roadways. Populations along interstate highways and other major roadways are generally set back from the road which minimizes exposure to traffic noise and fugitive dust and BMPs designed to minimize dust emissions during transport would be utilized to minimize impacts to those populations located along the proposed CCR haul route.

No direct impacts associated with ash impoundment closure are anticipated. Indirect impacts associated with trucking under this alternative (CCR and borrow material) are disproportionate to local EJ communities, but are short term and, given the number of truck trips to haul CCR off-site (22 trucks passing by a given location each hour) are minor to moderate in nature. Conversely, the employment opportunities would be provided to local residents to support the construction phase which would result in positive impacts to area low-income and minority populations.

3.10 Natural Areas, Parks and Recreation

3.10.1 Affected Environment

As illustrated on Figure 3-4, three managed areas (i.e. natural areas, parks, wildlife management areas, habitat protection areas, recreational areas) occur within 2 mi of the West Ash Impoundment (TVA 2014). This section addresses managed areas that are on or near the ALF West Ash Impoundment project area as impacts from closure activities would generally occur within areas in the vicinity of the West Ash Impoundment.

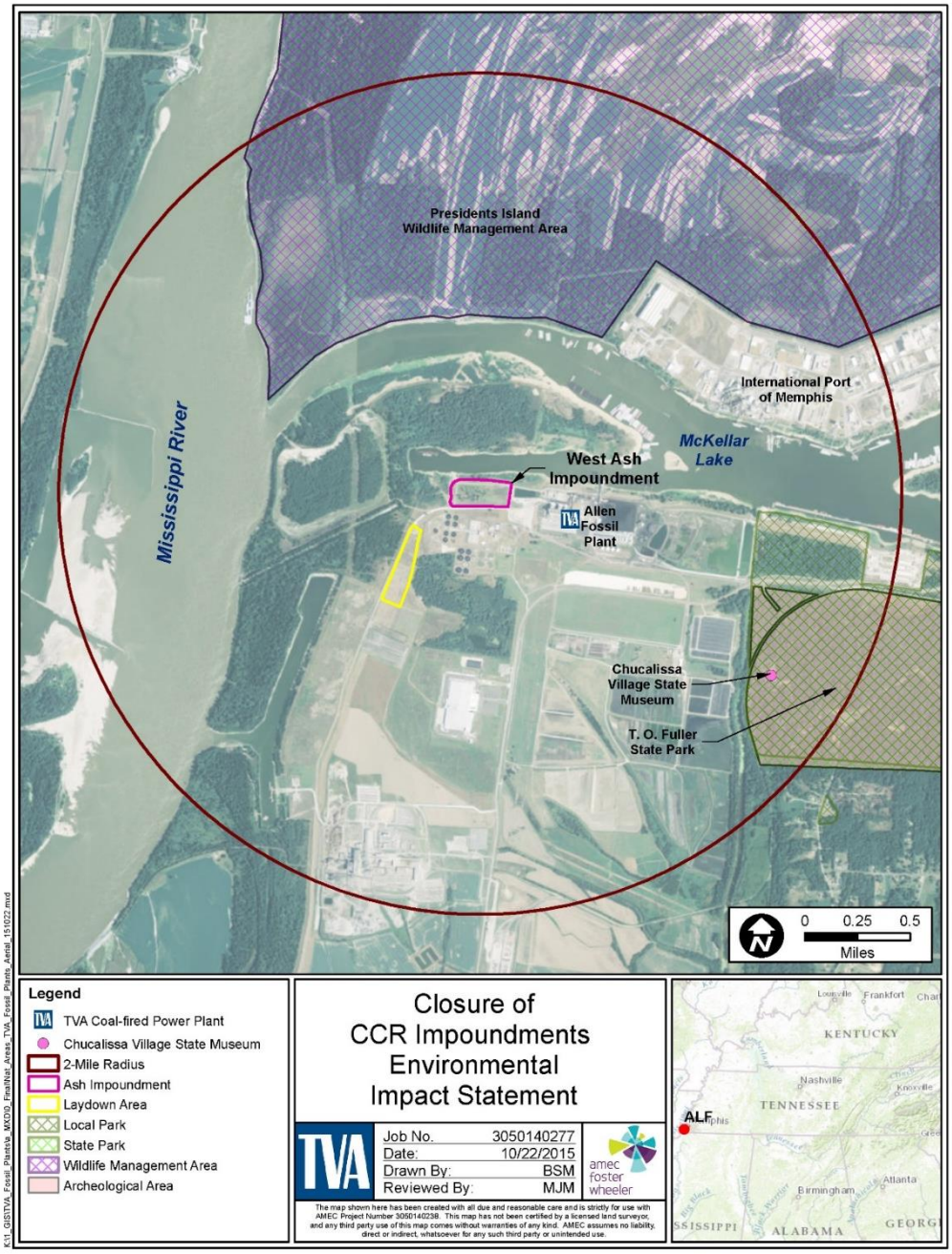


Figure 3-4. Natural Areas, Parks and Recreational Facilities Near ALF

T.O. Fuller State Park and the Chucalissa Archaeological Site are located within 2 mi of ALF. T.O. Fuller State Park consists of 1,138 ac of forest, including floodplains, wetlands and 6 mi of hiking trails. Recreation facilities at the park include a picnic area, campground, swimming pool, and tennis courts. The Chucalissa Archaeological Site is located within the boundaries of the state park, and includes a Native American village, preserved archaeological excavations, and a modern museum (Tennessee State Parks 2013). Presidents Island Wildlife Management Area managed by the Tennessee Wildlife Resources Agency, is located north of the plant site on the opposite side of McKellar Lake. McKellar Lake in the immediate vicinity of ALF is part of the International Port of Memphis and is characterized by industrial rather than recreational use. There are no Nationwide Rivers Inventory Stream or Wild and Scenic Rivers present in the immediate vicinity of the proposed project site.

The ALF East Impoundment is located on the east side of the generating facilities, and its closure is not being evaluated in this site-specific NEPA review. However, this area is utilized by area birders as shorebirds are known to frequent this area (TWRA 2015). Although the impoundment is not open to the public, TVA allows birders to view the site from surrounding roadways. The former West Ash Impoundment does not contain water and, therefore, does not attract shorebirds or other wading birds.

3.10.2 Environmental Consequences

3.10.2.1 Alternative B – Closure-in-Place

As discussed in Part I, Section 3.15 there would be no direct impact to natural areas, parks or recreational areas under this alternative as the ash impoundment is located in an industrial area and borrow material would be obtained from a previously permitted site.

There would be no indirect impacts from on-site construction activities given the existing industrial setting of the project location and the distance between the natural areas, parks or recreational facilities and the construction site. No impacts to recreation associated with birdwatching of shorebirds or other waterfowl would occur with this alternative as the West Ash Impoundment does not contain water and does not attract species of interest to recreational birders.

There is a potential for indirect impacts associated with the transport of borrow material to the closure site. Increased traffic, noise and potential fugitive dust from the transport vehicles may have temporary effects during the construction phase. Borrow material would be obtained from one or two sites located approximately 5 mi southeast of the plant. T.O. Fuller State Park is located within 2 mi of the project site. The haul route from the borrow sites to ALF would utilize roadways adjacent to this park. However, the route does not utilize the roadways within the park, which minimizes impacts to users of this facility. Considering the temporary nature of the proposed action, and the relatively low number of trucks anticipated to be used to transport borrow material, indirect impacts to natural areas, parks or recreation areas are anticipated to be negligible.

3.10.2.2 Alternative C – Closure-by-Removal

As discussed in Part I, Section 3.15, there would be no direct impact to natural areas, parks or recreational areas under this alternative as the ash impoundment is located in an industrial area. Borrow material would be obtained from a previously permitted site, and all CCR material would be hauled to an off-site commercial municipal solid waste landfill for disposal.

As identified under Alternative B, there would be no indirect impacts from on-site construction activities given the existing industrial setting of the project location and the distance between the natural areas, parks or recreational facilities and the construction site.

There is a potential for indirect impacts to natural areas, parks and recreational areas associated with hauling CCR off to a permitted landfill and hauling borrow material to the closure site. Indirect impacts associated with the transport of borrow material on-site would be the same as those described for Alternative B. The landfill being considered for the disposal of CCR from ALF is the South Shelby Landfill located approximately 19 mi to the southeast. As noted in Section 3.11, the major segment of the proposed haul route is I 55, and there are no parks, recreation or natural areas located along that route. However, T.O. Fuller State Park is located within 2 mi of the project site, and would be exposed to potential effects from both trucks hauling off CCR and hauling on borrow material. Although this alternative is not expected to have any notable adverse impacts on this park for the reasons stated in the Alternative B discussion, there would be a greater potential for indirect impacts due the higher quantities of construction-related traffic.

3.11 Transportation

3.11.1 Affected Environment

ALF is located in an industrial area that is served by highway, railway and waterway modes of transportation. Major traffic generators within the Frank C. Pidgeon Industrial Park include Nucor Steel, Electrolux Corporation, ALF and the CSX intermodal facility. Traffic generated by these facilities is expected to be composed of a mix of cars and light duty trucks, as well as medium duty (larger delivery trucks) to heavy duty trucks (semi-tractor trailers).

Two service interchanges provide access to ALF from 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 Paul R. Lowry Road. From West Mallory Avenue, Paul R. Lowry Road provides direct truck and automobile access to ALF. Paul R. Lowry Road varies from two to four lanes, whereas Rivergate Drive, Weaver Road, West Peebles Road, and Raines Road are two lanes wide.

Roadways to be incorporated as the proposed haul route for transport of borrow and for transport of CCR are identified in Figure 2-2. Table 3-3 indicates the 2013 Average Annual Daily Traffic (AADT) for the primary roads used for these proposed haul routes.

Table 3-3. Average Daily Traffic Volume (2013) Along the ALF Proposed Haul Routes

Roadway	Average Annual Daily Traffic (AADT)
Paul R. Lowry Road between ALF and Rivergate Drive	8,079
Weaver Road between W. Mitchell Road and Fields Road	4,480
Raines Road west of Weaver Road	3,643
I-55 – West Mallory Avenue to Kansas Street	69,173
East Shelby Road – east of Airways Boulevard	37,987

Source: TDOT 2013.

3.11.2 Environmental Consequences

3.11.2.1 Alternative B – Closure-in-Place

Traffic generated by the closure of the West Ash Impoundment would consist of the construction workforce, shipments of goods and equipment, and the hauling of borrow material to the site to be used in the Closure-in-Place activities. The duration of closure activities are not expected to last more than 12 months for this impoundment, assuming the use of 15-yard tandem dump trucks and 10 truckloads (borrow only) per day. This equates to a traffic count of 20 trucks per day. The construction workforce traveling to and from ALF would contribute to the traffic on the local transportation network. A construction workforce of 75 to 100 could be expected to support closure activities under this alternative. This workforce volume would occur at the beginning and ending of the work day. Additional construction-related vehicles (dozers, backhoes, graders, loaders, etc.) would be delivered to the West Ash Impoundment on flatbed trailers under both the mobilization and demobilization stages of the project. Overall, the traffic volume generated by the construction workforce and the construction-related vehicles would be relatively minor and it is assumed that these motorists would disperse throughout the transportation network and use interstate highways or major arterial roadways as much as possible,

Once construction is completed, maintenance phase traffic associated with the closed impoundment would be negligible.

Transport of borrow material is assumed to take the following haul route from Borrow Site #1 to the ALF ash impoundment: South 430 ft on Sewanee Road; then east on Raines Road for 1.4 mi; then north on Weaver Road for 2.3 mi; then east on West Peebles Road for 1.2 mi; then north on Kansas Street for 0.8 mi; then west on Rivergate Drive for 1.4 mi; then west on Paul R. Lowry Road for 3.2 mi; then west on the Plant Road for 1.2 mi to the ash impoundment. This longer haul route is proposed over a shorter route through T.O. Fuller State Park in order to avoid noise and to minimize traffic impacts to the park. Borrow Site #2 is along the path of the haul route to Borrow Site #1, so only Borrow Site #1 is evaluated as it is longer. Along this route, an increase in the traffic count of approximately 20 vehicles per day are expected (Table 3-4).

Table 3-4. Traffic Impacted Associated with the Closure-in-Place of the West Ash Impoundment

Roadway	2013 Traffic (AADT)	Construction Phase Traffic (AADT)	Traffic Increase (Percent)
Construction Workforce/Material Shipments			
Paul R. Lowry Road between ALF and Rivergate Drive	8,079	8,099	0.2
Transport of Borrow Material			
Weaver Road between West Mitchell Road and Fields Road	4,480	4,500	0.4
Raines Road west of Weaver Road	3,643	3,663	0.5

The percentage increases in traffic on the surrounding road network resulting from the Closure-in-Place of the West Ash Impoundment are negligible. Because the existing roadway network is expected to have sufficient capacity to absorb the expected temporary construction traffic increase, potential impacts of construction on roadway transportation are expected to be minor and temporary.

3.11.2.2 Alternative C – Closure-by-Removal

Traffic generated by the removal of CCR and closure of the West Ash Impoundment would consist of the construction workforce, shipments of goods and equipment, the hauling of CCR off-site to a permitted landfill, and the hauling of borrow material to the site to be used to cover the site after removal of the CCR.

As with Alternative B, the traffic volume generated by the construction workforce and the construction-related vehicles would be relatively minor and it is assumed that these motorists would disperse throughout the transportation network and use interstate highways or major arterial roadways as much as possible.

Removal within the 5-year closure period would result in 25,000 truckloads of CCR to a Subtitle D landfill. It is anticipated that up-front permitting and planning will take six months and post-closure site restoration and permit close-out will take six months. TVA expects that the rate of removal would result in the transport of an average of up to 100 truckloads of CCR per day (Figure 2-3). This would equate to a daily traffic count of 200 trucks passing by a given location each work day (22 per hour). The South Shelby landfill is used for this analysis and has been identified as the nearest Subtitle D landfill having sufficient capacity to accommodate CCR materials from the West Ash Impoundment.

Approximately 10 truckloads of borrow would be hauled on a daily basis for no more than 12 months using 15-yard tandem dump trucks to provide material for the cover system. This equates to a traffic count of 20 truck trips per day. Therefore, traffic generated by the haul off of CCR is the controlling factor in assessing impacts to the local roadway network for Alternative C.

Transport of CCR is assumed to take the following route from the West Ash Impoundment to the South Shelby landfill: east on Plant Road; then east on Paul R. Lowry Road; then left on West Mallory Avenue; then left on I-55 southbound; then exit and east on East Shelby Drive; then right (south) on Malone Road to the landfill. The total one-way haul distance is approximately 19 mi. Traffic impacts associated with the hauling off of CCR are reflected in Table 3-5.

Table 3-5. Traffic Impacts Associated with the Closure-by-Removal of the West Ash Impoundment

Roadway	2013 Traffic (AADT)	Construction Phase Traffic (AADT)[1]	Traffic Increase (Percent)
Paul R. Lowry Road - ALF to Rivergate Drive	8,079	8,279	2.4
I-55 – West Mallory Avenue to Kansas Street	69,173	69,373	0.3
East Shelby Road – east of Airways Boulevard	37,987	38,187	0.5

[1] Based on CCR Haul Truck Traffic = 100 trucks trips per day (traffic count of 200 per day)

The percentage increases in traffic on the surrounding road network resulting from the removal of CCR and closure of the West Ash Impoundment are negligible. Because the existing roadway network is expected to have sufficient capacity to absorb the expected temporary construction traffic increase, potential impacts of construction on roadway transportation are expected to be minor and temporary.

3.12 Cultural and Historic Resources

3.12.1 Affected Environment

Parts of ALF have been previously surveyed for cultural resources. These surveys were conducted to satisfy the requirements of Section 106 of the National Historic Preservation Act.

No known archaeological sites or architectural properties listed or eligible for listing on the National Register of Historic Places (NRHP have been previously identified within the footprint of the ash impoundment, proposed laydown areas, or within the plant boundaries. The laydown area was previously surveyed as part of the Allen Fossil Plant Emission Control Project Environmental Assessment and no cultural resources were identified (TVA 2014).

T.O. Fuller State Park and the Chucalissa Archaeological Site are located within 2 mi of ALF (see Figure 3-4). The Chucalissa Archaeological Site is located within the boundaries of the state park, and includes a Native American village, preserved archaeological excavations and a modern museum (Tennessee State Parks 2013).

3.12.2 Environmental Consequences

3.12.2.1 Alternative B – Closure-in-Place

As discussed in Part I, Section 3.18, no direct impact to cultural resources are anticipated under Alternative B as the CCR impoundment is located in a disturbed industrial area, the laydown area was previously surveyed and no cultural resources were identified, and borrow material would be obtained from a previously permitted site.

No indirect impacts from on-site construction activities are anticipated given the existing industrial setting of the project location and the distance (> 1.0 mi) between the nearest identified cultural resource site and the West Ash Impoundment or laydown area.

A potential for indirect impacts associated with the transport of borrow material to the closure site exists. Increased traffic, noise and vibration from the transport vehicles may have temporary effects during the construction phase. Borrow material would be obtained from one or two sites located approximately 5 mi southeast of the plant. The Chucalissa Archaeological Site is located within 2 mi of proposed project site and construction traffic would utilize the roadways adjacent to this park. However, the route does not utilize roadways within the park. Considering the temporary nature of the proposed action, and the relatively low number of trucks anticipated to be used to transport borrow material, indirect impacts to the Chucalissa Archaeological Site are anticipated to minimal.

Therefore, TVA does not anticipate impacts to cultural resources from Alternative B. The Tennessee Historical Commission concurred that the project will have no effect on any cultural resources listed on or eligible for the NRHP (Tennessee Historical Commission 2016) (see Part I, Appendix C).

3.12.2.2 Alternative C – Closure-by-Removal

The site-specific impacts for Alternative C – Closure-by-Removal for the West Ash Impoundment are similar to the impacts for Alternative B. In addition, all CCR removed from the ash impoundment would be transported to a permitted landfill and this landfill would have previously undergone Section 106 review to evaluate potential impacts to

historic resources. Transporting CCR to a permitted landfill would have similar temporary impacts as those discussed under Alternative B for transporting borrow material. Indirect impacts would be minor and would not impair or have an adverse effect on historic properties.

TVA finds that no historic properties would be affected by closure activities associated with Alternative C. The Tennessee Historical Commission concurred that the project will have no effect on any cultural resources listed on or eligible for the NRHP (Tennessee Historical Commission 2016) (see Part I, Appendix C).

3.13 Noise

3.13.1 Affected Environment

The West Ash Impoundment is located south of McKellar Lake in an area zoned for heavy industrial properties. The closest homes to the construction site are located approximately 2 mi southeast of the ash impoundment, and the T.O. Fuller State Park is approximately 1.2 mi from the ash impoundment. T.O. Fuller State Park and the surrounding residential area are situated on lands at a higher elevation than ALF and densely forested areas of T.O. Fuller State Park separate residential areas from the proposed construction site.

There are numerous existing sources of noise at ALF and near off-site areas. Operations at the existing coal plant generate varying amounts of environmental noise. Noise generating activities associated with the existing plant include coal unloading activities, dozer operations associated with coal pile management, truck operations and occasional rail operations. Existing noise emission source levels associated with these activities typically ranges from 59 to 87 decibels A-weighted (dBA) (TVA 2014).

Although there are no federal, state, or local regulations for community noise in Shelby County; Tennessee, EPA (1974) guidelines recommend the day-night sound level (Ldn) not exceed 55 dBA for outdoor residential areas. The U.S. Department of Housing and Urban Development (HUD) considers an Ldn of 65 dBA or less to be compatible with residential areas (HUD 1985).

3.13.2 Environmental Consequences

3.13.2.1 Alternative B – Closure-in-Place

As discussed in Part I, Section 3.19, noise impacts under this alternative would be associated with on-site closure activities, transport of borrow material and construction-related traffic (construction workforce and the shipment of goods and equipment) to and from the closure site.

Typical noise levels from construction equipment are expected to be 85 dBA or less at a distance of 50 ft from the construction site. Based on straight line noise attenuation, it is estimated that noise levels from these sources would attenuate to 42 dBA at the boundary of T.O. Fuller State Park, (the nearest noise sensitive land use). This level is below the EPA noise guideline for Ldn of 55 dBA. Consequently, no direct noise impacts associated with on-site closure activities at the West Ash Impoundment are anticipated.

There is a potential for indirect noise impacts associated with an increase in construction related traffic and the transport of borrow material to the closure site. However, as stated in Part I, Section 3.19, noise impacts from construction related traffic are expected to be minor

as construction-related traffic would utilize interstate highways or major arterial roadways as much as possible and likely would not have a noticeable increase on traffic volume and consequently traffic noise in the vicinity of those major roadways

Primary noise impacts are associated with the concentrated truck movements along the route used to transport borrow material to ALF. Borrow material would be obtained from one or two sites located approximately 5 mi southeast of the plant and the haul routes to these sites are identified in Figure 3-3. This haul route was developed to minimize adverse effects on sensitive receptors in the area including, residences, T.O. Fuller State Park and the Chucalissa Archeological site. TVA's development of the haul route optimized use of Paul R. Lowry Road, located north of T.O. Fuller State Park. This is an arterial roadway that provides access to ALF and the Frank C. Pidgeon Industrial Park and is characterized by an existing traffic volume that includes truck use. Parkland and residences located along the haul route proximate to this road and residential streets would be impacted by the noise generated by the transport of borrow material.

As identified in Section 3.11, the percentage increases in traffic on the surrounding road network resulting from the Closure-in-Place of the ALF West Ash Impoundment are negligible and therefore the increase in current noise levels is estimated to be less than three dBA and, therefore, traffic noise is not anticipated to increase perceptibly. However, for receptors along the local roadway system serving the plant, noise related effects may be more pronounced during the construction period. This increase would be minor due to the projected increase in traffic of 20 trucks per day (two trucks per hour) passing near these residences. Therefore, given the temporary and intermittent nature of closure activities, and negligible increase in noise levels, indirect impacts associated with this alternative would be minor.

3.13.2.2 Alternative C – Closure-by-Removal

As identified for Alternative B, based on straight line noise attenuation, it is estimated that noise levels from on-site construction activities would attenuate to 42.4 dBA at the boundary of T.O. Fuller State Park, (the nearest noise sensitive land use). This level is below the EPA noise guideline for Ldn of 55 dBA. Consequently, no direct noise impacts associated with on-site closure activities at the West Ash Impoundment site are anticipated.

There is a potential for indirect noise impacts associated with an increase in construction related traffic and the transport of borrow material to the closure site. These impacts are expected to be minor. It is assumed that there will be no schedule overlap between the removal of CCR and the placement of borrow. Therefore, traffic generated by the haul off of CCR is the controlling factor in noise impacts for Alternative C.

The landfill being considered for the disposal of CCR from ALF is the South Shelby Landfill located approximately 19 mi to the southeast. As noted in Section 3.11, the proposed route to the landfill includes I-55 and other roadways designed to handle relatively high volumes of traffic. This temporary increase in traffic would not result in a perceptible increase in traffic noise. However, for receptors along the local roadway system serving the plant, noise related effects may be more noticeable due to the projected increase in traffic count of 200 trucks per day (22 trucks per hour) for a period not expected to last more than 12 months. Given the temporary and intermittent nature of closure activities, and somewhat greater increases in noise levels from trucking operations, indirect impacts associated with this alternative would be moderate.

3.14 Cumulative Effects

This section tiers from the analysis in Part I, Section 3.25. The 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 resource. The appropriate geographic area of analysis for ALF is therefore limited to the immediate project area and vicinity (2-mi radius) surrounding ALF and the associated haul routes. For air quality, the geographic area is the county.

This analysis is limited to only those resource issues potentially adversely affected by project activities under Alternative B, the preferred alternative, at the site. Resources that are not affected or that have an overall beneficial impact as a result of the proposed action are not considered for cumulative effects. Accordingly, land use, prime farmland, geology and seismology, floodplains, surface water, groundwater, vegetation, socioeconomics, wildlife, aquatic ecology, threatened and endangered species, natural areas, visual, cultural, hazardous materials/waste, and safety resources 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 resource categories specifically considered in this cumulative effects assessment include air quality, noise, environmental justice, and transportation.

3.14.1 Identification of "Other Actions"

Past, present, and reasonably foreseeable future actions that are appropriate for consideration in this cumulative analysis are listed in Table 3-6. These actions were identified within the geographic area of analysis as having the potential to, in aggregate, result in larger, and potentially significant adverse impacts to the resources of concern.

Actions that are listed as having 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 3-6. Summary of Other Past, Present or Reasonably Foreseeable Future Actions in the Vicinity of the Proposed Project

Actions Description	Description	Timing and Reasonable Foreseeability
Operations of Adjacent Industrial Facilities	Operations within Frank C. Pidgeon Industrial Park, Port of Memphis, and T.E. Maxson Wastewater Treatment Facility	Past, Present, Reasonably Foreseeable Future
Construction of Combined Cycle (CC) Facility	Installation of CC facility adjacent to the ALF coal plant	Present
Retirement of ALF Coal Plant	TVA plans to retire the ALF coal plant and is building replacement gas-fired generation adjacent to the plant	Reasonably Foreseeable Future

3.14.1.1 Operations of the Adjacent Industrial Facilities

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 Maxson waste water treatment plant (WWTP), Nucor Steel, Electrolux, the City of Memphis Earth Complex, the CN/CSX intermodal facility, and other zoned industrial sites (Moon Inc. 2008).

The T.E. Maxson WWTP is located on lands immediately west of ALF. The plant began operation in 1975 and treats an average of 70 MGD of wastewater. The treatment regime currently consists of coarse bar screens, grit removal, fine bar screens, and primary treatment followed by high rate trickling filters, conventional activated sludge, and secondary clarification. 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 digested sludge is dewatered and applied on-site at a location immediately southeast of ALF (City of Memphis 2014). In addition to the existing facility, the City has reserved 120 ac immediately south of the wastewater treatment plant for future expansion (Moon Inc. 2008).

The commercial Port of Memphis operations are a past, present and future action within the project area immediately north of ALF. 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.

3.14.1.2 Construction of CC Facility

TVA is constructing and plans to operate a new facility fueled by natural gas, which would replace all ALF coal-fired generation. The natural gas facility will be located just south of the existing coal facility on a site that TVA currently leases. The CC facility would not only provide the real power to meet area loads, but also serve as major sources of dynamic reactive power for the area that is needed to rapidly respond to changes in demand. Construction of this facility also includes 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 would be constructed and operated by MLGW.

3.14.1.3 Closure of ALF Facility

Following completion of construction of the proposed CC facility, the three ALF coal units would be retired. Virtually all coal unit operational measures would be discontinued and the coal plant would be subject to basic care and maintenance measures. Primary operational measures that would be 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 would discontinue discharging fly ash and bottom ash to designated wet impoundment areas, but ash ponds would be maintained until closure plans are proposed and implemented. Routine plant deliveries would also be discontinued. The existing switchyard would be maintained for use in future operations associated with the proposed CC facility. Employment at the plant would be reduced.

3.14.2 Analysis of Cumulative Effects

To address cumulative impacts, the existing affected environment surrounding the West Ash Impoundment 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 Code of Federal Regulations 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.

Air Quality: Among the other identified actions within the geographic area on-going operations within the adjacent industrial facilities, including the Frank C. Pidgeon Industrial Park and the Port of Memphis, have the potential to contribute to additional air quality impacts. Additionally, the closure of ALF will have an overall beneficial impact to the region's air quality.

As discussed in Part I, Section 3.1, evaluation for Alternative B Closure-in-Place would involve several activities that would potentially result in air emissions and dust. These activities include grading and compaction of CCR, transport of borrow material, and installation of approved closure systems. Transport of borrow material is expected to be from the same sites as that used for borrow for the CC plant. Emissions from these activities (particulate matter, carbon Monoxide, nitrogen oxides) would, therefore, have the potential to be additive to those associated with trucking operations to provide borrow for the CC plant. Alternative C would have greater air quality impacts than Alternative B due to the increased number of trucks used to transport CCR to the off-site landfill. Nonetheless, because all operations are short-term impacts that are potentially coincident, potential cumulative effects may be expected to occur on a local basis, but would not be expected to diminish regional air quality. Therefore, minor short term cumulative effects to air quality are anticipated as a result of this alternative.

Noise: Among the other identified actions within the geographic area on-going operations within the adjacent industrial facilities, including the Frank C. Pidgeon Industrial Park and the Port of Memphis, have the potential to contribute to additional noise impacts. The noise generated during the construction of TVA's natural gas facility is expected to be temporary and not a significant impact to any sensitive noise receptors. The closure of ALF would result in an overall decrease in noise levels within the geographic area. The noise generated from these actions is not anticipated to change significantly in the foreseeable future.

As discussed in Part I, Section 3.25 the potential for cumulative noise impacts would be associated with the transportation of borrow material from off-site locations. Transport of borrow material is expected to be from the same sites as that used for borrow for the CC plant. Noise emissions from trucking operations would therefore have the potential to be additive to those associated with trucking operations to provide borrow for the CC plant. Nonetheless, because both operations are short-term impacts that are potentially coincident, potential cumulative effects may be expected to occur on a local basis. Therefore, minor short term cumulative effects associated with noise emissions are anticipated as a result of this alternative.

Noise impacts under Alternative C would be greater than Alternative B due to the additional noise related to hauling CCR offsite to a permitted landfill. However, given the temporary

nature of closure, noise emissions associated with Alternative C are not expected to result in significant cumulative impacts.

Environmental Justice: Other identified actions that would have an impact on EJ communities within the geographic area include the construction of the natural gas facility and the closure of the coal-fired ALF facility. The overall decrease in employment between these two actions could have an impact on EJ communities.

Under Alternatives B and C, employment opportunities could be provided to local residents to support the construction phase which would result in positive impacts to area low-income and minority populations. These employment opportunities could offset some of the impacts caused by the closure of the coal-fired plant.

All of the block groups along the designated haul route used to transport borrow material to the construction site meet the criteria for EJ consideration. 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 borrow material. It is also possible that some of these communities would be along the routes taken during construction activities for the new CC facility. Nonetheless, because both operations are short-term impacts that are potentially coincident, potential cumulative effects may be expected to occur on a local basis. Such physical impacts associated with the transport of borrow material (i.e., noise, dust) would be mitigated through BMPs identified in Section 3.9. Therefore, minor short term cumulative effects to EJ populations are anticipated as a result of this alternative.

All of the block groups along the proposed haul route to the off-site landfill meet the criteria as an EJ population. Therefore potential impacts to EJ communities under Alternative C would be greater than Alternative B as this alternative would impact EJ communities along the haul route to the landfill and the haul route used to transport borrow material to the construction site. However, as with alternative B, impacts would be mitigated through BMPs and the cumulative impact to EJ populations are anticipated to be minor and short term.

Transportation: The potential for cumulative effects to transportation from other identified actions includes the on-going operations of the adjacent industrial facilities and the construction of the planned natural gas-fired TVA facility. Current and future operations at the Maxson WWTP and Frank C. Pidgeon Industrial park would utilize the same roads into and out of the area as those used during the construction and operation of the gas-fired TVA facility. Additionally, construction phase traffic for the CC facility would occur in addition to the existing traffic generated by the operating ALF. Once construction is completed, operational phase traffic of the new CC facility would be much lower than the traffic generated during construction and there would be significantly fewer heavy vehicles than what would be present during construction.

Traffic generated by the closure of the West Ash Impoundment would consist of the construction workforce, shipments of goods and equipment, and the hauling of borrow material to the site to be used in the closure activities. Construction phase traffic would occur in addition to the existing traffic generated by the operation of ALF, construction of the CC facility, and on-going operations of the surrounding industrial facilities. However, once closure of the impoundment is completed, associated maintenance phase traffic would be negligible.

It is anticipated that the existing roadway network would have sufficient capacity to absorb the expected temporary construction traffic increase. Therefore, potential impacts of construction on roadway transportation are expected to be minor and temporary. Any increases in traffic from the other identified actions are expected to also be easily absorbed by the existing roadway network. Therefore, cumulative effects to transportation resources are not anticipated as a result of this alternative.

Alternative C would have greater transportation impacts than Alternative B due to increased number of trucks used to transport CCR off-site to a permitted landfill. However, because impacts the transportation network under this alternative are expected to be minor and temporary, no cumulative effect to transportation resources are anticipated.

This page intentionally left blank

CHAPTER 4 – LITERATURE CITED

Bailey, R. G. 1995. Ecoregions and subregions of the United States (map). Washington, DC: USDA Forest Service. 1:7,500,000.

Barbour, R. W. and W. H. Davis. 1974. Mammals of Kentucky. The University Press of Kentucky, Lexington, Kentucky.

Beard, L. M. 1989. Summary of Groundwater Data at Allen Fossil Plant. 1988. TVA Report WR28-2-38-100.

City of Memphis. 2014. TVA Meeting with Division of Public Works, March 26, 2014.

Denton, Gregory M., M. H. Graf, D. H. Arnwine and Linda K. Cartwright. 2012. The *2012 305(b) Report, the Status of Water Quality in Tennessee*. Division of Water Resources, Tennessee Department of Environment and Conservation.

Dewberry Consultants LLC. 2013. Coal Combustion Residue Impoundment Round 11 - Dam Assessment Report: Allen Fossil Plant, Tennessee. February 2013.

Electric Power Research Institute (EPRI). 2016a. Qualitative Application of Relative Impact Framework to Ten Tennessee Valley Authority Surface Impoundments, Technical Report 3002007542, April, 2016

_____. 2016b. Relative Impact Framework Application for a Hypothetical CCR Impoundment. Technical Report 3002007544. May 2016.

_____. 2016c. Relative Impact Framework for Evaluating Coal Combustion Residual (CCR) Surface Impoundment Closure Options. Technical Report 3002007543, May 2016.

Griffith, G. E., J. M. Omernik, J. A. Comstock, S. Lawrence, G. Martin, A. Goddard, V. J. Hulcher and T. Foster. 2001. Ecoregions of Tennessee, Reston, Virginia, U.S. Geological Survey.

Hall, Blake and Associates, Inc. 1991. Hydrogeologic Report for Portions of Pidgeon Industrial Park - Memphis, Tennessee.

Harvey, M. J. 2002. Status and Ecology in the Southern United States. Pages 29-34 in Kurta, A. and J. Kennedy (Eds.). The Indiana bat: biology and management of an endangered species (A. Kurta and J. Kennedy, eds.). Bat Conservation International, Austin, Texas.

Henry, T.H. 2012. Results of the Tennessee River Valley Shorebird Initiative. Final Report, July 2012.

Jenniges, A. J. and R. G. Plettner. 2008. Least tern nesting at human created habitats in Central Nebraska. Waterbirds 31:274-282.

Jones, K. H. 2009. Population Survey of the Interior Least Tern on the Mississippi River from Cape Girardeau, Missouri to Baton Rouge, Louisiana. Under Contract with Choctaw Transportation Company Inc.

Key Environmental, Inc. 2013. Alternate Source Demonstration Arsenic Concentrations in Groundwater. Allen Fossil Plant. October 2013.

Koop, O.C. 2001. Hazardous and trace elements in Tennessee Soils and Other Regolith. State of Tennessee, Department of Environment and Conservation, Division of Geology.

Kurta, A., S. W. Murray, and D. H. Miller. 2002. Roost selection and movements across the summer landscape. *In* A. Kurta and J. Kennedy, Eds. The Indiana Bat: Biology and Management of an Endangered Species. Bat Conservation International, Austin, Texas.

Lauderdale, Vance. 2011. McKellar Lake. Memphis Magazine, June 2011. Retrieved from http://www.memphismagazine.com/June-2011/McKellar-Lake/ (accessed August 2015).

Martin, J. W. and J. R. Parrish. 2000. Lark Sparrow (*Chondestes grammacus*). In The Birds of North America, No. 488 (A. Poole and F. Gill, Eds.). The Birds of North America, Inc., Philadelphia, PA.

Mitchell, Wendy. 2006. Braken County man killed in ash pond slide at DP&L. J. M. Stuart Electric Generating Station. The Ledger Independent, July 25, 2006 by staff writer Wendy Mitchell. Retrieved from http://www.maysville-online.com/news/bracken-county-man-killed-in-ash-pond-slide-at-dp/article_12612753-294d-536b-b0b0-7454ef814eae.html (accessed August 2015).

Moon, E. W. Inc. 2008. Master Plan for Development, Frank C. Pidgeon Industrial Park. Prepared for: Memphis and Shelby County Port Commission, Memphis, TN.

Nicholson, C. P. 1997. Atlas of the Breeding Birds of Tennessee. The University of Tennessee Press. Knoxville, TN.

Parker, J. W. 1999. Mississippi Kite (*Ictinia mississippiensis*). The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Birds of North American Online. Available at: http://bna.birds.cornell.edu/bna/species/402.

Pompei, V. D. 2004. Migration stopover sites used by Great Lakes piping plovers (*Charadrus melodus*). Thesis, University of Minnesota, Twin Cities, Minnesota.

Spear, K. A., S. H. Schweitzer, R. Goodloe and D. C. Harris. 2007. Effects of Management Strategies on the Reproductive Success of Least Terns on Dredge Spoil in Georgia. Southeastern Naturalist 6(1):27-34.

Tennessee Department of Environment and Conservation (TDEC). 2011. NPDES Permit number TN0005355. Retrieved from http://www.tn.gov/assets/entities/environment/attachments/permit_water_tnr100000.pdf (accessed October 2015).

_____. 2014. Final Version Year 2012 303(d) list. Nashville, TN. Retrieved from http://www.tn.gov/environment/water/docs/wpc/2012-final-303d-list.pdf>.

Tennessee Department of Transportation (TDOT). 2013. Memphis Southwest Traffic Map, 2013. Prepared by the Tennessee Department of Transportation Long Range and Project Planning Divisions.

Tennessee Historical Commission (THC) 2016. TVA, Ash Impoundment Closures, Unincorporated, Multi County. THC. April 2016.

Tennessee Natural Heritage Program. 1977. Data provided to TVA's Regional Natural Heritage Database as part of TVA-State Data Exchange, September 19, 1977.

Tennessee State Parks. 2013. T.O. Fuller State Park. Retrieved from http://tnstateparks.com/parks/about/t-o-fuller (accessed April 2014).

Tennessee Valley Authority (TVA). 1995. Allen Steam-Electric Plan NPDES Permit Renewal.

_____. 2006. Development of Ash Management Strategy Allen Fossil Plant, Shelby County, Tennessee, Final Environmental Document, pg. 13, August 2006.

_____. 2014. Allen Fossil Plant Emission Control Project, Final Environmental Assessment. August 2014.

Tennessee Wildlife Resources Agency (TWRA). 2015. Tennessee's Watchable Wildlife. Retrieved from http://www.tnwatchablewildlife.org/watchareadetails.cfm?uid=09071514275310887&region=Ensley_Bottoms_Complex_(The_Pits,_Robco_Lake,_TVA_Lakes)&stateareа=West_Tennessee (accessed September 2015).

Tuttle, M. D. and J. Kennedy. 2002. *Thermal requirements during hibernation. In* The Indiana bat: biology and management of an endangered species (A. Kurta and J. Kennedy, Eds.). Bat Conservation International, Austin, Texas.

U.S. Department of Housing and Urban Development (HUD). 1985. The Noise Guidebook, HUD-953-CPD Washington, D.C., Superintendent of Documents, U.S. Government Printing Office.

U. S. Environmental Protection Agency (EPA). 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. Office of Noise Abatement and Control, Arlington, VA.

_____. 2015. Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities, 80 Federal Register 21302. April 17, 2015.

U.S. Fish and Wildlife Service (USFWS). 1985a. Determination of Endangered and Threatened Status for Piping Plover. Federal Register 50: 50726-50734.

_____. 1985b. Endangered and Threatened Wildlife and Plants; Interior Population of the Least Tern Determined to be Endangered. Federal Register 50: 21784-21792.

_____. 2003. Recovery Plan for the Great Lakes Piping Plover (*Charadrus melodus*). Ft. Snelling, MN. 151pp.

_____. 2007. Indiana bat (*Myotis sodalis*) Draft Recovery Plan: First Revision. U.S. Fish and Wildlife Service, Fort Snelling, Minnesota. 258 pp.

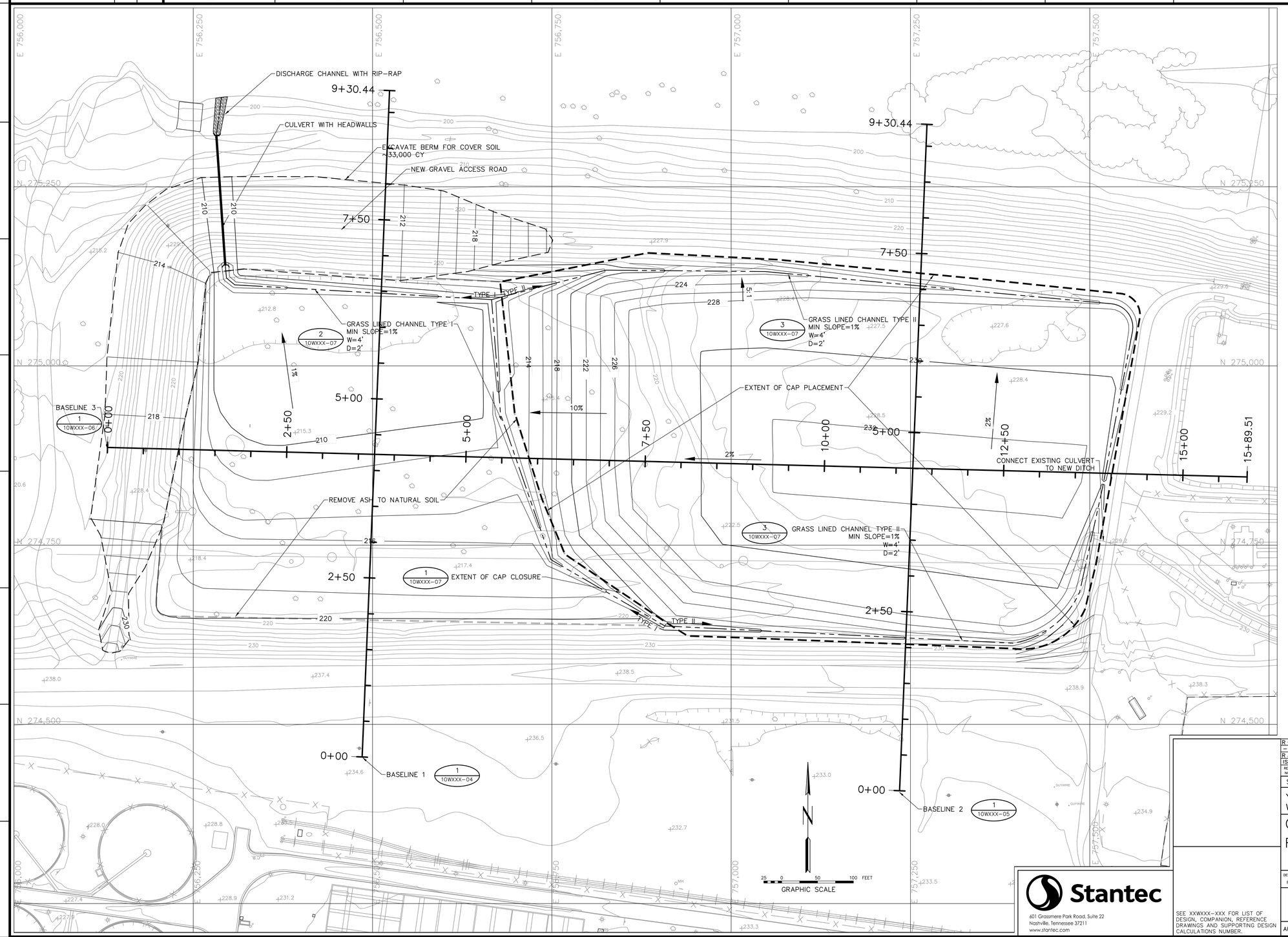
_____. 2013. Interior Least Tern (*Sterna antillarum athallasos*). Retrieved from http://www.fws.gov/southdakotafieldoffice/tern.htm (accessed April 2014).

_____. 2014. Northern long-eared bat interim conference and planning guidance. Retrieved from http://www.fws.gov/midwest/endangered/mammals/nlba/pdf/NLEBinterimGuidance6Jan2014.pdf (accessed January 2014).

U.S. Geological Survey (USGS). 2011. National Land Cover Dataset. Retrieved fromhttp://viewer.nationalmap.gov/viewer/ (accessed September 2015).

Appendix A – Conceptual Closure Plans, Preferred Alternative

This page intentionally left blank



SURVEY CONTROL NOTE:

A GLOBAL POSITIONING SYSTEM (GPS) BASE STATION HAS BEEN ESTABLISHED AND TRANSFORMATION PARAMETERS DETERMINED BY TVA USING SELECTED SURVEY CONTROL MONUMENTS. CONTACT WITH TVA SURVEYING DEPARTMENT (423)751-8416 OR (423)751-2571 SHALL BE MADE BEFORE ANY SURVEY OR CONSTRUCTION WORK IS COMMENCED. BASE STATION FREQUENCIES AND TRANSFORMATION PARAMETERS WILL BE PROVIDED TO THE CONTRACTOR FOR USE IN CONSTRUCTION ACTIVITIES AT THE SITE. PREVIOUSLY USED OR ESTABLISHED CONTROL POINTS AND MONUMENTS SHALL NOT BE USED BY THE CONTRACTOR WITHOUT PRIOR APPROVAL BY TVA SURVEYING DEPARTMENT.

TOPOGRAPHIC MAPPING SOURCE NOTE:

TOPOGRAPHIC MAPPING INFORMATION WAS OBTAINED FROM TUCK MAPPING SOLUTIONS, INC.
HORIZONTAL DATUM: LOCAL 27; VERTICAL DATUM: NGVD29
STATE PLANE ZONE ALF PLANT LOCAL
FLIGHT DATE: 03/11/2014; COMPLETION DATE: 08/25/2014

LEGEND

- PROPERTY LINE
- 360 INDEX CONTOUR
- INTERMEDIATE CONTOUR
- BASELINE

10% SUBMITTAL
ISSUED FOR REVIEW
NOT FOR CONSTRUCTION

PLOT DATE: 08/26/2015 USER: MCBREEN, KATE
V:\7287\ACTIVE\7287505\ENVIRONMENTAL\DRAWING\SHEET_FILES\REVIEW\REVA_CONV\7287505C-101-G01.DWG

REV NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT ID	AS CONST	DISCIPLINE INTERFACE
R –	–	–	–	–	–	–	–	–	–	–	–
R A	08/28/2015	RGS	CAM	–	TMM	DGS	MST	JCK	–	–	–

ISSUED FOR REVIEW

SCALE: 1"=50' EXCEPT AS NOTED

YARD
WEST ASH POND CLOSURE

CONCEPTUAL DESIGN
FINAL GRADING AND DRAINAGE PLAN

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
R.G. SCHUFF	C.A. MCBREEN	–	T.M. MOORE	D.G. STEPHENS	M.S. TURNBOW	J.C. KAMMEYER

ALLEN FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2010 | DATE 08/25/2015 | 38 | C | 10WXX-03 | R A

Stantec
601 Grassmere Park Road, Suite 22
Nashville, Tennessee 37211
www.stantec.com

SEE XXWXXX-XXX FOR LIST OF DESIGN, COMPANION, REFERENCE DRAWINGS AND SUPPORTING DESIGN CALCULATIONS NUMBER.

STANTEC	A
TASK COMPLETED BY:	REV NO.

PLOT FACTOR:1
W_TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY